

BEHAVIORAL ASSUMPTIONS AND THEORY DEVELOPMENT: THE CASE OF TRANSACTION COST ECONOMICS

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From a critical realist perspective, I discuss the role played by behavioral assumptions in organization theories, and use transaction cost economics as an illustrative example. Core behavioral assumptions often constitute the foundation of the mechanistic explanations of a theory, and thus should play a pivotal role in theory development. I distinguish between assumption-based and assumption-omitted theory testing, and show that empirical research in transaction cost economics has been dominated by assumption-omitted testing. To establish a solid foundation for a new theory, management researchers should pay more attention to assumption-based testing. Copyright © 2006 John Wiley & Sons, Ltd.

Truly important and significant hypotheses will be found to have ‘assumptions’ that are wildly inaccurate descriptive representations of reality, and, in general, the more significant the theory, the more unrealistic the assumptions ... the relevant question to ask about the ‘assumptions’ of a theory is not whether they are descriptively ‘realistic,’ for they never are, but whether they are sufficiently good approximations for the purpose in hand. And this question can be answered by seeing whether the theory works, which means whether it yields sufficiently accurate predictions (Friedman, 1953: 14–15).

The above bold statements were made more than half a century ago in response to the extensive debate aroused by Lester’s (1946) trenchant attack on the realism of the behavioral assumptions of marginal theory. Lester’s point is that,

according to his empirical study, business executives do not arrive at their production decisions through consulting schedules or multivariate functions showing marginal cost and marginal revenue. But marginal theory assumes they do. Thus, the theory’s behavioral assumptions do not reflect what takes place in reality. Friedman’s (1953) famous thesis on economic assumptions has created the most important methodological debate within the discipline (Mäki, 2000) and is said to be probably the most influential of the noted economist’s numerous works (Mayer, 1993).

Unfortunately, a similar methodological debate has never occurred in management research in general and strategy research in particular. With few exceptions (e.g., Ghoshal and Moran, 1996; Heiman and Nickerson, 2002; Wright, Mukherji, and Kroll, 2001), researchers seldom pay close attention to the role played by assumptions, especially behavioral assumptions, in organization theories. In this article, I aim at achieving two main objectives. First, from a critical realist perspective, which is a mainstream philosophical perspective in management research (see Mir and Watson,

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2000), I discuss the relationship between behavioral assumptions and the mechanistic explanations of a theory. I argue that core behavioral assumptions often constitute the foundation of such explanations. Second, I distinguish between two ways of theory testing—assumption-omitted and assumption-based—and recommend that when a new theory is initially tested, the latter should play a more important role than the former. As shown by the case of transaction cost economics (TCE) below, which has been dominated by assumption-omitted testing, researchers do not seem to be aware that such dominance may slow down theory development and needs to be rectified by incorporating more assumption-based testing.

I use Williamson's version of TCE as an example to illustrate my arguments for four main reasons. First, TCE is one of the leading perspectives in management and organizational studies (David and Han, 2004), has received an increasing amount of attention from a broad range of audiences (Rindfleisch and Heide, 1997), and has emerged as a major paradigm in the academic literature (Hill, 1990). Second, there have been numerous empirical tests on various aspects of the theory. This set of studies offers a solid picture of how researchers have dealt with the behavioral assumptions of TCE. Moreover, there are some comprehensive reviews of these studies (e.g., Boerner and Macher, 2003; David and Han, 2004; Rindfleisch and Heide, 1997; Shelanski and Klein, 1995). This rich TCE literature, both theoretical and empirical, facilitates the illustration of my arguments. Third, one of its key behavioral assumptions, opportunism, has been a subject of controversy (Hodgson, 2004; Williamson, 1993). The extent of empirical support that TCE has received is also a controversial issue (David and Han, 2004). This article contributes to these debates from a fresh angle. Last but not least, focusing on one example, instead of several, enables me to demonstrate my arguments fully yet concisely.

In the next section, I discuss the critical realist perspective of mechanistic explanations and their relation with assumptions. This section provides the backdrop for the article. I then trace how the empirical research in TCE has dealt with the behavioral assumptions of the theory. Finally, based on the distinction between assumption-omitted and assumption-based theory testing, I

argue that the latter should play a more important role than the former during the initial stage of theory development.

MECHANISTIC EXPLANATIONS

'In the natural sciences, no event or process is regarded as having been satisfactorily understood unless its actual or possible mechanism has been unveiled' (Bunge, 1997: 454). A basic function of theories is 'to make sense of what would otherwise be inscrutable or unmeaning empirical findings' (Kaplan, 1964: 302). In other words, theories offer explanations for phenomena observed in the real world. More specifically, a critical realist perspective¹ argues for what Bunge calls 'mechanistic explanations,' which describe the mechanisms underlying the phenomena concerned.

Structures and mechanisms

Structures are sets of internally related objects and mechanisms are ways of acting (Sayer, 1992). Objects are internally linked in a structure such that an object's identity depends on its relations with the other components of the structure. Consider a supplier–buyer relationship. The relationship presupposes the existence of sales contract, delivery of goods or services, payment, after-sales service, product warranty, and so on, which together form a structure. Models used in organization theories, in fact, display structures of interrelated constructs.

The combined effects of structures and mechanisms *may* generate events that in turn *may* be observed. However, events take place whether or not they are observed or detected by people. Structures and mechanisms are real and distinct from the patterns of events they generate; they remain the same even when they counteract each other in such a way that no events are generated. The absence of an event does not necessarily mean that the underlying mechanism does not exist. For example, the vase on a table does not fall to the ground because

¹ Critical realism is a growing intellectual movement not only in science but also in social science disciplines (Archer *et al.*, 1998; Cruickshank, 2003), especially economics (Lawson, 1996), management (Ackroyd and Fleetwood, 2000), and marketing (Hunt, 1992). Tsoukas (1989) and Tsang and Kwan (1999) have provided concise descriptions of the perspective, which is based on two fundamental philosophical theses. First, a reality independent of human perception and cognition exists. Second, this reality has its own inherent order (Fay, 1996).

the operating gravitational force is counterbalanced by the reaction force of the table.

A generative mechanism is responsible for the happening of events. It is not a single *variable* but an *account* of the way the events occur (Pawson, 1989). For the same set of events, different mechanisms can be proposed to explain its occurrence. Harré argues that '[s]cientific explanation consists in finding or imagining plausible generative mechanisms for the patterns amongst events' (Harré, 1970: 125). For instance, the interrelationship between the temperature and pressure of a gas is explained in terms of the action of its molecules—the generative mechanism in this case.

The core of TCE focuses on 'transactions and the costs that attend completing transactions by one institutional mode rather than another' (Williamson, 1975: 1–2). The transaction, which is a transfer of a good or service between technologically separable units, is the unit of analysis in TCE. The basic structure of TCE consists of four main parts: (1) the behavioral assumptions of bounded rationality, opportunism, risk neutrality, and transaction cost minimization; (2) the principal transaction attributes of asset specificity, uncertainty, and frequency; (3) a variety of transaction costs; and (4) the various modes of governance. A core behavioral assumption of TCE is that managers make contracting decisions in a transaction-cost-economizing manner (Williamson, 1975, 1985). This assumption forms the foundation of the theory's mechanistic explanations.

Consider a typical TCE explanation. As the asset specificity of a transaction increases, redeployability of the asset for alternative uses decreases. This in turn will increase bilateral dependency and contracting hazards between the parties concerned under conditions of uncertainty. Owing to bounded rationality, contracts are necessarily incomplete and offer limited protection against opportunistic behavior. The high-powered incentives of the market form of governance impede adaptability among transacting parties, resulting in high transaction costs associated with monitoring exchange behavior and guarding against opportunism. Thus markets are ill equipped to deal with situations of high bilateral dependency. Transaction-cost-economizing considerations will push transactions with high asset specificity into more integrated forms of governance, such as hybrid and hierarchy.

How this mechanism actually generates observable events depends on a number of contingencies, the most prominent of which concerns the institutional environment (political and legal institutions, laws, customs, and norms) (North, 1991). Changes in the institutional environment shift the comparative costs of markets, hybrids and hierarchies (Williamson, 1997).

Assumptions and explanations

Need assumptions be realistic? In a blunt yet insightful critique of Friedman's (1953) argument that it does not matter whether the assumptions of an economic theory are realistic as long as the theory yields sufficiently accurate predictions, Bunge proposes the following analogical reasoning: 'All humans are vegetables. All vegetables are mortal. Ergo, all humans are mortal' (Bunge, 1996: 55). In other words, a ridiculous assumption may lead to a faultless conclusion. His critique concerns the relationship between assumptions and the mechanistic explanations offered by a theory, an issue that has been largely neglected by the heated debate aroused by Friedman's thesis. Sayer (1992) argues that if predictions and calculations are needed rather than explanations, assumptions need not be realistic; all that matters is that the theory 'works' in the sense of producing accurate results. Yet a major function of a theory is also to explain and not just to predict. As Kaplan says, 'if we look at the explanations which actually occur in science as well as in everyday life, and not only at what an ideal explanation would be or what all explanations are "in principle," it appears that we often have explanations without being able to predict' (Kaplan, 1964: 347). Moreover, we need to understand the mechanism underlying a theory's predictive power in order that we can properly make use of the normative implications of the theory. As Hodgson comments, 'A faulty explanation would be likely to lead to faults in corporate strategy and in the design of governance structures' (Hodgson, 2004: 404).

It is useful to distinguish between core and peripheral assumptions. The former are about the major causes postulated by a theory while the latter refer to the minor causes (Mäki, 2000). A core assumption is a constituent of the mechanistic explanation of a theory. In marginal theory, the assumption of profit maximization through equating marginal cost with marginal revenue underlies

the mechanism concerning how business executives make their production decisions. For TCE, opportunism, defined as 'self-interest seeking with guile' (Williamson, 1975: 6),² is a key factor affecting the transaction costs of various modes of governance, which in turn determine the choice of a governance arrangement (Wathne and Heide, 2000). More often than not, a core assumption is a key element of a mechanistic explanation. Just imagine what TCE would look like without the assumption of opportunism. If the potential for opportunism does not exist, buyers and suppliers will cooperate and promises will be sufficient for protecting market transactions (Williamson, 1985).

In summary, an unrealistic core assumption will lead to an unrealistic mechanistic explanation and thus a defective theory. Core assumptions have to be realistic. How far an assumption is realistic needs to be determined empirically. Using the example of opportunism, the next section discusses how the empirical research in TCE has handled the behavioral assumptions of the theory.

EMPIRICAL RESEARCH IN TCE

In econometrics (e.g., Chow, 1983; Johnston, 1991), there is a distinction between structural and reduced models. The former contain formulas representing the relation of every dependent variable to its independent variables on various levels, while the latter exhibits the net or overall relation between the dependent variable and the ultimate independent variables. Consider a structural model of the form

$$z = f(x, y) \quad (1a)$$

where

$$x = g(u), \text{ and } y = h(v) \quad (1b)$$

Substituting Equations 1b into Equation 1a results in the corresponding reduced model:

$$z = \varphi(u, v) \quad (2)$$

² TCE does not assume that people are universally opportunistic, but merely that 'some individuals are opportunistic some of the time' (Williamson, 1985: 64). In other words, it is the *potential* for opportunism that actually matters.

There are two crucial methodological differences between the two models (Bunge, 1997). First, Equations 1b 'explain' the intermediary variables x and y whereas Equation 2 does not even contain them. In other words, the reduced model is simpler and also shallower than the structural model for skipping the intermediary variables. Second, the reduced model can be derived from the structural model but not the other way round because the task of working out the structural model from the reduced model is an inverse problem with an indefinite number of solutions. As illustrated by the examples below, a behavioral assumption is often eliminated in the process of converting a structural model into its reduced form. Consequently, the reduced model is often much less informative with respect to the related mechanism than the structural model.³

The majority of empirical research in TCE is a variation of the discriminating alignment hypothesis, which 'holds that transactions, which differ in their attributes, are aligned with governance structures, which differ in their costs and competencies, in a discriminating (mainly, transaction-cost-economizing) way' (Williamson, 1991: 277). Governance structure is the dependent variable, while transactional properties and control variables serve as independent variables. Among the three TCE assumptions about human nature, namely bounded rationality, opportunism, and risk neutrality, opportunism occupies the most important spot in the theory. Opportunism is the ultimate cause for the failure of markets and for the existence of hierarchies (Williamson, 1993). It is the most frequently invoked assumption when researchers formulate hypotheses in their empirical studies. Thus, my discussion here focuses on this assumption.

Consider a pioneer empirical study of TCE. Based on data from the U.S. automobile industry, Monteverde and Teece (1982a) argue that assemblers will vertically integrate when the production process of a component generates specialized, non-patentable know-how. This is because the existence of transaction-specific know-how and the

³ My distinction between structural and reduced models is different from Masten's (1996). The reduced model of Masten is used by researchers to tackle the methodological issue that transaction costs simply cannot be observed for governance structures not chosen. The model is of a totally different nature than mine. Nevertheless, his reduced model has a similar problem that reduced-form estimates 'do not permit identification of the structural relations that underlie those hypotheses' (Masten, 1996: 51).

difficulties of skill transfer imply that it will be costly for the assembler to switch to an alternative supplier. When the assembler is locked into dependence upon a specific supplier, the assembler will be exposed to the possibility of opportunistic recontracting and quasi rent appropriation. They further argue that applications engineering effort reflects the extent of embedded specialized know-how. Thus they formulate their only hypothesis as:

Hypothesis 1a: 'The greater is the applications engineering effort associated with the development of any given automotive component, the higher are the expected appropriable quasi rents and, therefore, the greater is the likelihood of vertical integration of production for that component.' (Monteverde and Teece, 1982a: 207)

They obtained from an assembler a list of 133 automotive components, each of which was recorded as either produced internally or sourced externally. They tested the reduced model by operationalizing application engineering effort as the cost of developing a given component and skipping the construct 'expected appropriable quasi rents.' Hence, they were actually testing the following hypothesis:

Hypothesis 1b: The higher is the cost of developing any given automotive component, the greater is the likelihood of vertical integration of production for that component.

Their finding strongly supported Hypothesis 1b, and so they draw the conclusion: 'Transaction cost considerations surrounding the development and deepening of human skills appear to have important ramifications for vertical integration in the automobile industry, thereby supporting the transaction cost paradigm advanced by Williamson' (Monteverde and Teece, 1982a: 212, emphasis added). This finding 'has been widely acclaimed as providing empirical support for the TCE paradigm' (Chiles and McMackin, 1996: 74). What has been neglected by this claim is that Hypothesis 1b does not reflect any transaction cost considerations related to opportunism. As argued above, there are an indefinite number of solutions when deriving the structural model from the reduced one (Bunge, 1997). There is a real possibility that Hypothesis 1b was supported for reasons totally unrelated to

the TCE paradigm even if we accept their argument that the cost of developing a component reflects the extent of embedded specialized know-how.

For instance, in developing a knowledge-based view of the firm, Grant (1996) identifies know-how with tacit knowledge. A key characteristic of tacit knowledge is its difficulty of being transferred from one party to another. Madhok (1996) also notes that organizationally embedded know-how is more difficult to transact without loss in value than generic know-how. Thus, in Monteverde and Teece's (1982a) study, if the extent of embedded specialized know-how associated with an automotive component is great, it will be very costly for an assembler to transfer the know-how to the supplier who is supposed to manufacture the component. Unless the supplier can achieve a much lower production cost than the assembler, it is simply not cost effective for the assembler to outsource the production process, which necessarily incurs a substantial knowledge transfer cost. (Moreover, the know-how may be so tacit that transfer is virtually impossible.) In fact, for such a component, it is likely that the assembler will be able to manufacture it at a significantly lower cost than the supplier.

Kogut and Zander argue that 'the central competitive dimension of what firms know how to do is to create and transfer knowledge efficiently *within* an organizational context' (Kogut and Zander, 1992: 384, emphasis added). Since the know-how associated with the component is firmly embedded within the assembler and becomes its social knowledge (Kogut and Zander, 1996), it will be more economical for the assembler than the supplier to coordinate and organize the employees who collectively possess the knowledge to produce the component. Moreover, since the design of the component 'must be highly coordinated with other parts of the automobile system' (Monteverde and Teece, 1982a: 212), it is arguably more efficient to have such coordination done within the assembler than between the assembler and the supplier. Note that this explanation, which involves a very different mechanism from Monteverde and Teece's, does not invoke any transaction cost considerations related to opportunistic behavior of suppliers.⁴ In

⁴ The above argument is based on a version of the knowledge-based view of the firm, advocated by Kogut and Zander (1992, 1996), Conner and Prahalad (1996) and Madhok (1996, 1997),

fact, Masten, Meehan, and Snyder (1991) offer a brief alternative explanation of Monteverde and Teece's (1982a) results along a similar line of argument.

Hypothesis 1a, the structural model of Monteverde and Teece, represents a slightly more direct test of TCE. This is because appropriable quasi rents are related to opportunism, which in turn is a key behavioral assumption of TCE: the higher are the expected appropriable quasi rents, the greater is the chance that they will be appropriated *if* opportunism exists. In any case, Hypothesis 1a is subject to fewer alternative mechanistic explanations than Hypothesis 1b. In order to provide a much more direct test of TCE in the context of their study, they may test a structural model similar to the following one:⁵

Hypothesis 1c: The greater is the applications engineering effort associated with the development of any given automotive component, the higher is the perceived risk of opportunistic recontracting and quasi rents appropriation and, therefore, the greater is the likelihood of vertical integration of production for that component.

Since Hypothesis 1b required measuring the cost of developing a component, Monteverde and Teece asked two automotive engineers to provide engineering cost ratings for their sample of components. With further effort and suitable operationalization of the constructs 'opportunistic recontracting' and 'quasi rent appropriation',⁶ it was indeed possible for them to test Hypothesis 1c, which would result in a significantly stronger test of TCE's mechanistic explanations.

that explicitly denies the necessity of the assumption of opportunism. Recently some scholars, such as Heiman and Nickerson (2002) and Nickerson and Zenger (2004), have tried to further develop the knowledge-based view by incorporating the assumption of opportunism.

⁵ As Coase comments, 'the interrelationships which govern the mix of market and hierarchy . . . are extremely complex' (Coase, 1992: 718). It is by no means my intention to claim here that testing Hypothesis 1c will address all the problems associated with TCE empirical research. Rather, I just argue that Hypothesis 1c provides a stronger test of the mechanistic explanation proposed by Monteverde and Teece (1982a) than Hypothesis 1b.

⁶ One simple, though rather rough, way is to carefully explain the concepts of opportunistic recontracting and quasi rent appropriation in the context of their study to the two automotive engineers, and then to ask them to rate the risk of opportunistic recontracting and quasi rent appropriation for each component.

In a related study, Monteverde and Teece (1982b) examine the issue of quasi-vertical integration—whereby automotive assemblers own the specialized and dedicated equipment used by suppliers. They argue that when the appropriable quasi rents associated with the tools and dies of an automotive component are high, the supplier of the component is reluctant to own the tooling for fear of being taken advantage of by the assembler. In this case, the assembler will assume ownership, resulting in quasi integration. They measured quasi rents originated from asset specificity by the multiplicative composite of tooling cost and degree of specialization, and, as expected, found a positive relationship between quasi integration and quasi rents. Their hypothesis, though not explicitly stated in their article, is of the following reduced form:

Hypothesis 2a: The higher are the appropriable quasi rents, the greater is the likelihood of quasi-vertical integration.

They conclude that the 'practice of quasi integration . . . appears to be explained, in part, by the desire of suppliers to avoid the possibility of opportunistic recontracting by downstream customers' (Monteverde and Teece, 1982b: 328). (There seems to be a typo here: 'reconstructing' should be 'recontracting.') Again, their reduced model is silent with respect to their proposed mechanistic explanation concerning suppliers' avoidance of opportunistic recontracting and appropriation of quasi rents. The existence of appropriable quasi rents does not imply the existence of the *fear* of opportunistic rent appropriation. Whether the latter really exists has to be confirmed empirically by a structural model, such as:

Hypothesis 2b: The higher are the appropriable quasi rents, the higher is the perceived risk of opportunistic recontracting and quasi rents appropriation and, therefore, the greater is the likelihood of quasi-vertical integration.

Monteverde and Teece's two studies are probably the first ever empirical research in TCE and have made a significant contribution to filling the empirical void of the theory. Unfortunately, the methods of both studies fail to touch upon the behavioral assumption of opportunism, which forms the core of their proposed mechanistic

explanations. As such, they have set an inappropriate precedent for subsequent empirical studies. Although TCE has placed opportunism at the center of the agenda of organizational researchers (Beccerra and Gupta, 1999), the construct has rarely been studied empirically.

In a systematic assessment of the empirical support for TCE, David and Han (2004) examine 308 statistical tests of TCE constructs and relationships from 63 articles published during 1982–2002. Out of the 308 tests, there are only 7 and 12 tests involving opportunism as independent and dependent variables, respectively, though most of the 308 tests invoke the assumption of opportunism implicitly or explicitly. (Tests on the behavioral assumptions of bounded rationality and risk neutrality in the TCE context are almost completely absent.) For instance, the most frequently tested independent variable is asset specificity, with a total of 107 counts. Yet, as illustrated by the examples of Monteverde and Teece (1982a, 1982b) above, the effect of asset specificity on governance choice is based entirely on the assumption of opportunism. Without opportunism, cooperation will be the norm between assemblers and suppliers and promises will suffice to safeguard market transactions (Williamson, 1985). Since the number of tests on asset specificity is far greater than that on opportunism, it is very likely that most of the hypotheses associated with the former are stated in the reduced form similar to Hypotheses 1b and 2a.

In the next section, I make a distinction between assumption-omitted and assumption-based theory testing. To address the deficiency of the current empirical research in TCE, I argue that assumption-based theory testing should play a more important role than assumption-omitted testing during the early stage of theory development.

ASSUMPTION-OMITTED VS. ASSUMPTION-BASED THEORY TESTING

From a critical realist perspective, a basic purpose of testing a theory is to investigate how far its proposed mechanisms are consistent with observable events (Sayer, 1992). Since the core behavioral assumptions of a theory often form the foundation of its mechanistic explanations, it is crucial that these assumptions are tested during the early stage of empirical research. I call this way of theory

testing assumption-based. By testing a behavioral assumption, I mean investigating whether events observed in the real world are consistent with the assumption. In the context of Monteverde and Teece's (1982a, 1982b) studies, for instance, a test of the assumption of opportunism is to examine whether the threat of opportunistic behavior (in the form of opportunistic recontracting and quasi rents appropriation) will lead to vertical or quasi-vertical integration. In contrast, assumption-omitted theory testing is to exclude assumptions from empirical tests although assumptions may be invoked in formulating hypotheses. The tests are usually conducted on reduced models that are devoid of behavioral assumptions. Let us consider each of the two ways of theory testing in more detail below.

Assumption-omitted theory testing

As clearly indicated by the reviews of empirical research in TCE (e.g., Boerner and Macher, 2003; David and Han, 2004), the history of empirical research since the publication of Williamson's seminal book, *Markets and Hierarchies*, in 1975 has been dominated by assumption-omitted testing. Such dominance has prolonged counter-productive debates about the validity of TCE assumptions, and thus slowed down theory development. Simon cautions that many TCE assumptions are 'with no empirical support except an appeal to introspection and common sense' (Simon, 1991: 27). A case in point is the controversy surrounding the behavioral assumption of opportunism. An interesting observation is that the debate mainly consists of theoretical exchanges (e.g., Ghoshal and Moran, 1996; Granovetter, 1985; Williamson, 1993, 1996), and that few empirical studies have measured opportunism (David and Han, 2004; Rindfleisch and Heide, 1997). This observation is made against the backdrop that opportunism occupies a central position in TCE and is itself a complex construct (Wathne and Heide, 2000). Scholars seem to have missed a simple fact that sciences, whether natural or social, are after all empirically based; no amount of rigorous theorizing can compensate for the lack of empirical testing.

In fact, if opportunism had been tested by some early studies of TCE, certain controversial issues might not have arisen. For example, Conner and

Prahalad (1996) argue that knowledge-based considerations can outweigh opportunism-based considerations when governance structures are chosen. Hart (1990) comments that TCE does not specify the mechanisms through which opportunism is reduced in organizations. Similarly, Ghoshal and Moran (1996) comment that TCE errs in the assumption that organizations exist because of their ability to attenuate opportunism through control. The issue of how and how far organizations are able to reduce opportunism has to be tackled by not only theorizing but also empirical research. The latter is the ultimate judge of the validity of the former. Unfortunately, the empirical literature of TCE is virtually silent with respect to this issue. A great deal of intellectual effort is thus wasted on debating issues that can be and should be settled empirically.

Ghoshal and Moran make the following comment concerning the empirical research in TCE:

Even though an impressive number of empirical studies have found a positive relationship between asset specificity and internalization ..., correlation does not demonstrate causation. Relationship-specific assets (e.g., distance, routines) can reduce the costs of internal coordination, *independent of their effects on opportunism*. (Ghoshal and Moran, 1996: 40, emphasis added)

In response, Williamson claims that TCE 'is an empirical success story' (Williamson, 1996: 55). Is it? Assumption-omitted theory testing relies heavily on reduced models. As there are an indefinite number of solutions when deriving the structural model from the reduced one (Bunge, 1997), a confirmatory test of the reduced model may not offer significant empirical support for the structural model entailed by the theory. Therefore, a theory that has been based predominately on assumption-omitted testing cannot be an empirical success story. Ghoshal and Moran's above-mentioned critique pinpoints that the usual reduced-form TCE research on the relationship between asset specificity and internalization does not involve testing opportunism, which constitutes the foundation of TCE mechanistic explanations. Monteverde and Teece's (1982a, 1982b) pioneer TCE studies are typical examples of such reduced-form research.⁷

⁷ Tsang and Kwan (1999) note that some early TCE studies build on Monteverde and Teece's (1982a, 1982b) and form a set of replicated studies in the focal area of vertical integration in

David and Han's (2004) assessment of the empirical support for TCE delivers mixed results. They found significant empirical support for TCE in some areas (e.g., asset specificity) and weak support in others (e.g., uncertainty and performance). If we take into account the fact that many of the empirical studies are of the reduced form, the overall support is best described as indirect, and thus more limited. All the previous reviews of the TCE literature seem to have missed this critical point. Nevertheless, I am not dismissing the efforts made by TCE researchers in improving their assumption-omitted methodologies. For example, Masten *et al.* (1991) contribute some innovative work toward estimating the structure of organization costs in shipbuilding. Monteverde (1995) uses a new construct, 'unstructured technical dialog,' to measure specific human capital investment in his study of the semiconductor industry. The construct is an improvement over similar measures adopted by previous studies, such as Monteverde and Teece (1982a) and Masten (1984). Such efforts surely help develop the theory, and should be applauded. What I argue here is simply that if these efforts are complemented by assumption-based testing, theory development will be further enhanced.

Assumption-based theory testing

When we start building a house, we focus on its foundation. After the foundation has been well established, we shift our attention to superstructures. By the same token, theory building starts from the foundation. During the initial empirical research on a new theory, assumption-based testing should play a more important role than assumption-omitted testing. More specifically, assumption-based testing serves three important functions: identifying problematic areas of a theory, opening up new opportunities for strengthening a theory, and clarifying the conceptual domain of an assumption.

First, assumption-based testing helps assess the realism of an assumption and thus facilitates theory

manufacturing industries. While this series of replicated studies help accumulate our knowledge of the focal area, replication will not solve the problem associated with reduced models. No matter how many times a reduced-form study is repeated, the tests are conducted on somewhat the same reduced model and the results may be accounted by the same alternative mechanistic explanations. To deal with the problem, assumption-based theory testing is needed.

development through identifying problematic areas. In their experimental study of the effects of asset specificity, uncertainty and frequency of the transaction on transaction costs and relational closeness, Pilling, Crosby, and Jackson (1994) use the TCE reasoning to formulate nine hypotheses about the costs of guarding against opportunism, which are regarded as one type of transaction costs. None of the hypotheses were supported and in fact, two of them had significant estimates in the opposite direction. Their findings raise questions about the linkage between opportunism and the specific dimensions of governance.

Second, testing an assumption may open up new opportunities for strengthening a theory. For instance, TCE adopts the assumption of risk neutrality, and risk preferences are assumed to have negligible effects on the main mechanisms of TCE. There has been virtually no empirical test of this assumption. Researchers tend to accept it without question. One exception is Chiles and McMackin (1996), who argue that the switch-over level of asset specificity will vary as a function of the risk preference of the firm, and therefore a more realistic assumption of variable risk preferences will improve the predictive efficacy of TCE. If there had been tests on risk neutrality, the effects of risk preferences might have been identified empirically long before Chiles and McMackin's theoretical argument.

Finally, not only the result, but also the process, of assumption-based testing contributes to theory development. To design an empirical test on a behavioral assumption, the researcher often needs to analyze the nature of the assumption carefully. For example, operationalizing a construct involves checking whether it is multi- or unidimensional (see Gerbing and Anderson, 1988). Wathne and Heide's (2000) conceptual analysis of opportunism arrives at a distinction between passive and active opportunism. The former is about withholding critical information while the latter concerns committing forbidden acts. Williamson (1996) states that the propensity for opportunism varies between cultures. In particular, Chen, Peng, and Saporito (2002) argue that opportunistic propensity is affected by cultural prior conditioning of individualism–collectivism, such that individualists have a higher opportunistic propensity in intra-group transactions and collectivists in inter-group transactions. In other words,

individualism–collectivism is a contingent condition affecting how opportunism manifests itself in an exchange relationship. In short, the process of assumption-based testing may clarify the conceptual domain of an assumption.

TESTING BEHAVIORAL ASSUMPTIONS

The history of empirical research in TCE shows that the lack of assumption-based testing was more likely due to neglect rather than difficulty of conducting the test. For example, Monteverde and Teece (1982a, 1982b) could readily incorporate tests of behavioral assumptions in their studies with additional effort. When they (1982a) requested two automotive engineers to rate the engineering cost of each of their sample of components, they could have asked simple questions such as 'What factors does an assembler consider when making make-or-buy decisions?' Similarly, when they (1982b) obtained a small sample of components from a major automotive supplier, they could have asked, 'What factors does a supplier consider when deciding whether to own the tools and dies of a component?' If they had asked such simple questions, their studies probably would have made more significant contributions to the TCE literature, and prompted more assumption-based testing among subsequent studies.⁸ Following closely after Monteverde and Teece is Stuckey's (1983) in-depth study of vertical integration and joint ventures in the aluminum industry. He uses the TCE reasoning throughout his analysis and yet his 348-page book contains no description of how decisions on governance structures are actually made by managers, let alone any analysis of whether the behavioral assumptions of TCE are realistic. He even states that '[o]ppportunism and bounded rationality are presumed always to exist, so bauxite traders are not unusual on these counts' (Stuckey, 1983: 74). In other words, he simply presumed that opportunism and bounded rationality existed among bauxite traders without trying to investigate whether and how far this was really the case.

I am arguing neither that assumption-based testing is *always* better than assumption-omitted testing nor that, when a new theory is initially

⁸ Another possibility is that they did ask questions of a similar nature but did not report them in their articles.

tested, *all* the tests should be assumption-based. Sometimes it makes sense to start testing a new theory without examining its behavioral assumptions. For instance, if two variables of a theory are posited to be related via a generating mechanism based on a certain behavioral assumption and it is much easier to measure the two variables than the variable(s) associated with the assumption, a cost-effective research strategy may be to first study the relationship between these two variables. If the relationship is as posited, then the assumption is examined and tested; if not, we can stop right there. The problem, as has happened with TCE, is that empirical support accumulates for the relationship between two variables (e.g., asset specificity and hierarchy), but few researchers bother to go deeper and investigate the underlying mechanisms and assumptions.

The main difference between behavioral assumptions and other relationships and constructs embedded in the structure and mechanism of a theory is that the former are more closely associated with human attitudes, beliefs and perceptions. To test behavioral assumptions, researchers need to collect data via direct or indirect contact with managers. Quantitative research based on secondary data, such as Gatignon and Anderson (1988), Hennart (1988), and Hu and Chen (1993) in the case of TCE, is not likely to yield much meaningful information about these assumptions. According to Yin, 'case studies are the preferred strategy when "how" and "why" questions are being posed' (Yin, 1994: 1). As a start, in-depth, unstructured interviews with managers who make transaction cost related decisions are particularly useful for collecting data about the key factors affecting their decisions.

A good example is Buckley and Chapman's (1997, 1998) longitudinal study on a small sample of British and French pharmaceutical companies and British scientific instrument companies. They conducted in-depth, unstructured interviews with managers based on the methodology of social anthropology. Their interviews focused on corporate management of the relationships with boundary entities of the company and pertained to the question of internalization vs. externalization of activities. When engaging in these activities, managers needed to cope with various transaction cost issues. Following the spirit of grounded theory (Strauss, 1987), Buckley and Chapman just let

respondents describe how they made decisions that involved transaction cost issues, without incorporating any TCE constructs in the probing questions. As far as possible, their interviews were conducted using the terms the manager employed rather than those of the interviewer. That is, they let data tell their own stories. This approach enables researchers to observe how events naturally unfold, and understand how managers actually behave. Such data provide a useful preliminary check on the realism of behavioral assumptions. Depending on the nature of investigation, other research methods that involve managerial contacts, such as questionnaire survey (e.g., Lyons, 1995) and experimental research (e.g., Pilling *et al.*, 1994), may also be appropriate.

Consider an example outside TCE. The classical theory of economic decision making assumes perfect rationality. A standard methodology in economics is to test the theory by its predictions of aggregate phenomena, a typical assumption-omitted approach. In 1934–35, in the course of a field study of the administration of public recreational facilities in Milwaukee, Simon (1979) noticed that the assumption of perfect rationality was not tenable. Subsequently he and his colleagues conducted several 'anthropological' field studies that elicited descriptions of decision-making procedures and observed the course of specific decision-making episodes. These studies led to his path-breaking argument for replacing perfect rationality by bounded rationality as the assumption underlying a decision-making theory.

Other than the above-mentioned requirement for collecting data through managerial contacts, testing behavioral assumptions does not call for special research designs. While it may not be easy to test a behavioral assumption, it is not likely to be more difficult than testing other relationships posited by a theory, such as the relationship between asset specificity and choice of governance modes in TCE. Operationalizing, for example, opportunism can be a challenging task (see Wathne and Heide, 2000); operationalizing asset specificity is not easy either (see Nooteboom, 1993).

CONCLUSION

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. It makes a difference, a very large difference, to our research strategy ... (Simon, 1985: 303)

Core behavioral assumptions of a theory often concern the fundamental issue of human nature. More specifically, I argue from a critical realist perspective that such assumptions constitute the foundation of the mechanistic explanations of a theory and should play a pivotal role in theory development. An unrealistic behavioral assumption will lead to an unrealistic mechanistic explanation and thus a defective theory. To what extent an assumption is realistic has to be determined empirically.

I have argued for a distinction between assumption-based and assumption-omitted theory testing. In order to establish a solid foundation for a new theory, researchers should prefer research methods that involve assumption-based testing. This approach, which necessitates collecting data via direct or indirect contact with managers, enables researchers to assess the validity and clarify the conceptual domain of an assumption. It may also open up new opportunities for strengthening a theory. In contrast, the history of empirical research in TCE illustrates how the dominance of assumption-omitted theory testing has slowed down theory development. The overall empirical support for the theory is weakened because reduced models are often subject to alternative mechanistic explanations.

I have used the assumption of opportunism to illustrate the above arguments. Similar problems exist with other TCE assumptions. For example, TCE assumes that managers utilize a transaction-cost-economizing calculus in making decisions concerning modes of governance (Williamson, 1975, 1985). Thus, TCE is a theory about the choice of governance structures made by managers in the context of given levels of asset specificity, uncertainty, and frequency of interaction. Similar to the debate about marginal theory in economics, a pertinent question here is: Do managers really make use of a transaction-cost-economizing calculus in making contracting decisions? The situation is very similar to that of marginal theory. While empirical studies of TCE assume that governance structures are chosen *as if* decisions were made based on the transaction-cost-economizing principle (see Friedman, 1953,

for the *as-if* formulation), they rarely investigate whether the decisions are *really* made in this manner. Buckley and Chapman's (1997, 1998) study mentioned above, which is probably the first ever empirical test of the assumption, did not find any evidence of transaction-cost-economizing decisions and thus cast serious doubt on the validity of the assumption. Further tests of the assumption are needed as the very foundation of the entire theory relies on it.

My analysis is also applicable to other theories. Consider, for instance, another major organization theory—agency theory. Similar to TCE, empirical research on the theory has been biased toward assumption-omitted testing from the very beginning (e.g., Amihud and Lev, 1981; Walking and Long, 1984). A core behavioral assumption of agency theory is that agents exhibit risk averse behaviors in decision making (Eisenhardt, 1989). This assumption has been rarely tested by agency theorists though research outside the theory shows that individuals may vary significantly in their attitudes towards taking risks (MacCrimmon and Wehrung, 1986; March and Shapira, 1988). As suggested by the theoretical arguments of Wiseman and Gomez-Mejia (1998) and Wright *et al.* (2001), empirically investigating how the agent's risk attitude actually affects a principal-agent relationship will tremendously enrich the theory.

As indicated by Wallace's (1971) model of scientific process, theory testing is an integral part of the process. Through empirical research, theories are confirmed or refuted. In view of the critical role of core behavioral assumptions in theory development, it is important that these assumptions are put to the test, especially during the early stage of theory testing. Unfortunately, assumption-omitted testing is the norm rather than the exception for organization theories. An objective of this article is to bring assumption-based testing to the foreground of empirical research. In conclusion, when designing an empirical test on a new theory, researchers should ask, 'Have we inadvertently taken the behavioral assumptions of the theory for granted?'

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