Understanding Opportunity Discovery and Sustainable Advantage

The Role of Transaction Costs and Property Rights

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UNDERSTANDING OPPORTUNITY DISCOVERY AND SUSTAINABLE ADVANTAGE: THE ROLE OF TRANSACTION COSTS AND PROPERTY RIGHTS

ABSTRACT

To add insight in new value creation, opportunity discovery should be integrated with strategic management theory. Based on the resource-based view and the economics of property rights we build a framework that accomplishes this. Our key argument is that property rights and transaction costs are important antecedents of opportunity discovery. We identify two mechanisms that establish this influence, and examine alternative ways in knowledge, transaction costs, and property rights influence opportunity discovery and sustainable advantage.

On November 24th, 1874 United States Patent #157,124 was granted to Joseph Glidden of DeKalb, Illinois for improved barbed wire fencing. Glidden's patent was only the culmination of a series of nine patents for improvements to wire fencing that were granted by the U.S. Patent Office to American inventors, beginning with Michael Kelly in November 1868 and ending with Glidden's patent (McCallum, 1965) which quickly became dominant. To be sure, wire fencing had been used for a very long time. However, property rights over livestock were less secure, as wire fencing would often break under the impact of heavy livestock pressing against the fencing. This would not happen with barbed wire, and the costs at which property rights to livestock could be protected therefore fell dramatically (Dennen, 1976; Anderson & Hill, 2004).

The new fencing innovation set in motion dramatic path-dependent processes of institutional, organizational and technological innovations throughout the Plains. Indeed, it has been argued that the emergence of barbed wire was as important a factor behind changing the life at the Plains as the rifle, telegraph, and locomotive (Webb, 1931; Hill, 1969). Arguably, barbed wire was *the* crucial factor underlying the transformation from ranching to farming, as the new fencing protected crops from livestock and meant that fields could be used as pasture after the harvest. Barbed wire ended the great cattle drives and the need for branding. Cattle could be kept at a limited area, which greatly increased the value to agricultural firms (farms) of this resource (Webb, 1931). It prompted experimentation with new more valuable resources, notably the Shorthorn, Angus, and the Hereford, as substitutes for the tougher, but less valuable Longhorn, as well as with the uses of land.

This example implies that resources (e.g., land) hold a number of potential uses, characteristics, etc., and that some of these "attributes" may not yet have been discovered.

Changes in the (transaction) costs of defining and enforcing property rights, induced by technological or legal changes or brought about by entrepreneurs themselves, alert entrepreneurs to the discovery of new potentially valuable resource attributes. Such discoveries may translate into sustainable advantages. We integrate these implications with strategic management theory, providing a novel theoretical account of opportunity discovery and the competitive implications thereof.

We build on the resource-based notion of firms as bundles of heterogeneous resources (Penrose, 1959; Barney, 1991), but place this notion in a dynamic context (Helfat & Peteraf, 2003). The full set of resource attributes are not known *apriori*; instead, resource attributes must be discovered (Nelson & Winter, 1982; Denrell et al., 2003). The fundamental argument of this paper is that such discovery is influenced by transaction costs. Two mechanisms link transaction costs and opportunity discovery. The first mechanism is the one implied by the above example: transaction costs determine how well defined and enforced property rights to resource attributes are; in turn, this influences the value that entrepreneurial resource owners expect to appropriate, and therefore their incentives to engage in opportunity discovery (Shepherd & DeTienne, 2005). We call this mechanism the "*appropriability mechanism*." Second, entrepreneurial experience influences opportunity discovery (e.g., Shane, 2000). However, experience (also) emerges from resource learning, that is, entrepreneurs' learning about the attributes of resources (Mahoney, 1995). Such learning entails transaction costs, for example, the costs of measuring the productivity potential of employees. The transaction costs that entrepreneurs face influence their resource learning, introduce path dependence in such learning (Argyris & Liebeskind, 1999; Argyris & Mayer, 2007), and therefore influence which opportunities will be discovered. We call

this the "*resource learning mechanism*." Both mechanisms imply that the level and direction of opportunity discovery is influenced by transaction costs.

This paper is located in the intersection of the economics of property rights (EPR) and the resource-based view (RBV), an emerging theoretical lens in strategic management research (e.g., Teece, 1986; Mahoney, 1992; Oxley, 1999; Foss & Foss, 2005; Kim & Mahoney, 2002, 2006). The argument that transaction costs and experience impact opportunity discovery contributes to the entrepreneurship literature (e.g., Kirzner, 1973; Shane, 2000; Shepherd & Tienne, 2005), for example, by suggesting answers to key issues in the entrepreneurship literature concerning the emergence and locus of entrepreneurial opportunities (Shane & Venkataraman, 2000). Moreover, links are forged with the strategic management literature: We explore how opportunity discovery may translate into sustained heterogeneity, and thereby respond to recent calls in the strategy literature for understanding rent-creation as a dynamic process (e.g., Helfat & Peteraf, 2003; Lippman & Rumelt, 2003a&b) and for integrating opportunity discovery with the RBV (e.g., Alvarez & Busenitz, 2001; Lippman & Rumelt, 2003b).

OPPORTUNITY DISCOVERY AND EXPERIENTIAL KNOWLEDGE: LITERATURE REVIEW

Opportunity Discovery

Opportunity (or entrepreneurial) discovery consists of actions initiated by individuals (Schumpeter, 1911; Kirzner, 1973; Shane, 2000) or teams (Penrose, 1959; Kor, 2003) directed at identifying a hitherto neglected opportunity. An opportunity is a situation "… in which new goods, services, raw materials, and organizing methods can be introduced and sold at a price

greater than their cost of production" (Shane & Venkataraman, 2000: 220). Opportunity discovery may consist of the discovery of new resource attributes or features of organization that help to serve market needs and wants in a better way (Schumpeter, 1911). For example, individuals or firms that introduce new improved contractual designs, sorting systems, organization structures, etc. may realize an entrepreneurial return that are based on the lowering of transaction costs. Opportunity discovery may result in the formation of new firms (e.g., Knight, 1921; Ardichivili et al., 2003), or may take place inside existing firms (e.g., Miller, 1983), or may not involve firms at all (Kirzner, 1973). Moreover, entrepreneurial discoveries can have productive, unproductive, or destructive results (Baumol, 1990), depending on their impact on overall value creation. Unproductive entrepreneurship leaves overall value creation unaffected, while destructive entrepreneurship is solely aimed at capturing value created by others agents through other means than bargaining and competition (e.g., new ways of lobbying or rent-seeking, cf. Baumol, 1990). The focus is here on value-creating opportunity discovery.

To some writers (notably Kirzner, 1973, 1997), the discovery of opportunities is costless, and the search, discovery, evaluation, and exploitation of opportunities are essentially one process. To us, in contrast, opportunity discovery requires significant knowledge, effort and investment, and it makes analytical sense to distinguish different phases in the opportunity discovery process. Nevertheless, the relevant phases are strongly overlapping, as stressed in much recent creativity research (e.g., Finke et al., 1992; Runco & Chand, 1995). This overlap implies that opportunity discovery may be understood as a continuous interplay between the phases, the generation of candidate ideas constantly interacting with evaluation. Except for cases of pure arbitrage, opportunity discovery implies that entrepreneurs have to engage in speculation

concerning the appropriable value that will result from the discovery (Knight, 1921; Kaish and Gilad, 1991; Eckardt and Shane, 2003; Lippman and Rumelt, 2003b; Denrell et al., 2003).

Focusing on opportunity discovery as the central construct is consistent with an emergent research agenda in the entrepreneurship literature, as summarized by Shane (2003: 4-5):

> The academic field of entrepreneurship incorporates, in its domain, explanations for why, when and how entrepreneurial opportunities exist; the sources of those opportunities and the forms that they take; the processes of opportunity discovery and evaluation; the acquisition of resources for the exploitation of these opportunities; the act of opportunity exploitation; why, when, and how some individuals and not others discover, evaluate, gather resources for and exploit opportunities; the strategies used to pursue opportunities; and the organizing efforts to exploit them.

The answers given to these key questions in the entrepreneurship field have increasingly concentrated on experiential knowledge.

Experiential Knowledge

An influential view in the entrepreneurship literature is that opportunity discovery depends critically on the *alertness* of the entrepreneur (Kirzner, 1973; Busenitz, 1996; Shane, 2003). The recent opportunity discovery literature concentrates on operationalizing alertness and identifying its antecedents, concentrating on expected rewards and prior, mainly experiential, knowledge (Busenitz, 1996; Venkataraman, 1997; Krueger, 2000; Shane & Venkataraman, 2000; Gaglio & Katz, 2001; Shane, 2000, 2003). For example, Shane (2000, 2003) builds a strong case that experiential knowledge moderates the relation from technological invention to the recognition of a potential opportunity, and that it furthermore moderates the relation from the recognized

opportunity to specific approaches to exploiting that opportunity. In the literature, experiential knowledge is taken to include such things as "prior knowledge about markets," "prior knowledge about how to serve markets," "prior knowledge of customer problems," etc. (e.g., Shane, 2000).

The emphasis on experiential knowledge harmonizes with recent firm-level work on opportunity discovery (usually conceptualized as innovativeness) and its experiential antecendents (Helfat, 1997; Mosakowski, 1998; Helfat & Raubitschek, 2000; Matsusaka, 2001; Mitchell et al., 2002; Lumpkin & Lichtenstein, 2005). However, in this literature, experiential knowledge concerns the understanding of the uses, functionalities, services, characteristics, etc. of *firm resources*, that is, knowledge of resource attributes (Foss & Foss, 2005). Such knowledge emerges from "resource learning" (Penrose, 1959; Spender, 1992; Mahoney, 1995), that is, human resources' learning about the services of other resources (Spender, 1992), implying that they know "… *more accurately* the relative productive performances of those resources" (Alchian and Demsetz, 1972: 94; emph. in orig.). Resource learning may involve learning-by-doing or more deliberate experimentation with resources, as well as processes of search and information acquisition.

The outcome of resource learning is experiential knowledge that in turn influences opportunity discovery. Experiential knowledge influences opportunity discovery for the following reasons. Entrepreneurs need to categorize and describe items (specifically items that can serve as an indication of an opportunity) in a relevant information domain, in order to build a workable representation of that domain that can assist them in opportunity discovery. People who work in ill-structured decision situations — such as those that characterize opportunity discovery (Knight, 1921) — require a representation that identifies and even amplifies relevant information

so as to allow them to discover discrepancies between the world and the representation that is used as an action guide (Walsh, 1995; Gaglio & Katz, 2001). Experiential knowledge shapes the building of categories and representations that assist entrepreneurs in decision-making (Nisbett & Ross, 1980; Abelson & Black, 1986; Day & Lord, 1992; Gaglio & Katz, 2001). A deep level of expertise within a certain information domain allows people to faster categorize ill-structured problems. Also, deep knowledge may provide an entrepreneur with more detailed ways of understanding and describing his or her resources (Hodgkinson & Johnson, 1994; Rensch et al., 1994), and thereby assist the discovery of new resource attributes.

Experiential knowledge from resource learning is fundamental in the initial phase of venture formation in which entrepreneurs may only be able to identify some elements of an opportunity and need to invoke imagination, and search for and process information in order to more fully identify and evaluate the opportunity (Cohen & Levinthal, 1990; Ardichvili et al., 2003). Moreover, the knowledge that entrepreneurs, or entrepreneurial teams (Penrose, 1959; Kor, 2003), acquire through resource learning may influence their knowledge structures in ways that enable them to identify opportunities faster or more consistently within a particular information domain (e.g., relating to a particular bundle of resources) than those who do not posses this particular knowledge (Shane, 2000; Dierickx & Cool, 1989). Thus, experiential knowledge from resource learning may also underlie path-dependent trajectories of discovery in established firms (Helfat, 1994; Helfat & Raubitschek, 2000), and be a source of sustained competitive advantage for such firms (Dierickx & Cool, 1989; Mahoney, 1995).

Cognition and Incentives in Opportunity Discovery

The emphasis on experiential knowledge in the entrepreneurship literature represents a cognitive focus on opportunity discovery: The main emphasis is on the discovery part, and the actual evaluation and eventual seizing of an opportunity, including the appropriation of returns, is often less emphasized (cf. Kirzner, 1993, 1997). This neglect is potentially misleading, because cognitive science implies that there is a strong and ongoing process of feedback from evaluation to discovery (cf. Finke et al., 1992, Runco & Chand, 1995). In other words, expectations of returns from opportunities influence the discovery process itself, influencing the intensity with which opportunities will be pursued and the directions in which discovery efforts will take. For example, entrepreneurs or firms may well possess the experiential knowledge that enables their scanning of certain emerging technological fields in search of discoveries. However, if expected returns in some of these fields are highly uncertain because of weak enforcement of property rights to discoveries within the field, this may negatively impact discovery efforts (Cohen & Klepper, 1996). Expected returns are influenced by assessments of the costs at which property rights to discoveries can be delineated and enforced (and possibly also exchanged). These costs are transaction costs. For example, if transaction costs are sufficiently large, they may provide a powerful dis-incentive to discovery. This indicates that it is worthwhile exploring the role of transaction costs and property rights in the process of opportunity discovery in order to provide a more comprehensive understanding of the antecedents of opportunity discovery,

LINKING TRANSACTION COSTS AND OPPORTUNITY DISCOVERY: APPROPRIABILITY AND RESOURCE LEARNING MECHANISMS

Transaction costs have seldom been explicitly related to opportunity discovery, and there is little or no theoretical and empirical work that systematically explores the relation (but see Michael [2007] for a transaction cost analysis of the marketing side of entrepreneurial ventures). The following discussion conceptualizes the two mechanisms that link transaction costs and opportunity discovery, the "*appropriability mechanism*" and the "*resource learning mechanism*." We make use of the economics of property rights (the EPR) to frame the discussion.

Attributes and Opportunity Discovery

The EPR begins from the notion that most resources have multiple attributes (Coase, 1960; Cheung, 1970; Barzel, 1997; Demsetz, 1988), including the different functionalities and services/uses (Penrose, 1959) that the resources can offer. For example, a copying machine is a multi-attribute resource in the sense that it can be used in different time periods, by many different persons, for many different types of copying work, can be purchased in different colors, sizes, etc. Building on the EPR, Foss & Foss (2005) argue that the understanding of resource value is improved by conceptualizing resources as bundles of attributes to which property rights may be delineated, enforced and exchanged. This builds on the recognition that it is not resources themselves that are valuable, but their attributes. Understanding attributes and the extent to which property rights can be delineated, enforced and exchanged add increased insight into resource value and value appropriation.

Adopting an attributes perspective not only yields additional insight into resource value and value appropriation; it also links opportunity discovery and resources. Thus, opportunity discovery may be conceptualized in terms of the discovery of new valued resource attributes. Individual resources may have a multitude of *undiscovered* attributes, some of which may be

associated with appropriable value (Demsetz, 1988; Denrell et al., 2003). A determinant of the appropriable value from newly discovered resource attributes is whether the discoverer can delineate and enforce property rights to his new discovery. In turn, this depends on the transaction cost of delineating and enforcing property rights.

The Appropriability Mechanism

A crucial insight of the EPR is that transactions involve the exchange of property rights rather than the exchange of goods *per se* (Coase, 1960, 1988). Hence, the unit of analysis in this perspective is the individual property right. Property rights consist of the right to consume, obtain income from, and alienate resource attributes (Alchian, 1965). The EPR dissociates property rights from legal connotations, so that an (economic) property right speaks more to the actual *ability* of an agent to consume, obtain income from, and alienate resource attributes than to whether he is legally entitled to do so (cf. Barzel, 1997). (Obviously, however, such ability is likely to be influenced by the extent to which property rights are legally enforceable). In this perspective, transaction costs can be defined in a consistent manner, namely as the costs of delineating, enforcing and exchanging property rights (Coase, 1960; Barzel, 1997). Property rights may be enforced by the state as well as by private means (Barzel, 1997), as in the case of the barbed wire example. When rights are perfectly enforced, owners can completely hinder non-payers from taking possession of, imitating, or consuming any resource attributes that they hold property rights to. That is, property rights and their enforcement influence the value entrepreneurs can appropriate from exploration of different resource attributes.

Given that discovery and evaluation of opportunities are closely intertwined processes, transaction costs influence *which attributes* will be subject to discovery. Thus, the perceived cost

of delineating and enforcing property rights to newly discovered attributes are likely to influence discovery efforts in predictable directions. As a general matter, "… entrepreneurial energy and innovation are starkly biased towards the creation of those surpluses which can be *appropriated* by the innovator" (Lippman & Rumelt, 2003a: 924; our emphasis; cf. also Shepherd & DeTienne, 2005). This link between transaction costs and discovery is the "appropriability mechanism."

To illustrate, consider the barbed wire example that introduced this paper. Prior to the advent of barbed wire, the cost of enforcing property rights to cattle and land were such that ranchers did not seriously consider experimenting with introducing the Shorthorn, Angus, and Hereford on the plains. The cost of enforcing property rights to these attributes of land and cattle were prohibitive. The changing property rights structure implied by the advent of barbed wire had the effect of drastically lowering enforcement cost, *changing the space for opportunity discovery*. As another example, the 1980 Supreme Court decision in Diamond v. Chakrabarty implied a significant removal of uncertainty with respect to what was the law in biotechnology patenting. This drastically changed the appropriability regime confronting a number of industries (Pisano, 1990), and made exploring genetic engineering and its uses in these industries substantially more attractive. The relevant space of potential opportunity discovery was expanded as a result of the delineation and enforcement of property rights to biotech research results.

Property rights to resource attributes (or bundles of attributes) are seldom perfectly enforced, as owners face transaction costs of delineating and protecting property rights to such attributes. Some resource attributes will optimally not be protected against non-payers' attempts at appropriating value generated by the attributes (Barzel, 1997). For example, resources are not likely to be completely protected against imitation; contracts may not completely safeguard

against hold-up; supermarkets do not monitor and price the parking spaces they offer customers (effectively inviting non-owners to capture these attributes); etc. Such imperfect protection of property rights to valuable attributes gives rise to capture by non-owners in ways that dissipate value. Capture takes many forms: while value erosion from imitation (Barney, 1991) may be the relevant mechanism of capture in the case of the biotechnology example above, the barbed wire example suggests other, more direct, kinds of capture of property rights in the form of theft. Another example is hold-up (Williamson, 1996). However, the underlying logic is the same: property rights to certain resource attributes are captured, and the "victim" is not compensated (Barzel, 1997). Note in passing that an implication of this reasoning is that the reduction of transaction costs by means of new ways of delineating (e.g., better ways of measuring attributes), protecting (e.g., improved protection of business secretes, better ways of protecting credit card information in virtual exchanges, barbed wire,), and exchanging (e.g., introducing internet trade) property rights may constitute entrepreneurial opportunities.

In sum, the appropriability mechanism implies that transaction costs help defining the *relevant* space for opportunity discovery: the transaction costs of enforcing property rights to newly discovered resource attributes moderate the relation between experiential knowledge and opportunity discovery by influencing the distribution of perceived costs and benefits in the space of discoveries.

The Resource Learning Mechanism

While experiential knowledge matters to the discovery of opportunities, building such knowledge is costly. Resource learning may imply experimenting with resources, combining and recombining them, and learning about their attributes in the process (Penrose, 1959; Orr, 1996).

Thus, resource learning emerges from M&As (Matsusaka, 2001), the ramp-up and calibration of factory production (Foss, 2001; Stiglitz & Heine, 2007), interaction between employees and managers (Argote, 1999), and other processes that result in the discovery of new resource attributes. These processes are costly, and some of the relevant costs are transaction costs, such as the costs of negotiating M&As, contracting (and re-contracting) over resource uses in strategic alliances, delineating decision rights over corporate resources inside the firm, building information revelation mechanisms that can reveal the relevant types of human capital, etc. While no direct estimates of the transaction costs of resource learning appear to exist, there are reasons to believe that such costs are often substantial; think of expenses on corporate lawyers in connection with M&As or the recruitment costs of hiring new employees.

To further exemplify, consider the problem of how to design and coordinate a system of productive tasks with many task complementarities. Designers are not likely to have full knowledge *ex ante* about, for example, the optimal sequencing of tasks, even if they perfectly know the functionalities of physical resources. For example, the problem of defining an optimal sequence of tasks in a complex system of production may require more calculation capacity than is available in a super-computer (Galloway, 1996: 64). Some kind of experimental, iterative learning process is then required to solve the problem. In a world of complete knowledge, perfect rationality and zero transaction cost, all rights to all uses of all assets could be perfectly specified *ex ante* in contracts; there would be no need to learn about resource attributes. However, in a more realistic setting, understanding the various ways in which tasks may be sequenced, the physical equipment used, etc. requires an iterative process of specifying resource attributes and trying out solutions. Costs of defining resource uses, measuring the productivity of resources,

coordinating uses, etc. are incurred. If these costs are very high, it may only pay to perform a few iterations before a solution is decided upon. Little experiential knowledge is built concerning the properties of the production system. In contrast, lower costs may lead to faster and more resource learning, and a solution that is closer to the optimum. In sum, transaction costs directly influence resource learning processes, because the expected gains will be balanced against the (transaction and other) costs of resource learning.

OPPORTUNITY DISCOVERY AND SUSTAINABLE ADVANTAGE: A FRAMEWORK FOR ANALYSIS

Benchmarks

While experiential knowledge, the appropriability mechanism, and the resource learning mechanism add insight into opportunity discovery, do they also influence how and to what extent opportunity discovery translates into sustainable advantage? Moreover, while experiential learning and the two mechanisms have so far been treated separately, it seems warranted to consider the realistic situations where they interact.

To examine these issues in greater detail, we make use of ("unrealistic") benchmark situations where the effects of experiential knowledge, the appropriability mechanism and the resource learning mechanism on opportunity discovery and advantage are nullified. The analysis is then complicated by sequentially "switching on" experiential knowledge and the two mechanisms. The purpose of this exercise is to be able to more clearly study the effects on certain dependent variables (e.g., opportunity discovery) of certain independent variables (e.g.,

transaction costs), eliminating other influences. Thus, one can consider the direct effects of the independent variables as a precursor to understanding combined or interaction effects

Such thought experiments are commonplace in economics (see Hahn [1973] for a methodological explication and defence of its use), and are also sometimes used by management scholars. For example, Barney (1991) begins his exposition of the RBV by analyzing what will happen to sustained competitive advantages in a setting where firms control identical resource bundles, then gradually introducing antecedents of sustained competitive advantage to finally arrive at the full set of jointly necessary conditions for such advantage. Thus, Barney begins from an extreme benchmark, and gradually relaxes the constraining assumptions, introducing greater realism.

We specifically ask how property rights/transaction costs and knowledge separately and interactively influence opportunity discovery and sustained advantage. The result is a clearer understanding of the operation of the mechanisms that are at work. The independent variables that we here consider as determinants of opportunity discovery and sustained advantage are property rights and transaction costs and (experiential) knowledge. We abstract from other potentially relevant independent variables, for example, risk preferences, personality traits, network position, etc.

Blueprint technology. Two analytical devices are used to characterize the benchmarks. The first one is that of "blueprint technology" (Robinson, 1933; Demsetz, 1991), that is, the assumption that knowledge that can be used by any one entrepreneur can also be used by any other entrepreneur. In the simplest versions of production theory in economics (Robinson, 1933), productive knowledge is a pure public good, that is, it is non-rivalrous in use and it is impossible

to exclude any non-payers. We do not adopt this extreme assumption. As understood here, blueprint knowledge only means that the transfer of knowledge is not impeded by imperfect and differential absorptive capacity on the part of entrepreneurs. It may be possible to exclude non-payers depending on the (transaction) costs of doing so. The opposite of blueprint technology is that knowledge exchange and transfer among entrepreneurs is limited because of absorptive capacity gaps.

Zero transaction costs. The second device we make use of is that of the zero transaction cost setting introduced by Coase (1960). Coase (1988) and Barzel (1997) argue that the assumption of zero transaction costs means that property rights to all valuable resource attributes are perfectly delineated, enforced, and exchanged at zero cost. At issue, however, is what is meant by "all valuable resource attributes." Coase (1988) interprets the zero cost condition as implying omniscience, so that zero transaction costs literally mean that *all* resource attributes (including all future resource uses) are known to decision-makers. This corresponds to a general equilibrium model with a full set of inter-temporal prices (Denrell et al., 2003). In such a setting, there is, of course, no scope for opportunity discovery. However, other writers, with whom we side, argue that opportunity discovery can take place even if transaction costs are zero: that existing transactions are costless to transact does not logically imply that all potential transactions have been discovered (cf. Kirzner, 1973). Accordingly, the zero transaction cost condition does not rule out opportunity discovery that is rooted in privately held experiential knowledge (cf. Makowski & Ostroy, 2001). However, it does rule out costs of writing and enforcing contracts involving knowledge transactions. That is, only differences in absorptive capacity may impede knowledge transactions when transaction costs are zero. Moreover, in the zero transaction cost

benchmark, the appropriability mechanism and the resource learning mechanism are eliminated in the sense that transaction costs cannot be antecedents of opportunity discovery under this benchmark.

Four cases. The two benchmark situations can now applied to generate four cases, depending on whether we "switch on" or "switch off" transaction costs and knowledge. Specifically, we consider four combinations of the determinants of opportunity discovery and sustainable advantage. These are [zero transaction costs, blueprint knowledge], [zero transaction costs, non-blueprint knowledge], [positive transaction costs, blueprint knowledge], and [positive transaction costs, non-blueprint knowledge]. For each one of these combinations, we discuss the nature of discoverable opportunities, value creation and appropriation, the role of opportunity discovery in creating resource heterogeneity, and the organization of opportunity discovery and exploitation. We focus on these dependent variables because they are crucially important in entrepreneurship and strategic management research. See Table 1.

Insert Table 1 Here

Case A: Zero Transaction Costs and Blueprint Knowledge

Opportunity discovery. Kirzner (1973) argues that even in the model of the market of economics textbooks, there is a need for the entrepreneur as an equilibrating force. This textbook model is one in which transaction costs are zero and where knowledge is blueprint. Even in this extreme case opportunity discovery can take, namely in the form of the discovery of new resource attributes and resource learning (recall that there is no assumption here that

entrepreneurs are omniscient). The entrepreneur's incentives to engage in opportunity discovery and resource learning arise from the discrepancies in earnings from exploiting resource attributes that he has already discovered and exploiting newly discovered attributes. However, neither transaction costs, nor barriers to knowledge utilization will influence which resource attributes entrepreneurs discover. Property rights can be delineated and enforced at zero cost, which eliminates all concerns of capture, including capture from imitation. This nullifies the appropriability mechanism. Also, there are no transaction costs that hinder resource learning; this mechanism, too, is nullified.

Value creation and appropriation. The zero transaction cost assumption and the assumption that prior knowledge can be fully absorbed by any entrepreneur imply that any value creating discovery will be utilized to its full economic capacity (i.e., where the marginal net benefit from further utilization is zero) (Mosakowski & Ostroy, 2001). Over time, total value creation will be maximized because of the absence of transaction costs and barriers to knowledge absorption. While value creation will be independent of bargaining power (cf. the Coase Theorem, Coase, 1960), bargaining power will determine how much value entrepreneurs and factor owners will *appropriate*. Specifically, how much value an entrepreneur who makes a discovery can appropriate depends on the bargaining game among the entrepreneur, those who benefit from the discovery, and those who hold property rights to complementary resources that are needed to exploit the discovery (cf. Teece, 1986). There is no *a priori* reason to impute all or even the largest amount of the created value to the entrepreneur.

Path-dependence and sustainable heterogeneity. Entrepreneurs may start out with heterogeneous bundles of resources attributes which results in heterogeneous resource learning.

However, as there are no transaction costs of selling knowledge and no barriers to absorbing knowledge, no entrepreneur will be locked into a path of inferior resource learning and opportunity discovery: "best-practice knowledge" can be purchased at factor markets. In fact, other kinds of path dependence are also ruled out by virtue of the zero transaction cost condition, as optimal solutions will always be negotiated when there are no obstacles (i.e., transaction costs) to doing so. Thus, no strategic issues relating to lock-in to inferior products or technical solutions can arise.

The other side of the coin is that long-lasting resource heterogeneity among entrepreneurs cannot be an outcome of initial knowledge endowments or opportunity discovery, because all knowledge and all discoveries will be made available on the relevant factor markets. When entrepreneurs hold secure property rights to the discoveries they make, they will be best off by letting others share in the discovery (against compensation). Factor heterogeneity stemming from initial knowledge endowments or discoveries cannot persist in this situation. Moreover, as factor markets perfectly reflect the expected value of resource attributes and of resource learning (the foundation for the discovery of new attributes), no entrepreneur can consistently outperform the market. Thus, the absence of costs or cognitive constraints on the movement of resources, including knowledge, limit the causes of sustainable heterogeneity, and therefore differential rents (Barney, 1991), to initial endowments of non-reproducible resources (e.g., location).

Economic organization. As the resource learning mechanism and the appropriability mechanisms are nullified, the process of resource learning is independent of transaction costs, and can be organized through market contracts at zero cost. Firms as governance structures have no particular advantages concerning the organization of resource learning processes (Williamson,

1996). Relatedly, the entrepreneur has no incentive to control a resource or resource bundle by means of holding ownership title; costless bargaining and contracting over resource attributes can substitute for ownership (Hart, 1995). Thus, firms will not arise as means to secure value appropriation (as in Liebeskind, 1996).

Case B: Zero Transaction Costs and Non-Blueprint Knowledge

Opportunity discovery. When knowledge is non-blueprint, entrepreneurs will have less access to knowledge than in Case A. The entrepreneur's own accumulated experience is an important antecedent of opportunity discovery (Shane, 2000, 2003). The non-blueprint nature of knowledge in this case is a force limiting overall opportunity discovery. However, entrepreneurs may gain by developing means of reducing buyers' knowledge requirements. Thus, entrepreneurs may direct opportunity discovery toward making knowledge "more tradable" by embodying it in products, equipment, or in modular components which do not require much knowledge on the part of the recipient (Demsetz, 1991). Thus, a consequence of the changing nature of knowledge is that the *nature* of the opportunity discovery process changes.

Value creation and appropriation. In terms of assumptions made, Case B perhaps best approximates the RBV (Barney, 1991; Peteraf, 1993): while the RBV pays little attention to transaction costs, differential knowledge resources are central in this view. However, the explicit introduction of opportunity discovery, a phenomenon not yet incorporated with the RBV, means that strategic challenges go beyond those traditionally identified in the RBV. Because in this case all transaction costs are zero, and property rights can therefore be costlessly protected, threats to value appropriation from imitation, opportunistic hold-up and the like are non-existent. As in the RBV entrepreneurs may face potential substitutability threats; however, with ongoing opportunity

discovery entrepreneurs face the threat of total value erosion, as completely different bodies of knowledge and complementary resource may serve a given market need in a new and very different way. This is a serious concern to an entrepreneur as he or she cannot insure his investments in knowledge and complementary assets against such events. No insurance markets emerge to insure against discoveries that are deemed unlikely to succeed by all except a knowledgeable entrepreneur (Knight, 1921). Strategic flexibility becomes important in this case.

Path-dependence and sustainable heterogeneity. As in Case A, entrepreneurs may start out with different bundles of resource attributes which gives rise to differential accumulation of knowledge. However, in a setting in which knowledge is non-blueprint (contrary to Case A), resource heterogeneity among entrepreneurs may be sustained and perhaps even increase. The reason is that an entrepreneur's prior related knowledge provides him or her with a learning advantage and possible first mover advantages within the scope of his or her knowledge domain. Thus, the entrepreneur has an incentive to direct opportunity discovery efforts in directions that allow building on already accumulated knowledge.

Economic organization. At the same time the entrepreneur also faces incentives to set up a productive operation by contracting with complementary resources on a longer-term basis (Casson, 1982; Alchian, 1984; Lipmann & Rumelt, 2003b). This makes economic sense to the extent that the idiosyncratic nature of the knowledge accumulated through resource learning processes makes it hard to trade on factor markets (Teece, 1982). The entrepreneur's opportunity discovery will be influenced by resource learning stemming from these complementary resources. As more knowledge that is specific to these complementary resources is accumulated, the entrepreneur will come to value this particular bundle of resources higher than entrepreneurs

who do not posses the resource-specific knowledge. This may confer a factor market advantage (Barney, 1986) as the knowledgeable entrepreneur is able to take more resource attributes into account in the resource evaluation (Denrell et al., 2003). Heterogeneity is sustained because of advantages in opportunity discovery relating to the knowledge resources controlled by the entrepreneur.

Case C: Positive Transaction Costs and Blueprint Knowledge

Opportunity discovery. The presence of transaction costs "switches on" the resource learning and the appropriability mechanisms (these are not present in Case A and B). The presence of transaction costs implies that not all opportunities that would be value creating in Cases A and B will be exploited. First, transaction costs imply that property rights will be less secure and need protection. This negatively influences the net value that the entrepreneur expects to appropriate (Teece, 1986; Coff, 1997; Shepherd & DeTienne, 2005). Thus, if contracts are imperfect because of transaction costs, other agents may capture parts of the surplus from a discovery. For example, a buyer may engage in hold-ups (Hart, 1995; Williamson, 1996) involving complementary assets that are necessary to the production or marketing of the discovery. Second, the appropriability risk from imitation becomes a concern. Third, costs of engaging in resource learning also limit constrain the set of opportunities relative to Case A and B.

An implication of these points is that it now (in contrast to Case A and B) matters *which* entrepreneur (or firm) makes a particular discovery (even if the knowledge leading to the discovery is fully transferable). Some entrepreneurs may face transaction costs that other entrepreneurs do not face (to the same extent); for example, entrepreneurs may face differential

abilities to raise capital and access complementary resources, or face different costs of protecting property rights to discoveries or costs of resource learning.

Value creation and appropriation. Overall, the presence of transaction costs harm value creation relative to Case A, first, because transaction costs dissipate value (Barzel, 1997), and, second, because many discoveries will not be made in the presence of transaction costs. The presence of transaction costs in itself may lead to opportunity discovery as entrepreneurs seek to reduce transaction costs to increase the value they can appropriate (Coase, 1988; Makowski & Ostroy, 2001). However, some transaction costs will remain. Whether the presence of transaction costs is more harmful to value creation than non-blueprint knowledge (i.e., Case B) cannot be established on *apriori* grounds.

The presence of transaction costs has several distinct strategic implications to firms in the context of opportunity discovery. First, value appropriation depends on the transaction costs firms face of delineating and enforcing property rights to resource attributes. Thus, when looking for resource attributes that may yield a competitive advantage, entrepreneurial firms must consider what are the costs of keeping these attributes rare (and non-imitable), as well as protected from other types of value capture (Chi, 1994; Foss & Foss, 2005). Second, transaction costs introduce strategic hazards in the form of externalities that negatively impact resource values. For example, low quality producers may threaten established high quality levels. In this situation, entrepreneurial firms may become more dependent on complementary resources that can credible signal their intentions to important stakeholders (Akerlof, 1970; Klein & Leffler, 1981). For entrepreneurial firms that direct opportunity discovery towards the quality dimension,

it is therefore a strategic challenge to acquire the relevant complementary resources and to direct opportunity discovery towards areas in which they are able to put these resources to use.

Path-dependence and sustainable heterogeneity. In Case C resource heterogeneity emerges endogenously from discovery, but for reasons different from those mentioned in Case B. Transaction costs make some of the resource attributes discovered by entrepreneurs non-tradable. Some types of resource attributes are less likely to be tradable, such as new uses of capabilities, brand name capital, reputation and culture (Dierickx & Cool, 1989); entrepreneurs face incentives to utilize these themselves by engaging in opportunity discovery in areas related to these resources (Denrell et al., 2003). This gives rise to path-dependency, ultimately induced by transaction costs (cf. also Argyres & Liebeskind, 1999).

Economic organization. In a setting with transaction costs, the process of opportunity discovery will be organized in a way that minimizes transaction costs. Transaction costs create incentives for the entrepreneur to *own* resources rather than to rely on contractual delineation and enforcement of property rights to newly discovered resource attributes. Resource ownership confers a bundle of rights, including rights to *hitherto undiscovered* attributes of the relevant resource. An entrepreneur may prefer to acquire ownership of a resource rather than acquire a specified, finite list of rights to resource attributes. The reason is that resource ownership is a low-cost means of allocating the rights to resource attributes that are discovered by the entrepreneur/owner. In a well-functioning legal system, resource ownership usually implies that the courts will not interfere with an entrepreneur/owner's exploitation of new attributes. There is also an incentive effect on opportunity discovery of resource ownership: ownership implies a legally recognized right to the income of that resource, including the right to income from

discovered attributes. Moreover, resource ownership may economize with costs of enforcing property rights, because owning rather than contracting over attributes can make imitation of a discovery more costly to would-be imitators (cf. Teece, 1986; Liebeskind, 1996). Note in passing that these rationales of ownership go beyond those discussed in the economics literature (e.g., Barzel, 1982, 1997; Williamson, 1985; Hart, 1995), but makes sense in a dynamic economy in the context of opportunity discovery.

When an entrepreneur takes ownership of resources this is tantamount to forming a firm (Knight, 1921; Foss & Klein, 2005). Strictly speaking, however, it need not be the entrepreneur who sets up a firm or acquires complementary resources as, under the assumptions of the present case, the entrepreneur's knowledge may be transferred to another entrepreneur, depending on the transaction costs of doing this. Conceivably, the entrepreneur may face high transaction costs in establishing ownership to the preferred bundle of resources and in establishing a firm governance structure. For this reason the entrepreneur may prefer to transfer the relevant knowledge of a discovery to those who have lower transaction costs of setting up a firm. Transaction costs thus determine the *organizational context of opportunity discovery*, specifically whether the entrepreneur becomes an employee or an individual contractor.

Case D: Positive Transaction Costs and Non-Blueprint Knowledge

Opportunity discovery. The final, and most realistic, case is the one where both transaction costs and differential ability to absorb knowledge are allowed to influence opportunity discovery. As in Case B, firms' discovery activities will be path-dependent, because of differential accumulation of knowledge stemming from the non-blueprint nature of knowledge (Helfat, 1994; Helfat & Raubitschek, 2000). The difference is that the resource learning and the appropriability

mechanisms now both contribute to shaping paths of discovery. Several different scenarios can be conceived depending on how knowledge and these two mechanisms together influence opportunity discovery. For example, firms may be very favorably positioned *vis-à-vis* opportunity discovery in terms of their control of firm-specific knowledge resources and learning; however, it may be so costly to enforce discoveries (i.e., the appropriability mechanism) that advantages are offset. Or, resource learning may be so costly (e.g., forging contractual links with outside parties to access knowledge is very costly) that it swamps benefits from low costs of enforcing property rights.

The relative contribution of knowledge and the appropriability and resource learning mechanisms with respect to shaping opportunity discovery (as well as their interaction) requires more analytical attention than can be given here. However, what influences opportunity discovery in actuality is likely to be industry-specific. Evolutionary economists and students of technological change (Nelson and Winter, 1982; Teece, 1986; Helfat, 1994; Cohen & Klepper, 1996) argue that industry-level technological change is shaped by technological opportunities and appropriability regimes and their interaction, but that these forces differ across industries. Similarly, whether knowledge or the two transaction cost mechanisms are the primary antecedents of opportunity discovery is likely to be industry-specific. For example, rather strong intellectual property rights protection characterizes the pharmaceutical industry, and this gives the appropriability mechanism a form that is different from the form it takes in industries with weaker appropriability regimes, such as the music industry.

Value creation and appropriation. As firms discover opportunities along paths of discovery that are shaped by both firm-specific knowledge and transaction costs, the resulting

heterogeneity in discovery may translate into long lasting differences in appropriable value creation across firms. What has been said above about value creation and appropriation under Case B and C also applies here.

Path-dependence and sustainable heterogeneity. Transaction costs and differential knowledge reinforce one another in the creation of resource heterogeneity and path dependency. Prior related knowledge directly constrains the learning processes, because it directs search and experimentation in certain directions as well as provides entrepreneurs with certain heuristics for problem-solving. This will produce sustained heterogeneity (when knowledge is non-blueprint). The presence of transaction costs reinforces such heterogeneity. First, as transaction costs make some opportunities unattractive (because property rights cannot be sufficiently enforced), some resource attributes will not be explored and entrepreneurs will not build knowledge relative to these. Second, transaction costs and knowledge directly interact in shaping the resource learning processes. That is, there are knowledge and transaction costs implication of organizing resource learning processes. Transaction costs exert an influence because there are costs of searching for, exploring, accessing, and combining resource attributes to try out new combinations (Teece, 1982; Kogut & Zander, 1992; Matsusaka, 2001), and these costs constrain resource learning because they constrain what resource combinations can be tried, and what resource attributes that will be examined. An implication for theory, which so far has been unexamined in strategic management, is that transaction costs play a key role in the formation and development of capabilities.

Economic organization. Transaction costs and resource learning interact in providing a rationale for ownership and firm organization. Entrepreneurs have incentives to own resources

because of the costs of trading accumulated knowledge and for the "speculative" reason that resource ownership confers property rights to discovered resource attributes to the resource owner. Firms as governance structure emerge in order to reduce the costs of protecting against imitation and other types of rent capture, such as shirking and hold-up (Liebeskind, 1996). However, the extent to which firms are needed in order to protect against imitation differs from Case C. In Case D entrepreneurs have different abilities to absorb knowledge, creating a barrier to imitation. Differences among entrepreneurs with respect to their knowledge bases likewise influence their incentives to imitate competitors' resource bundles, as they do not see the same opportunities for discovery of new attributes as those who have the relevant knowledge (Denrell et al., 2003). Thus, we should expect to see not only more sustainable heterogeneity among entrepreneurs in this setting compared to Case C, but also less non-market economic organization.

A further rationale for firm organization is that firms emerge as means of lowering the transaction costs involved in resource learning. Resource learning may require that the entrepreneur have to enter into collaboration with firms who control complementary knowledge that costly to transfer. Organizing experimental processes involving combination and recombination of resource attributes across markets requires continuous costly re-negotiation among resource owners. Moreover, asset specificity may arise from such processes, giving rise to the familiar hold-up problem. Given this, part of the rationale of firms is that they can organize entrepreneurial learning processes in a transaction cost minimizing manner (for this argument, see Foss, 2001). Thus, contrary to Kirzner (1973), who is adamant that entrepreneurship may be

exercised independently of asset ownership and firm organization, there is a logical nexus between entrepreneurship, ownership and firms, namely when transaction costs are positive.

CONCLUDING DISCUSSION

The key aim of this work has been to define a role for transaction costs and property rights along with experiential knowledge as antecedents of opportunity discovery and sustained advantage. The arguments lie in the intersection of the strategic management and entrepreneurship fields and contribute to both of these. In the following, the specific contributions to the two fields are briefly outlined.

Contribution to the Resource-based View

Opportunity discovery, resource learning and transaction costs. Because it is the source of new value creation, opportunity discovery seems central to strategic management. In general, however, opportunity discovery has not been a prominent theme in strategic management research (but see, e.g., Hitt et al., 2001; Ireland et al., 2003). Thus, strategic management's dominant perspective, the RBV, still has to find room for opportunity discovery in its theoretical edifice (but see Rumelt, 1987; Mosakowski, 1998; Alvarez & Busenitz, 2001; Alvarez & Barney, 2004). Although there may be deep reasons why the RBV and the entrepreneurship field have lived somewhat separate lives — such as differences in levels of analysis (firm vs. the entrepreneur) —, many prominent scholars have rightly argued that understanding opportunity discovery is a pressing issue in strategic management (e.g., Hitt et al., 2001; Lippman & Rumelt, 2003b; Helfat & Peteraf, 2003; Denrell et al., 2003).

The present work contributes to overcoming the schism in a number of ways. First, concerning the differences concerning levels of analysis, the analysis here suggests that what is the relevant level is partially dependent on transaction cost considerations: if such costs are zero, the entrepreneur is unambiguously the relevant level, as firms have no rationales of existence. However, to the extent that transaction costs cause learning and capabilities to be internalized in firms, firms become the relevant level of analysis for opportunity discovery. Second, the paper links the key entrepreneurship construct of opportunity discovery to RBV notions of resource heterogeneity and learning. While others have linked opportunity discovery to resource learning (Penrose, 1959; Mahoney, 1995; Helfat, 1997; Foss, 2001; Helfat & Peteraf, 2003; Stieglitz & Heine, 2007) and transaction costs to the RBV (e.g., Coff, 1999; Foss & Foss, 2005; Kim and Mahoney, 2006), the specific contribution of this work is to introduce transaction costs and property rights as important antecedents of opportunity discovery in the context of a resource-based view. Transaction costs moderate the relation between knowledge and opportunity discovery, and they influence the costs of engaging in resource learning. For this reason, transaction costs matter to understanding *which resource attributes* entrepreneurial firms will explore, and *which firms* will explore *which* resource attributes.

Path-dependence and resource endogeneity. Transaction costs furthermore matter to the understanding of how heterogeneous resources emerge from resource learning, and how resource heterogeneity may be sustained — both key issues in a dynamic RBV (Helfat & Peteraf, 2003). Knowledge-based differences among entrepreneurs are likely to create long lasting differences in entrepreneurial discovery activities when knowledge gained from resource learning possesses cumulative and path-dependent characteristics. This can lead to firm-specific trajectories of

learning that result in continuous identification and exploitation of opportunities and are rent-yielding along the trajectory. Helfat (1994, 1997) describes such trajectories for the US petroleum industry. Some of the knowledge that underlies a path of resource learning is tied to a firm-specific context (Kogut & Zander, 1992), because of the high transaction costs to outsiders of accessing it. For example, it has been argued that knowledge embedded in capabilities and culture is often costly to competitors to access and imitate (Dierickx & Cool, 1989), and prohibitively costly to trade on factors markets. In other words, transaction costs may play a key role in the creation of sustained heterogeneity and therefore sustained advantage.

Contributions to Entrepreneurship Research

In an influential paper, Shane and Venkataraman (2000: 218) argued that although entrepreneurship provides research questions for many fields in management, strategy and organization scholars are fundamentally concerned with three sets of research questions, namely why, when and how 1) entrepreneurial opportunities arise; 2) certain individuals and firms and not others discover and exploit opportunities, and 3) different modes of action are used to exploit those opportunities (including the issue of "… how the exploitation of entrepreneurial opportunities are organized in the economy," p.224). The distinctive contribution of this work is to proffer new answers informed by the EPR and the RBV to these important research questions.

The emergence of entrepreneurial opportunities. With respect to the first question, how entrepreneurial opportunities arise, we have pointed to the important role of transaction costs and property rights in understanding how entrepreneurial opportunities arise. At a very fundamental level, transaction costs are at the heart of entrepreneurship: The presence of transaction costs means that there cannot be a full set of contingent forward markets, as in the full intertemporal

general equilibrium model of Debreu (1959) (Radner, 1968). The intertemporal coordination of present resource uses and future consumption is undertaken by the entrepreneurial function, that is, by engaging in the discovery of intertemporal opportunities (Knight, 1921). At a simpler level, the reduction of transaction costs may in itself constitute an entrepreneurial opportunity, as when firms that come up with new contractual designs, new sorting mechanisms, etc. gain an entrepreneurial advantage (Makowski & Ostroy, 2001). However, a specific contribution of this work has been to link transaction costs to prior, mainly experiential, knowledge in opportunity discovery. Thus, transaction costs matter to opportunity discovery because, first, the experiential outcomes of processes of resource learning depend on the transaction costs of combining and recombining resource attributes, ascertaining the attributes of resources, etc., and, second, the transaction costs of enforcing property rights to discoveries influence the direction of search.

The localized nature of entrepreneurial opportunities. Concerning the second research question outlined by Shane and Venkatamaran, that is, why, when and how certain individuals and firms and not others discover and exploit opportunities, this work suggests that there is an important transaction cost dimension to addressing the question. Traditionally, the entrepreneurship literature has pointed to such things as network position, personality traits, and — increasingly — prior, experential knowledge as the critical antecedents. The literature on firm evolution and innovation similarly points to prior related knowledge as the critical antecedent. While not disagreeing with this view *per se*, a comprehensive understanding of the why, when and how of opportunity discovery must include transaction costs, because resource learning and the direction of search efforts are fundamentally impacted by transaction costs.

Modes of action for exploiting opportunities. With respect to the final research question, the why, when and how different modes of action are used to exploit opportunities, this work has developed the point that the exploitation of opportunities is fundamentally dependent on transaction costs. In particular, firms may arise not only for the reasons familiar from the organizational economics literature (Hart, 1995; Williamson, 1996), or to protect against imitation (Liebeskind, 1996), but also because they may be superior mechanisms for coordinating resource learning processes (Foss, 2001). A specific contribution is the argument that resource ownership may arise partly for transaction cost reasons and partly for speculative reasons: Entrepreneurs will assume ownership of resources which they expect to be rich in hitherto undiscovered but potentially valuable attributes because contracting over these attributes is too costly. This differs from the view prevalent in organizational economics, namely that ownership is an instrument of bargaining power that arises to minimize dissipation of value caused by hold-up threats (Hart, 1995).

Limitations and Future Work

As indicated by the example that introduced this paper, there is an important "macro" angle into opportunity discovery and resources: Changes in technologies, institutions, and legal regimes influence the matrix of property rights and transaction costs that firms face (Teece, 1986; North, 1990; Williamson, 1996; Oxley, 1999). Our analysis implies that these changes impact opportunity discovery in predictable ways and have implications for sustained advantage. In this paper, we have sidestepped this macro angle in order to keep the analytical complexity at a manageable level. However, future work may theorize the links from macro change to

opportunity discovery. Empirical work on this may utilize both qualitative as well as event study research methodologies.

Relatedly, there is an important micro dimension that has not been fully explored and developed. Thus, research indicates that firm organization impacts on entrepreneurship (Miller, 1983). However, as we have conflated the entrepreneur and the firm we have not dealt with this issue. Insights on property rights and transaction costs would appear to be an important part of an inquiry into these issues (for an important beginning, see Alvarez & Barney, 2004). Other micro issues that have not been dealt with here include the more fine-grained aspects of the appropriability and resource learning mechanisms linking transaction costs and opportunity discovery. What transaction costs are relevant here, exactly? How does experiential knowledge interact with these mechanisms (cf. Argyres & Mayer, 2007)? Additional insight into these issues likely requires extensive, mainly qualitative, research. The aim of this paper has been to outline a framework for research into how transaction costs and property rights impact opportunity discovery and sustainable advantage, thereby linking entrepreneurship and strategic management research.

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Table 1: *FOUR CASES*

	OPPORTUNITY DISCOVERY (OD)	VALUE CREATION AND APPROPRIATION	PATH-DEPENDENCE/ HETEROGENEITY	ECONOMIC ORGANIZATION
CASE A: ZERO TRANSACTION COSTS (TC), BLUEPRINT KNOWLEDGE	**All opportunities will be fully exploited**	**The two condtions imply that value creation will be maximum. Value will be split solely according to bargaining powers.**	**None -- as** **1. All knowledge that can be profitably traded will be traded.** **2. All inefficiencies can be traded away.**	**Spot market contracting can handle all transactions/no rationale for firms.**
CASE B: ZERO TRANSACTION COSTS, NON-BLUEPRINT KNOWLEDGE	**Knowledge will accumulate differently and this will impact OD. Less OD than under A.**	**Less value creation than under A, since some knowledge will not be fully exploited.**	**Yes because of, imperfect absorptive capacity.**	**Clusters of complementary assets arise, as some knowledge cannot be traded on factor markets**
CASE C: POSITIVE TRANSACTION COSTS, BLUEPRINT KNOWLEDGE	**TC of enforcing discoveries negatively influence OD. Less OD than under A.**	**TC reduce value creation. Resource ownershp and vertical integration are means of appropriation.**	**PD may stem from, e.g., sunk cost investments.**	**Firms as governance structures emerge.**
CASE D: POSITIVE TRANSACTION COSTS, NON-BLUEPRINT KNOWLEDGE	**OD determined jointly by TC and knowledge**	**Value creation less than under all other Cases.**	**TC are a source of path-dependence (sustained heterogeneity)**	**Firm organization is chosen to foster OD. "Speculative" cause of ownership.**

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