# Pragmatic Methodology:

# A Sketch, with Applications to

# Transaction Cost Economics

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I address the topic of pragmatic methodology as a practitioner in applied microeconomics who has been working in the still nascent field of the "economics of organization." My purpose is both to make explicit the methodology out of which transaction cost economics works and to suggest that other theories of economic organization do the same. Conceivably convergence will develop in the process, maybe even a consensus. At a minimum, it will be useful to have each implicit methodology made explicit.

I begin with some contrasting views on methodology. Section 2 sets out the rudiments of pragmatic methodology. Section 3 examines how transaction cost economics responds to the four precepts of pragmatic methodology. Additional methodological considerations that are posed by transaction cost economics are discussed in Section 4. Concluding remarks follow.

## 1. Some Background

Tjalling Koopmans' (1957) chapter on "The Construction of Economic Knowledge" begins with a section titled "The Bad Repute of Methodology," which opens with a quote from Dennis H. Robertson, who finds "it necessary in self-defense to start with a few words on the distasteful subject of methodology" (Koopmans, 1957, p. 129). Koopmans nevertheless perseveres and ends up siding with Roy Harrod: "My substantial excuse for choosing methodology today is that I find a strong inner urge to say something" (1957, p. 130).

My strong inner urge is to take exception with the "anything goes"

predilection to which Mark Blaug (1997, p. 20) refers – both in general and, especially, with reference to transaction cost economics.

## 2. Pragmatic Methodology

Describing himself as a native informant rather than as a certified methodologist, Robert Solow's "terse description of what one economist thinks he is doing" (2001, p. 111) takes the form of three precepts: keep it simple; get it right; make it plausible. Keeping it simple is accomplished by stripping away inessentials, thereby to focus on first order effects – the main case, as it were – after which qualifications, refinements, and extensions can be introduced. Getting it right entails working out the logic. And making it plausible means to preserve contact with the phenomena and eschew fanciful constructions.

Solow observes with reference to the simplicity precept that "the very complexity of real life … [is what] makes simple models so necessary" (2001, p. 111). Keeping it simple requires the student of complexity to prioritize: "Most phenomena are driven by a very few central forces. What a good theory does is to simplify, it pulls out the central forces and gets rid of the rest" (Friedman, 1997, p. 196). Central features and key regularities are uncovered by the application of a focused lens.

Getting it right "includes translating economic concepts into accurate mathematics (or diagrams, or words) and making sure that further logical operations are correctly performed and verified" (Solow, 2001, p. 112); and plausible simple models of complex phenomena are expected to "make sense for 'reasonable' or 'plausible' values of the important parameters" (Solow, 2001, p. 112). Also, because "not everything that is logically consistent is credulous" (Kreps, 1999, p. 125), fanciful constructions that lose contact with the phenomena are suspect − especially if alternative and more veridical models yield refutable implications that are congruent with the data.

This last brings me to a fourth precept: derive refutable implications to which the relevant (often microanalytic) data are brought to bear. Nicholas Georgescu-Roegen had a felicitous way of putting it: "The purpose of science in general is not prediction, but knowledge for its own sake," yet prediction is "the touchstone of scientific knowledge" (1971, p. 37). Indeed, most economists know in their bones that theories that are congruent with the data are more influential. Milton Friedman's reflections on a lifetime of work are pertinent: "I believe in every area where I feel that I have had some influence it has occurred less because of the pure analysis than it has because of the empirical evidence that I have been able to organize."[1]

Inasmuch as the social sciences deal with exceptionally complex phenomena (Simon, 1957, p. 89; Wilson, 1999, p.183), "any direction you proceed in has a very high a priori probability of being wrong; so it is good if other people are exploring in other directions" (Simon, 1992, p. 21). Accordingly, we are concerned with theories (plural) rather than a theory (singular). Also pertinent in this connection is that theories rarely appear full blown but undergo a natural progression – from informal to pre-formal, semi-formal, and fully formal stages of development – over which interval the relation between the theory and the evidence is interactive (Newell, 1990, p. 14):

> Theories cumulate. They are refined and reformulated, corrected and expanded. Thus, we are not living in the world of Popper … [Theories are not] shot down with a falsification bullet…. Theories are more like graduate students – once admitted you try hard to avoid flunking them out…. Theories are things to be nurtured and changed and built up.

Successive refinements and reformulations of a theory do not, however, go on indefinitely. Sooner or later the time comes for a reckoning when each would-be theory needs to stand up and be counted – which I take to mean that each candidate theory

should be examined with reference to the four precepts of pragmatic methodology, with special emphasis on the last.

## 3. Transaction Cost Economics

The relation of transaction cost economics to each of the four precepts of pragmatic methodology is herein described.

### 3.1 Keep it simple

Of the many purposes served by economic organization, transaction cost economics names transaction cost economizing as the main case – broadly in the spirit of Frank Knight's contention that (1941, p. 252; emphasis added):

> Men in general, and within limits, wish to behave economically, to make their activities and <u>their organization</u> "efficient" rather than wasteful. This fact does deserve the utmost emphasis; and an adequate definition of the science of economics … might well make it explicit that the main relevance of the discussion is found in its relation to social policy, assumed to be directed toward the end indicated, of increasing economic efficiency, of reducing waste.

The more common assumption in 1941 and for the ensuing 30 years was that monopolizing rather than economizing was the main case, but that was conceptually wrong-headed and led to public policy error. Ronald Coase spoke to the prevailing misconception as follows: "If an economist finds something – a business practice of one sort or another – that he does not understand, he looks for a monopoly explanation. And as in this field we are very ignorant, the number of un-understandable practices tends to be rather large, and the reliance on a monopoly explanation frequent" (1972, p. 67). Public policy errors ensued, as witness the "inhospitality tradition" in antitrust enforcement – according to which nonstandard contractual practices and organizational

structures were regarded “not hospitably in the common law tradition, but inhospitably in the tradition of antitrust.”[2]

Although monopolizing reasoning is sometimes mesmerizing (as in the business strategy literature, where monopolizing ploys and positioning are commonly the main case), the power and importance of economizing reasoning has made progressive headway.[3] Pertinent in this connection is that economizing can take several forms, of which transaction cost economics focuses principally on adaptation.

Interestingly, both the economist Friedrich Hayek and the organization theorist Chester Barnard were in agreement that adaptation is the main problem of economic organization, but they differed as to kind. Autonomous adaptations in response to changes in relative prices were responsible for the “marvel of the market” to which Hayek (1945) referred. Barnard (1938), by contrast, focused on coordinated adaptations of a “conscious, deliberate, purposeful kind” accomplished with the support of hierarchy. Conditional on the attributes of transactions, adaptations of both kinds are important – which is to say that transaction cost economics examines markets and hierarchies in a combined way (rather than persist with the old ideological divide between markets or hierarchies).

### 3.2 Get it right

The transaction cost economics response to the precept “get it right” is to examine the economizing purposes of economic organization through the lens of contract, where the lens of contract is to be contrasted with the neoclassical resource allocation paradigm – the lens of choice − which focuses on prices and output, supply and demand, and describes the firm as a black box that transforms inputs into outputs according to the laws of technology.

If and as, however, “mutuality of advantage from voluntary exchange … [is] the most fundamental of all understandings in economics” (Buchanan, 2001, p. 29), then

economic organization should be examined through the lens of contract – as well or instead. As applied to the economics of organization, the lens of contract divides into two parts: ex ante incentive alignment and ex post governance. As between these two, transaction cost economics focuses predominantly on the ex post governance of contractual relations, broadly in the spirit of John R. Commons' reformulation of the problem of economic organization, namely: "the ultimate unit of activity … must contain in itself the three principles of conflict, mutuality, and order. This unit is a transaction" (Commons, 1932, p. 4).

Although Commons subsequently recommended that "theories of economics center on transactions and working rules, on problems of organization, and on [how] … the organization of activity is … stabilized" (1950, p. 21), a coherent theory of organization for implementing these novel ideas eluded Commons and his followers, possibly because the concept of transaction cost had yet to surface and because of the primitive state of organization theory at the time. Be that as it may, TCE subscribes to and aspires to operationalize both parts of the Commons program, in that the transaction is made the basic unit of analysis and governance has the purpose and effect of infusing order, thereby to mitigate conflict and realize mutual gain. This is a recurrent theme. Crucial, moreover, to the operationalization of TCE is that the transaction costs that matter are of a comparative kind. It is neither here nor there, for purposes of organizing a particular transaction, if two alternative modes of governance have high but identical transaction costs. As discussed in 3.4, below, transaction cost differences are where the economizing action resides.

Note with respect to the logic of economic organization that TCE operates at a much more microanalytic level of analysis than does orthodoxy. Rather than deal with composite goods and services, TCE focuses on transactions, the attributes of which matter. The firm, moreover, is described not as a black box but as a mode of

governance to be compared with alternative modes or organization, each of which displays distinct attributes. As Kenneth Arrow observed (1987, p. 734):

> … the New Institutional Economics movement [of which TCE is a part] … does not consist primarily of giving new answers to the traditional questions of economics – resource allocation and the degree of utilization. Rather it consists of answering new questions, why economic institutions have emerged as they did and not otherwise … [and] brings sharper nanoeconomic … reasoning to bear.

Although many economists are reluctant to engage the microanalytics and prefer to work at what they regard as the "high ground," it is elementary that the high ground comes at a high cost if the application of textbook reasoning fails to provide good answers to old questions and/or fails to pose new questions that expose core issues, especially those that have public policy significance.

3.3 Make it plausible

Making it plausible poses tensions with both of the first two precepts. When plausibility collides with simplicity and mathematical tractability, what to do?

In the spirit of pluralism to which I referred earlier, different economists will decide that differently. For my purposes here I merely observe that TCE provides "added plausibility" in the following four respects: (1) the cognitive and self-interestness attributes of human actors are described as bounded rationality and opportunism respectively;[4] (2) express provision is made for key intertemporal regularities of economic organization (of which the Fundamental Transformation is one and bureaucratization is another);[5] (3) the limits of the courts for contract enforcement purposes are admitted (whereupon much of the burden of contract implementation falls upon private ordering); and (4) as discussed in Section 4, TCE asks that each simple

model of economic organization confront the challenge of scaling up, thereby to approximate the real world phenomenon (e.g., the modern corporation) of interest.

3.4 Predictions and empirical testing

Some social scientists scoff at prediction, evidently in the belief that prediction is easy. Also, since everyone knows that "it is easy to lie with statistics," what useful purpose is served by empirical testing? My experience is different: prediction is a demanding standard and corroboration is not easy but difficult.

The comparison between managerial discretion theory and transaction cost economics is illustrative. Whereas the economics of discretionary behavior (Williamson, 1964, 1970) took exception with the standard assumption that managers in the large corporation were reliably committed to profit maximization and predicted that the managerial firm and the neoclassical firm would differ in their responses to variations in the condition of the environment (as between adverse and munificent) and to lump sum taxes, compelling evidence was difficult to work up and indirect tests were merely suggestive. In the end, few economists were persuaded. The neoclassical theory of the firm remained securely in place.

Neoclassical economics also long resisted the logical lapse to which Coase referred in his famous 1937 paper on "The Nature of the Firm," where Coase put his finger on a "gap in economic theory." Thus whereas neoclassical theory took the organization of economic activity as between firm and market as given, Coase advised that firm and market should be viewed as <u>alternative</u> modes for organizing economic activity, the choice between which (the make-or-buy decision) varied among transactions and <u>should be derived</u> (1937, p. 389). Many economists agreed that this lapse should be repaired, yet the 1937 article was "much cited and little used" 35 years later (Coase, 1972, p. 63). The missing ingredient was lack of operationalization. Here as elsewhere, it takes a theory to beat a theory (Kuhn, 1970, p. 77).

Not only did the fiction of zero transaction costs need to give way to positive transaction costs, but tautological uses of transaction cost reasoning needed to give way to a predictive theory of which transactions would be organized by which modes of governance and why. Naming and explicating the key microanalytic attributes of transactions and of governance was vital. In the spirit of Jon Elster's dictum that "explanations in the social sciences should be organized around (partial) mechanisms rather than (general) theories (1994, p. 75; emphasis in original), attention was focused not on economic organization in general but on the intermediate product market transaction in particular.

Interestingly, vertical integration was both the first problem to which transaction cost economics and would become the paradigm problem in relation to which a vast variety of other contractual phenomena would be interpreted as variations on a transaction cost economizing theme.[6] Empirical tests for the relation between the asset attributes of transactions and vertical integration got underway in the 1980s (Monteverde and Teece, 1982; Masten, 1984) and have been continued and refined since – becoming "one of the great success stories in [empirical] industrial organization over the last 25 years" (Whinston, 2001, p. 185). Reaching beyond vertical integration, published empirical transaction cost articles numbered over 900 as of 2005 (Macher and Richman, 2006) and cover a vast range of contractual phenomena (Macher and Richman, 2006, p. 37).

TCE, moreover, has found applications beyond business and economics to include the contiguous social sciences of law, organization theory, and political science. Indeed, transaction cost has become one of the "unifying languages" within economics and more generally. This would not have occurred but for the development of a logic of organization that operated at a more microanalytic level of analysis, an insistent demand for predictive content, and the ensuing empirical research agenda.

4. Supplementary Considerations

Although the four precepts of pragmatic methodology are more basic and universal in their application than are the four supplementary considerations that I introduce here, I contend that all contractual theories to economic organization and should be examined with respect to the following: the key attributes of human actors on which they rely; the unit of analysis; the scaling up of simple models to approximate the phenomena of interest; and remediableness.

Human Actors: Whereas, to their credit, economists commonly give meticulous attention to the mechanisms through which their theories work, the implied attributes of the human actors who implement these mechanisms often receive scant attention. Evidently human actors can be expected to rise to the occasion, as defined by "whatever the theory calls for."

That is rather cavalier, yet might be justified by invoking the precepts of simplicity and prediction/testing. Because a "more realistic" theory would be more complex and less tractable, let the predictions and empirical tests thereof speak for the assumptions. But then what are we to make of the many would-be theories that are remiss in prediction/testing respects? Surely there is no harm in unveiling the implied assumptions about human actors. Indeed if, as Herbert Simon contends, "Nothing is more fundamental in setting our research agenda and informing our research methods than our view of the nature of the human beings whose behavior we are studying" (1985, p. 303), there could be benefits. Especially relevant to the study of contract (and arguably more generally) are the cognitive competence and self-interest attributes that are ascribed to human actors.[7]

Cognitive competence and self-interest attributes are interactive in the context of contract (Williamson, 1985, pp. 30-32, 43-63). In the face of strong assumptions about

cognitive competence (unbounded rationality, or variations, thereon), concerns over contractual defection by reason of opportunism vanish. But similarly, if strong assumptions about benign behavior and/or the reliability of promise are made, the needs to think through complex contingencies and engage in forward planning are vastly reduced.

If, for example, human actors possess the cognitive ability to implement comprehensive contingent claims contracting, then we are in the world of Arrow-Debreu where contracts are ubiquitous, whereupon organization is unneeded for coordination or control purposes. If instead the list of six assumptions that are made by Drew Fudenberg, Bengt Holmstrom, and Paul Milgrom (1990) apply, then we are in a world where a sequence of short-term contracts can implement an optimal long-term contract.[8] The latter assumes a slightly weaker condition of rationality than does the former, but the analytical impact of both, as these relate to opportunism, is identical: both vitiate contractual hazards attributable to opportunism. If and as implicit cognitive assumptions made in the service of analytical convenience obscure rather than spotlight key issues, such assumptions should be made explicit.

Transaction cost economics describes both cognition and self interest in a two-part way. Specifically, cognition combines bounded rationality with feasible foresight while self interest joins benign behavior with opportunism. Thus all complex contracts are unavoidably incomplete (by reason of bounded rationality) yet human actors are assumed to have the capacity to look ahead, recognize hazards, work out the mechanisms, and, albeit imperfectly, factor the ramifications back into the ex ante contractual design (by reason of feasible foresight). Also, most human actors will do what they agree to and some will do more most of the time (benign behavior), but outliers for which the stakes are great will elicit defection and/or posturing with the purpose of inducing renegotiation (which are manifestations of opportunism).

The combination of bounded rationality and state-contingent opportunism transform the world of complete contracting into one where (1) all complex contracts are unavoidably incomplete (by reason of bounded rationality) and (2) contractual hazards await (by reason of opportunism). The assumption of feasible foresight nevertheless affords relief, in that the parties to such incomplete contracts will craft ex ante cost-effective credible commitments − of which unified ownership of both stages ( vertical integration) is an extreme case.

Unit of Analysis: Not all theories of economic organization name the unit of analysis out of which they work, but some do. The "role," the "decision premise," and the "routine" have been variously recommended. The unit of analysis for the behavioral theory of the firm and for evolutionary economics is the routine. The unit of analysis for transaction cost economics is the transaction.

More is needed, however, than merely to nominate a unit of analysis. It has been vital to transaction cost economics and is important more generally, to name the critical dimensions with respect to which the unit of analysis (e.g., the transaction) differs. This in turn depends on how human actors are described in both cognitive and self interest respects. Given the description of human actors on which transaction cost economics relies, the critical attributes of transactions are asset specificity (which is a measure of bilateral dependency, to which maladaptation hazards accrue), uncertainty (the disturbances, small and great, to which transactions are subject), and the frequency with which transactions recur, which has a bearing on both reputation effects (in the market) and private ordering mechanisms (within firms).[9]

Absent dimensionalization, would-be units of analysis lack predictive content. Appeal to vague units often leads to obscuration.[10]

Scaling Up: Solow observes that "The very complexity of real life … [is what] makes simple models so necessary" (2001, p. 111). The object of a simple model is to capture the essence, thereby to explain hitherto puzzling practices and make predictions that are subjected to empirical testing. But simple models can also be "tested" with respect to scaling up. Does repeated application of the basic mechanism out of which the simple model works yield a result that recognizably describes the phenomenon in question?[11]

The test of scaling up is often ignored, possibly out of awareness that scaling up cannot be done. Sometimes it is scanted, possibly in the belief that scaling up can be accomplished easily. The influential paper by Michael Jensen and William Meckling on "Theory of the Firm: Managerial Behavior, Agency Costs, and Capital Structure" (1976) is an exception.[4] The authors work out of a simplified setup where an entrepreneur (100% owner-manager) sells off a fraction of the equity of the firm, as a result of which his incentive intensity is reduced and monitoring and credible contracting issues are posed. What the authors are really interested in, however, is not entrepreneurial firms but in the "modern corporation whose managers own little or no equity" (1976, p. 356). Investigating the latter is beyond the scope of their paper, but they express belief that "our approach can be applied to this case"… [These issues] remain to be worked out in detail and will be included in a future paper" (1976, p. 356). The authors deserve credit for recognizing the need for scaling up.

Alas, Jensen and Meckling never produced the follow-up paper, but that is not the end of the story. The fundamental challenges posed by Jensen and Meckling have occupied a place of prominence on the research agenda of finance economics in the years since (Tirole, 2006). Especially noteworthy is what Jean Tirole refers to as the investor activism paradigm, which takes the form of a three-tier hierarchy: "(1) agent

(entrepreneur), (2) supervisor (large monitor), (3) principal (other investors). The role of the monitor is … to reduce the asymmetry of information between the principal [dispersed shareholders] and the agent [entrepreneur]. This role is endangered by the possibility of collusion" between the monitor and the entrepreneur (Tirole, 2006, p. 362). Of the several candidates for monitor that Tirole discusses, the variant that most nearly applies to the separation of ownership from control in the modern corporation is the monitor as compliant board of directors.

Scaling up issues relevant to the modern corporation are also posed by the theory of the firm as team production (Alchian and Demsetz, 1972) and the theory of the firm as governance structure. The theory of team production is grounded in a condition of technological nonseparability, which Alchian and Demsetz illustrate with the example of manual freight loading: "Two men jointly lift heavy cargo into trucks. Solely by observing the total weight loaded per day, it is impossible to determine each person's marginal productivity" (1972, p. 779). Accordingly, rather than pay each person according to his (unmeasurable) marginal product, such activities are organized cooperatively (as a team), the members of which are paid as a team and are monitored by a boss lest they engage in shirking. This is instructive, but does technological nonseparability scale up to explain the modern corporation?

One possibility is that the large corporation is an indecomposable whole, in which event everything is connected with everything else and the condition of technological nonseparability is operative throughout the entire enterprise. Another possibility is that, as Simon describes in "The Architecture of Complexity" (1962), large hierarchical systems are broken down into nearly decomposable subsystems – within which interactions are extensive and between which they are attenuated.[12] Simon's examination of social, biological, physical, and symbolic systems as well as the logic of

complexity supports the proposition that decomposability "is one of the central structural schemes that the architect of complexity uses" (1962, p. 468).

The Alchian and Demsetz model of team production makes no provision for decomposability. Accordingly, the boundary of the firm is defined by the cluster of technologically nonseparable activities within which continuous real time coordination is vital. Manual freight loading qualifies, as do groups as large as the symphony orchestra. Because, however, team production does not extend to the decision to join a series of technologically separable stages such as we observe in the modern corporation, the theory of team production does not scale up to form the modern corporation.

How does that transaction cost economics setup fare in scaling up respects? Does successive application of the make-or-buy decision, as it is applied to individual transactions, scale up to describe something that approximates a multi-stage firm? Note in this connection that transaction cost economics assumes that the transactions of interest are those that take place between technological separable stages. This is the "boundary of the firm" issue as described elsewhere (Williamson, 1985, pp. 96-98). Upon taking the technological "core" as given,[13] attention is focused on a series of separable make-or-buy decisions − backward, forward, and lateral – to ascertain which should be outsourced and which should be incorporated within the ownership boundary of the firm. So described, the firm is the inclusive set of transactions for which the decision is to make rather than buy – which does implement scaling up, or at least is a promising start (Williamson, 1985, pp. 96-98).

More generally, all candidate theories of the firm should be examined in scaling up respects. The public policy ramifications of would-be theories of the modern corporation that do not scale up should be regarded with precaution..

Remediableness: Avinash Dixit's examination of The Making of Economic Policy (1996) opens with a discussion of normative public policy analysis in which the government is assumed to maximize a social welfare function. Policymaking, so described, is viewed "as a purely technical problem. The implicit assumption is that once a policy that maximizes or improves social welfare has been found and recommended, it will be implemented as designed, and the desired effects will follow" (Dixit, 1996, pp. 8-9). This is tantamount to doing black box welfare economics in which transaction costs are assumed to be zero.

It is Dixit's judgment (and mine) that applied welfare economics, like the theory of the firm, should open up the black box and examine "the actual workings of the mechanism inside" (Dixit, 1996, p. 9). What I have referred to as the Remediableness Criterion is an effort to restore perspectives.

The Remediableness Criterion holds that an extant practice or mode of organization for which (1) no feasible superior alternative can be described and (2) implemented with expected net gains is (3) presumed to be efficient. The first condition removes hypothetical ideals from the relevant comparison set. The second makes provision for implementation obstacles of both political (real politick) and economic (setup cost) kinds. The Remediableness Criterion thus both disallows pronouncements of inefficiency that rest on a comparison of an actual (hence flawed) practice with a hypothetical (ideal) alternative and asks the public policy analyst to be more respectful of the political process.[14]

As Robert Michels observed early in the 20th century, we need first to understand deviations from ideals, of which the appearance of oligarchy in systems that were organized with democratic purpose is one, if we are to deal with them effectively: "Nothing but a serene and frank examination of the oligarchical dangers of democracy

will enable us to minimize these dangers, even though they can never be entirely avoided" ([1915] 1962 p. 370). Oligarchy is merely one illustration of path dependent outcomes for which a serene and frank examination of the microanalytic mechanisms is needed if hazard mitigation is to be accomplished.

## 5. Conclusions

A colleague remarked that the four precepts of pragmatic methodology as herein described are uncontroversial. I am pleased if others concur. Pragmatic methodology is concerned first and foremost, however, with practice. Agreement in theory and noncompliance in practice are altogether too common. If and as the demands of logical consistency (in theory) yield infeasibility (in practice), applied economists will understandably question whether the theory is ripe for applications in practice.

Transaction cost economics responsively relates, I think, to each of the four precepts of pragmatic methodology. It furthermore adds four supplementary considerations that are relevant to contractual theories of economic organization and more generally. Both transaction cost economics and pragmatic methodology nevertheless remain works in progress.[15]

## Footnotes

1. Personal communication, February 6, 2006, from Milton Friedman to the author.
2. The quote is attributed to the then head of the Antitrust Division of the U.S. Department of Justice by Stanley Robinson, 1968, N.Y. State Bar Association, Antitrust Symposium, p. 29.
3. Although the strategic pursuit of monopoly power is analytically interesting, for most firms in large and open economies such power is negligible or fleeting. For most firms in most industries most of the time, therefore, economy is the best strategy. That sounds mundane and sometimes is. As the study of private ordering reveals, however, many fascinating economizing issues are posed upon examining economic organization through the lens of contract rather than the orthodox lens of choice.
4. These are discussed further in Section 4.
5. For an elaboration, see Williamson (1985, chaps. 2, 6).
6. The overarching discriminating alignment hypothesis is this: transactions, which differ in their transactional attributes, are aligned with governance structures, which differ in their cost and competence, so as to effect a transaction cost economizing result.
7. Note that many phenomena that do not appear to be contractual in nature can often be reformulated in contractual terms, of which Coase's reformulation of the externality problem (1960) is an early example.
8. The more controversial assumptions made by Fudenberg et al, have the effect of annihilating problems of information asymmetry. This is accomplished by

assuming three-way costless knowledge of public outcomes (by principal, agent, and arbiter) and common knowledge of both technology and preferences over action-payment streams. These assumptions make strong (but unexamined demands) on limited cognitive competence.

9. Also crucial to the transaction cost economics project is the proposition that governance is the means by which to infuse order, thereby to mitigate conflict and realize mutual gain. Alternative modes of governance – markets, hybrids, and hierarchies - are described as discrete structural syndromes of attributes to which adaptive strengths and weaknesses accrue.

Incentive intensity, decision and administrative control instruments, and contract law regime are the defining attributes with respect to which governance structures are described. Interestingly, but not surprisingly, market and hierarchy are polar opposites in these three respects – in that markets are characterized by high-powered incentives, negligible administrative control, and a legal rules contract law regime whereas hierarchies display low-powered incentives, considerable administrative control, and settle internal disputes administratively with the support of forbearance law. The discriminating alignment hypothesis provides the predictive link between transactions and governance structures. (See note 6, supra.)

10. Although naming the decision premise as the unit of analysis (Simon, 1957) has been instructive for human problem solving (Newell and Simon, 1972), it has not been similarly useful to the economics of organization. And while naming the routine as the unit of analysis in evolutionary economics seems to be important – "routines play the role [in economic evolutionary theory] that genes play in biological evolutionary theory" (Nelson and Winter, 1982, p. 14) – the critical

attributes with respect to which routines differ have yet to be named. Possibly Geoffrey Hodgson's definition of a routine as "organizational dispositions to energize conditional patterns of behavior within an organized group of individuals, involving sequential response to cues" (2006, p. 208) will be instructive, but that too awaits dimensionalization.

11. Other examples where scaling up issues are posed include Thomas Schelling's treatment of the evolution of segregation in the "self-forming neighborhood" (Schelling, 1978, pp. 147-155), the expansive claims sometimes made on behalf of the paradox of voting (Williamson and Sargent, 1967), and the move from project financing to composite financing in the modern corporation (Williamson, 1988).

12. "The loose … coupling of subsystems … [means that] each subsystem [is] independent of the exact timing of the operation of the others. If subsystem B depends upon subsystem A only for a certain substance, then B can be made independent of fluctuations on A's production by maintaining a buffer inventory" (Simon, 1977, p. 255).

13. The technological core often rests on site specificity considerations, of which the realization of thermal economics between successive separable stages of production is an example (Williamson, 1996, pp. 15-16).

14. As George Stigler puts it, "government's goals as revealed by actual practice [deserve respect and] are more authoritative than those pronounced by professors of law or economics" (1992, p. 459).

15. Probably the most insistent challenge for transaction cost economics has been to move beyond the logic of words and diagrams (as in Williamson 1985, 1991,

1996) to include “full formalization” of a mathematical modeling kind. Although recent formalization work has been undertaken (Bajari and Tadelis, 2001; Levin and Tadelis, 2005; Tadelis and Williamson, 2007), full formalization remains a work-in-progress. Other challenges to transaction cost economics include making provision for (1) the early stage development of high-technology firms (where real-time responsiveness is of the essence); (2) differences in the institutional environment (to which the literatures on Positive Political Theory (Spiller and Tommasi, 2007) and multinational investment (Oxley, 1999; Henisz and Zelner, 2005) are pertinent); (3) applications to “human capital” firms (law firms; consultants) and non-commercial enterprise (Hansmann, 1996; Williamson, 1999); and (4) the enduring puzzles of corporate governance (Williamson, 2007). Also, issues of endogeneity in conjunction with empirical testing have been posed (Masten and Saussier, 2000). Although responses to all of the above have been fashioned, more such work is needed and new challenges can be expected to arise.

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