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THE PROBLEM OF UNOBSERVABLES IN STRATEGIC MANAGEMENT RESEARCH

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In this paper we argue that unobservable constructs lie at the core of a number of influential theories used in the strategic management literature—including agency theory, transaction cost theory, and the resource-based view of the firm. The debate over how best to deal with the problem of unobservables has raged in the philosophy of science literature for the best part of the current century. On the one hand, there are the positivists, who believe that theories containing unobservable constructs are only useful as tools for making predictions. According to positivists, such theories do not inform us about the deep structure of reality. On the other hand, there are the realists, who believe that our theories can give us knowledge about unobservables. Herein we review this debate, we argue for adopting a realist position, and we draw out the implications for strategic management research.

INTRODUCTION

From the earliest days of the Renaissance, empirical validation provided the selection mechanism for scientific theories. The saga of scientific development is rife with accounts of theories which postulated a then unobservable entity as the root explanation of some phenomenon, followed only later by the development of tools to measure the new entity. The progress of science depended on the increasing ability of scientists to observe, and thus verify, key components of theories and their interrelations. The invention of the telescope by Galileo proved significant because it provided a window for the observation of previously unobservable, yet hypothesized, entities. The advent of quantum physics provided the most current, and perhaps most compelling, account in the saga of scientific development. For quantum physicists the building blocks of matter were unobservable on two fronts. Subatomic particles (e.g., electrons, neutrinos, quarks) are *measurement unobservable* in the sense that instrumentation cannot be calibrated to such a degree as to permit their direct observation. Moreover, quantum mechanics holds that the act of observing a subatomic particle effects a change in the state of that particle which is by no means trivial (Putnam, 1990). This constitutes *state unobservability* because the observation of the entity causes a change of state in the entity.[1]

For more than half a century now the debate over how best to deal with the problem of unobservables has raged in the philosophy of science literature (Boyd, 1991a). According to one school of thought—the logical positivists—

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[1] It is noteworthy that social scientists are also aware of the problems of state unobservability. The assumption of ethnographic research methodologies is that the direct observation of social processes by 'outside' observers causes a substantive change in the processes of interest. What is observed is what is constructed for and by the observer, not the process of interest.

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we can never be sure of the existence of unobservables. Consequently, theories that contain unobservables should not be judged on the basis of their correspondence to reality, but instead on their instrumental value as tools for generating predictions about the behavior of physical, natural, and social systems. A second school of thought—the realists—takes a different position. According to realists, the scientific enterprise can give us knowledge about the existence of unobservable entities. Realists argue that when a theory that contains unobservable entities is well corroborated by scientific evidence, then we may have good reason for believing that those unobservable entities have a correspondence in reality. Thus, the realist believes that we can make statements about the truth value of theories that contain unobservables—the more skeptical logical positivist does not.

We argue that the debate between logical positivists and realists has important implications for the discipline of strategic management. Many of the theories that are used to address the central questions of strategic management research contain key constructs that are state unobservable. The very observation of these constructs would eliminate the explanatory and predictive power of the theories. These include transaction cost theory, agency theory, and the resource-based view of the firm. If one adopts the instrumentalist position of modern logical positivists, the presence of unobservables in these theories suggests that while they may predict observable phenomena accurately enough, the derivation of normative rules for managerial action from such theories constitutes an unscientific endeavor. In contrast, the realist position is that since our theories can give us knowledge about unobservables, it is legitimate to derive normative rules from those theories that can be used to guide managerial action.

At the heart of the debate between logical positivists and realists, therefore, are divergent views about the limits of human knowledge and the kinds of conclusions that we can draw from theories that successfully predict observable phenomena. The importance of the debate between logical positivism and realism for strategic management is the veracity of normative predictions which come from theories such as the resource-based view of the firm. Since many view the *raison d'être* of strategic management research as being the generation of normative heuristics, it is of critical importance to understand this debate and the implications that it holds for both strategy research and for the value of the claims made for the results of that research. Our mission in writing this paper, however, goes beyond merely explaining these different views, for we do take an advocacy position. As Popper once noted, we believe that 'while realism is neither demonstrable nor refutable . . . it is arguable, and the weight of the argument is overwhelmingly in its favor . . . Common sense is clearly on the side of realism' (1972: 38).

UNOBSERVABLES IN STRATEGIC MANAGEMENT RESEARCH

Transaction cost theory, agency theory, and the resource-based view of the firm provide excellent examples of the central role of state-unobservable constructs in the strategic management literature. Our selection of these theories is not meant to imply that they are the only, or even the most important, theories that have a bearing for the strategic management research—arguably, other theories that have been used in strategic management also contain unobservables, including traditional industrial organization economics and its derivatives such as strategic group theory (entry and mobility barriers may be unobservable).

Transaction cost theory

Transaction cost economics (TCE) has been used to explore a variety of issues of interest to strategic management researchers, including diversification, vertical integration, and quasi-integration (e.g., Teece, 1982; Williamson, 1985). TCE states that transactions (exchanges) should be viewed as the basic unit of economic analysis. TCE asserts that markets and hierarchies can be viewed as alternative mechanisms for governing transactions. The central proposition of TCE is that there are costs to executing any transaction, whether that transaction occurs in a market or within a hierarchy. Maximizing efficiency requires that transactions are governed by the mechanism that minimizes those transaction costs (Coase, 1937). For some transactions TCE predicts that hierarchy is the appropriate governance mechanism, for others market governance is

appropriate, and for still other transactions a governance mechanism that straddles the market–hierarchy divide is predicted to be the most appropriate (Williamson, 1991).

Two of the main determinants of the transactions costs associated with a *market-mediated* exchange are argued to be *opportunism* and *asset specificity* (Williamson, 1985). Opportunism refers to the proclivity that economic actors have to engage in self-interest seeking with guile. While not all economic actors are opportunistic, it is impossible to know for sure *ex ante* which trading partners will be opportunistic (Williamson, 1985). Asset specificity refers to the extent to which transactions are supported by productivity-enhancing (and rent-producing) specialized assets that are uniquely tailored to that transaction. TCE predicts that when one party makes substantial investments in specialized assets in order to trade with another, the other may attempt to opportunistically appropriate the rent stream generated by the specialized asset, thereby defrauding the owner of the specialized asset of his/her expected return. In order to protect the rent stream from appropriation, the owner of the specialized asset may invest in safeguards such as contingent claims contracts and monitoring mechanisms. The costs of establishing safeguards are known as *ex ante transaction costs*. They serve to reduce the risk of opportunism, but not to eliminate it, since it is impossible to draft truly comprehensive contingent claims contracts that eliminate the risk of opportunism (Williamson, 1985).

A residual risk of opportunism remains even after *ex ante* transaction costs have been borne. In the event that this risk is realized and opportunism does occur, additional costs are borne. These include the costs of contract enforcement and the unrecovered loss of rent stream due to opportunism. The *ex post transaction costs* associated with a transaction are defined as these additional costs, multiplied by the probability of opportunism occurring, which is itself a function of the safeguards put in place (i.e., of the *ex ante* transaction costs). Thus, total transaction costs associated with a market-mediated exchange are seen as the sum of *ex ante* and *ex post* transaction costs. The core prediction of TCE is that if total transaction costs exceed the costs of governing the same transaction with a hierarchical setting, the exchange should be internalized within a hierarchy.

The key variable which drives the transaction cost engine is opportunism. According to Williamson (1985), one cannot know how an economic actor will behave in a given situation until he/she is placed in that situation. While other transaction cost theorists argue that factors such as an actor's reputation can send a reasonably strong signal as to his/her likely behavior, they also acknowledge that reputation is at best an imperfect guide to future behavior (Hill, 1990). Thus, opportunism is a purely *ex post* phenomenon—it cannot be observed until it has occurred, and yet it is the perceived risk of opportunism that facilitates the calculation of *ex ante* transaction costs. Moreover, under situations where information pertaining to a transaction is highly ambiguous, opportunism may be unobservable *ex post*. One may not know when one has been ripped off. Opportunism clearly suffers from measurement unobservability.

Opportunism is also characterized by state unobservability. The decision to locate a transaction in a market or a hierarchy is driven by the costs associated with the risk of opportunism in conjunction with asset specificity. If opportunism were observable *ex ante* then encompassing, contingent claims contracts could be written to govern the transaction without the exorbitant costs of hierarchical governance. If opportunism were observable *ex ante*, there would exist little economic justification for the presence of hierarchy. *Ex ante* observation of opportunism would change the state of the world and vitiate the explanatory power of TCE.

Agency theory

Agency theory has been invoked in the strategic management literature to explain the structure of corporate governance mechanisms and the efficacy of the takeover mechanism. An agency relationship is defined as one in which one or more persons (the principal(s)) engages another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent (Jenson and Meckling, 1976). The cornerstone of agency theory is the assumption that the *utility functions* of principals and agents diverge. This divergence of interests gives rise to an *efficiency loss* to the

principal. According to agency theory, this efficiency loss can be reduced if the principal establishes appropriate incentive systems, monitoring mechanisms, and enforcement mechanisms, and if the agent bears bonding costs. The sum of any incentive, monitoring, enforcement, and bonding costs, along with any remaining efficiency loss, are referred to as *agency costs*. Agency theory asserts that economic selection processes favor governance structures that economize on agency costs (Fama, 1980). By governance structures, agency theorists mean the mechanisms that police the implicit or explicit contracts between principals and agents. These include incentive-based performance contracts, monitoring mechanisms such as the board of directors, and enforcement mechanisms such as the managerial labor market and market for corporate control.

Even this thumbnail sketch reveals that a number of unobservable constructs are to be found at the heart of agency theory. The utility functions of principals and agents are unobservable because the elements in each individual's utility function are subjectively determined (Mirowski, 1989). Researchers may observe choices made by agents (or principals), such as how they allocate their time between work-related effort and 'on-the-job consumption'; however, this is substantially different from the actual observation of utility. Moreover, the arguments made by Alchain and Demsetz (1972) with regard to team production suggest that *the choices* made by agents may themselves often be unobservable—which further complicates the process of observing utility. The construct of utility is a shining example of measurement unobservability; utility defies measurement as a *quid pro quo* of its construction (Mirowski, 1989).

Just as importantly, the divergence of interests between principals and agents constitutes a state unobservable. The entire contribution of agency theory hangs on the *ex ante* state unobservability of this divergence of interests. The accurate *ex ante* observation of divergent interests between principals and agents would eliminate the need for principals to incur agency costs, and the governance structures said to minimize agency costs would become superfluous. Stated simply, *the value added by agency theory depends on the ex ante state unobservability of the degree of divergent interests between agents and principals.* Moreover, the fact that utility and the resulting divergence of interests between principals and agents cannot be directly observed implies that agency costs, which are a function of this divergence of interests, are also inherently unobservable.

The resource-based view of the firm

The resource-based view (RBV) of the firm is the most recent of the three theories reviewed here to break upon the strategic management scene (Barney, 1991; Conner, 1991; Mahoney and Pandian, 1992; Wernerfelt, 1984). The RBV seeks to explain the pattern of performance differences between firms over time. Central to the RBV is a conception of the firm as a collection of heterogeneous resources, or factors of production. Resources include physical resources, such as plant and equipment, human resources, such as managerial and technical staff, and organizational routines, which are the 'software programs' that organizations use to coordinate their human and physical resources and put them to productive use (Penrose, 1959; Nelson and Winter, 1982). The RBV argues that heterogeneous resource endowments are the source of competitive advantage (or disadvantage). The magnitude of competitive advantage generated by a resource depends upon the extent to which it either reduces the cost structure of the firm, or helps differentiate the firm's product offering. It also depends upon the uniqueness of the resource in relation to those possessed by competitors.

The sustainability of competitive advantages relies upon three factors: the rate of resource obsolescence due to environmental change; the availability of substitutes for the resource; and the *inimitability* of the resource. The inimitability of a resource is argued to depend upon the height of barriers to imitation, which in turn is a function of the extent to which the target resource is *observable*. Resources are argued to be unobservable if they are tacit, diffused throughout the organization, or socially embedded (Reed and DeFillippi, 1990). Organizational routines, in particular, are argued to have these characteristics (Nelson and Winter, 1982; Reed and DeFillippi, 1990). The core proposition of the RBV with regard to sustainability proceeds on the logic that, all else being held constant,

the more unobservable a value resource, the higher are the barriers to imitation, and the more sustainable will be a competitive advantage based upon that resource.

The power of the theory to explain performance persistence over time is based upon the assumption that certain resources are by their nature unobservable, and hence give rise to high barriers to imitation. These resources are state unobservable because the observation of the resource, in whatever degree, immediately erodes the height of the barrier to imitation. The observation of this resource effects a change in its own nature as well as the nature of the firm within which it is embedded. In short, if there are no unobservable resources, the RBV loses much of its explanatory power.

LOGICAL POSITIVISM AND REALISM

Almost all of the work in the philosophy of science during the present century has either been produced within the tradition of logical positivism, or has been written as a response to it (Boyd, 1991a). Realism is no exception to this; indeed, modern realism emerged in the early twentieth century as the dominant response to the philosophical problems that quantum mechanics created for logical positivism. Since then the debate between logical positivism and realism has been waged continuously in the philosophical literature (Boyd, Gasper, and Trout, 1991). Despite this lengthy discourse, the debate has not yet been resolved—nor will it be. Like all philosophical debates, ultimate resolution is impossible and one's position is arrived at by weighing the arguments.

Logical positivism

Logical positivism traces its genealogy back to the eighteenth-century enlightenment thinkers of Locke, Berkeley, and Hume (Russell, 1946). As a school, the logical positivists reached their pinnacle in the middle of the twentieth century in the so-called 'Vienna Circle' (Brown, 1970). Positivists have traditionally espoused a verificationist theory of meaning. More recently, they have moved towards what is referred to as an instrumental position. Positivists also espouse a formalistic theory of truth.

Verificationist theories of meaning

The central doctrine of logical positivism is the verificationist theory of meaning (Boyd, 1991b; Brown, 1970; Hacking, 1983). This is the thesis that a proposition (theoretical statement) is meaningful if, and only if, its elements can be empirically verified. The emphasis on verification can be traced back to Hume in whose system 'all perceptions of the mind resolve themselves into two distinct kinds, which I shall call IDEAS and IMPRESSIONS' (Hume, 1739: 1). Impressions are based upon sensory data, and include emotions and passions. Thus, to see an apple is an impression in the mind. Ideas are the 'faint images' of impressions which are brought into the memory. When an individual remembers that they saw an apple yesterday, they are creating an idea in their mind of an apple. The crux of Humean empiricism, therefore, is the thesis that there can be no ideas formed independently of impressions. Given this, it follows that *only those objects in the world which can be empirically verified have meaning*. Put another way, central to logical positivism is the thesis that all genuine knowledge is based on sensory observation—whether that be direct observation, or observation aided by instruments (Hacking, 1983).

The verificationist theory of meaning has two key implications for the development of scientific theories. First, only those statements whose elements have empirically verifiable meanings can qualify as propositions (all scientific theories are propositions). Second, as a direct consequence of the above, there are no elements in a proposition, or theory, which are purely theoretical. Purely theoretical elements cannot be verified and thus have no meaning. There is no value added to knowledge by the inclusion of a purely theoretical element—one that cannot be verified by empirical observation—in determining the truth value of a proposition. Only terms that can be empirically observed, and which, therefore, have meaning, are necessary and useful in establishing the truth of a proposition.

Logical positivists apply the verificationist theory of meaning to the *problem of demarcation*—that is, to the problem of distinguishing between science and nonscience. According to this approach, theories that contain purely theoretical elements whose meaning cannot be

verified through sensory observation are *not* scientific theories. Thus, logical positivism has often been associated with attacks on metaphysics (e.g., religion), and attempts to show that, in contrast to true science, such inquiries cannot result in real knowledge (O'Hear, 1989). Logical positivists are unwilling to take any 'leaps of faith' regarding nonempirical based knowledge. A strict application of the verificationist theory of meaning to agency, transaction costs, and resource-based theory would doom these theories to the realm of metaphysics, along with the likes of quantum mechanics, precisely because they contain unobservable elements whose existence it is impossible to verify. However, as we shall see next, the positivists have shifted their position to admit unobservables into scientific theories, while maintaining a deep skepticism about the ultimate truth value of such theories.

The instrumental position and the problem of unobservables

Logical positivism has been roundly attacked for its inability to handle theories heavily reliant on unobservable constructs, such as quantum physics (Putnam, 1990). It has not helped the positivist cause that some of these theories, and particularly quantum mechanics, have been spectacularly successful in making predictions that are subsequently confirmed by empirical observation. In response, positivists have moved away from a strict interpretation of the verificationist theory of meaning, and towards an *instrumental* position that admits to the value of incorporating unobservables in scientific theories, without formally accepting the realist position that such theories can give us knowledge about those unobservables.

The instrumental position asserts that the ultimate truth or falsity of a scientific theory is irrelevant; it is the ability of a theory to explain empirical reality that is the proof of its value (Nagel, 1979). To the instrumentalist, theories are merely tools, much like hammers and saws, used by scientists to construct predictions of observable phenomena. It would be absurd to debate the truth or falsity of a hammer, and the instrumental argument holds that the concern with the truth of scientific theories is similarly misplaced. The strength of the instrumentalist response is to fundamentally shift the criteria on which science should be judged, away from the search for truth and toward the search for adequate explanation.

Milton Friedman's influential essay, *The Methodology of Positive Economics*, justifies the use of unobservable economic constructs by adopting the instrumentalist position. He argues:

> the relevant question to ask about the 'assumptions [constructs]' of a theory is not whether they are descriptively 'realistic [observable],' for they never are, but whether they are sufficiently good approximations for the purpose in hand. And this question can be answered only by seeing whether the theory works, which means whether it yields sufficiently accurate predictions (Friedman, 1953: 15).

Thus, for example, whether or not people actually calculate the marginal utility of a quantity of any good they care to purchase, or whether utility exists at all, is of little relevance in the instrumentalist approach. What matters is that when researchers proceed *as if* people did engage in such calculations, the predictions of the marginalist model conform to empirically observed reality. To give another example, a similar logic sustains the validity of transaction cost economics, regardless of the observability (or existence) of transaction costs. The assumption that markets select economic entities that economize upon transaction costs apparently yields accurate predictions about the governance structures observed in the real world (see Williamson, 1985, Chapter 5). Thus, an instrumentalist can accept the value of transaction cost theory as an instrument for predicting governance form, without having to commit to the belief that transactions costs actually exist in the real world. For the instrumentalist, transaction costs are simply a useful theoretical construct; but one that is unobservable and therefore hypothetical.

In defense of this position an instrumentalist will claim that for any observable phenomenon, P, that has been accurately predicted by a theory T_1, which contains an unobservable construct, it will always be possible to construct alternative theories, T_2 to T_n, which yield the same predictions as T_1, but which offer contradictory accounts and evoke different (or additional) unobservable entities. It follows that scientific evidence can never decide between competing theories that contain unobservable phenomena, but which yield equivalent and empirically con-

firmed predictions. We may choose the simplest model for pragmatic reasons (i.e., by utilizing Ockham's razor), but pragmatic standards of choice have nothing to do with truth or knowledge.

Formal theories of truth

Since a positivist position maintains that the truth value of theories containing unobservables *cannot* be assessed on the basis of their correspondence to reality, positivists assess the truth value of such theories on the basis of their logical form. The most recent defender of this approach has been Hempel (1962), who has championed the *deductive-nomological* (DN) model of explanation. This model can be set out schematically as follows:

$L_1, L_2, \ldots, L_n$ (general laws)

$C_1, C_2, \ldots, C_n$ (background conditions)

E (phenomenon to be explained)

According to this approach, a proposition has truth value if the phenomenon it is seeking to explain, E, can be deductively derived from a set of general laws, $L_1, L_2, \ldots, L_n$, and background conditions, $C_1, C_2, \ldots, C_n$. The DN model suggests that the truth value of scientific theories depends upon the syllogistic *form* of the theory and not upon the substances of general laws, background conditions, and phenomena to be explained. That is, general laws and background conditions do not have to have any basis in reality for a theory to be true. The truth value of a theoretical statement is not assessed on the basis of its correspondence to reality, but upon the basis of its mathematical form.

The DN approach has come to dominate the practice of the social sciences. Current social science research is laden with a predilection for warranted assertability based on the syllogistic form of theories and models (for details see Miller, 1991). Economics stakes its claim as a true science because its core propositions can all be reduced to mathematical equations whose truth depends upon form, not content. The increasing use of the logic tools of economic analysis, and particularly game theory, by strategic management researchers provides an illustration of the reliance on formal models within the context of the DN approach to warrant the truth claims of propositions (e.g., Camerer, 1991; Saloner, 1991).

Realism

Realism gained momentum in the middle of the twentieth century as the epistemological problems created by the inclusion of unobservable entities in quantum mechanics were debated in philosophical circles (Aronson, 1984; Putnam, 1990). Since positivists have a thorough-going hostility to unobservable or purely theoretical entities quantum mechanics presented a head-on challenge to the positivist philosophy of science. This is the challenge that realism addresses. Here we examine the realist position with regard to the problem of meaning, which goes beyond verification and instrumentalism, the problem of truth, which emphasizes correspondence, and the problem of confirmation.

Beyond verification and instrumentalism

The hallmark of realism is *a belief* that theories of science give us knowledge about the unobservable, and that under certain circumstances we may have good reason for *believing* statements about unobservable entities to be true. Thus, realists are willing to take 'leaps of faith' regarding unobservables. This is the antithesis of positivism, with its insistence that no knowledge of unobservable phenomena is possible and that theories based upon unobservable entities are not scientific but metaphysical (for the traditional positivist), or, at best, tools for explaining phenomena (for the instrumentalist). According to realists, when a well-confirmed scientific theory appears to describe unobservable theoretical entities, it is almost always appropriate to think of these terms as really referring to unobservable features of the world, *which exist independently of our theorizing about them*, and of which the theory is probably approximately true (Boyd, 1991a). So, for example, according to realists the quantum theory of physics suggests that atoms are made up of very small entities with various properties. The evidence that we have that such entities exist independent of our theorizing about them is not based upon observation of the entities themselves, since they are unobservable, but upon observation of their effects.

Realists argue that the instrumentalist position is untenable in practice, since the instruments that allow scientists to confirm the predictions of theories are themselves frequently constructed on the basis of theories that contain unobservable elements (for example, this is the case with electron microscopes). A true instrumentalist, therefore, would have to reject the observations provided by such instrumentation as metaphysical—a position that if widely accepted would result in the whole scientific enterprise quickly grinding to a halt (Putnam, 1990).

In contrast, realists adopt what Popper (1972) has referred to as the common sense approach to knowledge. This simply states that if a scientist makes a prediction on the basis of some theory that contains unobservable elements, and if this theory survives repeated attempts to falsify it, then we are justified in acting as if the theory were true. This holds even though we can never know for sure that the unobservable entities in the theory exist. Popper buttresses this argument by quoting Winston Churchill—and the quote is worth reproducing at length:

> Some of my cousins who had the great advantage of University education used to tease me with arguments to prove that nothing has any existence except what we think of it. I always rested on the following argument . . . [Here] is this great sun standing apparently on no better foundation than our physical senses. But happily there is a method, apart altogether from our physical senses, of testing the reality of the sun. Astronomers predict by [mathematics and] pure reason that a black spot will pass across the sun on a certain day. You look, and your sense of sight immediately tells you that their calculations are vindicated . . . We have taken what is called in military map-making a 'cross bearing'. We have got independent testimony to the reality of the sun. When my metaphysical friends tell me that the data upon which the astronomers made their calculations . . . were necessarily obtained originally through the evidence of their senses, I say 'No'. They might, in theory at any rate, be obtained by automatic calculating machines set in motion by the light falling upon them without admixture of human senses at any stage . . . I . . . reaffirm with emphasis . . . that the sun is real, and also that it is hot—in fact as hot as Hell, and that if the metaphysicians doubt it they should go there and see.[2]

[2] From Winston S. Churchill (1944). *My Early Life—A Roving Commission.* Macmillan, London, p. 131.

Popper follows this quote by noting that while Churchill does not prove realism, for a philosophical argument can never be decisive, his arguments do constitute an excellent refutation of the specious arguments of the positivist—a conclusion with which we concur.

Correspondence theories of truth

Realists adhere to a correspondence theory of truth, according to which propositions are true if, and only if, they correspond to actual conditions in the real world (Boyd, 1991a; Horwich, 1990; Tarski, 1935). This view stands in contrast to the formal theory of truth, in which the truth value of a proposition is assessed by its syllogistic form, as opposed to its substance. The realist conception is that the truth value of a proposition can only be assessed by its *substance*—it is only true if its substance corresponds to that of the real world.

It is important to realize that the correspondence theory *does not* constitute a rejection of the DN model as a useful method for deducing predictions. However, it does constitute a rejection of the instrumentalist argument that the only legitimate claim for the truth value of a theoretical statement is that based upon the syllogistic form of the statement. The correspondence theory of truth maintains that a statement derived from the DN model may be correct, as judged by its syllogistic form, but it may be false in the sense that it does not correspond to reality. An example of this is Postrel's (1991) use of game theory to demonstrate that given certain background conditions it is rational for bank managers to set their pants on fire in public (the so-called Flaming Trousers Conjecture). Postrel's point is that game theory is no more than a logical tool, and as such it can be misused to produce absurd propositions that nevertheless have the correct syllogistic form. Only if the proposition corresponds to reality does it have truth value.

Confirmation

As for theory confirmation, here too realists part company with the skepticism of positivists. While the realist would not disagree with the positivist claims that we cannot ever conclusively prove a theory containing unobservables to be true, the

realist argues that we can have good reasons for believing that a theory is 'approximately true'.[3] Therefore, we may be justified in acting as if it were true. The realist approach here is commonly known as the 'inference to the best explanation' (Aronson, 1984). The thought underlying the inference to the best explanation is that if a theory consistently explains some data better than any other theory explains them, we have a good reason to act as if it were true. Moreover, realists argue that our belief in a theory can be stronger when it explains a diverse set of phenomena. It would be an absurd coincidence indeed if a wide variety of different kinds of phenomena were all explained by a particular theory, and yet that theory were not true. Thus, the argument from coincidence supports a good many of the inferences that we make to best explanation (Cartwright, 1991). Realists also point out, with some justification, that the inference to the best explanation is the only common sense position to take. After all, our design of bridges, airplanes, atomic power stations, computers, and space vehicles is guided by theories that we believe to be approximately true, even if we cannot ever conclusively prove them to be so.

IMPLICATIONS FOR STRATEGIC MANAGEMENT RESEARCH

We have shown that unobservable constructs are to be found at the core of a number of theories that underpin a good deal of strategic management research—including agency theory, transaction cost theory, and the resource-based view of the firm. We have also reviewed the debate between logical positivists and realists, and argued, convincingly we hope, that realism is more defensible than positivism. Building on this, in the current section we consider a number of implications of a realist's philosophy for the strategic management field.

[3] Lakatos (1968) argues that this is the original position which Popper (1959) intended to take. Popper's arguments have been used by positivists in support of the verificationist claims of their position. Popper's own statements regarding realism, quoted earlier, provided evidence that his position on these matter is more subtle than commonly assumed.

The legitimacy of normative science

Positivists and their instrumental cousins are by definition skeptics. They see theories containing unobservables as mere tools. This necessarily limits the ability of the positivist to derive normative rules from theories that can be used to guide managerial action. Recall the positivist argument that for any theory T_1 containing unobservables that explains a phenomenon, P, there are a number of feasible alternative theories, T_2 to T_n, that might be constructed to explain P. The positivist will always be suspicious, therefore, of normative rules derived from T_1, since the theory may be false. They will treat T_1 as a mere tool for generating predictions, while arguing that the theory itself may not have any correspondence in reality. In contrast, a realist will state that if T_1 is supported by the inference to the best explanation, we should not shy from deriving normative rules from that theory, even when they involve unobservable constructs. As strategic management researchers and teachers who hope to improve managerial action, the realist position seems to us to be the best way forward and, indeed, the only way that we can justify what we do. At the same time, we caution that adopting the realist position does not give researchers the right to preach normative rules derived from their favorite theory. As always, a theory must survive rigorous empirical testing before we can speak of it as being well corroborated.

Criteria for choosing between theories

A realist philosophy states that we cannot reject theories just because they contain key constructs that are unobservable. It is not enough to state that the unobservability of utility dooms agency theory, that transaction cost theory is untestable because transaction costs cannot be measured, or that the RBV is invalid because key resources may be unobservable. To reject a theory one must be able to show that the predictions of observable phenomena that are derived from that theory do not hold up under empirical testing. By the same token, however, a realist philosophy also indicates that we cannot accept a theory just because it is based upon a logical or mathematical model that has the correct syllogistic form. A theory may have the correct

syllogistic form, but if it has no correspondence in reality, the theory must be viewed as false. Put another way, theory building following the rules of the DN model is a necessary condition, but not a sufficient condition, for the acceptance of a theory.

Consideration of both the realist and instrumentalist positions implies that the only sure method of choosing between rival theories is the correspondence of the predictions of the theory with the real world. Wherever possible, researchers should design critical experiments, where the predictions of theory A are diametrically opposed to the predictions of theory B (Aronson, 1984). Observation of the real world thus allows us to infer with confidence that either theory A or theory B is correct, but not both.

The method of critical experiment is the path through which quantum mechanics and the theory of relativity have become accepted. The design of critical experiments is a difficult task in strategic management, where researchers are faced with a multitude of variables and contingencies, each of which potentially determines the outcome. However, we are confident that the ingenuity and creativity of strategic management scholars will meet the challenge of theory testing by critical experiments. We discuss some theory-testing strategies below.

Theory testing strategies

When testing theories that contain unobservable elements, scholars need to carefully think through their methodological approach. Recognizing that unobservable constructs cannot by definition be measured, they must develop testing strategies that take this into account. Here we review theory-testing strategies for each of the three theories reviewed earlier: transaction cost theory, agency theory, and the resource-based view of the firm.

Transaction cost theory

The predictions of transaction cost theory state that the optimal governance structure, G, is a function of the level of transaction costs arising in market-mediated exchange, TC, which in turn is a function of the degree of asset specificity, k, and the *ex ante* probability of opportunism, p. That is:

$$G = f_1(TC) = f_2(k, p)$$

Since researchers have recognized the problem of measuring p directly (k is measurable), the testing strategy has relied upon a reduced model that essentially has the following form:

$$G = f_3(k)$$

In this formulation p is assumed to be constant across settings and the level of transaction costs is inferred from k (e.g., see Monteverde and Teece, 1982; Walker and Weber, 1984). From a realist or positivist perspective, there is nothing wrong with such a theory-testing strategy given that key constructs—in this case p—are unobservable, and that the model $G = f_3(k)$ still yields testable and falsifiable predictions about G that are consistent with transaction cost theory. Furthermore, this basic model can be extended to give us more knowledge about unobservables such as p. Granovetter (1985) and Hill (1990), for example, have suggested that the *ex ante* probability of opportunism, p, is itself a function of the extent to which economic transactions are embedded within a social network, n. That is:

$$p = f_4(n)$$

Given that networks can be mapped out (Powell, 1990), this modification to transaction cost theory enables us to test the following model:

$$G = f_5(k.n)$$

where the network variable, n, *moderates* the relationship between G and k. Thus, this formulation can yield more knowledge about an unobservable, p. Specifically, it tells us whether p is attenuated when transactions take place within a network, as suggested by Granovetter (1985) and Hill (1990).

While the appropriate theory-testing strategy can give us knowledge about unobservables, it is important to point out that unless advocates of a theory that contains unobservables can develop such a testing strategy the theory itself is doomed to ultimate failure. The viability of transaction cost theory is enhanced because there are ways of 'getting at' transaction costs. *The viability of transaction cost economics hangs on*

the ability of the theory to make refutable predictions about G based on k and n.

Agency theory

Agency theory *assumes* that the (unobservable) utility functions of principal and agents diverge, *theorizes* that this divergence gives rise to inefficiencies which impact upon agency costs (another unobservable), and *proposes* that the adoption of appropriate governance structures for policing the relationship between principals and agents can economize on agency costs. Thus, agency costs, C, can be modeled as a function of the governance structure policing the relationship between principal and agents, G_{pa}. That is:

$$C = f(G_{pa})$$

Starting from this core proposition, agency theorists have developed detailed arguments about the value of different governance structures as mechanisms for aligning interests and reducing agency costs. Thus, on the basis of deductive logic, they might argue that some governance structure G'_{pa} is superior to G_{pa} because under G'_{pa} $C'<C$. The event study methodology represents a popular way of testing hypotheses derived from such arguments. The idea is to measure the change in agency costs that accompanies a certain type of change in governance structure. The core problem remains—agency costs are unobservable. However, in those cases where stockholders are the principals and corporate managers the agents, this problem has been solved by finding a workable proxy for agency costs; namely, the abnormal returns to stockholders that accompany a change in governance structure. The shift in governance structure may be a leveraged buyout, a change in board structure (e.g., separating the position of chairman and CEO), the adoption of some kind of contractual mechanism for aligning interests (e.g., golden parachute contracts), a hostile takeover, and so on (Jensen, 1988). Kaufman and Englander (1993) show that the abnormal returns offered by the new governance structure present in Kohlberg Kravis Roberts (KKR)-owned companies served as a powerful magnet for new investment capital, primarily from large institutional investors.

The crucial point is that agency theorists have found an observable proxy—abnormal returns—that allows them to operationalize an unobservable construct: agency costs. They do not directly measure the change in agency costs that accompanies a change in governance structure. Instead, they utilize a proxy that, from a realist perspective, can be argued to reflect the reduction in agency costs. A realist would maintain that such a testing strategy gives us information about agency costs and, by extension, the underlying divergence of interest between principals and agents that gives rise to those costs in the first place.

Alternatively, a researcher can use agency theory to argue that differences in governance structure across firms will be reflected in differences in firm strategy and performance over time. For example, in firms with relatively weak governance structures, managerial hegemony can be theorized to result in the pursuit of empire-building diversification strategies that depress firm performance but increase the size of the firm (the argument being that such strategies best satisfy a stylized managerial utility function that contains income, status, and power as central elements—see Aoki, 1984 for a justification). In contrast, when governance mechanisms are strong we might expect to see less diversification and higher performance. This gives rise to a model of the following form:

$$\pi = f(S) = f(G)$$

where π is the performance of the firm, S is firm strategy, and G is the governance structure. Since all of the elements in this model are observable, testing is relatively straightforward (for examples, see Bethel and Liebeskind, 1993; Hill and Snell, 1988). Again, a realist would argue that the results from such an empirical strategy give us information about an unobservable construct—in this case the utility functions of principals (stockholders) and managers (agents), since differences in utility will be reflected in strategic choices and subsequent firm performance.

The resource-based view

In contrast to transaction cost and agency theory, advocates of the resource-based view have yet to solve the empirical problem posed by the

inclusion of unobservables in the theory. For example, a key proposition in the RBV is that the persistence of profit rates, π, is a function of the barriers to imitating rare and valuable resources. In turn, barriers to imitation are argued to be a function of the degree of observability (or unobservability) of those resources, ϕ. Thus:

$$\pi = f(\phi)$$

The problem with this formulation is that it is currently untestable. It is by construction impossible to assess the degree of unobservability of an unobservable, since by definition inimitable resources are unobservable (Barney, 1991). One way out of this trap is for scholars to focus on observable variables that determine the degree of unobservability of a rare and valuable resource. Work by Reed and DeFillippi (1990) is an example of a move in this direction. If a set of variables, $X_1, X_2, \ldots, X_n$ can be identified that determines ϕ, such that $\phi = f(X_1, X_2, \ldots, X_n)$ then one can test the following model:

$$\pi = f(X_1, X_2, \ldots, X_n)$$

and doing so will give us knowledge about the role of ϕ in determining π. To achieve this goal, however, scholars must first identify the observable conditions $X_1, X_2, \ldots, X_n$ which can be used to proxy the height of barriers to imitation. While this is a daunting task, the work of Dierickx and Cool (1989) represents a positive first step in this endeavor. Having done this, scholars must generate a set of refutable predictions which link π and $X_1, X_2, \ldots, X_n$. The development of observables will facilitate the testing of the RBV; clear predictions about π will enable the strategic management community to adjudge the ultimate explanatory power of the RBV.

More generally, it should be noted that ultimately the RBV will stand or fall not on the basis if whether its key constructs can be verified, but upon whether its predictions correspond to reality observed *for populations of firms*. What scholars need to do is to theoretically identify what the observable consequences of unobservable resources are likely to be, and then go out see whether such predictions have a correspondence in the empirical world. The analogy here is with quantum mechanics, which has been confirmed *not* by observing subatomic entities (since they are unobservable) but by observing the trail left by subatomic entities in the cloud chambers of linear accelerators. Good models for the kind of large-sample econometric work that needs to be done can be found in empirical studies looking at the persistence of abnormal returns over time (Cubbin and Geroski, 1987; Jacobsen, 1988) and at the relative contribution of industry and firm-specific (resource-based) factors in explaining performance variations across firms (Hansen and Wernerfelt, 1989; Rumelt, 1991). Cubbin and Geroski and Jacobsen control for the influence of unobservable variables, while Wernerfelt and Rumelt utilize viable proxies for firm-specific resources in their empirical tests.

A final point is that the description of the firm found in the RBV is complex, deep, and historical. Since each firm is viewed as a unique entity, explaining the cause of superior (or inferior) performance *at the level of the individual firm* calls for clinical work of the type that is currently unfashionable in the management literature. We are not advocating a return here to the type of unstructured and atheoretical case study work that characterized the early strategic management literature. Rather, we are arguing that there is value to be had, in terms of explanation, in viewing the firm as a natural laboratory in which the theoretical propositions of the RBV are already being tested. The challenge facing researchers is to take a collection of firms that face a similar environment (e.g., firms in the same industry), to establish how these firms differ with regard to their resources, and to link these differences to barriers to imitation and the persistence of performance differences across time. Such work should follow the methodological ground rules for comparative clinical work laid out by Eisenhardt (1989), Leonard-Barton (1990)--for a recent example of such work see Collis (1991). If repeated clinical studies across a wide variety of contexts yield empirical results that are consistent with the RBV, then following a realist philosophy of science we may legitimately claim that the theory corresponds to reality. The key here, however, is the need for repeated clinical studies. For only with enough repetition across contexts will advocates of the RBV be able to counter the coincidence argument.

Observing unobservables

Realists should not use the fact that a construct is unobservable given current instrumentation as an excuse for not trying to develop new and better instrumentation that can observe the formally unobservable. The history of science contains many instances of formerly unobservable entities becoming observable due to the development of better instrumentation (e.g., the scanning electron microscope opened up a whole new world of formerly unobservable phenomena to the 'view' of scientists). When all is said and done, even the most diehard realist would still prefer that we be able to observe key theoretical constructs. There is no preference for theories that contain unobservables—just a preference for theories that are testable and well corroborated by empirical investigation. Accordingly, the realists should try to develop new instruments, or pursue new research methodologies, that may enable them to observe the formerly unobservable. For example, qualitative methodologies such as multiple case studies, event histories, and ethnographic inquiries may represent the best way forward in observing the effects of otherwise unobservable, idiosyncratic effects on business strategy and performance, such as those predicted by the resource-based view of the firm (Collis, 1991; Eisenhardt, 1989; Leonard-Barton, 1990).

Beware of scientific errors

Friedrich August von Hayek began his Nobel memorial lecture with a stinging attack on the practice of empirical economics during the late 1960s and early 1970s: To quote:

> it seems to me that this failure of the economists to guide policy more successfully is closely connected with their propensity to imitate as closely as possible the procedures of the brilliantly successful physical sciences—an attempt which in our field may lead to outright error . . . in the physical sciences the investigator will be able to measure what, on the basis of a prima facie theory, he thinks important, in the social sciences often that is treated as important which happens to be accessible to measurement . . . [unobservable effects] are simply disregarded by those sworn to admit only what they regard as scientific evidence: they thereupon happily proceed on the fiction that the factors which they can measure are the only ones that are relevant (Hayek, 1989: 3).

The scientistic error equates *measurability* of a construct with its *relevance* in explanation. According to Hayek the scientistic error lies at the core of the failure of economics and economists to make sound and constructive policy recommendations. We worry that it may also lie at the core of the (relative) failure of strategic management scholars to make sound and constructive strategic recommendations.

A realist position breaks the connection between measurability and relevance. Differing utility functions, transaction costs, opportunism, and unobservable resources are all relevant in explanation, but they are not directly measurable (i.e., observable). Unfortunately, our reading of the empirical literature suggests that the scientistic error is frequently committed in the strategic management discipline. There is an obsession with the measurement of observable variables—witness the enormous attention devoted to the development of measures of diversification—that is only matched by a corresponding failure to develop empirical strategies for testing theories that are based upon unobservable constructs (such as the resource-based view). We suspect that the preoccupation with observable variables may be driven by issues such as data availability. Developing strategies to test for the impact of unobservables is a far more difficult endeavor, but we believe that ultimately it is likely to prove to be far more relevant and rewarding. Moreover, within the framework of a realist philosophy of science, it is also the appropriate endeavor.

CONCLUSION

We have argued that unobservable constructs lie at the core of a number of influential theories used in the strategic management literature, we have pointed out that realists and positivists differ in the degree to which they believe that our theories can give us knowledge about such unobservable constructs, and we have drawn out the implications of a realist position for strategic management research. We hope that the value of this paper lies in its ability to inform others in the field about the nature of the debate between realists and positivists, and about the implications that this debate holds for strategic management research. Most importantly, however, we have tried to build a case for taking a

realist position, for we believe that doing so offers the only way forward for a field such as strategic management whose ultimate *raison d'être* rests upon its ability to inform managerial action.

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