

Scott E. MASTEN

Stéphane SAUSSIÉ

ECONOMETRICS OF CONTRACTS : AN ASSESSMENT OF DEVELOPMENTS IN THE EMPIRICAL LITERATURE ON CONTRACTING

Mots-clés : Contrats, théorie de l'agence, théorie des coûts de transaction, études empiriques.

Key words : Contracts, Agency Theory, Transaction Cost Economics, Empirical Studies.

The growth in the analysis of interfirm contractual relationships that has occurred in recent years is an indication of the importance economists associate with the issue of contracting and contract design. On the theoretical side, understanding how and why economic agents use contracts to coordinate their activities is crucial to understanding the organization and efficiency of economic exchange. For policymakers, understanding the functions and implications of various contract terms is a prerequisite to distinguishing between efficient and anti-competitive practices and to developing appropriate policies with respect thereto.

Over time, two approaches have come to dominate the analysis of contracting : agency theory and transaction cost economics. Of the two, agency theory is widely regarded as having had the greater success developing formal models of contracting behavior (1). But on the empirical side, the assessment is generally reversed. Compared to agency theory, transaction cost economics

(1) Voir note page suivante.

is seen as having been far more successful both at generating testable hypotheses and in explaining actual contracting practices.

In this article, we review the empirical research on contracting, with special emphasis on the relative contributions of agency and transaction cost theories, first, in providing structural guidance to empirical researchers and, second, in identifying observable determinants of both the decision to contract and the design of contractual agreements. We begin in section I with a description of the underlying structure and specification of contracting and contract duration models, followed by assessments of, first, the contributions of agency and transaction cost theories to the formulation of hypotheses about contracting decisions and, second, the evidence pertaining to those hypotheses. Section II extends the analysis from the decision *to contract* to the issue of contract design or, more precisely, to the relative success of agency theory and transaction cost economics in explaining the structure and content of contractual agreements. Section III comments briefly on the implications of empirical research on vertical integration for our understanding of contracting. Finally, in section IV, we provide an overall assessment of the literature's progress to date and discuss some remaining issues.

I. — WHY CONTRACT ?

Agency and transaction cost theories of contracting differ on the first and most basic question : Why contract ? Whereas the primary motives for contracting in the agency literature are risk transfer (insurance) and incentive alignment (see, generally, Hart and Holmstrom [1987]), transaction cost economists tend to view contracts more as devices for structuring ex post adjustments and for constraining wasteful (rent-dissipating) efforts to influence the distribution of gains from trade, including, especially, ex post bargaining and « hold-up » activities in transactions supported by relationship-specific investments (Williamson [1975], [1979] ; Klein, Crawford, and Alchian [1978]) and ex ante sorting and search in contexts where additional information serves merely to redistribute rather than expand the available surplus (Barzel [1982] ; Kenny and Klein [1983] ; Goldberg [1985]). Yet, despite these differences, the theories possess a common underlying structure. Before turning to the implications for empirical research of the differences in the theories, it will be useful to outline the basic decision structure that unites them.

- (1) Reviews of the agency literature can be found in Hart and Holmstrom [1987] and Furubotn and Richter [1998], among other sources. For purposes of this paper, we include under the heading « agency theory » complete contract theory (in the tradition of Myerson [1982]), incomplete contract theory (such as Grossman and Hart [1986]), and linear contract theory, the latter consisting of the set of models that restrict consideration to linear sharing rules (see, e.g., Allen and Lueck [1999] and Lafontaine and Slade [2000]). See Masten [1998b] for a discussion of the relation among these models.

1. Structure and Estimation

1.1. The contracting decision

In its most general form, the decision to contract represents a standard discrete choice problem : Transactors will choose to contract if the expected gains (net of transaction costs) from doing so are greater than those of organizing the transaction in some other way, or formally,

$$(1) \quad G^* = G^c, \text{ if } V^c > V^a, \text{ and} \\ = G^a, \text{ if } V^c \leq V^a ;$$

where G^c represents contracting, G^a an alternative to contracting, V^c and V^a (the transactors' beliefs about) the corresponding values of the transaction under contracting and the alternative, and G^* the governance form actually chosen.

Because the returns transactors expect from governing their transactions in different ways are difficult, if not impossible, to observe, a testable theory of contracting requires that the theory relate the benefits and costs of alternative governance arrangements to observable features of the transaction (2). To the previous arguments must thus be added relations of the form

$$(2) \quad V^c = V^c(X, e_c)$$

and

$$(3) \quad V^a = V^a(X, e_a),$$

where X represents a vector of observable attributes affecting the gains from trading under the relevant governance arrangements, and e_c and e_a are error terms that may reflect either variables omitted by the investigator or errors or misperceptions on the part of decision makers about the true values of V^c and V^a (3). If we assume, for practical reasons, that the preceding relations can be represented linearly as

$$(2') \quad V^c = \beta X + e_c$$

- (2) For a more detailed discussion of the problems of identifying the efficiency of alternative governance arrangements, see Masten, Meehan, and Snyder [1991].
- (3) Potential differences in the set of attributes that affect efficiency under alternative governance arrangements are captured in the model by the possibility that the estimated marginal effects of particular attributes equal zero.

and

$$(3') \quad V^a = \alpha X + e_a,$$

we can represent the probability that contracting will be chosen over the alternative governance form as $\Pr(G^* = G^c) = \Pr(V^c > V^a) = \Pr(e_a - e_c < (\beta - \alpha)X)$ (4). In words, an element of X whose effect on the expected gains from trade under contracting, β , is greater than its effect under the alternative arrangement, α , will increase the likelihood that contracting will be the observed form of governance. Theories of contracting inform the analysis by identifying which attributes empirical researchers should focus on, by predicting the differential effects (i.e., $\beta - \alpha$) of those attributes on the value of transacting and, potentially, by providing guidance on the functional form of the $V(X, e)$'s.

1.2. Contract duration

An alternative to the categorical formulation presented above is to treat the contracting decision as a question of contract duration: Instead of choosing between contracting and not contracting, transactors could be viewed as choosing how many periods (if any) their contract should cover. The absence of a contract, under this formulation, would then correspond to the limiting case of contract duration equal to zero. Conversely, one could view the contract duration decision as a series of discrete choices, in which transactors decide, for each future period, whether or not to govern exchange by contract. Drawing on this correspondence, we could represent the continuous analog to the discrete choice decision represented by equation (1) as

$$(4) \quad \max_{\tau} V^c(\tau) + V^a(T - \tau)$$

where τ represents contract duration, T the potential (possibly infinite) duration of the relationship between the parties, $V^c(\tau)$ the cumulative value of contractual exchange over the τ periods covered by the contract, and $V^a(T - \tau)$ the value of trade in the periods following expiration of the contract. Optimal contract duration, τ^* , is the value of τ that satisfies the first-order condition

$$(5) \quad V_{\tau}^c(\tau^*) = V_{\tau}^a(\tau^*).$$

In words, the parties would continue to increase contract duration until the value of transacting under a contract for an additional period was just equal to the (foregone) value of transacting without a contract in that period.

(4) This correspondence between the discrete choice framework and transaction-cost hypotheses was first outlined in Masten [1982], [1984].

As in the discrete choice case, our inability to observe the contracting parties' subjective expectations of V^c and V^a necessitates development of hypotheses that relate these values to observable attributes of transactions. Letting X and e again represent observable and unobservable factors, we can rewrite (5) as

$$(5') \quad V_{\tau}^c(\tau; X, e_c) = V_{\tau}^a(\tau; X, e_a).$$

Linearizing those functions as

$$(6) \quad V_{\tau}^c(\tau; X, e_c) = \beta_0 + \beta_1\tau + \beta_2X + e_c,$$

and

$$(7) \quad V_{\tau}^a(\tau; X, e_a) = \alpha_0 + \alpha_1\tau + \alpha_2X + e_a,$$

and substituting into (5') yields an expression for optimal contract duration, τ^* , of the form

$$(8) \quad \tau^* = \gamma_0 + \gamma_1 X + e$$

where

$$\gamma_0 = \frac{(\beta_0 - \alpha_0)}{\alpha_1 - \beta_1} \quad \text{and} \quad \gamma_1 = \frac{(\beta_2 - \alpha_2)}{\alpha_1 - \beta_1}$$

and $e = e_c - e_a$. For values of τ strictly between 0 and T , elements of X that increase the value of contracting for another period more than the foregone benefits of transacting without a contract in that period ($\beta_2 - \alpha_2 > 0$) will result in contracts of longer predicted duration. As in the discrete choice version of the model, the contribution of contract theories lies in identifying the attributes likely to affect the efficiency of contracting and its alternatives and in predicting the direction of their net effects.

Econometrically, equation (7) would seem to fit neatly the standard regression model. Two aspects of contract duration, however, necessitate departures from the standard model. One is duration's natural lower bound of zero, which affects how the distribution of the error term is parameterized. The second consideration is more peculiar to contracting. Because only contracts whose durations are at least as long as the difference between the sampling date and the contracting date « survive » long enough to appear in the sample – contracts written x years before the sampling date with durations greater than x years will appear in the sample but contracts with durations of less than x years will have expired and will not be represented – samples drawn from populations of contracts in existence at a point in time will tend to be over-represented by longer term agreements. If the unobserved determinants of contract duration are correlated with the observed variables, ordinary least

squares estimates of the coefficients in equation (7) will be biased (see, e.g., Maddala [1983], pp. 166-7). Empirical research on contract duration has generally recognized this data censoring problem and has sought to account for the potential bias using maximum likelihood estimation techniques (see Crocker and Masten [1988] and Joskow [1987]). A third issue, not addressed in the literature but relevant to studies of contract duration, is heteroscedasticity arising from the decreased precision with which contracting parties are likely to be able to assess the tradeoffs from altering contract duration at more distant dates. In the data, this phenomenon is manifested in the tendency for contract duration to be more « finely tuned » for shorter term agreements, which vary by intervals of days or months, while the duration of longer term contracts tends to cluster at discrete intervals of one, five, or ten years.

2. Predictions

Agency theory. Surprisingly, agency theory contains little explicit discussion either of the decision to contract or the choice of contract duration. Though seemingly a serious omission for a theory of contracting, the agency literature's inattention to those questions is consistent with the theory's inclusive use of the term *contract* to encompass any transaction (cf., for instance, Lyons [1996], p. 27). Under such a broad definition of contracting, it makes little sense to inquire whether contracting is desirable ; the only question is what form the contract will take. Even where agency theorists nominally distinguish between explicit and implicit contracts, agency theory provides no reason for transactors *not* to make their agreements explicit : Contracts deduced from agency axioms are complete, and therefore efficient, in the sense that (i) they specify each party's obligations for every possible contingency and (ii) they yield the best possible outcome given the information available at the time the agreement is carried out and thus « never need to be revised or complemented » (see, Holmstrom and Tirole [1989], p. 68). Combined with the assumption that courts enforce verifiable provisions costlessly, issues of contracting and contract duration are effectively removed from consideration.

To generate testable implications for contracting or contract duration from agency theory, it is thus necessary to step outside the deductive agency framework by invoking contracting (transaction) costs (see Hart and Holmstrom [1987], pp. 131-133). Given some nontrivial impediment to contracting, we can extrapolate that factors that increase the benefits of contracting will increase the likelihood and duration of contractual agreements. Since in agency theory those benefits derive from the sharing of risk and alignment of incentives, the theory would predict contracting and contract duration to be positively related to the level of risk (or uncertainty) and to the importance of effort and information to payoffs.

Transaction cost economics. In contrast with agency theory, the decision to contract and determinants of contract duration have been central concerns of the transaction cost literature. First, transaction cost economists, unlike agen-

cy theorists, tend to draw a clear distinction between contractual and noncontractual exchange, reserving the term *contract* for formal, legal commitments to which transactors give express approval and to which a particular body of law applies. By contracting, transactors expose themselves to potential third-party (judicial) sanctions for failing to honor their commitments and alter the procedures for resolving disputes and adapting to changing circumstances. In particular, whereas parties transacting without a contract are generally free to haggle, stall, or walk away as they please if dissatisfied with the terms of trade currently tendered, the law restricts the ability of contracting parties to extort concessions from their counterparts by unilaterally refusing to deal or threatening not to perform.

In terms of the models of the previous section, the principle benefits of contracting, V^c , or, in the contract duration context, of contracting for an additional period, V_t^c , in the transaction cost framework are (i) the greater willingness of transactors to take actions whose value is conditional on the other party's performance, and (ii) a reduction in the costs of (repeated) bargaining. The costs of contracting (i.e., foregone benefits of not contracting), V^a , meanwhile, include (i) the costs of anticipating, devising optimal responses to, and specifying future contingencies (formation costs), and (ii) the losses associated with efforts to enforce, evade, or force a renegotiation of the contract's terms and the « maladaptation » costs of failing adjust to changing circumstances (execution costs). The benefits of contracting, and therefore the likelihood of contracting and the duration of contractual agreements, increase with the value of relationship-specific investments, while more complex or uncertain transactions make specification and verification of performance more difficult and increase the risk that the contract will impede desirable adjustments or induce costly evasion or renegotiation efforts, and thus discourage transactors from entering formal, long term agreements.

3. Evidence

Agency theory. We are unaware of any empirical studies of the decision to contract or of contract duration from an agency perspective. As we discuss below, however, evidence from transaction cost studies, where variables of interest in the theories overlap, offers little support for agency theory concerns.

Transaction cost economics. To the best of our knowledge, only one large-scale empirical study of the choice between formal contracting and informal agreements has been undertaken to date. In a study of the contracting practices of U.K. engineering subcontractors and their customers, Lyons [1994] found that the probability that firms adopted a formal contract was significantly higher the greater the share of the subcontractor's output accounted for by that customer, the greater the percent of that output specifically designed to that customer's requirements, and where production required significant investments in specific capital. The likelihood of a formal contract fell, on the other hand, where the subcontractor employed expensive, but flexible, equipment

and where the firm produced an advanced technology product : the greater complexity and uncertainty likely to be associated with advanced technology products would tend to make contract specification and enforcement more difficult. The evidence is thus consistent with transaction cost predictions regarding the benefits of contracting in the presence of relationship-specific investments and the liabilities of contracting in complex and uncertain environments.

Several studies have examined the transaction cost determinants of contract duration. An early and well-known example is Joskow's [1987] econometric analysis of the duration of approximately 300 contracts between coal mines and coal-fired electricity generators. Joskow's analysis exploited (i) regional differences in the characteristics of coal and transportation alternatives across the U.S., (ii) differences in the proximity of mines and power plants, and (iii) variations in contract quantity, to create proxies for the degrees of physical-asset specificity, site specificity and dedicated assets. Joskow found the duration of coal contracts to be approximately 11 years greater in Western states, where coal is more heterogeneous, mines are larger, distances greater, and transportation alternatives fewer, than in the eastern U.S., where coal tends to be more homogeneous, mines are smaller and more numerous, distances are shorter, and transportation alternatives abundant, with Midwestern coal contracts intermediate both in duration and characteristics. Longer still, by approximately 12 years, were contracts for coal supplied to power generators located at the mouth of a mine. Finally, contract duration increased by an additional 13 years for each additional million tons of coal contracted for.

While Joskow's study provided evidence that contract duration varies with the benefits of contracting, Crocker and Masten's [1988] study of 245 natural gas contracts sought to assess variations in the costs as well as the benefits of contracting on the duration of contractual agreements. Like Joskow, Crocker and Masten found evidence of a positive relation between contract duration and appropriation hazards ; contracts tended to be of shorter duration for wells in gas fields (i) served by larger numbers of producers and pipelines (reducing appropriation hazards) and (ii) in which only a single producer operated, eliminating the risk of pipelines exploiting the common pool-drainage problem to extract price concessions. Crocker and Masten also found, however, (i) that natural gas contracts written during the period of greater uncertainty following the 1973 Arab oil embargo tended to be shorter (by an average of three years) than contracts written before the embargo, and (ii) that misaligned incentive provisions (a byproduct of price regulation) reduced contract duration by an average of 14 years. Finally, in addition to the study's substantive findings, Crocker and Masten developed a model of the contract duration decision that, though rudimentary, nevertheless yielded specific functional relationships for their estimations.

A pair of more recent studies by Saussier, [1998] [1999], analyzing contracts for coal transportation in France also examine both the costs and benefits of

contract duration (5). Saussier finds that the duration of these contracts was positively related to the value of investments in relationship-specific assets (as measured by the value of start-up investments and guaranteed contract quantities) and negatively related to the level of demand uncertainty over time. In addition, Saussier uses two-stage least squares and a set of exogenous instruments to endogenize the level of specific investments, addressing a potential limitation of the earlier literature. He finds his results to be largely robust to this refinement.

Finally, Bercovitz [1999] applies transaction cost reasoning to analyze the duration of franchise contracts, an area of study otherwise dominated by agency-oriented research (see, generally, Lafontaine and Slade [2000]). Consistent with the evidence from other contract duration studies, Bercovitz finds that the duration of franchise agreements is significantly longer the larger franchisee initial investments, which, she argues, are likely to be correlated with the franchisee's specific investment (6). In addition, Bercovitz argues that the threat of nonrenewal under shorter term contracts allows franchisors greater ability to discipline opportunistic franchisees. Consistent with this, she finds that franchise agreements tend to be of shorter duration in systems having the greatest potential for franchisee free-riding (as measured by the value of the system's brand name and the locational density of franchise outlets).

Although not specifically designed to test agency hypotheses, the results of several of these studies bear indirectly on the validity of predictions derived from agency concerns. Thus in as much as high technology projects tend to be riskier than simpler procurements, Lyons' [1994] finding that engineering subcontractors adopt formal contracts less frequently for projects characterized as high tech conflicts with what would be expected if risk transfer was a primary motive for contracting. Crocker and Masten's [1988] and Saussier's [1998] [1999] findings that contracts tend to have shorter duration in periods of higher uncertainty appear also to be inconsistent with the use of contracting as a mechanism to allocate risk (7).

- (5) Saussier had access to the full population of the contracts written over the period covered by his study and therefore did not face the censoring problem present in Joskow's and Crocker and Masten's studies. Saussier's study, however, involved a smaller number of contracts (29 or 70, depending on the specification).
- (6) Acknowledging that much of the equipment franchisees use is redeployable, Bercovitz includes only 10 % of equipment expenditures in this figure.
- (7) Compare Goldberg and Erickson [1987], p. 398.

II. — CONTRACT DESIGN

1. Specification and estimation

The variety of possible contract designs is virtually unlimited : the structure of contractual agreements may vary with, among other things, the objectives of the contracting parties, underlying production relations, and the nature and size of informational and strategic impediments to contract formation and enforcement. As a consequence, theory provides no unifying structure for the specification and testing of contract design hypotheses.

At a practical level, contract provisions and their analysis, like the contracting decision itself, take both discrete and continuous forms. Contract terms such as price (Joskow [1988b]) ; royalty rates and franchise fees (Lafontaine [1992] ; Bercovitz [1999]) ; and take-or-pay provisions (Masten and Crocker [1985] ; Mulherin [1986]) vary continuously, while other provisions such as price adjustment methods (Crocker and Masten [1991] ; Crocker and Reynolds [1993]) and the assignment of authority or discretion often have a discrete, on-or-off character. In still other cases, researchers have chosen to treat contract terms as discrete choices empirically even though conceptually the « discrete » alternatives are actually the limit values of some continuous contract parameter. An example is the treatment of fixed and variable payment schedules as discrete alternatives (see Leffler and Rucker [1991], Allen and Lueck [1992] ; and Masten and Snyder [1993]) even though the « choices » represent corner solutions within a more general contract containing continuously varying fixed *and* variable components (8).

The most common econometric issues to arise in the testing of contract design hypotheses consist of reasonably familiar simultaneity and endogeneity concerns and, for some continuously varying provisions, accommodations for limits on the range of the dependent variable. The only problem to arise so far that is even remotely peculiar to contracting concerns the systematic over-sampling of longer term contracts discussed earlier, which could bias estimates of the coefficients in contract design regressions to the extent that the errors in the contract duration and design equations are correlated. Empirical studies of contract terms that have recognized and made efforts to control for this potential bias include Joskow [1988b] ; and Crocker and Masten [1991].

(8) See Lafontaine and Slade [2000]. Empirically, contracts often do contain only fixed or variable payments, not both, a fact that suggests discontinuities in how the terms operate.

2. Predictions

Agency theory. Despite the profusion of agency theoretic models, neither complete nor incomplete contract theory has produced much in the way of testable hypotheses. In the case of complete contract theory, the potential complexity of optimal incentive schemes and their « extreme sensitivity » to changes in information assumptions have prevented formulation of general hypotheses about contract form (Hart and Holmstrom [1987], pp. 80-81, 105). On the other hand, incomplete contract theory, despite its name, is actually a theory of ownership rather than contracting that, by imposing severe restrictions on feasible contract forms, assumes in essence what a theory of contracting seeks to explain (9).

Partly because of their relative tractability, the literature on linear sharing contracts has been more successful than complete and incomplete contract theories at generating predictions. The main prediction of that literature is that efficient sharing rules will balance incentives for one party against inefficient risk bearing by that party or the incentives of trading partners ; larger shares should tend to be assigned to the party with (i) lower aversion to risk and (ii) the higher marginal productivity of effort. More recently, the generalization of the linear agency model to multi-task settings has augmented the list of agency predictions, most notably with the prediction that contracts should provide agents who perform multiple or multidimensional tasks, some aspects of which are difficult to measure, with low-powered incentives (Holmstrom and Milgrom [1991]).

Transaction cost economics. Transaction cost economists acknowledge the role of contract terms in aligning marginal incentives but see an additional function of contract design in preventing wasteful efforts to redistribute existing surpluses. In contrast to moral hazard, which represents a deviation from joint-surplus maximizing behavior within the terms of an extant contract, this second form of opportunism includes efforts to evade performance or to force a renegotiation of a contract's terms by imposing costs on one's trading partner. Because the incentive to engage in such efforts is likely to be related to the ex post distribution of contractual surpluses – parties greatly disadvantaged by the terms of a contract are more likely to want to evade or renegotiate a previous deal – contracting parties will seek to design contracts to divide ex post rents « equitably » (Masten [1988b]), keep the relationship with the agree-

(9) While sympathizing with the view that individuals are not capable of dealing with unlimited complexity, purists complain that, in the absence of an accepted model of bounded rationality, restrictions on feasible contract forms are unavoidably arbitrary and *ad hoc* (e.g. Tirole [1999], pp. 752-3 ; Hart and Holmstrom [1987], pp. 133, 148).

ment's « self-enforcing range » (Klein [1992]), or, equivalently, achieve what Oliver Williamson has called « hazard equilibration » ([1985], p. 34) (see also, Goldberg [1985] and Goldberg and Erickson [1987]). The more uncertain the environment and the harder it is to accommodate changing circumstances within the contract, the more likely it will be that parties will sacrifice the precision and ease of implementation of definite contract terms for more cumbersome but flexible « relational » contract terms that define performance obligations less precisely or establish procedures for negotiating adjustments in the terms of trade within the contract.

3. Evidence

Agency theory. In addition to its failure to generate testable hypotheses, complete contract theory has been criticized, by agency theorists themselves, for failing to account for even the more basic features of real world contracts. Thus, whereas the theory predicts detailed and complex payment rules specifying each party's performance obligations for every possible contingency (in the case of discrete contingencies) and elaborate nonlinear pricing rules (in the continuous case), actual contracts incorporate few if any explicit contingencies and generally use simple, typically linear, pricing schemes (Holmstrom and Hart [1987] ; and Bhattacharyya and Lafontaine [1995]).

Agency models that impose linearity at the outset thus start out with an obvious advantage in explaining observed contracts. Among the settings that have been analyzed in linear agency terms are franchising (Matthewson and Winter [1985] ; Lal [1990]), agricultural share-cropping (Stiglitz [1974] ; Eswaran and Kotwal [1985]), and product warranties (Priest [1981] ; Cooper and Ross [1985]). Yet despite the variety of settings to which agency models potentially apply, empirical studies of the determinants of contract terms from an agency perspective have been limited (see Lafontaine and Slade [2000]). One reason for this is the difficulty of finding workable proxies for contracting parties' relative risk aversion and the marginal contributions of their efforts to joint surplus. To the extent that these factors are difficult or impossible to measure, acceptance of the theory's predictions often turns on accepting nonfalsifiable risk preference and marginal productivity assumptions (Stigler and Becker [1977] ; Allen and Lueck [1995]).

Where risk arguments *have* been subjected to formal tests, they have not done well. For example, in franchising, where much of the recent empirical work has been directed, observed correlations between uncertainty and royalty rates are inconsistent with the standard assumption of franchisee risk aversion (Lafontaine [1992]). Risk sharing as a motive for contracting has fared poorly in other settings as well. Allen and Lueck [1992] [1999], for instance, conclude that the incidence of crop-share versus fixed-rent contracts between farmer-tenants and landowners is inconsistent with the maintained assumption that farmers are more risk averse than landowners. Similarly, Leffler and Rucker [1991] reject risk sharing as inconsistent with the incidence of lump-

sum versus royalty payments in contracts between timber harvesters and land owners.

Predictions from agency models based on incentive (as opposed to risk) considerations have fared somewhat better in general. Lafontaine [1992], for example, found that royalty rates across franchises tend to vary with the relative importance of franchisor and franchisee effort. On the other hand, « franchise fees are in general not negatively correlated with royalty rates, despite the fact that the standard principal-agent model suggests that they should be » (Lafontaine and Slade [2000]). Empirical research on agency contracting has also been criticized for focusing on an exceedingly limited range of contract terms (e.g., Bercovitz [1999]).

Transaction cost economics. Empirical transaction cost research on contract design has looked primarily at three types of provisions : incentive provisions, pricing structures, and price adjustment methods. Like the agency literature, transaction cost studies of incentive provisions have sought to determine whether contract terms align the interests of the contracting party and promote efficient adjustment to uncertainty. These studies have sought to explain more than just sharing rules, however. Studies by Masten and Crocker [1985] and Mulherin [1986], for instance, analyzed the incidence of take-or-pay provisions in natural gas contracts. Using data sets covering different periods in the history of gas contracting, the studies found that take-or-pay obligations varied with the alternative value of gas reserves, supporting an incentive interpretation over the alternative view that take-or-pay provisions served distributional or risk-sharing purposes (e.g., Hubbard and Weiner [1986]) (10). Though these studies approached the issue of take-or-pay obligations from a transaction cost perspective, their hypotheses and results are broadly consistent with an agency theoretic approach (11).

The overlap between transaction cost and agency theory predictions with respect to incentives can also be seen in two recent studies on the inclusion of « protective » provisions in franchise contracts. Although Bercovitz [1999] and Brickley [1999] analyze the use of various « nonprice-related » restric-

(10) Crocker and Masten's [1988] finding that distortions in the size of take-or-pay provisions significantly reduced the willingness of parties to engage in long-term contracting offered further support for the incentive interpretation of take-or-pay provisions. Case studies describing the use of minimum purchase requirements for coal (Carney [1978]), petroleum coke (Goldberg and Erickson [1987]), and bauxite (Stuckey [1983]), among other products, also corroborate this finding (see Masten [1988a], pp. 91-92, for a discussion).

(11) Compare, for example, Shavell's [1984] theoretical development of efficient breach analysis with the characterization of the optimal take or pay provision in Masten and Crocker [1985].

tions on behavior in franchise agreements in similar terms and derive similar predictions, one describes her analysis as « building on the transaction cost framework » (Bercovitz [1999]) while the other « uses agency theory to develop testable implications » (Brickley [1999]) (12). The papers provide evidence that noncompete clauses (Bercovitz), passive ownership prohibitions, area development plans, and mandatory advertising requirements (Brickley) are positively related to proxies for the potential for franchisee free riding and/or the size of initial investments.

Transaction cost economists have taken a distinct approach to the analysis of pricing structures in contracts, however. Whereas agency theory analyzes pricing structures in moral hazard and risk sharing terms, transaction cost economists have viewed the choice between fixed and variable payment terms as reflecting efforts to economize on transaction costs. An example is Leffler and Rucker's [1991] study of lump-sum versus per-unit pricing structures in timber harvesting contracts. In Leffler and Rucker's analysis, fixed-payment contracts give purchasers an incentive to engage in extensive presale measurement of timber quality and quantity, whereas per-unit contracts discourage harvesters from harvesting timber efficiently and require greater post-agreement monitoring and enforcement efforts. Using a sample of 188 North Carolina timber contracts, Leffler and Rucker found the use of per-unit pricing to be more prevalent on relatively heterogeneous timber tracks for which presale search costs were likely to be higher. Allen and Lueck's [1999] finding of a positive correlation between the variance in crop yields and the use of cash rent (fixed price) contracts for farm land – the exact opposite of the prediction based on farmer risk aversion – is consistent with a hypothesis that farmers find it easier to misreport crop yields when variations in exogenous factors (weather, pest infestations) are greater (see also Allen and Lueck [1998]). Transaction cost considerations also figure prominently in Masten and Snyder's [1993] analysis of pricing arrangements in equipment leases.

Empirical research also supports the role of « hazard equilibration » in contract design. Crocker and Masten [1991], for instance, conclude from their study of price adjustment in natural gas contracts that circumstances favoring the use of long-term, fixed-quantity agreements favor the adoption of relatively indefinite price adjustment provisions over formulaic adjustment mechanisms that, although less costly to implement, are more likely to induce efforts to evade performance obligations in extreme situations. As Goldberg and Erickson [1987] have noted, greater reliance on renegotiation provisions in fixed versus variable quantity contracts is difficult to reconcile with incentive alignment motives. Crocker and Reynolds' [1993] study of jet engine procure-

(12) More specifically, Brickley [1999] interprets his results as being consistent with the multi-task agency model of Holmstrom and Milgrom [1991], p. 747.

ment contracts found that contracts tended to contain more flexible price adjustment mechanisms as performance horizons lengthened and technological uncertainty increased, while contractor litigiousness and the absence of alternative engine suppliers favored more definite price terms. More generally, Saussier [2000] provides evidence that the « completeness » of contracts, as measured by the number of dimensions of performance specified in the contract, varies with the attributes of the transaction : Contracts for the transport of coal in France tend to contain more details the greater the level of asset specificity but include fewer provisions as uncertainty increases. Thus, overall, the available evidence supports the notion that, in designing contracts, transactors are sensitive to the tradeoff between the specification costs and rigidities associated with detailed performance obligations in uncertain or complex transactions, on the one hand, and the greater flexibility but higher expected cost of establishing terms of trade ex post with less definite « relational » contract provisions, on the other.

III. — CONTRACTING VERSUS VERTICAL INTEGRATION

While our discussion of contracting in section I presumed that the alternative to contracting was a simple, arms-length or « market » transaction, in practice the relevant alternative to contract is often vertical integration or « internal organization ». For space reasons and because the empirical literature on vertical integration versus contracting has been discussed at length in several recent and extensive reviews (e.g., Shelanski and Klein [1995] ; Crocker and Masten [1996] ; Coeurderoy-Quélin [1997] ; and Lafontaine and Slade [1997], [2000]), we confine ourselves here to a few observations.

Agency theory. Complete contract theory is unable to distinguish contracting from other institutional and organizational forms and thus unable to inform the choice between contracting and integration (13). Incomplete contract theory, by contrast, was developed specifically to explain the existence of the firm and might therefore be expected to inform the contract versus vertical integration decision. Contracting and integration are not treated as alternatives in the incomplete contract framework, however. Rather, the theory asks only which of two (or more) parties to a contract should own a particular asset ; the relationship between the parties themselves remains contractual regardless of who owns the asset (14).

(13) Models of vertical integration within the complete contract framework such as Crocker [1983] differentiate contracting from integration through the *deus ex machina* of eliminating information asymmetries upon integration.

(14) On the potentially testable implications of incomplete contract theory with respect to ownership (as opposed to integration) and their relation to the empirical literature, see Whinston [2000].

Given the limitations of complete and incomplete contract theories, linear contracting models have again, as in the case of contract design issues, been the primary source of predictions concerning the choice between contracting and integration within the broad agency framework. Or, to be more precise, models of the optimal linear share parameter have been used to extrapolate predictions about integration decisions : Assigning a large share of the residual to agents corresponds to the high-powered incentives associated with arms-length contracts, while a low share generates the low-powered incentives conventionally attributed to integration (see Lafontaine and Slade [2000]). Agency theory thus predicts that integration is likely to dominate contracting where conditions favor allocating more of the risk to the principal, namely, the principal is the lower cost risk bearer or the value of the principal's (noncontractible) effort is greater than that of the agent. Although the evidence supports the predicted effect of relative effort contributions, the empirical literature « strongly rejects » the prediction that higher risk leads to more integration (Lafontaine and Slade [2000]) (15). Finally, Holmstrom and Milgrom [1991] interpret Anderson's [1985] and Anderson and Schmittlein's [1984] findings that the importance of non-selling activities and difficulty measuring performance of sales agents leads to greater integration as support for the predictions of multi-task agency theory ; the inability to measure some of the multiple dimensions of an agent's effort favors reliance on lower-powered incentives and the imposition of restrictions of agent behavior frequently associated with integration (Holmstrom and Milgrom [1994]) (16).

Transaction cost economics. The vertical integration, or make-or-buy, decision has been the most extensively studied question in the empirical transaction cost literature (for overviews, see Joskow [1988] ; Shelanski and Klein [1995] ; and Crocker and Masten [1996]). For present purposes, two results are of particular note. First, the empirical literature reveals a consistent preference for integration over contracting as the specificity of investments increases. Thus, whereas asset specificity favors contracting when the alternative is

- (15) The empirical literature on franchise contracting versus company ownership also generally shows that the larger the required initial investment of agents the more likely are outlets to be integrated. Depending on whether initial investment is regarded as a proxy for risk or for agent effort, this result may or may not be consistent with the predictions of agency theory (see Lafontaine and Slade [2000]). To the extent that initial investment is correlated with the size of specific investments, the finding could also be interpreted as supporting transaction cost predictions (see Bercovitz [1999]).
- (16) Lafontaine and Slade [2000] review these arguments and other evidence. Although Holmstrom and Milgrom [1991] frame the problem in agency terms, the effects of measurement costs on contracting and integration decisions have long been part of the transaction cost literature (see, e.g., Barzel [1982]). Several of the relevant empirical studies also describe the problem in transaction cost terms.

simple exchange, contracting becomes less attractive as a way of protecting reliance or relationship-specific investments where the alternative to contracting is integrated ownership and production. Contracting thus appears to be only an imperfect response to the hazards posed by relationship-specific investments. Second, the evidence indicates that uncertainty and complexity also diminish the attractiveness of contracting relative to integration (e.g., Masten [1984]; Anderson and Schmittlein [1984]). Together with the evidence that uncertainty and complexity discourage contracting relative to simple exchange, these findings reinforce the conclusion that contracts are a costly and inflexible way to provide for future adaptations.

IV. — SOME CAUTIONARY NOTES

The relative contributions of agency theory and transaction cost economics in explaining observed contracting practices owe in some degree to differences in methodology. Agency theorists, with their emphasis on axiomatic deduction, have been hesitant to incorporate into their models constraints, such as bounds on cognitive ability, that cannot be easily modeled (see, e.g., Hart [1990], [1995]). Transaction cost economists working in the tradition of Ronald Coase and Oliver Williamson, by contrast, have sought to develop and refine theory guided more by specific phenomena or puzzles than by the susceptibility of the model to mathematical modelling. Although both have their place in the evolution of knowledge, it is not surprising in light of this difference that transaction cost economics – and, to a lesser extent, the more empirically oriented linear agency models – has turned out to have had more success empirically than the more mathematically elegant but ethereal complete and incomplete contract theories.

The term « success » can only be applied relatively, however ; « tentative progress » would be a more apt description. Though not specific to empirical research on contracting, a variety of issues should temper our confidence in the findings to date. Probably chief among those is the quality of proxies used for the explanatory variables identified by the theory. Often, these proxies are crude and imprecise stand-ins for the variables of true interest or are endogenous. Strictly speaking, the specificity of assets and the level of investment in those assets, which are treated as exogenous variables in much of the research, are themselves decision variables ; the location of facilities, the adoption of specialized designs or equipment, and the scale of investments, all of which have been treated as exogenous in the literature, should, by rights, be treated as endogenous variables. Only a few studies have made tentative steps in that direction (see, e.g., Lyons [1995], and Saussier [1999]).

Another limitation of the existing research has been its tendency to analyze individual provisions from complex contracts separately. Although focusing on individual contract terms has facilitated statistical analysis of the role of such terms, it has done so at the expense of ignoring potentially important interactions with and qualifications by other contract provisions that can radi-

cally alter or even negate their nominal meaning (see Masten [1998a]). Given that contract provisions will have been chosen simultaneously and are likely to interact with one another – often, as Goldberg and Erickson [1987] note, in subtle and unexpected ways – empirical contracting studies should, ideally, estimate the full set of contract provisions simultaneously. The econometric tools to handle such interactions and qualifications exist ; Joskow [1987] and Crocker and Masten [1991], for example, have analyzed interactions among contract terms using standard simultaneous equation techniques (17). The binding constraint here is not technique but data availability. As the number of provisions analyzed increases, the number of explanatory variables and the size of the data set needed for statistical identification multiplies. Often, sufficient numbers of observations to analyze more than two or three provisions at a time will simply not exist. But even where the population is sufficiently large for statistical confidence, inadequacies in the scope and quality of the data that can be obtained on a large scale can temper conceptual confidence in statistical results.

For these reasons, case studies are an important, indeed necessary, complement to econometric analysis. Although case studies are often (justifiably) disparaged on the grounds that they lack generality and invite ex post rationalization, such concerns must be weighed against the aforementioned limitations of statistical analyses and the richer perspective that high-quality case studies can offer. What case studies lack in generality they often make up in depth. Data and measurement problems that would cripple econometric analyses often yield to intensive scrutiny of a single or small number of cases. And while a case study cannot disprove the general validity of a theory, a single, well-documented fact can refute the applicability of a theory to a particular case. Moreover, puzzles and anomalies encountered in case studies can and often have been the stimulus to refinements in the theory. Finally, some cases – the contracts between Microsoft and computer equipment manufacturers, for example – are important enough in their own right to warrant intensive analysis.

To compensate for lack of generality, a good case study will seek to account for a more complete range of details in addition to exploiting whatever variation exists over time and across transactions. The transaction cost literature contains a number of excellent case studies that satisfy these but not the criteria for statistical confidence. Examples include Stuckey's [1983] analysis of organizational arrangements in the aluminum industry ; Palay's [1984] work on rail-freight contracts ; Gallick's [1984] analysis of the relations between tuna harvesters and processors ; Joskow's [1985] preliminary exploration of

(17) Bercovitz [1999] and Brickley [1999] also analyze multiple provisions but do not systematically analyze possible interactions among them.

vertical relations between coal mines and electric utilities ; Goldberg and Erickson's [1987] study of petroleum coke contracts ; Masten and Snyder's [1993] analysis of United Shoe Machinery Corp.'s lease terms ; Pirrong's [1993] analysis of variations in ocean shipping contracts ; Kaufman and Lafontaine's [1994] calculation of economic rents earned by McDonald's franchisees ; and Menard's [1996] investigation of organizational arrangements in the French poultry industry. What distinguishes these studies is their success in explaining the consistency among and variations in contractual details using a limited set of simple provisions. Such thoroughly researched and carefully argued case studies provide an important check that econometric analyses, in abstracting away from contract complexity to accommodate data limitations, don't misconstrue the purpose and function of particular terms.

Research on contracting has already begun to influence how courts think about contracting and resolve contract disputes (see, for instance, *PSI Energy v. Exxon Coal, USA*, 991 F.2k 1265 [1993]) and has normative implications for antitrust policy and business decision making as well. It is important, therefore, that positive theories of contracting behavior stand on as solid an empirical footing as possible. Although theoretical tensions are likely to persist between those who value axiomatic rigor and those willing to invoke empirical regularities to develop testable predictions, there are indications that agency theory and transaction cost approaches to problems of contracting and organization are converging (cf. Tirole, 2000). If that happens, the reality check provided by empirical research on contracting is likely to have played a significant role in that convergence.

REFERENCES

- ALLEN D.W., LUECK D., [1992], « Contract Choice in Modern Agriculture : Cropshare versus Cash Rent », *Journal of Law and Economics*, 35, pp. 397-426.
- ALLEN D.W., LUECK D., [1995], « Risk Preference and the Economics of Contracts », *American Economic Review*, 85, pp. 447-451.
- ALLEN D.W., LUECK D., [1998], « The Nature of the Farm », *Journal of Law and Economics*, 41, pp. 343-386.
- ALLEN, D.W. LUECK, D., [1999], « The Role of Risk in Contract Choice », *Journal of Law, Economics, and Organization*, October (in press).
- ANDERSON E. [1985], « The Salesperson as Outside Agent or Employee : A Transaction Cost Perspective », *Management Science*, 4, pp. 234-254.
- ANDERSON E., SCHMITTLEIN D.C., [1984], « Integration of the Sales Force : An Empirical Examination », *Rand Journal of Economics*, 15, pp. 3-19.
- BARZEL, Y., [1982], « Measurement Cost and the Organization of Markets », *Journal of Law and Economics*, 25, April, pp. 27-48.
- BERCOVITZ, J.E.L. [1999], « An Analysis of the Contract Provisions In Business-Format Franchise Agreements », in J. Stanworth and D. Purdy (ed.), « Franchising Beyond the Millennium : Learning Lessons from the Past » ; Proceedings of the 13th Conference of the Society of Franchising.
- BHATTACHARYYA, S., LAFONTAINE F. [1995], « Double-Sided Moral Hazard and the Nature of Share Contracts », *Rand Journal of Economics*, 26, pp. 761-781.
- BRICKLEY, J.A. [1999], « Incentive Conflicts and Contractual Restraints : Evidence from Franchising », *Journal of Law and Economics* 42, pp. 745-774.

- CARNEY, E.M. [1978], « Pricing Provisions in Coals Contracts », Rocky Mountain Mineral Law Institute, New York, Matthew Bender, pp. 197-230.
- COEURDEROY R. and B. QUÉLIN [1997] « L'économie des coûts de transaction. Un bilan des études empiriques sur l'intégration verticale », *Revue d'Économie Politique*, 107, pp. 145-181.
- COOPER, R., ROSS, T.W. [1985], « Product Warranties and Double Moral Hazard », *Rand Journal of Economics* 16, 103-113.
- CROCKER, K.J. [1983], « Vertical Integration and the Strategic Use of Private Information », *Bell Journal of Economics*, 14, pp. 236-248.
- CROCKER K.J., MASTEN S.E., [1991], « Pretia ex Machina ? : Prices and Process in Long Term Contracts », *Journal of Law and Economics*, 34, pp. 64-69.
- CROCKER K.J., MASTEN S.E., [1988], « Mitigating Contractual Hazard : Unilateral Options and Contract Length », *Rand Journal of Economics*, 19 (3), pp. 327-343.
- CROCKER K.J., MASTEN S.E., [1996], « Regulation and Administered Contracts Revisited : Lessons from Transaction-Cost Economics for Public Utility Regulation », *Journal of Regulatory Economics*, 9 (1), pp. 5-39.
- CROCKER K.J., REYNOLDS K.J., [1993], « The Efficiency of Incomplete Contracts : An Empirical Analysis of Air Force Engine Procurement », *Rand Journal of Economics*, 24, pp. 126-146.
- ESWARAN, M., KOTWAL, A. [1985], « A Theory of Contractual Choice in Agriculture », *American Economic Review*, 75, pp. 352-67.
- FURUBOTN, E. G. and RICHTER, R. [1998], « Institutions and Economic Theory : The Contribution of the New Institutional Economics ». Ann Arbor : The University of Michigan Press.
- GALLICK E.C, [1984] « Exclusive Dealing and Vertical Integration : The Efficiency of Contract in the Tuna Industry », Bureau of Economics Staff Report to the Federal Trade Commission, reprinted in Masten, S.E, (Ed.), Case Studies in Contracting and Organization, New York, Oxford University Press.
- GOLDBERG, V. P. [1985], « Price Adjustment in Long-Term Contracts ». *Wisconsin Law Review*, 1985, pp. 527-543.
- GOLDBERG V.P., ERICKSON J.E., [1987], « Quantity and Price Adjustment in Long Term Contracts : A Case Study of Petroleum Coke », *Journal of Law and Economics*, 30, pp. 369-398.
- GROSSMAN S.J. and O.D HART [1986] « The Costs and Benefits of Ownership : a Theory of Vertical Integration », *Journal of Political Economy*, 94, 691-719.
- HART, O.D. [1990], « Is "Bounded Rationality" an Important Element of a Theory of Institutions ? » *Journal of Institutional and Theoretical Economics*, 146, December, pp. 696-702.
- HART, O.D. [1995], « Firms, Contracts, and Financial Structure ». Oxford and New York : Oxford University Press, Clarendon Press.
- HART, O. D. and HOLMSTRÖM, B. [1987], « The Theory of Contracts », in Advances in Economic Theory, T.R. Bewley (ed.). Fifth World Congress. Cambridge : Cambridge University Press, pp. 369-98.
- HECKMAN, J.J. [1979], « Sample Selection Bias as a Specification Error », *Econometrica*, 47, pp. 151-163.
- HOLMSTRÖM B., MILGROM P., [1991], « Multitask Principal-Agent Analyses : Incentive Contracts, Asset Ownership and Job Design », *Journal of Law, Economics and Organization*, 7, pp. 24-51.
- HOLMSTRÖM B., MILGROM, P., [1994], « The Firm as an Incentive System », *American Economic Review*, 84, pp. 972-991.
- HOLMSTRÖM, B., and TIROLE, J. [1989], « The Theory of the Firm », in Schmalensee, R. and Willig, R.D. (eds.), Handbook of Industrial Economics. New York : Elsevier Science Publishing, pp. 61-133.
- HUBBARD R., WEINER R.J., [1986] « Regulation and Long-Term Contracting in U.S. Natural Gas Markets », *Journal of Industrial Economics*, 35, pp. 31-79.

- JOSKOW P.L., [1985], « Vertical Integration in Long term Contracts : The Case of Coal-Burning Electric Generating Plants », *Journal of Law, Economics and Organization*, 33, pp. 33-80.
- JOSKOW P.L., [1987], « Contract Duration and Relationship-Specific Investment : Empirical Evidence from Coal Markets », *American Economic Review*, 77 (1), pp. 168-185.
- JOSKOW P.L., [1988a)], « Asset Specificity and the Structure of Vertical Relationships : Empirical Evidence », *Journal of Law Economics and Organization*, 4, pp. 95-117.
- JOSKOW P.L., [1988b)], « Price Adjustment in Long Term Contracts : The Case of Coal », *Journal of Law and Economics*, 31, pp. 47-83.
- KAUFMAN, P.J., LAFONTAINE, F. [1994] « The Costs of Control : The Source of Economic Rents for McDonald's Franchisees », *Journal of Law and Economics*, 37, October, pp. 417-443.
- KENNEY R.W., KLEIN B., [1983] « The Economics of Block Booking », *Journal of Law and Economics*, 26, pp. 497-540.
- KLEIN B., CRAWFORD R.G., ALCHIAN A., [1978], « Vertical integration appropriable quasi-rents and the competitive contracting process », *Journal of Law and Economics*, 21 (2), pp. 297-326.
- KLEIN, B. [1992], « Contracts and Incentives », in L. Werin and H. Wijkander (eds.), *Contract Economics*. Cambridge, MA : Basil Blackwell. pp. 149-172.
- LAFONTAINE F., [1992], « Agency Theory and franchising : Some Empirical Results », *Rand Journal of Economics*, 23, pp. 263-283.
- LAFONTAINE F., SLADE M.E., [1997], « Retail Contracting : Theory and Practice », *Journal of Industrial Economics*, XLV, pp. 1-25.
- LAFONTAINE F., SLADE M.E., [2000], « Incentive Contracting and the Franchise Decision », in K. Chatterjee and W. Samuelson (eds.), *Advances in Business Applications of Game Theory*. Kluwer Academic Press (forthcoming).
- LAL, R. [1990], « Improving Channel Performance through Franchising », *Marketing Science*, 9, pp. 299-318.
- LEFFLER K.B., RUCKER R.R., [1991], « Transaction Costs and The Efficient Organization of Production : A Study of Timber Harvesting Contracts », *Journal of Political Economy*, 99, pp. 1060-1087.
- LYONS B.R., [1996], « Empirical Relevance of Contract Theory : Inter-Firm Contracts », *Oxford Review of Economic Policy*, 12, pp. 27-53.
- LYONS B.R., [1995], « Specific Investment, Economies of Scale, and the Make or Buy Decision : A Test of Transaction Cost Theory », *Journal of Economic Behaviour and Organization*, 26, pp. 431-443.
- LYONS B.R., [1994], « Contract and Specific Investment : An Empirical Test of Transaction Cost Theory », *Journal of Economics and Management Strategy*, 3, pp. 257-278.
- MADDALA, G.S. [1983], « Limited-Dependent and Qualitative Variables in Econometrics ». Cambridge : Cambridge University Press.
- MASTEN, S.E., [1982], « Transaction Costs, Institutional Choice and the Theory of the Firm ». Unpublished Ph.D. thesis.
- MASTEN S.E., [1984], « The Organization of Production : Evidence from the Aerospace Industry », *Journal of Law and Economics*, 27, pp. 403-417.
- MASTEN S.E., [1988a)], « Minimum Bill Contracts : Theory and Policy », *Journal of Industrial Economics*, 37, pp. 85-97.
- MASTEN S.E., [1988b)], « Equity, Opportunism and the Design of Contractual Relations », *Journal of Institutional and Theoretical Economics*, 144, pp. 180-195.
- MASTEN S.E., [1998a], « Nominal Terms, Real Intentions, and Contract Interpretation », paper presented to the 2nd International Conference on New Institutional Economics, Paris, September.
- MASTEN S.E. [1998b] « Contractual Choice », *Encyclopedia of Law & Economics*, B. Boukaert and G. De Geest (Ed.), Edward Elgar Publishing and the University of Ghent (forthcoming).

- MASTEN S.E., CROCKER K.J., [1985] « Efficient Adaptation in Long Term Contracts : Take-or-pay Provisions for Natural Gas », *American Economic Review*, 75, pp. 1083-1093.
- MASTEN S.E., MEEHAN J.W., SNYDER E.A., [1991], « Costs of Organization », *Journal of Law, Economics and Organization*, 7, pp. 1-27.
- MASTEN S.E., SNYDER E.A., [1991], « The Design and Duration of Contracts : Strategic and Efficiency Considerations », *Law and Contemporary Problems*, 52, pp. 63-85.
- MASTEN S.E., SNYDER E.A., [1993], « United States v. United Shoe Machinery Corp. : On The Merits », *Journal of Law and Economics* ; 36, pp. 33-70.
- MATHEWSON, G. F., WINTER, R.A. [1985], « The Economics of Franchise Contracts », *Journal of Law and Economics*, 28, pp. 503-526.
- MÉNARD C. [1996], « On Clusters, Hybrids, and Other Strange Forms : The Case of the French Poultry Industry », *Journal of Institutional and Theoretical Economics* ; 152, March, pp. 154-83.
- MONTEVERDE K., TEECE D. [1982] « Supplier Switching Costs and Vertical Integration in the Automobile Industry », *Bell Journal of Economics*, 13, pp. 206-213.
- MULHERIN, J.H., [1986], « Complexity in Long Term Contracts : An Analysis of Natural Gas Contract Provisions », *Journal of Law, Economics and Organization*, 2, pp. 105-117.
- MYERSON, R. [1982], « Optimal Coordination Mechanisms in Generalized Principal-Agent Problems », *Journal of Mathematical Economics*, June, pp. 67-81.
- PALAY, T.M., [1984], « Comparative Institutional Economics : The Governance of Rail Freight Contracting », *Journal of Legal Studies*, 13, pp. 265-287.
- PIRRONG C., [1993], « Contracting Practices in Bulk Shipping Markets : A Transactions Cost Explanation », *Journal of Law and Economics*, 36, pp. 937-976.
- PRIEST, G. [1981], « A Theory of the Consumer Product Warranty », *Yale Law Journal*, 90, pp. 1297-352.
- SAUSSIÉ, S. [1998], « La durée des contrats interentreprises », *Économie et Prévision*, 135, pp. 137-146.
- SAUSSIÉ S. [1999] « Transaction Cost Economics and Contract Duration : An Empirical Analysis of EDF Coal Contracts », *Louvain Economic Review*, 65, pp. 3-21.
- SAUSSIÉ S. [2000] « Contractual Completeness and Transaction costs », Forthcoming in the *Journal of Economic Behavior and Organization*, 42, pp. 189-206.
- SHAVELL, S. [1984], « The Design of Contracts and Remedies for Breach », *Quarterly Journal of Economics*, 98, pp. 121-148.
- SHELANSKI, H., KLEIN, P.G. [1995], « Empirical Research in Transaction Cost Economics : A Review and Assessment », *Journal of Law, Economics, and Organization*, 11, pp. 335-61.
- STIGLER, G.J. BECKER, G.S. [1977], « De Gustibus Non Est Disputandum », *American Economic Review*, 67, pp. 76-90.
- STIGLITZ, J.E. [1974], « Incentives and Risk-Sharing in Sharecropping », *Review of Economic Studies*, 41, pp. 219-255.
- STUCKEY J.A., [1983], « Vertical Integration and Joint Ventures in the Aluminum Industry », Cambridge, Harvard University Press.
- TIROLE, J. [1999], « Incomplete Contracts : Where Do We Stand ? », *Econometrica*, 67, pp. 741-82.
- WHINSTON, M.D., [2000], « On the Transaction Cost Determinants of Vertical Integration », (mimeo, January).
- WILLIAMSON O.E. [1971] « The Vertical Integration of Production : Market Failure Considerations », *American Economic Review*, 61, pp. 112-123.
- WILLIAMSON O.E. [1975] « Markets and Hierarchies : Analysis and Antitrust Implications - A Study in the Economics of Internal Organization », New-York Free Press.
- WILLIAMSON, O.E. [1979], « Transaction-Cost Economics : The Governance of Contractual Relations », *Journal of Law and Economics*, 22, pp. 233-262.
- WILLIAMSON O.E., [1985], « The Economic Institutions of Capitalism », New-York Free Press.
- WILLIAMSON O.E., [1996], « The Mechanisms of Governance », Oxford University Press.
- WILLIAMSON O.E., MASTEN S.E. [1995], « Transaction Cost Economics », Aldershot, UK : Edward Elgar Publishing.