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RESEARCH NOTES AND COMMENTARIES

HOW SYMMETRICAL ASSUMPTIONS ADVANCE STRATEGIC MANAGEMENT RESEARCH

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We develop the case for symmetrical assumptions in strategic management theory. Assumptional symmetry obtains when assumptions made about certain actors and their interactions in one of the application domains of a theory are also made about this set of actors and their interactions in other application domains of the theory. We argue that assumptional symmetry leads to theoretical advancement by promoting the development of theory with greater falsifiability and stronger ontological grounding. Thus, strategic management theory may be advanced by systematically searching for asymmetrical assumptions in existing theory in order to identify the instances where new and useful insights can be derived from adopting symmetrical assumptions.

INTRODUCTION

Theoretical assumptions determine the scope and implications of theories (Musgrave, 1981). And yet, little explicit discussion exists of the role of assumptions in building and assessing theory in strategic management (Tsang, 2006). We address the following two research questions: (1) Are there properties of assumptions in strategic management research that are particularly likely to be associated with theoretical advancement?; and (2) Are there ways in which strategic management researchers can systematically examine and possibly modify the assumptions of established theories so as to advance these theories?

Building theory in strategic management research involves representing real phenomena in 'stylized' or 'idealized' ways by suppressing some, potentially relevant, real phenomena while highlighting others (Dubin, 1978; Krajewski, 1977; Poole and Van de Ven, 1989; Whetten, 1989). Abstraction pertains to the characterization of dependent variables (i.e., *explananda*)–theories explain some phenomena, but are silent about other phenomena (Keynes, 1891). It also pertains to the choice and characterization of independent variables and the mechanisms that are theorized to link these variables (i.e., *explanantia*). Abstraction is obtained by the making of assumptions regarding explananda and explanantia (Musgrave, 1981; Mäki, 1992, 2000, 2004). Assumptions critically

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matter because they determine the closeness of a theory to reality, delimit its explanatory scope, and constrain its predictions and explanations (Lam, 2010; Mayer, 1999; Tsang, 2006). In fact, much critical discussion in strategic management has concerned assumptions. For example, strategy's dominant perspective, the resource-based view (the RBV), has been criticized for its assumptions concerning the nature of markets (Mathews, 2006; Ryall, Gans, and MacDonald, 2008), the cognitive capabilities of decision makers (Bromiley, 2005), demand-side phenomena (Priem, 2007), and transaction costs (Foss, 2003; Foss and Foss, 2005).

Such critique has been a driver of theoretical advancement in strategic management by prompting the modification of existing assumptions and the introduction of new ones. Modified or new assumptions typically imply that the *scope* of a theory (i.e., its perceived *explananda*) change and new predictions can be derived (Mäki, 2009). If such new predictions survive empirical testing, theoretical advancement is commonly understood to have occurred (Lakatos, 1970; Popper, 1959, 1994). Hence, the choice of assumptions in theorizing is vitally important. So is their modification as researchers change theories, for example, in trying to broaden their scope to cover theoretical 'blind spots' by the development of new explanations within previously unaddressed *domains* of application (i.e., a subset of a theory's potential *explananda*). For example, unrealistic assumptions that top management teams could be treated as unitary actors gave way to upper echelons theory (Hambrick, 2007). More generally, we argue that strategic management scholars may address such blind spots in extant theorizing in a systematic manner by scrutinizing the assumptions that form the foundations of theorizing and examine how these assumptions influence the applicability of theory.

Specifically, we introduce and develop the notion of *assumptional symmetry* (e.g., Fraassen, 1989; Mäki, 2001, 2004). In the explanation of select phenomena, social science theories focus on specified actors and their interactions within certain social domains rather than actors and interactions within other domains (Ylikoski, 2011). For example, the RBV highlights factor market (a domain) interaction between firms and suppliers (actors) as core to the explanation of heterogeneity in competitive outcomes, but treats the product market (a different domain) interaction between firms and buyers (actors) as peripheral to this explanatory task.[1] Assumptions typically differ, often dramatically, between the core and the more peripheral domains—what we call 'assumptional asymmetry.' Assumptional symmetry obtains when assumptions made about certain actors and their interactions in one of the application domains of the theory are also made about this set of actors and their interactions in other application domains of the theory. The RBV exemplifies assumptional asymmetry: while interaction between firms and suppliers on (at least some) factor markets must be characterized by frictions (or competitive advantages cannot exist), interaction on product markets is typically either explicitly modeled as frictionless, namely perfectly competitive (Lippman and Rumelt, 1982; Peteraf and Barney, 2003), or not modeled at all. Such assumptions allow the theorist to address heterogeneity in competitive outcomes literally in isolation from product market phenomena; specifically, those real-world imperfections of product markets that may, in fact, matter greatly to heterogeneity in competitive outcomes (Makadok, 2010, 2011).

We argue that making assumptions more symmetrical is typically associated with theoretical advancement in the sense of producing new insight that may potentially be empirically corroborated. This is the 'main effect' we proffer. In fact, recent work in the RBV suggests that theoretical advancement has been accomplished by relaxing the asymmetrical treatment of product and factor markets in early contributions (e.g., Lippman and Rumelt, 1982; Peteraf, 1993), moving toward more symmetrical models (e.g., Adner and Zemsky, 2006; Chatain, 2010; Chatain and Zemsky, 2011; Foss and Foss, 2005; Priem and Butler, 2001). More generally, we argue that strategic management theory can be advanced by systematically searching for asymmetrical assumptions in existing theory in order to identify the instances where new and useful insights can be derived from adopting more symmetrical

[1] Notice, however, that one firm's factor market can constitute another firm's product market. In other words, many markets simply *are* both factor and product markets (cf. Brandenburger and Stuart, 1996). A given market does not change its inherent or real characteristics because of different theoretical representations of it. Hence, if a market that is one firm's factor market is characterized by imperfections, then those imperfections simply cannot disappear if we consider it in the context of being another firm's product market.

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assumptions. Thus, assumptional symmetry may function as a diagnostic tool for identifying 'hidden' variables and blind spots in existing theory—which, in turn, give rise to new and improved strategic management theory. However, theorizing is also subject to constraints that affect the extent to which assumptional symmetry facilitates theoretical advancement. Such constraints can be classified as *ontological* (i.e., phenomena may be inherently asymmetrical, requiring asymmetrical assumptions), *pragmatic* (i.e., asymmetrical assumptions about peripheral sets of explananda might be warranted for the purpose of achieving analytical tractability in the explanation of core sets of explananda), and *epistemological* (i.e., empirical tests are often unable to conclusively confirm or refute theoretical assumptions).

The overall purpose of this article is to raise and address the issue of proper assumptions in strategic management research and to proffer metatheoretical notions that can organize and facilitate progress in such discussions. To set the stage for this discussion, we next review the role of assumptions in theorizing. We then proffer and develop the notion of assumptional symmetry and relate it to theoretical advancement.

THEORIZING AND THE ROLE OF ASSUMPTIONS

The building of new theory, with novel and surprising predictions (Davis, 1971, 1986), is an important determinant of success (e.g., citation rates) in management research (Colquitt and Zapata-Phelan, 2007). Successfully building new theory usually involves introducing new, different assumptions in existing theorizing, typically because adequately addressing a hitherto unexplained phenomenon makes this necessary. Hence, it is not surprising that discussion and controversy in strategic management often concern what are good/bad, useful/less useful, realistic/unrealistic, etc., assumptions (see Bromiley, 2005; Camerer, 1994; Lam, 2010; Poole and van de Ven, 1989; Shugan, 2007; Tsang, 2006, 2009). And yet, there does not seem to be clearly articulated and agreed-upon principles that can be used to examine the assumptions that strategic management researchers make. However, clarity in the process of theory building is desirable (Bacharach, 1989; Oxley, Rivkin, and Ryall, 2010; Tsang and Ellsaesser, 2011; Whetten, 1989),[2] particularly in a field that draws on multiple disciplines and perspectives, such as strategic management (Agarwal and Hoetker, 2007). In the next paragraphs, we discuss the important role of assumptions in theorizing.

Assumptions and theories

There are at least three different types of theoretical assumptions, each of which plays a different role in theory (Musgrave, 1981). First, assumptions may be based on the conjecture that certain factors matter so little that they can be safely ignored without significantly affecting the theory's predictions (negligibility assumptions). Such negligibility assumptions refer to a '. . . hypothesis that some factor F which might be expected to affect [the] phenomenon actually has no effect upon it, or at least no detectable effect' (Musgrave, 1981: 378). In the case of the RBV, this corresponds to the notion that product market imperfections are empirically unimportant for the explanation of competitive advantage (cf. Rumelt, 1991). Second, assumptions may also function as a means of delimiting a theory's empirical domain of applicability by stating the specific conditions under which the theory does not apply (domain assumptions). Hence, contrary to negligibility assumptions, where F is assumed to have a negligible effect on the studied phenomenon, domain assumptions refer to situations where F in fact has a significant effect and where the theory, therefore, is restricted to situations where F is absent (Mäki, 2000). This form of assumptions would correspond to the position that the RBV is not designed to account for the performance effects of product market imperfections and is, therefore, not applicable when such imperfections are present

[2] As Ylikoski (2011: 8) notes that 'causal explanation provides information about causal history, but not all information about that history is regarded as explanatory. We have to pick *the right aspects of the causal process* to be included in the explanation. That is to say, how far in the causal history should we reach? How do we choose the events to be included in the explanation? How do choose the right level of abstraction for describing these events? In how much detail should the events be described and which of their detail should be included in the description? Apparently, we somehow manage to solve these problems intuitively when we are constructing explanations, but it would be much better if we could make the principles governing these judgments explicit.'

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(in a non-negligible way). Finally, assumptions may also function as temporary simplifying devices that allow the theorist to retain tractability, while successively approximating the true casual pattern. Such heuristic assumptions are typically made at an early stage of a theory's development, with the intention of relaxing these assumptions at a later stage as the theory matures (Mäki, 2000). This may be exemplified by the argument that the simplifying assumptions made about product market imperfection in some versions of the RBV (e.g., assuming competitive product markets) has allowed the theory to more fully concentrate on the firm performance effect of strategic factor market imperfections (see Peteraf and Barney, 2003).

Assumptions are embodied in models, that is, the concrete manifestations of theories (Mäki, 2004; Oxley *et al.*, 2010). Whether mathematical or formulated in natural language, models are miniature universes that attempt to capture the essence of the phenomenon one seeks to investigate, as well as the mechanisms that produce the phenomenon (Camerer, 1994; Montgomery, Wernerfelt, and Balakrishnan, 1989; Rasmusen, 1989; Saloner, 1994; Sugden, 2009). Building models involves 'theoretical isolation,' that is, assuming that certain variables (that represent entities, phenomena, or mechanisms) do not interact with the rest of the world. For example, certain variables may be entirely excluded from consideration. Or, it is assumed that variables can have values within only a certain interval. Making such assumptions is tantamount to excluding much information about our complex reality. Yet, many scholars maintain that even unrealistic assumptions may serve very useful purposes, namely by easing the construction of theories and the working out of observable implications from the relevant theories (e.g., Friedman, 1953; Shugan, 2007).[3] Others counter that assumptions steer explanation and prediction so that too extreme assumptions may lead these activities astray (e.g., Lam, 2010; Tsang, 2006).

The general issues underlying such debates are: what are good and bad assumptions in science—and what are our criteria for deciding on this? These issues have been debated in economics in terms of the 'realism' of assumptions (Caldwell, 1980; Foss and Foss, 2000; Friedman, 1953; Machlup, 1955; Mäki, 1992, 1994; 2000; Nagel, 1963; Samuelson, 1963), in sociology (Hedström, 2005; Lindenberg, 1992), and in marketing (Shugan, 2007; Tsang, 2009), but only to a small extent in strategic management research (but see Camerer, 1994; Lam, 2010; Tsang, 2006).

Debating assumptions

All theorizing involves making assumptions about the world that are descriptively false in the sense that certain aspects of a phenomenon are deliberately excluded, often reflecting a mixture of ontological (negligibility assumptions), epistemological (domain assumptions), and pragmatic considerations (heuristic assumptions). Not surprisingly, theoretical discussion often involves such different considerations. For example, some assumptions '. . . may be based on metaphysical considerations; they are made to exclude those aspects of the object that are expected to be ontically peripheral or inessential' (Mäki, 1994: 153). In this interpretation, the criterion for what is a 'good' assumption is that it highlights an essential aspect of the phenomenon or the mechanisms producing the phenomenon.[4] For example, scholars who consider bounded rationality to be a ubiquitous aspect of human cognition may reject theorizing that involves the assumption that individuals are maximizers (Simon, 1955). However, disagreements may easily arise with respect to what exactly are those essential or fundamental phenomena that theorizing should not abstract from.

Simplifying assumptions can be defended in terms of the need for analytical tractability (Oxley *et al.*, 2010). The search is for the minimum assumptions that are '. . . needed to generate an interesting conclusion—the *starkest, barest* model that has the desired result. This desired result is

[3] Strategic management scholars also make obviously unrealistic assumptions, such as assumptions that employees are perfectly docile (Davis, Schoorman, and Donaldson, 1997); that organizations do not manifest any incentive conflict (Conner and Prahalad, 1996; Marschak and Radner, 1972); or that resources are, as a starting point for theorizing, completely homogeneous (Barney, 1991). Such obviously unrealistic assumptions may still be useful because they allow the theorist to concentrate all his/her attention on a selected set of issues that have become clearly delineated by means of the assumptions.

[4] Morgenstern (1964: 4) acknowledged that assumptions are necessary in all theorizing, but added that '. . . [r]adical simplifications are allowable in science so long as they do not go against the essence of the given problem.' Thus, a given assumption should be considered '. . . faulty if it bypasses a fundamental feature of economic reality.'

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the answer to some relatively narrow question' (Rasmusen, 1989: 3; emphasis added). While such modeling dominates economics and is making its presence felt in management research (Adner *et al.*, 2009), it is not uncontroversial, and critics argue that it often excludes essential aspects of real-world decision making (e.g., Camerer, 1994; Foss and Foss, 2000; Furubotn and Richter, 2005). Such disagreements suggest that even if scholars agree on the (complex) nature of the world, they may hold different views of the appropriate modes of theorizing (Nelson and Winter, 1982). In particular, formal economists practice an approach in which the theorist explicitly begins from very stylized settings, such as the perfect competition model, and gradually introduces more and more detailed and complex assumptions. This typically proceeds in terms of constructing models that 'relax' one or more specific assumptions of the extreme model. Thus, assumptions have a heuristic character (see Musgrave, 1981): they constitute gradual steps taken toward more precise prediction rather than an ontological commitment to a certain depiction of the world. For example, theorists assume that within a relationship (e.g., between a principal and an agent), everything but the values of a few variables (e.g., the agent's effort) is perfectly known by all parties. The advantage of this procedure is that it allows the theorist to conduct theory building in a partial, tractable, and focused manner (Adner *et al.*, 2009). However, it also makes theorizing highly asymmetrical—which may be associated with disadvantages, such as neglecting factors that potentially have a bearing on what the theorist seeks to explain. Clearly, such disadvantages need to be weighed against the advantages of tractability. As the latter are well known (e.g., Adner *et al.*, 2009; Oxley *et al.*, 2010; Suppes, 1968), we concentrate on the notion of assumptional symmetry in this article.

ASSUMPTIONAL SYMMETRY

Basic meaning

The term symmetry derives from the Greek 'summetria,' which may roughly be translated as 'common measure.' Symmetry has a number of fundamental meanings. Thus, in everyday language, symmetry often refers to the aesthetic notion of a pleasing proportionality, balance, or equilibrium. This is the notion of symmetry that one associates with architecture, design, etc. Relatedly, symmetry is often understood in the sense of geometrical symmetry, as in reflection symmetry ('mirror image') or rotational symmetry (a sphere preserves its symmetry after rotation). The meaning of symmetry adopted in physics is '. . . invariance of some structural feature of the world under some transformation' (Audi, 1999: 703; see also Fraassen, 1989; Penrose, 2007).

We build on the argument that symmetry is not just applicable to physical objects, but also to theories and the process of building and evaluating theory (e.g., Fraassen, 1989). For example, symmetry can be used as a proof technique, relying on the basic 'symmetry requirement' that '[p]roblems which are essentially the same must receive essentially the same solution' (Fraassen, 1989: 236). The challenge to theorists is determining what constitutes essentially similar problems. Hence, symmetry arguments build on the knowledge that a particular symmetry exists, using this knowledge as a tool of inference.

Symmetrical and asymmetrical theories

Assumptional symmetry is closely related to the idea of 'ontological unification,' that is, to the extent that phenomena share basic characteristics, science should be aimed at 'redescribing apparently independent and diverse phenomena as manifestations (outcomes, phases, forms, aspects) of one and the same small number of entities, powers, and processes' (Mäki, 2001: 498). Similar arguments often appear in the social sciences, notably in economics. For example, it seems asymmetrical to assume that individuals are fundamentally self-interested when they act in the economic marketplace, but fundamentally driven by prosocial motivations when they act in the political domain. The recognition in the 1960s that this assumption was routinely made in much of economics—and that it was highly problematic (even inconsistent) and needed to be changed—was the starting point of an influential current in modern economics, namely 'public choice theory,' the study of constitutional and other political phenomena making systematic use of the rational economic man assumption (Buchanan and Tullock, 1962; Buchanan, 2003). This approach was based on

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the common-sense argument we know from observation that political and bureaucratic actors act based on self-interest. At the same time, the latter assumption allowed the study of political and bureaucratic resource allocation to move from the periphery to the core of economics, expanding the explanatory scope of economics in the process.

Thus, it is possible to classify theories as more or less symmetrical based on the uniformity with which they apply their central ('hard core,' Lakatos, 1970) assumptions across different domains of application. A theory is more symmetrical when the central assumptions that drive a theory—or family of theories within a discipline, that is, those that are necessary for producing the predictions of the theory—are the same across the various domains to which the theory applies. Based on this notion of assumptional symmetry, the RBV would seem to be asymmetrical. A central assumption in the RBV is that of asymmetric information on strategic factor markets. If such informational conditions do not obtain, there can be no rents from implementing strategies in product markets (Barney, 1986). In contrast, product market interaction is often explicitly assumed to take place under symmetric information (e.g., Lippman and Rumelt, 1982; Peteraf and Barney, 2003; Peteraf, 1993). A question prompted by this example is whether such asymmetry is somehow a problematic feature of the theory that theorists should seek to remedy. To answer this question, we need to address the broader issue of what may be said in favor of assumptional symmetry.

Assumptional symmetry and theoretical advancement: the main effect

Various arguments can be invoked in favor of theory development based on assumptional symmetry (e.g., aesthetics). Our basic proposition is that assumptional symmetry facilitates theoretical advancement in terms of the development of new and improved theory (the 'main effect'). The development of new theoretical propositions typically involves expanding the scope of a theory so that previously unexplained phenomena are added to those that the theory seeks to explain or that those phenomena already within the explanatory scope of the theory can be explained in novel, potentially better ways (Lakatos, 1970). This is desirable and facilitates theoretical advancement because it increases (1) *falsifiability* in terms of the number of test implications that can be derived; and, supposing these new conjectures are empirically corroborated, (2) the *ontological grounding* of the theory.

Falsifiability

Falsifiability is generally perceived as a desirable property of management theory (Bacharach, 1989; Montgomery *et al.*, 1989). Assumptional symmetry supports the empirical testing of theory by promoting falsifiable theory. A theory that consistently applies its basic assumptions, without resorting to auxiliary hypotheses that decrease the number of situations in which the theory's assumptions could be falsified, is by definition more falsifiable (Lakatos, 1970; Popper, 1959). In other words, the risk that the results of empirical tests of the theory are affected by the making of auxiliary assumptions in other domains (i.e., *ad hoc* modifications) is reduced by the use of symmetrical assumptions: the focal explanation is either equally true or false in all relevant application domains. Hence, the adoption of assumptional symmetry leads to an increase in the falsifiability of the theory since after the operation it rules out more than it did previously (Popper, 1959).

Ontological grounding

Mäki (2009: 16) argues that 'it is the factual discoveries we make about the real order of things that should determine the scope of theories and the disciplinary divisions in our scientific practices.' In other words, the scope of a theory should be ontologically grounded. Thus, theories may be advanced by achieving a better fit between the assumptions that are made and 'the real order of things.' Such advancements include the incremental discovery of the complete set of *explananda* that a particular assumption should be applied to. For example, theoretical advancement takes place when the application of an assumption is successfully extended to a new domain, and the theory's explanatory scope is increased as a result of this operation.[5] In other words,

[5] However, it is conceivable that making a theory more symmetrical can make its main predictions break down, in which case asymmetry is a necessary element for the theory to have validity. In other words, the boundary conditions of the theory become clearer and the tests of the theory can be more precise.

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the application of assumptional symmetry leads to theoretical advancement when it builds on 'substantive assumptions about symmetry in the world,' specifically, a claim or conjecture that a particular symmetry exists in reality (Fraassen, 1989: 242).

For example, if the assumption of bounded rationality can be taken to be an important characteristic of real-world strategic decision making and strategic decision makers are bounded rational in their capacity as buyers of resources (i.e., the domain of factor markets), we can leverage this real characteristic of strategic decision makers and reasonably conjecture that they are also bounded rational in their capacity as *sellers* of products (i.e., the domain of product markets). Although the relevant constraints on decision making might differ across different situations, it might be assumed that the intrinsic characteristics of strategizers do not radically change across domains (this is a substantive assumption about symmetry). Thus, if the bounded rationality assumption enables the explanation of important factor market phenomena (e.g., incomplete information, etc.), it might also allow for the explanation of similar phenomena in product markets. Building new theory that extends the bounded rationality assumption from the domain of factor markets to the domain of product markets extends the scope of strategic management theorizing that involves this assumption, increasing the explananda/explanantia ratio of the theory (i.e., the extent that the theory is able to explain much by little) (Mäki, 2009).[6]

It is important to note that assumptional symmetry refers to the extent that assumptions made about a *certain set of actors* and their interactions in one of the application domains of a theory are also made about *this set of actors* and their interactions in other actual and potential application domains of the theory. Different types of actors might differ significantly in terms of their inherent decision-making abilities and the information to which they have access. Hence, our argument for assumptional symmetry should not be interpreted as an argument against the practice of making different assumptions about different types of actors when this supported by knowledge that these actors have differential underlying characteristics. For example, a firm in a consumer goods market may reasonably be modeled as more well informed than the individual consumers. The reason for this 'asymmetry' may be that the average firm has more resources than the average consumer to spend on information processing activities. Indeed, suppressing this real asymmetry may hinder the explanation of important phenomena. This illustrates how assumptional symmetry may be used to identify the explanatory boundary conditions that are relevant to a theory (e.g., the real difference between end consumers and industrial buyers). Such discoveries may themselves lead to advances in terms of enabling a better specification of the conditions under which the theory is applicable which, in turn, allows for more specific and powerful tests of the theory.

Moderators

The effect of assumptional symmetry on theoretical advancement is subject to ontological, pragmatic, and epistemological constraints or moderators. Thus, there are conditions under which the adoption of assumptional symmetry does not necessarily lead to theoretical advances.

Ontological constraints

Assumptional symmetry is not a criterion by which the truth-value of theoretical propositions is determined. The truthfulness of a theoretical proposition is determined by whether it stands up to rigorous empirical tests (Friedman, 1953; Musgrave, 1981; Popper, 1959). For assumptional symmetry to facilitate theoretical advancement, it must represent 'the actual degree of unity in the world . . . in a truthful fashion' (Mäki, 2009: 365). A different way of stating this is that 'problems that are essentially the same must receive essentially the same solution' (Fraassen, 1989: 236). The factual discovery of the nature of phenomena is, thus, an important constraint on the application of assumptional symmetry since its application requires an accurate determination of what constitutes 'problems that are essentially the same' (i.e., domains of application that are essentially similar). For example, in transaction cost economics, assumptions of bounded rationality and transaction

[6] Consider Furubotn and Richter's (2005: 446) argument that the bounded rationality of *all* human decision makers means that one must also recognize that '. . . [t]ransaction costs must appear *everywhere* in the system because of the nature of the individuals making decisions . . . Thus, once we reject the notion of the omniscient decision maker who is 'completely rational,' the economic model undergoes a basic transformation.'

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costs are selectively introduced into some domains while being absent in other (Furubotn and Richter, 2005).[7] The extent to which such assumptional asymmetry distorts the predictions of a theory and, thus, limits theoretical advancement, depends on the *real* symmetry of the assumed phenomena (e.g., bounded rationality and transaction costs) across the relevant domains.

Pragmatic constraints

Theorists face trade-offs between explaining different sets of phenomena and make choices on what to explain based on their perceived relative significance. This provides a constraint on the application of assumptional symmetry for a theory's core (i.e., perceived to be of a relatively greater significance) and peripheral (i.e., perceived to be of a relatively lesser significance) phenomena. Thus, asymmetrical assumptions about peripheral phenomena might be warranted for the purpose of achieving analytical tractability in the explanation of core phenomena. For similar reasons, the successive approximation of a causal pattern over time by gradually making more realistic (and complex) assumptions might, in some situations, warrant making temporarily asymmetrical assumptions about core and peripheral phenomena to be able to move forward with the analysis. Such pragmatic constraints are likely to be more binding in the early stages of the life cycle of a theory (or family of theories), before the onset of distinct cumulative theoretical development.

Epistemological constraints

Assumptional symmetry, like many other models in science, is subject to epistemological constraints. These constraints arise because most scientific theories are, at some level, underdetermined by empirical evidence in the sense that empirical tests are unable to conclusively confirm or refute them (and, thus, also the core assumptions the theories build on) (Mäki, 2009). Specifically, the application of assumptional symmetry builds on recognizing what constitutes 'problems that are essentially the same,' or what is essentially similar across different application domains. The answer to these questions is rarely straightforward from an empirical or practical standpoint. Epistemological problems might, for example, arise because empirical tests of theories involve background assumptions that are themselves not tested. In other words, the empirical confirmation or refutation of assumptions is often subject to epistemic uncertainty that arise out of uncontrolled complexity in the test situation (see Mäki, 2009).

IMPLICATIONS FOR RESEARCH PRACTICE

Assumptional symmetry can be used as a diagnostic probe to evaluate existing theory as well as a research heuristic to facilitate the development of new theory. One particular use of assumptional symmetry that we find fruitful is diagnosing an existing theory in order to identify ways of broadening its scope to new domains based on the specific inference that the theory's critical assumptions can be fruitfully applied in these domains as well. Hence, in order to highlight the practical relevance of assumptional symmetry, we briefly outline a methodology by which the symmetries that are relevant for future theory development can be identified and evaluated to promote the development of new and improved theory. We use the RBV as an example.

In the first step, a set of critical and asymmetrical assumptions in a given theory are identified along with the specific domains that the asymmetry concerns (e.g., the assumption that strategic factor markets are subject to frictions while product markets are frictionless). An assumption is critical: if absent the assumption, no explanation of the relevant phenomenon is possible. It is asymmetrical if the assumption is made about certain actors and their interactions in one of the application domains of the theory but *not* made about this set of actors and their interaction in other application domains of the theory. Second, by evaluating the explanatory and predictive consequences of the identified asymmetries, it may be decided whether symmetrical assumptions can be fruitfully used to improve the theory. This step involves asking why symmetry rather than asymmetry should be adopted

[7] Furubotn and Richter (2005: 513) argue that 'some empirical justification for these assertions would have to be forthcoming. We would have to ask how large the costs are in each area and what specific factors account for the positive or zero costs stipulated. Such questions, though, have no easy answer. Indeed, the idea that zero transaction costs and positive transaction costs can hold simultaneous in an economic universe does not seem defensible conceptually.'

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for a set of assumptions across certain domains (e.g., to account for potential product market phenomena such as small numbers bargaining, information asymmetry, and uncertainty). While our model highlights some important advantages of assumptional symmetry, this ultimately involves comparing the benefits of the explanations generated under the two distinct set of assumptions (i.e., considering ontological, pragmatic, and epistemological constraints). Third, in the final step, the critical assumption is symmetrically applied across the selected domains, replacing the prior asymmetrical assumptions, to generate new insights into the studied phenomenon and new predictions. For example, making RBV assumptions about small numbers bargaining, asymmetric information, and uncertainty—not only in the context of factor markets but also in the context of products—may provide new insight into the role of bargaining/governance capabilities *vis-à-vis* buyers and competitive diagnostics as a strategic resource.

CONCLUSION

What are the characteristics of a good scientific theory? Conventionally, scholars judge the quality of a theory on the extent to which it withstands rigorous empirical tests and provides an accurate reflection of reality (Popper, 1959). In addition to empirical and predictive accuracy, Kuhn (1998: 103) identifies and summarizes four generally accepted characteristics of a good theory, namely *consistency* ('not only internally or with itself, but also with other currently accepted theories applicable to related aspects of nature'); *broad scope* ('a theory's consequences should extend far beyond the particular observations, laws, or subtheories it was initially designed to explain'); *simplicity* ('bringing order to phenomena that in its absence would be individually isolated and, as a set, confused'); and being *fruitful of new research findings* ('disclose new phenomena or previously unnoted relationships among those already known'). Our case for assumptional symmetry emphasizes a particular method for the comparison between explanatory/predictive outcomes under the assumptions of symmetry and asymmetry, respectively, as a means for theoretical advancement. Thus, assumptional symmetry increases the explanatory *scope* of a theory, promotes *simplicity* by bringing isolated phenomena within the orbit of a unified theory, and is *fruitful of new research findings*. Although we have not pursued the theme in this article, it is also arguable that assumptional symmetry increases *consistency* by leveraging the same assumptions across the various domains of a theory. Thus, assumptional symmetry is an important scientific and methodological principle that promotes generally accepted characteristics of good theory.

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REFERENCES

Adner R, Polos L, Ryall M, Sorenson O. 2009. The case for formal theory. *Academy of Management Review* **34**: 201–208.

Adner R, Zemsky P. 2006. A demand-based perspective on sustainable competitive advantage. *Strategic Management Journal* **27**(3): 215–239.

Agarwal R, Hoetker G. 2007. A Faustian bargain? The growth of management and its relationship with related disciplines. *Academy of Management Journal* **50**: 1304–1322.

Audi R. 1999. *The Cambridge Dictionary of Philosophy*. Cambridge University Press: Cambridge, U.K.

Bacharach SB. 1989. Organizational theories: some criteria for evaluation. *Academy of Management Review* **14**: 496–515.

Barney JB. 1986. Strategic factor markets: expectations, luck, and business strategy. *Management Science* **32**: 1231–1241.

Barney JB. 1991. Firm resources and sustained competitive advantage. *Journal of Management* **17**: 99–120.

Brandenburger A, Stuart H. 1996. Value-based business strategy. *Journal of Economics and Management Strategy* **5**: 5–24.

Bromiley P. 2005. *The Behavioral Foundations of Strategic Management*. Blackwell Publishing: Malden, MA.

Buchanan JM. 2003. *Public Choice: The Origins and Development of a Research Program.* Center for Study of Public Choice. George Mason University: Fairfax, VA.

Buchanan JM, Tullock G. 1962. *The Calculus of Consent: Logical Foundations of Constitutional Democracy*. University of Michigan Press: Ann Arbor, MI.

Caldwell B. 1980. Positivist philosophy of science and the methodology of economics. *Journal of Economic Issues* **14**: 53–73.

Camerer C. 1994. Does strategy research need game theory? In *Fundamental Issues in Strategy*, Rumelt RP, Schendel D, Teece DJ (eds). Harvard Business School Press: Boston, MA.

Chatain O. 2010. Value creation, competition, and performance in buyer–supplier relationships. *Strategic Management Journal* **32**(1): 76–102.

Chatain O, Zemsky P. 2011. Value creation and value capture with frictions. *Strategic Management Journal* **32**(11): 1206–1231.

Colquitt JA, Zapata-Phelan CP. 2007. Trends in theory-building and theory testing: a five-decade study of the *Academy of Management Journal*. *Academy of Management Journal* **50**: 1281–1303.

Conner KR, Prahalad CK. 1996. A resource-based theory of the firm: knowledge versus opportunism. *Organization Science* **7**: 477–501.

Davis JH, Schoorman FD, Donaldson L. 1997. Toward a stewardship theory of management. *Academy of Management Review* **22**: 20–47.

Davis MS. 1971. That's interesting! Towards a phenomenology of sociology and sociology of phenomenology. *Philosophy of the Social Sciences* **1**: 309–344.

Davis MS. 1986. That's classic! The phenomenology and rhetoric of successful social theories. *Philosophy of the Social Sciences* **16**: 285–301.

Dubin R. 1978. *Theory Building*. Free Press: New York.

Foss K, Foss NJ. 2000. Theoretical isolation in contract theory: suppressing margins and entrepreneurship. *Journal of Economic Methodology* **7**: 313–339.

Foss K, Foss NJ. 2005. Resources and transaction costs: how property rights economics furthers the resource-based view. *Strategic Management Journal* **26**(6): 541–553.

Foss NJ. 2003. The strategic management and transaction cost nexus: past debates, central questions, and future research possibilities. *Strategic Organization* **1**: 139–169.

Fraassen BC. 1989. *Laws and Symmetry*. Clarendon Press: Oxford, U.K.

Friedman M. 1953. The methodology of positive economics. In *The Methodology of Positive Economics: Reflections on the Milton Friedman Legacy*, Uskali M (ed). Cambridge University Press: New York; 3–44.

Furubotn E, Richter R. 2005. *Institutions and Economic Theory*. University of Michigan Press: Ann Arbor, MI.

Hambrick DC. 2007. Upper echelons theory: an update. *Academy of Management Review* **32**: 334–343.

Hedström P. 2005. *Dissecting the Social: On the Principles of Analytical Sociology*. Cambridge University Press: Cambridge, U.K.

Keynes JN. 1891/2011. *The Scope and Method of Political Economy*. Transaction Publishers: New Brunswick, NJ.

Krajewski W. 1977. Idealization and factualization in science. *Erkenntnis* **11**: 323–339.

Kuhn TS. 1998. Objectivity, value judgment, and theory choice. In *Philosophy of Science: The Central Issues*, Curd M, Cover JA (eds). W.W. Norton & Company, Inc.: London, U.K.

Lakatos I. 1970. Falsification and the methodology of scientific research programmes. In *Criticism and the Growth of Knowledge*, Lakatos I, Musgrave A (eds). Cambridge University Press: Cambridge, U.K.

Lam SY. 2010. What kind of assumptions need to be realistic and how to test them: a response to Tsang (2006). *Strategic Management Journal* **31**(6): 679–687.

Lindenberg S. 1992. The method of decreasing abstraction. In *Rational Choice Theory: Advocacy and Critique*, Coleman JS, Fararo TJ (eds). SAGE Publications: London, U.K.

Lippman SA, Rumelt RP. 1982. Uncertain imitability: an analysis of interfirm differences in efficiency under competition. *Bell Journal of Economics* **13**: 418–438.

Machlup F. 1955. The problem of verification in economics. *Southern Economic Journal* **22**: 1–21.

Makadok R. 2010. The interaction effect of rivalry restraint and competitive advantage on profits: why the whole is less than the sum of the parts. *Management Science* **56**: 356–372.

Makadok R. 2011. The four theories of profit and their interaction joint effect. *Journal of Management* **3**: 1316–1334.

Mäki U. 1992. On the method of isolation in economics. In *Intelligibility in Science*, Dilworth C (ed). Rodopi: Amsterdam, The Netherlands.

Mäki U. 1994. Isolation, idealization, and truth in economics. In *Idealization VI: Idealization in Economics*, Hamminga B, de Marchi NB (eds). Rodopi: Amsterdam, The Netherlands.

Mäki U. 2000. Kinds of assumptions and their truth: shaking an untwisted F-twist. *Kyklos* **53**: 317–336.

Mäki U. 2001. Explanatory unification: double and doubtful. *Philosophy of Social Science* **31**: 488–506.

Mäki U. 2004. Theoretical isolation and explanatory progress: transaction cost economics and the dynamics of dispute. *Cambridge Journal of Economics* **28**: 319–346.

Mäki U. 2009. Economics imperialism: concepts and constraints. *Philosophy of Social Sciences* **39**: 351–360.

Marschak J, Radner R. 1972. *An Economic Theory of Teams*. Yale University Press: New Haven, CT.

Mathews JA. 2006. *Strategizing, Disequilibrium and Profits*. Stanford Business Press: Stanford, CA.

Mayer T. 1999. The domain of hypotheses and the realism of assumptions. *Journal of Economic Methodology* **6**: 319–330.

Montgomery CA, Wernerfelt B, Balakrishnan S. 1989. Strategy content and the research process: a critique and commentary. *Strategic Management Journal* **10**(2): 189–197.

Morgenstern O. 1964. Pareto optimum and economic organization. Research memorandum 63, Econometric Reseach Program, Princeton University, Princeton, NJ.

Musgrave A. 1981. 'Unreal assumptions' in economic theory: the F-twist untwisted. *Kyklos* **34**: 377–387.

Nagel E. 1963. Assumptions in economic theory. *American Economic Review* **53**: 211–219.

Nelson RR, Winter SG. 1982. *An Evolutionary Theory of Economic Change*. Belknap Press: Cambridge, MA.

Oxley JE, Rivkin JW, Ryall MD. 2010. The strategy research initiative: recognizing and encouraging high-quality research in strategy. *Strategic Organization* **8**(4): 377–386.

Penrose R. 2007. *Fearful Symmetry*. Princeton University Press: Princeton, NJ.

Peteraf MA. 1993. The cornerstones of competitive advantage: a resource-based view. *Strategic Management Journal* **14**(3): 179–191.

Peteraf MA, Barney JB. 2003. Unraveling the resource-based tangle. *Managerial and Decision Economics* **24**: 309–323.

Poole MS, van de Ven AH. 1989. Using paradox to build management and organization theories. *Academy of Management Review* **14**: 562–578.

Popper KR. 1959. *The Logic of Scientific Discovery*. Routledge: New York.

Popper KR. 1994. *The Myth of the Framework: In Defence of Science and Rationality*. Routledge: London, U.K.

Priem RL. 2007. A consumer perspective on value creation. *Academy of Management Review* **32**: 219–235.

Priem RL, Butler JE. 2001. Is the resource-based 'view' a useful perspective for strategic management research? *Academy of Management Review* **26**: 22–40.

Rasmusen E. 1989. *Games and Information*. Blackwell Publishing: Oxford, U.K.

Rumelt RP. 1991. How much does industry matter? *Strategic Management Journal* **12**(3): 167–185.

Ryall MD, Gans JS, MacDonald G. 2008. The two sides of competition and their implications for strategy. Available at: http://works.bepress.com/michael_ryall/15 (accessed 28 March 2013).

Saloner G. 1994. Game theory and strategic management: contributions, applications, and limitations. In *Fundamental Issues in Strategy*, Rumelt RP, Schendel D, Teece DJ (eds). Harvard Business School Press: Boston, MA.

Samuelson PA. 1963. Problems of methodology. *American Economic Review* **53**: 231–236.

Shugan SM. 2007. It's the findings, stupid, not the assumptions. *Marketing Science* **26**(4): 449–459.

Simon HA. 1955. A behavioral model of rational choice. *Quarterly Journal of Economics* **69**: 99–119.

Sugden RA. 2009. Credible worlds, capacities, and mechanisms. *Erkenntnis* **70**: 3–27.

Suppes P. 1968. The desirability of formalization in science. *Journal of Philosophy* **65**: 651–664.

Tsang EWK. 2006. Behavioral assumptions and theory development: the case of transaction cost economics. *Strategic Management Journal* **27**(11): 999–1011.

Tsang EWK. 2009. Assumptions, explanation, and prediction in marketing science: 'it's the findings, stupid, not the assumptions. *Marketing Science* **28**(5): 986–990.

Tsang EWK, Ellsaesser F. 2011. How contrastive explanation facilitates theory building. *Academy of Management Review* **36**: 404–419.

Whetten D. 1989. What constitutes a theoretical contribution? *Academy of Management Review* **14**: 490–495.

Ylikoski P. 2011. Social mechanisms explanatory relevance. In *Analytical Sociology and Social Mechanisms*, Demeulenaere P (ed). Cambridge University Press: Cambridge, U.K.