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THE CHOICE OF ORGANIZATIONAL FORM: VERTICAL FINANCIAL OWNERSHIP VERSUS OTHER METHODS OF VERTICAL INTEGRATION

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Vertical integration is a fundamental corporate strategy of interest to the fields of strategic management and organizational economics. This paper synthesizes theoretical arguments and empirical findings from this literature to identify the underlying advantages and disadvantages of choosing vertical financial ownership relative to vertical contracts. It then suggests that in the absence of agency and transaction costs, vertical financial ownership and vertical contracting are equivalent governance structures for achieving corporate objectives. However, given a world of positive agency and transaction costs, the key theoretic question then becomes predicting when market mechanisms are sufficient, when intermediate forms of vertical contracting become necessary, and when vertical financial ownership becomes the preferred governance structure. The concluding section of the paper provides a framework for making this analysis based on a synthesis of agency and transaction costs perspectives.

INTRODUCTION

Although economists and strategic management researchers recognize that there are many possible motives for vertical integration[1] (Perry, 1989; Harrigan, 1983), there has not been a systematic synthesis of the considerable body of literature in the field of industrial organization and strategy on this important strategic option (Bettis, Bradley, and Hamel, 1992). A unified conceptual framework is a particularly important foundation for further research from a strategic management perspective, since this field draws its strength from integrative research approaches (Bowman, 1990; Huff, 1981). This paper therefore suggests a general theory for predicting and prescribing **vertical financial ownership** that integrates and extends previous work done under both the strategy and industrial organization paradigms.

Inherent in the concept of vertical financial ownership is the elimination of contractual or market exchanges and the substitution of internal transfers within the boundaries of the firm via internal development or merger. The disadvantages of vertical financial ownership suggest that corporate strategy research should examine more carefully the alternative **governance structures** of vertical integration (Williamson, 1991). The vertical integration strategy may be implemented by a continuum of governance structures which include spot markets, short-term contracts, long-term contracts, franchising, joint ventures, and vertical financial ownership (hierarchy).

The first section of the paper considers the advantages of vertical integration strategy. The second section of the paper illustrates the isomorphic nature of vertical integration via contracting compared with vertical financial

Key words: Vertical integration, transaction costs, agency theory, organizational form

[1] A fairly comprehensive list of published and working papers on vertical integration is available from the author upon request.

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ownership. It is proposed as a general theorem that every motive for vertical financial ownership may be achieved alternatively by an appropriate vertical contract (e.g., resale price maintenance, territorial restrictions, exclusive dealing, tying, and franchise fees) when agency and transactions costs are assumed to be absent. **Indeed, in the absence of transaction costs, vertical contracting can replicate the advantages of vertical financial ownership**. Vertical contracts (Lafferty, Lande, and Kirkwood, 1984) can be perfect substitutes for vertical financial ownership. Thus, most theories of vertical financial ownership that have been provided in the literature are described more accurately as theories of **vertical integration strategy**. Most theories of vertical integration provide us with no guidance concerning the appropriateness of vertical financial ownership relative to vertical contracting. We are still left with the task of predicting and prescribing organizational form. Put differently, the formulation of vertical integration *strategies* (Harrigan, 1984) needs to be supplanted by a more general discussion of governance *structures* to effectively implement corporate objectives. The last section of the paper advances a general theory for explaining and predicting the pattern of vertical financial ownership and vertical contracting in different environments which draws on an integrated transaction costs and agency theory perspective.

THE ADVANTAGES OF VERTICAL INTEGRATION STRATEGY[2]

An exhaustive review of the economic and strategy literature (Mahoney, 1989) suggests that the *motives* for vertical integration may be classified into four major categories: (1) transaction costs considerations; (2) strategic considerations; (3) output and/or input price advantages; and (4) uncertainties in costs and/or prices. While no firm will be motivated by all of these potential advantages, taken as a whole these advantages illustrate the broad utility of this corporate option, a usefulness that justifies greater theoretical and empirical attention than has been given to vertical integration to date in strategic management. The second half of the paper examines the first category of transaction costs considerations. In this section we consider other motives that allegedly explain vertical financial ownership, *per se*.

Strategic considerations

The firm may achieve strategic advantages via vertical financial ownership. Vertical financial ownership is frequently cited, for example, as a means of increasing barriers to entry (Chatterjee, 1991) and foreclosing competitors (Allen, 1971; Salinger, 1988). Vertical financial ownership may also be used to raise rivals' costs by reducing the number of suppliers (Ordover, Saloner, and Salop, 1990). Moreover, when entry into two two separate stages of production is already difficult because of large capital requirements, combining successive stages will further raise entry barriers, if new entrants must enter two stages rather than one (Comanor, 1967). Vertical financial ownership has the potential disadvantage of also being a major source of exit barriers (Harrigan, 1985b), but exit barriers themselves may play a compensating positive role if they constitute additional barriers against prospective entrants (Porter, 1980, 1985).

A motive related to entry barriers is the strategy of 'price squeezing' (Joskow, 1985b). Vertical financial ownership may enable a firm to eliminate competition by lowering the price of the output while simultaneously raising the price of the input. Edwards (1953) contends, for example, that the price of crude oil was raised and the price of gasoline was lowered to such a degree that the independent refiner could not operate. Adams (1964) similarly argues that the large integrated steel companies utilized a price squeeze to eliminate smaller, less integrated competitors. McNicol (1975) provides a related example of 'quantity discrimination' resulting in a 'supply squeeze' of independent fabricators in the copper industry.

Vertical financial ownership may be used strategically not only in an environment of intense competition, but in a regulated environment as well. If a firm is subject to effective rate-of-return regulation in the final stage of production

[2] The purpose of this section is to provide a fairly comprehensive list of motives suggested for vertical integration provided in the literature and to indicate sources that explain each of these motives in-depth. Once, these motives are in place, we can then consider a comprehensive illustration of the isomorphic nature of vertical financial ownership and vertical contracting, taking each motive in turn.

but is permitted to integrate backward, for example, it may be able to avoid the effect of the regulatory constraint by transfer pricing the intermediate product above marginal cost (Dayan, 1975).

Vertical financial ownership can even promote oligopoly by improving the monitoring necessary to maintain coordination (Adams and Dirlam, 1964). Adelman (1972) suggests that vertical merger into refining by the highly concentrated crude oil suppliers enhanced stability of coordination by making it more difficult for an oligopolist to plan secretly to increase market share. Since there were few significant independent refiners, no company could increase its output of crude oil without first building refineries and distribution systems which clearly signaled their plans to competitors. Vertical financial ownership thus may evolve as a means of maintaining oligopolistic discipline and may provide mobility barriers (Caves and Porter, 1977) which sustain the stability of strategic groups (McGee and Thomas, 1986). Differences between existing firms in their degree of vertical financial ownership appear to have led to difficulties in agreement on the desirable vertical price structure.

Output and input price discrepancies

If output and input prices are not given to the firm, then there are several possible explanations for vertical financial ownership. In the successive monopoly case, Spengler (1950) considers a product that passes through three successive stages of production before being ready for sale to consumers. Each stage of production contains sufficient monopoly power to charge a price above the competitive level. Here, a vertically integrated firm controlling all three stages of production can earn a larger profit than can be obtained by the 'myopic chain monopoly' (Greenhut and Ohta, 1976). The essential idea is that the vertically integrated producer can evade the monopoly prices imposed by upstream firms.

In the case of bilateral monopoly (Machlup and Taber, 1960), vertical financial ownership facilitates arriving at the input choice consistent with joint profit maximization under nonintegrated bilateral monopoly. A 'fundamental transformation' (Williamson, 1985) where firms become 'locked in' to a vertical relationship is not uncommon (Alchian and Woodward, 1988; Klein, Crawford, and Alchian, 1978). Vertical financial ownership minimizes risk of rent appropriation (Walker, 1988).

In the case of an upstream monopoly, if there exists a variable-proportions technology (Warren-Boulton, 1978) that allows a mixing of input levels to produce the final product, vertical merger permits the integrated firm to achieve efficiency in resource utilization (Quirmbach, 1986). As a first approximation these cost savings accrue as additional profits to the integrating monopolist (Schmalensee, 1973). Abiru (1988) extends this stream of literature to include the more empirically relevant case of variable-proportions technology and successive oligopolies. Vertical financial ownership, under plausible conditions, leads to efficiency in the density of retail outlets (Dixit, 1983) and lower retail prices to consumers (Perry and Groff, 1985).

The price discrimination incentives for vertical financial ownership can be elaborated by considering the example of an intermediate good monopolist selling to two downstream competitive industries. The upstream monopolist can increase profits by selling the intermediate product at a lower price to the downstream firm with the relatively higher price sensitivity (Perry, 1978). Vertical merger by the upstream monopolist can eliminate incentives for arbitrage of the intermediate product between the downstream firms. Perry (1980) contends that forward integration by Alcoa in the period 1888–1930 was inspired by price discrimination. Alcoa, over time, integrated into the relatively more price-sensitive markets, such as cookware.

Crandall (1968) submits that Ford's expansion into competitive components markets similarly was motivated by the desire to price discriminate. Ford purchased Auto-Lites' battery plant and obtained more revenue from those who used their vehicle the most (Weintraub, 1949). Asset specificity of parts and economies of scale in producing repair parts also tend to lock customers in with an automobile manufacturer.

Uncertain costs and prices

Vertical financial ownership is a potential response to the stochastic elements confronting the firm. Uncertainty can take many forms: parametric or structural (Langlois, 1984); percep-

tual or market based (Downey, Hellriegel, and Slocum, 1975); volume, measurement, quality or technological (Klein, Frazier, and Roth, 1990; Williamson, 1985). In the absence of any of these uncertainties, the firm need not exist (Coase, 1937; Knight, 1921). As uncertainty increases, not only is the firm called into existence, there are increasing arguments for expanding the scope of organizational activity through vertical financial ownership. More specifically, the same arguments found in the basic theory of the firm (Coase, 1988b; Hansmann, 1988; Masten, 1988) can be utilized to justify vertical financial ownership. Indeed, any theory that explains the **necessity** of vertical financial ownership is, of course, a theory of the firm.

Arrow (1975) examines uncertainty in the supply price of the upstream good by focusing on asymmetric information between parties at the upstream and downstream stages. A downstream firm has the incentive to purchase one or more upstream firms because this improves its pricing forecast and thus its ability to purchase the appropriate level of capital. Carlton (1979) presents a similar model in which both output and input firms face uncertainty in demand and firms must make decisions concerning price and production before actual demand is observable. In this case there is some risk of supply failure to the customer as well as risk to the seller of overproduction. Vertical financial ownership is a means of transferring this risk. Firms integrate to ensure a supply of input for their 'high probability' demand and continue to purchase their 'low probability' demand.

Green (1986) presents a model in which the price in the intermediate market is fixed so that fluctuations in external demand for the intermediate product result in rationing of either upstream or downstream firms. Vertical financial ownership allows the combined firm to avoid rationing, and thus avoid demand uncertainty due to fluctuations in purchasing behavior by upstream or downstream firms (Blair and Kaserman, 1983). Vertical financial ownership, however, does *not* affect variability due to fluctuations in aggregate market demand (Bernhardt, 1977).

While the strategy literature tends to agree on many of the potential advantages of vertical financial ownership that have been given more detailed attention in the organizational economics literature, two points of apparent disagreement concern demand uncertainty and technological uncertainty. It is a time-honored tradition in the economics literature to argue that vertical financial ownership is motivated by the attempt to assure supply (Flugge, 1929; Frank, 1925; Jewkes, 1930; Willoughby, 1901) and to avoid the risk of foreclosure of markets (Hart and Tirole, 1990). In a 'thin' sellers or buyers market it may pay to make, rather than buy, even at higher production cost. The additional cost is, in effect, an insurance payment (Adelman, 1949). Several empirical studies have supported the hypothesis that demand or volume uncertainty leads to increased vertical financial ownership (Anderson and Schmittlein, 1984; Levy, 1985; Walker and Weber, 1987).

The issue of whether vertical financial ownership reduces risk and uncertainty has had mixed empirical evidence. Levin (1981) finds, for example, that vertical merger into crude production for oil refining in the 1948–72 period reduced the variance of profits. Chatterjee, Lubatkin and Schoenecker (1989) find that vertical financial ownership reduces the systematic risk of the firm. Helfat and Teece (1987) find that vertical financial ownership reduced uncertainty as measured by Beta in the CAPM model. However, D'Aveni and Ilinitch (1990) find that fully integrated firms have higher systematic and bankruptcy risk in the forest products industry.

Even more problematic, recent work in the strategy field by Harrigan (1985a, 1986) yielded a negative relationship between demand uncertainty and vertical financial ownership. I submit, however, that the Williamsonian view that uncertainty leads to **greater** vertical financial ownership and the Harrigan view that uncertainty leads to **less** vertical financial ownership can be reconciled. Williamson's statement is a conventional comparative statics argument that *if the level of asset specificity remains constant*, then an increase in uncertainty increases the likelihood of vertical financial ownership. Harrigan, on the other hand, is analyzing the effect of uncertainty in a dynamic contingency framework that incorporates the dimensions of stages, breadth, degree and form of integration. To translate Harrigan's view in Williamson's terms: an increase in uncertainty may lead a firm to utilize less firm-specific assets. In consequence, less vertical financial ownership would obtain in the long-run. But this does not contradict Williamson, who only argues that vertical financial ownership

will increase (under uncertainty) if asset specificity remains constant.

Vertical financial ownership may also be an adaptive response to the agency problems of measurement uncertainty (Alchian and Demsetz, 1972). In particular, shirking problems in team production induces vertical financial ownership (Jones, 1984). When output depends on joint efforts, individuals have the incentive to 'free-ride' in hopes of receiving greater reward than their efforts would otherwise dictate. Empirical studies are consistent with the hypothesis that measurement uncertainty of this type leads to vertical financial ownership (Anderson and Schmittlein, 1984; Anderson, 1985).

Measurement uncertainty and quality uncertainty are also important factors that lead to performance ambiguity (Jones, 1987). The need to reduce quality uncertainty for key inputs may spur backward integration, while the need to assure point-of-sale service, which is often critical for new products, may necessitate forward integration. Finally, the problem of technological uncertainty (Hennart, 1982) and the trading of technological knowledge may lead to vertical financial ownership (Arrow, 1974). Here again an apparent disagreement can be found in the literature. Armour and Teece (1980) argue that trong relationship between research intensity and vertical financial ownership in the petroleum industry was due to market failures in information exchange. However, Harrigan (1986) and Walker and Weber (1984, 1987) find that technological uncertainty was associated with less vertical financial ownership. The resolution of apparent disagreement here requires care to not confound asset specificity and uncertainty (Anderson and Schmittlein, 1984). If technological uncertainty leads to the utilization of more flexible (less firm-specific or product-specific) technologies, a link suggested by Balakrishnan and Wernerfelt's (1986) model, then less vertical financial ownership obtains.

The problems of recognition, disclosure, team organization and dissipation that are involved in contracting under technological uncertainty all suggest a decision of vertical financial ownership (Caves, 1982; Teece, 1982). The effect of technological uncertainty on vertical financial ownership may be especially influenced by the coordination costs of contracting for many parts in a system. Monteverde and Teece (1982a) argue that the automobile electrical system involved substantial interdependencies and was consequently produced in-house. The Walker and Weber (1984, 1987) automobile studies could be updated to consider these system coordination influences on the technological uncertainty—vertical financial ownership linkage.

In summary, uncertainty may take many forms and the various *types* of uncertainty considered here may have differential impacts on the make-or-buy decision. Moreover, even the assessment of the effects of a particular type of uncertainty on the choice of governance structure can be problematic. For example, the dynamic effect of demand uncertainty on the choice of vertical financial ownership or vertical contract is theoretically indeterminate. Furthermore, empirical evidence has provided mixed results. However, one thing is certain. To determine the effect of uncertainty on the choice of organizational form, empirical studies must take into account positive agency and transaction costs. Indeed, in the absence of transaction costs, uncertainty has no impact on governance structure. Even more generally, in the absence of transaction costs, every motive for vertical financial ownership may be achieved equally well by a vertical contract. The validity of this fundamental Coasian (1988a) insight is rigorously demonstrated in the following section.

THE ISOMORPHIC NATURE OF VERTICAL FINANCIAL OWNERSHIP AND VERTICAL CONTRACTING

Most of the published theoretical articles considered in the preceding section claim to be providing explanations for vertical financial ownership. It is important to realize, however, that this assertion is often misleading. While motives provide explanations for *vertical integration strategy* they do not provide insight on the choice of organizational form (governance structure). **In short, when we abstract from transaction costs, knowing the motive for vertical integration cannot help us in predicting or prescribing organizational form. Conversely, knowing the organizational form cannot help us to infer motive**[3] (Phillips and Mahoney, 1985). Hence, many economic papers

[3] Courts continue to mistakenly attempt to infer motive by observing organizational form. Clearly, such attempts are a red herring.

that claim to provide theories of vertical mergers actually provide theories of vertical integration strategy. The choice of governance structure to implement the vertical integration strategy remains unspecified.

It now will be demonstrated that vertical contracting (i.e., exclusive dealing, resale price maintenance, exclusive territories, etc.) is a viable alternative to vertical financial ownership. In fact, in the absence of transaction costs, vertical contracting can replicate the advantages of vertical financial ownership. In some cases a simple vertical contract may replicate the vertical financial ownership outcome (Blair and Kaserman, 1983); in other cases more complex vertical contracts are needed (Bolton and Bonanno, 1988). This equivalency proposition is a variation of the 'Coase theorem' that in the absence of transaction costs, the initial assignment of property rights does not matter from an efficiency perspective (Coase, 1960). The key argument is that the various motives provided for vertical financial ownership, derived from the competitive strategy and economics literature, can be directly generalized to become arguments for vertical integration and applied *inter alia* to long-term contracts (Crocker and Masten, 1988), and equity joint ventures.

To illustrate our variation of the 'Coase theorem' that much of the literature on vertical financial ownership can be read in the more general terms of vertical integration, research on vertical financial ownership is matched with literature discussing other forms of vertical integration in Table 1. A necessary difference between alternative forms of vertical integration is the transaction costs involved. Table 1 thus ignores transaction costs, but considers the other motives for explaining vertical financial ownership.

Table 1 suggests, for example, that vertical financial ownership is not the only way of creating entry barriers. Exclusive territories, exclusive dealer arrangements, long-term contracts and vertical price-fixing (resale price maintenance) may be used as strategic entry barriers (Aghion and Bolton, 1987) in ways that are very similar to the protection created by vertical financial ownership. In both cases, firms monopolize the downstream (or upstream) market and thus raise rivals' costs (Krattenmaker and Salop, 1986).

The regulated firm similarly need not have full vertical financial ownership to avoid rate-of-return regulation. Transfer pricing via quasi-integration would suffice (Blois, 1972). In cases where vertical integration has been needed to maintain an oligopolistic pricing arrangement, tying contracts have been used expressly for this purpose (Burstein, 1960a).

Moving to input and/or output price discrepancies as a motive for vertical integration, alternative vertical constraints such as exclusive territories (Katz, 1978); requirements contracts (Shillinglaw, 1954), exclusive dealing (Lin, 1990), franchise fees (Gal-Or, 1991), resale price maintenance (Oster, 1984; Shaffer, 1991) and/or forcing tie-in purchases also may be used to maintain control. The general argument is that promotional efforts, determination of final price, and uses of technology are important decisions frequently made by the downstream firm (retailer) that influence the profitability of the upstream firm (manufacturer). The upstream firm has a strong incentive to control the downstream firm's decisions, but this control can be achieved in many ways other than vertical financial ownership.

In the successive monopoly case, a franchise fee or resale price maintenance, where the manufacturer mandates that the dealer cannot exceed the profit-maximizing price, replicates the vertical financial ownership outcome (Blair and Kaserman, 1983; Rey and Tirole, 1986). In the case of bilateral monopoly, Machlup and Taber (1960) argued that if two separate firms bargain about price and quantity, they could achieve joint profit maximization without vertical financial ownership being required. Blair and Kaserman (1987) demonstrated an equivalence between ownership integration and formula price contracts in the bilateral monopoly model. Burstein (1960a) explored the variable proportions incentive for vertical integration and argued that the upstream monopolist could obtain identical results by tying the purchase of the nonmonopolized substitute inputs to the purchase of the intermediate product over which the monopolist has control (Blair and Kaserman, 1978).

Price discrimination could be achieved by tying arrangements rather than vertical financial ownership (Burstein, 1960b). For example, companies have tied staples to stapling machines, rivets to riveting machines, computer cards to computers, and paper supplies to electrofax

Table 1. Motives for Vertical Control

Motive	Paper suggesting vertical financial ownership	Paper suggesting vertical contract
Strategic Considerations		
Entry	(Bain, 1968)	Exclusive Dealing Contracts (Comanor and Frech 1985)
Barriers	(Chatterjee, 1991) (Porter, 1980)	Tying contracts (Whinston, 1990)
Circumvent regulation	(Dayan, 1975)	Quasi-vertical integration (Silva-Echenique, 1989)
Maintaining oligopolistic discipline	(Adams and Dirlam, 1964)	Tying contracts or resale price maintenance (Burstein, 1960a)
Output and/or Input Price Discrepancies		
Successive Monopoly	(Spengler, 1950) (Greenhut and Ohta, 1976)	Franchise fee or resale price maintenance (Rey and Tirole, 1986)
Bilateral Monopoly	(Williamson, 1971)	Contract bargaining (Machlup and Taber, 1960)
Upstream Monopoly	(Schmalensee, 1973)	Tying contract (Burstein, 1960a) (Blair and Kaserman, 1978)
Price Discrimination	(Crandall, 1968) (Perry, 1980)	Tying contract (Burstein, 1960b) (Blackstone, 1975) Territorial restrictions coupled with resale price maintenance (Phillips and Mahoney, 1985)
Uncertainties about Costs and/or Prices		
Reduce asymmetric uncertainty	(Arrow, 1975)	Vertical contract (Teece, 1982)
Reduce or transfer risk	(Carlton, 1979)	Long-term contract (Carlton, 1979)
Assure Supply (Demand uncertainty)	(Walker and Weber, 1984)	Collateral (Benjamin, 1978) Deferred rebates (Goldberg, 1979)
Control quality and services	(Harrigan, 1986)	Exclusive territories (Goldberg, 1982) Resale price maintenance (Marvel and McCafferty, 1984) (Phillips and Mahoney, 1985)
Control the density of retail outlets	(Blair and Kaserman, 1983)	Vertical contracts (Dixit, 1983)
Reduce shirking (Measurement Uncertainty)	(Alchian and Demsetz, 1972)	Relational contract (Williamson, 1979)
Reduce technological uncertainty	(Teece, 1982)	Licensing (Hennart, 1988a)
Appropriate R&D spillovers	(Phillips, 1983)	Vertical contracts (Evans and Grossman, 1983)
Trading of Technology	(Arrow, 1974)	Licensing (Kogut, 1988)

copying machines (Blackstone, 1975). Territorial restrictions coupled with resale price maintenance could also facilitate price discrimination (Phillips and Mahoney, 1985). The final key advantage comes from uncertainties about costs and/or prices. In the case of asymmetric upstream information (Arrow, 1975) auxiliary markets might convey the information without vertical financial ownership. Arrow assumes, however, that upstream producers will have severe diffi-

culties in selling information, which may or may not hold true empirically. Second, he assumes that a forward-contract cannot be written that would enable downstream firms to make correct investment decisions (Teece, 1980).

In the Carlton (1979) model the analysis of vertical integration explicitly refers to either long-term contract or vertical financial ownership. Thus, in Carlton's view, the desire to shed risk by itself does not provide a powerful incentive for vertical financial ownership. Firms concerned with the supply of an input could write contracts which include a large penalty such as holding 'hostages' (Buchanan, 1992; Williamson, 1983), collateral (Benjamin, 1978), or deferred rebates, performance bonds and liquidated damage provisions (Goldberg, 1979).

In terms of product quality and service, Harrigan (1986) persuasively argues that new pioneering products and high quality differentiated products require vertical financial ownership to insure that quality is maintained through the linkages of the value-added chain (Anderson and Coughlan, 1987). A manufacturer can use forward integration to differentiate her product by providing a higher level of service at the distribution level than would an independent distributor (Coughlan, 1985). However, manufacturers of new products frequently use vertical contracts to achieve the same objective. For example, the manufacturer may use exclusive territories or resale price maintenance to achieve high quality service. By reducing price competition, the manufacturer induces the retailers to compete on service and other nonprice terms. Vertical price-fixing contracts (Shepard, 1990) between the manufacturer and retailers mitigate free-rider problems (Goldberg, 1984; Telser, 1960, 1990) by eliminating discounters and enabling the manufacturer to signal quality via retail endorsement (Klein and Murphy, 1988; Marvel and McCafferty, 1984). Mitigating free-rider problems seem to have been the rationale explaining resale price maintenance for high quality products such as Lenox china and Magnavox televisions (Goldberg, 1982), Sony electronics, Florsheim shoes, and London Fog raincoats (Overstreet, 1983).

Similarly, exclusive territories and resale price maintenance provide incentives for retailers to offer services to the customer on behalf of the manufacturer, and exclusive dealing provides incentives for the manufacturer to undertake promotional services that benefit the retailers (Marvel, 1982). In short, the problem of shirking (Jones, 1984) may be solved by vertical (relational) contracting (Williamson, 1979) as well as by vertical financial ownership.

Researchers have maintained that vertical financial ownership is an institutional response to technological uncertainty (Teece, 1982), to the difficulty of trading information (Arrow, 1974), and to 'internalize externalities' such as R&D spillovers (Phillips, 1983). Vertical financial ownership also is suggested as a means of protecting value-creating aspects of proprietary products or process technology (Lippman and Rumelt, 1982). However, internal organization may not be necessary to alleviate these problems. Licensing, for example, is sometimes a sufficient organizational response to minimize the difficulties inherent in technology transfer (Hennart, 1988a; Kogut, 1988).

In summary, this section has recapitulated the motives described in the previous section and has demonstrated that for each motive, a vertical contract may replicate the advantages of vertical financial ownership. In the following section it is suggested that this fundamental proposition may be derived from mathematical principal-agent models (Hart and Holmstrom, 1987; Holmstrom and Tirole, 1989).

THE TWO BRANCHES OF AGENCY THEORY

Jensen and Meckling (1976: 308) define positive agency costs as the sum of monitoring expenditures by the principal, the bonding expenditures by the agent and the residual loss. Transaction costs concern both ex ante and ex post costs of contracting. Specifically, ex ante costs include: (1) search and information costs; (2) drafting, bargaining and decision costs; and (3) costs of safeguarding an agreement. Ex post costs of contracting include: (1) monitoring and enforcement costs; (2) adaptation and haggling costs; (3) bonding costs; and (4) maladaptation costs (Williamson, 1985). For the purposes of this paper, positive agency costs are considered to be a subset of transaction costs. The similarities between positive agency costs and ex post transaction costs are, after all, transparent. While

the basic unit of analysis of agency theory concerns the incentive and measurement problems of the *individual*, transaction cost analysis stresses the attributes of the *transaction*. The thesis of this paper is that measurement costs and transaction costs should be considered simultaneously for the purpose of predicting organizational form.

The insight on the complementarity of vertical financial ownership and vertical contracting can be expressed in terms of agency theory. It is useful to consider two 'separate branches of agency theory' (Jensen, 1983); namely mathematical principal-agent models (Rey & Tirole, 1986) and positive agency theory (Eisenhardt, 1989; Jensen and Meckling, 1976; Oviatt, 1988). It is argued here that the two branches do not belong to the same tree. Hence, the fact that conversation between scholars of the two branches is minimal (Jensen, 1983) is not surprising.

Mathematical principal-agent models assume unbounded rationality of agents and no differential costs between long-term contracts and hierarchy. Indeed, the firm is a 'nexus of contracts' in which the continuum of governance structures is compressed to a single point. That organizational form is inconsequential in such models is hardly surprising. To translate these models in transaction costs terms, one may argue that these mathematical models rigorously demonstrate that in the absence of bounded rationality and transaction costs, firms are superfluous. The alignment of ex ante incentives, via contracting, suffices. Organizational economists are sensitive to the fact that while the 'nexus of contracts' lens highlights and reveals salient organizational problems, it also blurs and neglects the distinctive features of real world firms (Williamson, 1991).

Principal-agent models convincingly demonstrate that a vertical contract can always be written to achieve the vertical financial ownership outcome (Evans and Grossman, 1983) if we ignore the problems of bounded rationality and transaction costs. Or put differently, mathematical principal-agent models provide rigorous demonstrations of the 'Coase theorem.' In fact, vertical contracts represent one of the most obvious applications of principal-agent theory (Bonanno and Vickers, 1988; Mathewson and Winter, 1984; Tirole, 1988).

It is ironic, to say the least, that many economists refer to this fictional world of zero transaction costs as a 'Coasian world.' To set things right, Coase notes that (1988a: 174): 'Nothing could be further from the truth. It is a world of modern economic theory, one which I was hoping to persuade economists to leave.' Evolutionary economics (Nelson and Winter, 1982), **positive** agency theory (Fama, 1980; Jensen and Meckling, 1976), and transaction costs economics (Williamson, 1989) take seriously the proposition that organizational form does matter. The remainder of the paper considers positive agency and transaction costs for determining organizational form.

THE ADVANTAGES OF VERTICAL FINANCIAL OWNERSHIP

The governance structure chosen to implement the vertical integration strategy is often chosen to minimize the cost of negotiating, adapting, monitoring, and enforcing buyer–supplier relationships. A good example of the potential cost savings of vertical financial ownership is the avoidance of sales taxes when arms-length contracting is replaced by internal transfers (Coase, 1937). More subtly, vertically integrated petroleum firms have found it profitable to increase the price of crude oil relative to the price of final products in order to shift as much of their reported earnings as possible to the raw materials extraction stage, which enjoys tax preferences associated with resource depletion (Bolch and Damon, 1978). Similar results can be found in other basic conversion industries such as copper, aluminum and steel (Scherer and Ross, 1990).

A fundamental motive for various institutional arrangements is the failure of markets to satisfactorily handle certain transactions (Casson, 1984). Important sources of market failures include externalities, increasing returns and sunk costs and market imperfections (Yao, 1988). These market frictions violate the standard assumptions of competitive equilibrium models. Prices are no longer sufficient statistics. Long-term relational contracts (Mulherin, 1986; Wiggins and Libecap, 1985), 'impartition' policies (Barreyre, 1988), tapered and quasi-integration (Monteverde and Teece, 1982b), joint ventures (Kogut, 1988), franchising (Norton, 1988), networks (Blois, 1990; Jarillo, 1988, 1990; Thorelli, 1986),

interfirm organization (Phillips, 1960), quasi-firms (Eccles, 1981), hybrids (Borys and Jemison, 1989), and 'vertical financial ownership' (Flaherty, 1981) are some of the 'institutions of capitalism' (Williamson, 1985) which emerged in response to the inadequacies of 'classical market contracting' (Macneil, 1980). The generalizable thesis of the transaction costs literature is that the particular institution (governance structure) chosen to implement the strategy of vertical integration mainly serves efficiency purposes (Bork, 1978; Williamson, 1985).

Williamson's (1985) seminal research develops a well-grounded theoretical framework for explaining and predicting this market failure. The basic idea is that contractual difficulties arise when opportunistic agents (Anderson, 1988; Maitland, Bryson and Van De Ven, 1985; Provan and Skinner, 1989) engage in frequent transactions in an environment of sufficient uncertainty and/or complexity to surpass bounded rationality capabilities (Simon, 1978). The risk of self-interested agents utilizing asymmetric information to their advantage is high in such environments and vertical financial ownership is one response to this inadequacy of classical market contracting.

Contractual problems become acute when there are small numbers bargaining, a situation that occurs when transactions involve human, physical or site 'asset specificity' (Joskow, 1988; Spiller, 1985; Williamson, 1979). Human asset specificity involves uniquely related learning processes or teamwork. Physical asset specificity includes requirements for specialized machine tools and equipment. Site specificity occurs when unique locational advantages exist, as, for example, when a power plant is located near a coal mine to save on transportation costs. Vertical financial ownership can assure requisite inputs in such situations and the importance of asset specificity in explaining and predicting vertical financial ownership is supported by a large body of literature including case studies (Alston and Gillespie, 1989; Butler and Carney, 1983; Bowen and Jones, 1986; Globerman and Schwindt, 1986; Goldberg and Erickson, 1987; Hennart, 1988b; Jones and Pustay, 1988; Klein, 1988; Leblebici, 1985; Palay, 1984; Russo, 1992; Silver, 1984; Teece, 1976), formal modeling (Kleindorfer and Knieps, 1982; Masten, 1982; Riordan and Williamson, 1985) and statistical testing (Heide and John, 1988, 1990; Jones, 1987; Kerkvliet, 1991; Krickx, 1990; Leffler and Rucker, 1991; Lieberman, 1991; Masten, Meehan and Snyder, 1989; Mosakowski, 1991; Spekman and Strauss, 1986; Walker and Poppo, 1991).

A last important transaction cost motive for vertical integration involves economies of scope (Baumol, Panzar, and Willig, 1982), including technological complementarities (Bain, 1968). The standard example of vertical financial ownership to achieve economies of scope is found in the integration of iron ore and steel production (Dennison, 1939; Lavington, 1927). An example of major technological interdependency can be found between equipment manufacturing and operations in the telecommunications industry (Phillips, 1983). Baumol, Panzar, and Willig (1982) maintain that economies of scope are a sufficient condition for vertical financial ownership. However, as Teece (1980) has emphasized, economies of scope do not explain the 'scope of the enterprise'. **Transaction costs theory suggests specific advantages of vertical financial ownership, *per se*.** Advantages include, but are not limited to, the following:

(1) **Profit.** Vertical financial ownership may most effectively achieve the profit incentive since preemptive claims on profits between separate firms are eliminated.

(2) **Coordination and Control.** The firm has better control of opportunistic behavior due to the authority relationship (Dow, 1987) within the firm. Managers of the divisions can be required to cooperate in an adaptive manner and promotions can be adjusted to achieve such behavior. Furthermore, disputes may be settled more effectively internally, rather than through litigation.

(3) **Audit and Resource Allocation.** Contrary to the claims of Grossman and Hart (1986), the auditing powers of the firm are superior to the auditing capabilities of contracting parties (Williamson, 1975). The differential improvement of auditing by merged railroad firms relative to auditing by railroad cartels is illustrative (Chandler, 1977). A firm has the legal right to audit its divisions but no right to audit outside contractors. Integrated firms have superior information upon which they can base allocations to their divisions so that the incentive for those divisions to use their information strategically (to the detriment of the enterprise's profits) is

eliminated (Crocker, 1983). Furthermore, improved information enables the firm to allocate personnel to tasks more effectively.

(4) **Motivation.** A fourth advantage of the vertically integrated firm comes from the quasi-moral involvement that may develop within its boundaries. Particularly successful organizations inculcate an ungroundable but vital sense of human solidarity, and these clan-like emotions can have positive productivity impacts (Ouchi, 1980). Equity and due process develops in internal labor markets (Doeringer and Piore, 1971) and institutional and personal trust relations evolve. Selection, training, and socialization may minimize the divergence of preferences of team members (Eisenhardt, 1985; Ouchi, 1980). Convergent expectations reduce behavioral uncertainty and associations within the boundaries of the organization become valued.

(5) **Communication.** A fifth advantage of the vertically integrated firm is the development of a coding system which increases communication efficiencies and provides stability in operations (Malmgren, 1961). The standardization of language is seen in accounting systems, blueprints, and other reporting systems. Admittedly, these economies could be obtained via recurrent contracting but the efficiencies of the coding may be impaired due to the risk of opportunism. Firms are arguably better than markets in communicating and coding respects because the hazards of opportunism are mitigated due to superior auditing and greater incentive harmony within firms. The upshot is that firms (within capacity limits) have an information processing advantage, and this advantage complements superior auditing capabilities (Sandler and Cauley, 1980). In summary, when a firm vertically integrates, ownership changes (Alchian, 1984), incentives change, and governance structures (ability to monitor and reward) change (Williamson, 1985).

DISADVANTAGES OF VERTICAL FINANCIAL OWNERSHIP

The suggestion that vertical financial ownership should be chosen due to ownership, incentive and governance structure advantages, however, lacks a **comparative institutional assessment.** Strategic management researchers have begun to focus on the implementation problems of vertical financial ownership and have provided an analysis which is complementary to the organizational economics literature.

The disadvantages of vertical financial ownership may be classified under three major categories: (1) bureaucratic costs; (2) strategic costs; and (3) production costs.

Bureaucratic costs

Implementation costs of vertical financial ownership have proved to have particularly important negative effects, especially because they are so difficult to anticipate (Jones and Hill, 1988). Vertical merger increases the size of an organization which often results in additional hierarchical levels. Increasing size and bounded spans of control imply greater distance of most subordinates from their ultimate superiors. Increasing spans of control may lead to communication distortion due to serial reproduction loss and/or deliberate distortion to achieve divisional objectives (Cremer, 1980; Williamson, 1967) thus obviating a major advantage of vertical financial ownership.

The loss of high-powered market incentives suggests that internal organization may also be more costly than the market mechanism (Williamson, 1985), undercutting the profit incentive for integration. One explanation is that the lack of direct competitive pressures on the cost of the intermediate products may allow increasing levels of slack (Cyert and March, 1963) and thus reduce profitability. Even if outside sources exist as a potential disciplining influence, they may be bypassed due to bureaucratic considerations. A norm of reciprocity between divisions easily develops (Gouldner, 1960), and over time the benefits of reducing transaction costs are lost.

As firms vertically integrate away from the core business, they are also likely to become involved in new manufacturing or selling tasks. Managing at the manufacturing and distribution stages requires different skills than previously required by firms active only in upstream or downstream operations and inexperience may lead to comparatively high internal costs (Harrigan, 1985c). In short, the synergies possible through vertical financial ownership may be overestimated and do not necessarily compensate for higher costs (Buzzell, 1983).

Strategic costs

While Arrow (1975) suggested that vertical financial ownership may eliminate the problem of asymmetric information between contractual parties, the flip side of the argument has been suggested by Harrigan (1984), namely that vertical financial ownership may result in a loss of access to information and tacit knowledge as relationships with experienced and more broadly based suppliers and distributorships are severed. A second potential strategic cost to vertical integration is that the firm may purchase specialized assets that increase sunk costs and may lead to chronic excess capacity and low profitability (Chandler, 1962; Rumelt, 1974). Third, vertical integration may decrease a firm's *strategic flexibility* and lead to high exit barriers (Harrigan, 1985d). Moreover, psychological commitment (Staw and Ross, 1978) and administrative difficulties of divestment (Duhaime and Grant, 1984; Duhaime and Schwenk, 1985) are important dynamic costs that need to be considered in the make-or-buy decision. Flexibility may conflict with stability. In a very real sense, flexibility and stability are antithetical. To the extent that an organization makes commitments to insure stability of operations, it must surrender a degree of flexibility by increasing the firm's dependence on a particular segment of economic demand (Kessler and Stern, 1959). This commitment attribute is precisely why the vertical integration decision is appropriately classified as a *strategy* (Oster, 1990).

Production costs

Walker and Weber (1984) suggest that production costs are critical in the make-or-buy decision. A vertically integrated firm that does not utilize a sufficient amount of the input to achieve minimum efficient scale will be at a cost disadvantage against firms that contract out to an efficient supplier achieving full economies of scale (Stigler, 1968). Second, vertical financial ownership may lead to a capital drain, a potential problem that is particularly damaging to smaller firms (Williamson, 1975). Third, capacity imbalance in the vertically integrated firm may lead to higher production costs than incurred by firms that utilize market mechanisms (Hayes and Wheelwright, 1984).

The disadvantages of vertical financial ownership considered here and the advantages of vertical financial ownership considered in the previous section suggest that rich case histories of procurement decisions are necessary and should be valued (Temin, 1988). An historical approach may provide insight on the dynamic change of governance structures over time (North, 1981). Stigler (1951) suggests a life-cycle theory of vertical financial ownership based on Adam Smith's (1776) observation that 'the division of labor is limited by the extent of the market.' Hence, vertical financial ownership is predicted in the early stages and declining stages of the industry life-cycle when demand is low and specialized firms along a value-chain cannot be sustained. De-integration is predicted in the emerging stage of the industry as demand increases. Empirical studies have provided mixed support for the life-cycle theory (Etgar, 1977, 1978; Levy, 1984). Detailed historical studies, however, indicate that vertical financial ownership is not merely a demand side phenomenon and that the predicted de-integration stage frequently does not occur (Chandler, 1977; Porter and Livesay, 1971; Stuckey, 1983).

Clearly, Stigler's theory lacks consideration of the supply side (transaction costs). Furthermore, the pattern of vertical financial ownership may be a path dependent (Arthur, 1989) process. Thus, a firm that starts out highly integrated may develop a bias toward certain kinds of idiosyncratic process innovations that further reinforce its integrated structure (Langlois and Robertson, 1989).

A higher sensitivity toward the inherent value of historical analysis does not mean that rigorous models which are subject to empirical tests should not also be employed. On the contrary, the argument here is that the historical and analytical approaches are complementary. In terms of the second approach, a parsimonious model that may explain and predict the choice of governance structure is an important task that is developed in the last section of the paper.

A FRAMEWORK FOR PREDICTING ORGANIZATIONAL FORM

The great insight of Coase (1937) and the subsequent formalization in principal-agent models demonstrate the theoretical equivalence of vertical contracting and vertical financial ownership when transaction costs are presumed to be

absent (Cheung, 1983; Katz, 1989). Conversely, in order to predict and prescribe organizational form **from an efficiency perspective**, the necessity of analyzing positive agency and transaction costs is undeniable. In fact, if one accepts the premise that the environment selects out those firms that use *relatively* efficient governance structures (Nelson and Winter, 1982), then the conclusion that transaction costs critically determine organizational form is not an 'assertion' (Pfeffer, 1982) at all. It is, in fact, a tautology.

This is not to say that transaction costs theory cannot be challenged or criticized. The conclusion that transaction costs determine organizational form may be challenged by questioning the premise that environmental selection processes are efficacious (Perrow, 1986); to the extent that they are not effective, power and politics may be operative (Pfeffer and Salancik, 1978). In fact, recent empirical research suggests that in the case of the adoption of the multidivisional structure both efficiency and power politics matter (Palmer, Friedland, Jennings, and Powers, 1987). While recognizing the legitimacy of alternative theoretical perspectives and the inevitable limitations inherent in relying on one 'conceptual lens' (Allison, 1971), this paper nonetheless, pushes hard on the efficiency orientation to predict organizational form.

However, even those that grant the premise that efficiency considerations determine organizational form have criticized transaction costs theory and positive agency theory perspectives for a lack of dimensionalizations and operationalizations of such costs. While criticism of this kind was warranted in the late 1970s, such criticism in the 1990s is uninformed. Transactions have been dimensionalized in terms of frequency, uncertainty and asset specificity (Williamson, 1985: 79).

In the framework developed below, frequency is not considered critical for the following reasons: First, as Williamson (1985) notes, when asset specificity is low, frequency does not influence organizational form. Second, when asset specificity is high, both occasional transactions and recurrent transactions may require unified governance. While frequency does influence the choice of governance structure in the case of 'intermediate' asset specificity, such refined predictions are not attempted here.

The choice of organizational form may be determined then by uncertainty (demand and technological) and asset specificity (physical, human, site) in the transaction costs model. The positive agency theory literature (Alchian and Demsetz, 1972; Eisenhardt, 1989) emphasizes the critical role of **measurement** uncertainty in determining organizational form. Table 2 summarizes the extensive subset of the vertical integration literature that deals directly with operationalizing these agency and transaction-costs variables.

The transaction costs approach (Williamson, 1979) provides insight into the key role of asset specificity, but neglects the interactive effects of measurement problems that have been highlighted by agency theory.[4] On the other hand, positive agency theory emphasizes measurement costs but neglects asset specificity. Combining these two efficiency perspectives enables us to make predictions and offer prescriptions on the make-or-buy decision.

The agency perspective emphasizes information asymmetry issues. A significant aspect of information asymmetry in organizations is the problem of ascertaining and rewarding individual effort in team production (Jones, 1984). Asymmetric information (between principals and agents) due to team production leads to the so-called *'nonseparability problem'* (Alchian and Demsetz, 1972). If reward cannot be based on output, a manager is necessary to monitor behavior or effort (Barzel, 1982). A second important agency theory variable concerns knowledge of the transformation process or **task programmability** (Eisenhardt, 1985; Ouchi, 1979). Low task programmability reduces the effectiveness of monitoring effort. As Table 2 shows, a good deal of the literature on the vertical integration decision has been concerned with such uncertainties, and the results in general suggest that as measurement uncertainty increases, vertical financial ownership is increasingly likely.

The transaction cost approach emphasizes **asset specificity** as the fundamental variable in determining the optimal vertical integration strategy (Williamson, 1985). When assets are not closely tied to a specific strategy, the theory

[4] A referee argues that some 'transaction cost theorists' (e.g., Barzel, 1982; North 1981) do focus on the measurement issue. The referee does agree that a synthesis between asset specificity and measurement branches of transaction costs theory is called for.

Table 2. Empirical research on the vertical integration decision

Study/sample/ methodology	Measures (vertical integration {VI}, uncertainty {U}, & asset specificity {AS}	Results*
Anderson & Schmittlein (1984) 16 electronic component manufacturers Survey data Logit analysis	VI = use of direct sales force U = expected deviation between forecast and actual sales in the next year, expressed as a percentage {volume uncertainty} = the likelihood of perceived difficulty of measuring the results of individual salespeople equitably {measurement uncertainty} AS = average of six (standardized) variables representing manager's perceptions of the importance of human capital specificity	Volume uncertainty had no statistically significant effect on the likelihood of vertical integration. Measurement uncertainty increased vertical integration at a statistically significant level. Asset specificity increased the likelihood of the adoption of the vertical integration strategy at a statistically significant level.
Anderson (1985) 13 electronic component manufacturers Survey data Logit analysis	VI = use of direct sales force U = difficulty of evaluating performance {measurement uncertainty} AS = Company specificity and brand-specific know-how required	The more difficult it was to evaluate sales performance the greater the likelihood of vertical integration (statistically significant). The greater the human capital asset specificity the higher the likelihood of vertical integration (statistically significant).
Armour and Teece (1980) U.S. petroleum industry for the 1954–75 period Regression analysis	VI = number of primary production stages AS = firm's expenditure on basic, applied, or development research	Vertical integration is significantly associated (at the 95% level) with basic and applied research expenditures. Human capital asset specificity of technological knowhow necessitates vertical integration.
Caves and Bradburd (1988) 83 U.S. Industries for 1975 Regression analysis	VI = input–output measure on the distribution of each industry's shipments among other industries AS = (a) joint fewness of sellers and buyers (b) capital intensity that is potentially sunk and specific to the industry	Small numbers bargaining and firm-specific sunk capital were positively associated with vertical integration at a positive and statistically significant level.
Harrigan (1986) 192 firms from 16 industries from 1960–81 Chi-square tests	VI = measures of degree, stages, breadth and form of VI U = changes in sales growth {volume uncertainty} = years to obsolesce technology {technological uncertainty}	Both volume uncertainty and technological uncertainty led to less vertical integration at a statistically significant level

Table 2. Continued

Study/sample/ methodology	Measures (vertical integration {VI}, uncertainty {U}, & asset specificity {AS}	Results*
John and Weitz (1988) 87 industrial goods firms Survey data Regression analysis Logit analysis	VI = percent sold directly to end users AS = human capital asset specificity U = average response of 5 items including industry, market share, and sales forecasting volatility	Vertical integration was positively and significantly related to asset specificity and environmental uncertainty Production costs were not statistically significant
Joskow (1985) 277 observations of contracts or complete ownership by coal-burning electric generating plants	VI = utility ownership of mines AS = mine-mouth plants which involved site specificity, physical asset specificity and dedicated assets	While 85% of the coal used to generate electricity is supplied by the market mechanism, virtually all of the mine-mouth mines are owned by utilities
Levy (1985) 69 firms representing 37 different industries for the years 1958, 1963, 1967, 1972 regression analysis	VI = value-added/sales (enterprise-based census) U = log of firms sales regressed on a time trend, the variance of the error term is used as a measure of uncertainty AS = small numbers of firms and the intensity of research and development expenditures	Volume uncertainty, fewness of firms, and research intensity each increased the likelihood of vertical integration at a statistically significant level
MacDonald (1985) 79 three and four digit producer goods industries for 1977 regression analysis	VI = the proportion of shipments from manufacturing industries that are made to affiliated units {U.S. Census of Manufacturers} AS = small numbers (high buyer or seller concentration) = capital intensity, which is measured by the ratio of fixed assets to shipments	The use of vertical integration is more prevalent in capital intensive industries and in those four digit industries characterized by high levels of buyer or seller concentration at a statistically significant level

Table 2. Continued

Study/sample/ methodology	Measures (vertical integration {VI}, uncertainty {U}, & asset specificity {AS}		Results*
MacMillan, Hambrick, and Pennings (1986)	backward integration =	1 - (purchases)/(costs of goods sold)	Volume instability led to an increased likelihood of backward integration for consumer, capital, and component supplier businesses at a statistically significant level.
178 consumer 99 capital 275 component businesses	U =	Four-year mean absolute deviation of served market sales from served market growth rate	Asset specificity/capital intensity increased the likelihood of backward integration for consumer, capital, and component supplier businesses at a statistically significant level.
regression analysis	AS =	Gross book value of plant and equipment per dollar of revenues	
Masten (1984)	VI =	make or buy survey data	Components that were complex and specialized were more likely to be made in-house at a statistically significant level.
1,887 component specifications for the aerospace industry	U =	if the component is highly complex	
	AS =	if the component is highly specialized	
Maximum Likelihood procedure			
Masten, Meehan and Snyder (1991)	VI =	make or buy	Complexity had a nonmonotonic effect on the probability of the choice of 'make.' Beyond some threshold the probability of make increases as complexity increases.
43 make and 31 buy decisions in naval shipbuilding	U =	component is highly complex	
censored regression techniques	=	high engineering effort	High engineering effort increases the likelihood of a ('make') decision.
	AS =	firm-specific human skills	Human asset specificity leads to a make decision at a statistically significant level.
Monteverde and Teece (1982a)	VI =	80 percent or more of the component requirements produced in-house	Backward integration was more likely when the engineering effort required to design a part was high, suggesting the importance of human capital asset specificity.
Ford & General Motors for 1976, 133 auto components	AS =	amount of engineering effort required in designing a part	
probit analysis	=	part made specifically for a single assembler	Backward integration was also more likely when the parts were firm-specific.

Table 2. Continued

Study/sample/ methodology	Measures (vertical integration {VI}, uncertainty {U}, & asset specificity {AS}	Results*
Walker and Weber (1984; 1987) 60 components of an automobile manufacturer	VI = make or buy decision U = Volume uncertainty (a) expected volume fluctuations (b) uncertainty of volume estimates	High volume uncertainty leads to a make decision in low competition (but not high competition) markets
LISREL estimation using unweighted least squares	= Technological uncertainty (a) frequency of changes in product specification (b) probability of technological improvements	Technological uncertainty has no influence on make-or buy decisions when supplier competition is low but leads to a buy decision when competition is high.

*Only the results relevant to the relationship between asset specificity, uncertainty and the adoption of vertical integration are briefly summarized here. For details, see the original references.

suggests that market and informal means of coordination will be preferable corporate strategies. Vertical financial ownership (hierarchy) makes sense only when assets are idiosyncratic and closely tied to a specific strategy.

The integration of the transaction costs and agency approaches yields task programmability, nonseparability, demand uncertainty, technological uncertainty and asset specificity as five determinants of organizational form. Although each of these variables has been operationalized, no single empirical study has considered all five variables simultaneously.

While not denying the possibility that demand uncertainty and technological uncertainty may be critical transaction costs variables in predicting organizational form, the earlier discussion of the Harrigan–Williamson debate suggests that the impact of these variables on organizational form is theoretically indeterminate. Hence, the parsimonious model presented here considers the interactive effects of the positive agency costs variables of task programmability and nonseparability and the transaction costs of asset specificity. To highlight the interactive effects of these variables, consider each in a dichotomous (low, high) form, as shown in Table 3.

This table suggests a synthetic theory of corporate vertical control. Drawing together empirical evidence from two fields of inquiry—strategy and economics—and applying insights from two theoretical perspectives—transaction cost and agency theory—it offers a more integrative organizational economics (efficiency) approach to the choice of governance structure than previously available.

In its simplified form, the theoretic perspective can be expressed in 8 different circumstances which might face the corporation. When the output of the individual is easily measured (low nonseparability) and asset specificity is low (cases 1 and 5), the ease of input measurement (task programmability) is inconsequential. In both cases, the market mechanism (spot market prices) should run smoothly. Vertical financial ownership can add very little to this scenario; it is unlikely to be considered, and is highly unlikely to be effective. Since asset specificity is low, the process of competition provides few degrees of freedom for agents to behave opportunistically. Thus, the price system is the predicted institutional arrangement for exchange.

When the output of the individual is easily measured (low nonseparability) and asset specificity is high (cases 2 and 6) a long-term relationship is required for the parties to be willing to invest in high sunk cost investments (high asset specificity). However, low nonseparability suggests that hierarchy is not essential (Alchian and Demsetz, 1972). The type of long-term relationship chosen will be influenced by the ability to measure input behavior (Anderson

Table 3. Predicting the organizational form of vertical control

	Low Task Programmability		High task programmability	
	Low specificity	High specificity	Low specificity	High specificity
Low non-separability	1: spot market	2: long-term contract	5: spot market	6: joint venture
High non-separability	3: relational contract	4: clan (hierarchy)	7: inside contract	8: hierarchy

Definitions:
Low task programmability: Observing input (effort) is a poor measure for making rewards.
High nonseparability: Observing output is a poor measure for making rewards.
High specificity: Human, physical and/or site firm-specific investments are high.
Spot market: The price system works smoothly.
Long-term contract: Obligations of principals and agents are specified and enforced by third-parties (courts)
Relational contract: Obligations of principals and agents are specified and self-enforced. Social conditioning is applicable.
Inside contract: A hybrid arrangement between contract and hierarchy that is best described as a 'manager as monitor' setup.
Joint ventures: An equity agreement whereby a separate entity is created.
Hierarchy: A superior-subordinate relationship; financial ownership.
Clan: Organization that is based on a vital sense of human solidarity.

and Oliver, 1987; Ouchi, 1979; Eisenhardt, 1985). If task programmability is high (case 6), an equity joint venture that allows a more refined monitoring system to develop is an effective governance structure.[5] If task programmability is low (case 2), a long-term contract that stipulates output performance and is enforced by courts is the predicted organizational choice.

When the output of the individual is difficult to measure (high nonseparability) and asset specificity is low (cases 3 and 7) a long-term relationship is not required due to low switching costs or exit barriers (low asset specificity). When task programmability is low (case 3), some type of relational contract (Dwyer and Oh, 1988; Macneil, 1980) that inculcates cooperative attitudes is required since output control and behavioral controls are ineffective as a consequence of high nonseparability and low task programmability. Cooperation must be achieved by a 'private ordering' (Williamson, 1985) rather than reliance on third-party enforcement.

A situation in which there is low asset specificity (i.e., near perfect labor markets), high nonseparability and high task programmability (case 7) precisely describes the conditions posited by Alchian and Demsetz (1972). Williamson (1975: 95–98) argues that the 'inside-contract' system (Buttrick, 1952) is the real world governance structure that most resembles the Alchian and Demsetz (1972) 'manager as monitor' model.[6] Departments in the inside contracting system are paid by a piece-rate, however, team production may exist *within* a department and thus a manager is required to mitigate the shirking problem. A detailed historical analysis of the inside-contracting system may be found in Mahoney (1989).

When individual output is difficult to measure (high nonseparability) and asset specificity is high (cases 4 and 8), contractual problems become

[5] As a referee points out, cell 6 is not as clear cut as some of the other cells in Table 3. The referee correctly points out that if the nonseparability problem were nil, then long-term contracts will be preferred. However, with low (but not zero) nonseparability an equity relationship may provide the least-cost governance alternative. A full explanation of joint ventures would need to cover task programmability and nonseparability problems as continuous, rather than dichotomous variables. In short, the argument here is that a majority of joint ventures will be found in cell 6. However, the simple dichotomous representation in Table 3 does not allow us to argue that high task programmability, low nonseparability and high asset specificity are sufficient conditions to explain joint ventures. Clearly, long-term contracts may also appear in cell 6. I am indebted to the referee for making this idea clear.

[6] A referee points out that the agency perspective would not distinguish between cell 7 and cell 8. Williamson (1975: 95–98) makes a persuasive case that cell 7 and cell 8 would be governed differently. Thus, the synthesis of agency theory and transaction costs theory of Table 3 does allow us to make more refined predictions than either theory provides separately. I am indebted, once again, to the referee that brought this point to my attention.

acute. The scenario of high task programmability, high asset specificity, and high nonseparability (case 8) are the classical conditions which indicate that vertical financial ownership (hierarchy) is the preferred governance mode (Williamson, 1985). However, when task programmability is low (case 4) we have a worst-case scenario in which asset specificity is high and input and output measurements are ineffective. Ouchi (1980) prescribes a clan relationship in which trust and human dignity are emphasized and opportunistic attitudes are transformed in favor of human solidarity. The inculcation of moral values (such as Adam Smith's concept of 'sympathy') and cooperative attitudes are considered a viable solution to an otherwise intractable economic dilemma.

CONCLUSION

A great deal of attention has been given to diversification as a basic corporate strategy (Ramanujam and Varadarajan, 1989). This paper suggests that vertical integration strategy is an option with similar complexities deserving increased research attention. Recent efforts by industrial organization and strategic management researchers to expand our theoretical and empirical understanding of vertical integration (which includes vertical contracting and vertical financial ownership) have been exciting and fruitful (Carney and Gedajlovic, 1991; Stiles, 1992). We have begun to understand complex phenomena that were ignored or treated as strategic puzzles a decade ago. On the other hand, at present this work is somewhat disjoint, with individual researchers tending to respond to increasingly specific debates about the details of different vertical integration scenarios.

The underlying proposition of this paper is that new theoretical insight is most likely to take place at the interface of the strategy and economics literature and be achieved by more broadly conceptualizing vertical integration. More specifically, new insights into vertical integration may be found by considering vertical financial ownership (via internal development or merger) as one end of a vertical integration continuum that also includes vertical markets and vertical contracting. Even more broadly, it has been argued that the theory of vertical financial ownership and the theory of the firm are isomorphic.

Expanding the horizons of discourse in this way gives us access to a much richer set of theoretic tools. Insights from the agency literature (Eisenhardt, 1988; Jensen and Meckling, 1976), the organizational economics literature (Barney and Ouchi, 1986), the property rights literature (Hart and Moore, 1990; Jones, 1983) and a dynamic resource-based theory of the firm (Penrose, 1959; Wernerfelt, 1984) become available for enhancing our knowledge of vertical integration strategy and vertical governance structure.

The key theoretic advance of the paper is achieved by integrating two branches of the organizational economics literature (Barney and Ouchi, 1986)—positive agency theory literature and transactions costs literature. The transactions costs literature has underemphasized information asymmetries. The agency literature relies on assumptions about information asymmetries and risk aversion but ignores asset specificity, a topic given considerable attention in transaction costs analysis. A synthesis of the two efficiency perspectives is used to predict and prescribe the optimal vertical governance structure. The choice among organizational forms outlined in the specific model depends upon the degree to which nonseparable team effort is required, the ability to program tasks and the level of asset specificity. Each of these variables has been operationalized and **an empirical study that utilizes all three variables is warranted**. Different mixes of these variables lead the firm to scenarios that extend from spot market contracting to vertical financial ownership.

From an efficiency perspective, it has been argued that the influence of positive agency and transaction costs are undeniable. The empirical questions concern: (1) whether the three dimensions of transaction costs specified here are 'sufficient statistics' for predicting organizational form; and (2) whether the efficiency orientation alone (even if we added frequency, demand uncertainty and technological uncertainty dimensions, among others) is adequate to predict organizational form. The adequacy of the proposed framework and the cogency of the efficiency orientation cannot be ascertained by logic; empirical testing is required. However, *within the efficiency conversation*, the following argument has been emphasized throughout the paper: In the absence of transaction costs analysis, the prediction of organizational form is a logical impossibility.

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[Footnotes]

[4] **Measurement Cost and the Organization of Markets**

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