

# Dynamic Capabilities and the Role of Managers in Business Strategy and Economic Performance

Mie Augier

Stanford University, Stanford, California 94305, augier@stanford.edu

David J. Teece

Institute of Management, Innovation and Organization, Haas School of Business,  
 University of California, Berkeley, Berkeley, California 94720, teece@hass.berkeley.edu

**T**his paper discusses some developments in the theory of the organizational capabilities of the business enterprise. Antecedents are recognized, and some promising new developments and areas for future research are identified. The role of managers in the economic system is highlighted and discussed within the context of economic and organizational research. Suggestions for future developments of dynamic capability research involve employment of evolutionary and behavioral theories.

*Key words:* strategy; organizational changes; organizational capabilities

## 1. Introduction

Management and organization lie at the heart of the performance of both individual enterprises and national economies. The purpose of organization is to enable and facilitate coordination and collective effort by individuals. However, such activity requires entrepreneurial and professional management—the price system alone cannot “manage” economic activity. The invisible hand must have fingers that can work in a coordinated fashion.

This paper helps outline a framework that can be used to help organize ideas about management and strategy. Recognized business historians such as Chandler (1990) attribute a large part of the reason why the United States overtook Britain in economic performance to differences in strategy, management, and enterprise structure. Many other writers see the organization of Japanese firms after 1950 as a major factor enabling Japanese post-war growth. Mowery and Nelson (1999, p. 371) ascribe descriptive power to the “dynamic capabilities” framework in helping illuminate the importance of enterprise performance to industrial leadership.

Three central themes are developed in this paper. First, there is a role for managers and leaders not just in managing the business enterprise, but also in the theory of a properly functioning economic system and in industrial leadership. Second, the emerging paradigm of dynamic capabilities helps explicate the role (strategic) managers and management play in a market economy. The dynamic capabilities framework can be used as a foundation for understanding the processes of opportunity sensing and seizing, as well as the processes of strategic renewal. Managers in this paradigm play an essential role in both identifying and capturing new strategic

opportunities, in orchestrating the necessary complementarities and other organizational assets, and in inventing business models and new organizational forms. Third, dynamic capabilities rest on assumptions and intellectual foundations that can be traced to the behavioral theory of the firm, to evolutionary theory, as well as to Penrosian views on the nature of the firm.

This paper will also show that the dynamic capabilities paradigm goes considerably beyond older paradigms, especially through the integration of ideas about coordination and complementarities. These ideas are increasingly important in contexts where network externalities and asset specificity matter.

## 2. Economic Growth and Enterprise Development

The field of economics reminds us of the virtues of the price system. Markets enable the low-cost achievement of some level of coordination and response to changing technologies and market circumstances (Hayek 1945). How markets and organizations complement each other has of course been extensively studied (e.g., Williamson 1985). However, where managers fit in is not clear, until one recognizes that it is not just traders and arbitrageurs who respond to market signals. Managers have critical roles to play inside the organization. They direct operations and decide how resources are to be orchestrated and allocated. Although they are agents of the principals (owners), they usually have considerable strategic discretion over the allocation of resources. How they exercise that discretion to achieve the goals of the organization is the central focus of the field of strategic management.<sup>1</sup>

Indeed, the organization of the business enterprise and the quality of its management need to be thought of as fundamental to economic response. Managers do more than effectuate the deployment and redeployment of resources in response to price signals. Their role is often overlooked, and is not featured in either Hayek's (1945) framework, or in more contemporary economic frameworks. An economy with a competitive market structure won't spawn the creation and continuation of viable enterprises unless there are exceptionally capable entrepreneurs and managers orchestrating necessary responses to technological and market changes.

Managers can also shape the evolution of technologies and markets themselves. Although few scholars today dispute that the engine of capitalist development is the business enterprise, the role of the business enterprise and its management in growth and development is greatly underemphasized in mainstream theory.

Accordingly, if we want to better understand economic growth and development, we need a more complete understanding of the role of management and entrepreneurship in enterprise performance, and of enterprise performance in economic development and growth. The fact that management has been omitted from economic growth theory, be it neoclassical or the so-called "new" growth theory, may be one reason why economists have difficulty explaining differences in enterprise level as well as national growth rates.

Surprisingly, it is only recently that economic growth theorists and development scholars alike have begun to recognize that the application of technology and the development of institutions to protect property, control corruption, and advance the rule of law are critical to economic development and economic growth. For instance, a leading mainstream scholar, Jeffrey Sachs (2005, p. 41), recently wrote,

I believe that the single most important reason why prosperity spreads, and why it continues to spread, is the transmission of technologies and ideas underlying them. Even more important than having resources in the ground, such as coal, was the ability to use modern, science-based ideas to organize production.

Sachs's recent emphasis on technology and organization is significant only because mainstream economic theory has been slow to embrace the importance of technology and enterprise, and to recognize the mechanisms by which technology is developed, used, transferred, and protected. In the modern world, the multinational corporation is often the instrument by which technology gets developed, used, and transferred, at least in commercial contexts.

Survival for the business enterprise is not just about executing well. It's also about figuring out where to put resources, realizing those opportunities, and then defending and/or moving on when competition inevitably

arises. A company that is excellent at making the wrong things will fail. Yet it can be mediocre in providing innovative things that people want, and it may succeed, at least for a while.

Today, firms compete in an increasingly global marketplace where creating, owning, and managing intangible assets is very important. Battles for customers and for talent are continuous. As intermediate (supply) markets expand through outsourcing, and as governments succeed in creating "level" playing fields, the number of competitors increase, and privileged access to opportunities declines. The liberalization of trade and investment regimes worldwide has served to sharpen competition in those regions exposed to global competition. The global dispersion in the sources of innovation requires enterprises to take a global approach to the innovation process.

The new world we are in requires a different breed of manager, and highly skilled employees with capacities to combine and integrate. In particular, managers must act entrepreneurially, think strategically, and execute flawlessly (or very nearly so) if they are to lead their organizations successfully. They must also figure out how to harness the skills of highly skilled individuals—the "literati"—who today play a much more significant role in creative success and enterprise performance than they did in the past.

In short, strategic, organizational, and human resource decisions made by management lie at the heart of enterprise performance. Indeed, in today's economy, success requires that managers behave in an intensely entrepreneurial manner and build into their organization the capacity to sense and seize opportunities, and then transform and reconfigure as opportunities and competitive forces dictate. Such capabilities, if built, constitute what we call the dynamic capabilities of the enterprise. Not many CEOs have the necessary skills, and fewer still succeed in building them into their businesses. The dynamic capabilities framework developed in the field of strategic management highlights the growing importance of entrepreneurial management.

Entrepreneurial management may sound like an oxymoron. But in the context of today's open economies, the distinction between the functions of entrepreneurs and managers are fading. Once the process of new business formation is achieved, the role of the entrepreneur and the role of managers in enterprise success morph considerably. Business failure is often associated with a failure to achieve these transitions.

Put differently, once an enterprise is established, continued success in an open competitive economy requires entrepreneurial management and the building, maintenance, and employment within the enterprise of "dynamic capabilities."<sup>2</sup> Of course, enterprises large and small have great trouble sustaining long-term superior performance. Even with large research and development

(R&D) budgets, success through innovation is by no means automatic. Of course, it never was.

In short, the business enterprise must do a lot more than simply allocate large expenditures to R&D to sustain superior performance. The innovation process requires active orchestration of both intangible and tangible assets by entrepreneurs and managers. This is true whether the context is the small or the large enterprise. Understanding this orchestration is center stage in the emerging paradigm of dynamic capabilities.

### 3. Intellectual and Behavioral Foundations of Dynamic Capability Theory

#### 3.1. Dynamic Capabilities Defined

Early statements of the dynamic capabilities framework can be found in Teece et al. (1990, 1997), Teece and Pisano (1994), Teece (1996). The definition of dynamic capabilities found in Teece et al. (1997) is slightly modified to read as follows:

*The ability to sense and then seize new opportunities, and to reconfigure and protect knowledge assets, competencies, and complementary assets with the aim of achieving a sustained competitive advantage.*

This is consistent with the Helfat et al. (2007) definition of a dynamic capability as “the capacity of an organization to purposefully extend, create, or modify its resource base,” emphasizing the intentional, or purposeful element in capabilities.<sup>3</sup>

Helfat et al. (2007) contrast evolutionary (dynamic, external) fitness with technical fitness. Capabilities can be disaggregated into technical fitness (how effectively a capability is performed) and dynamic fitness, by which we mean external fitness (whether the right activity is being performed). The latter is about making the right investments at the right time, and lining up the necessary complements. It is not as much about running hard as running smart. Both measures of fitness can be calibrated from zero (unfit) to some positive number (various degrees of fitness). Achieving technical and external fitness may also require shaping the environment, as well as positioning oneself advantageously within it. And different firms may have different levels of technical and external fitness.

For analytical purposes, we believe it is possible to disaggregate dynamic capabilities into three classes: the capability to sense opportunities, the capacity to seize opportunities, and the capacity to manage threats through the combination, recombination, and reconfiguring of assets inside and outside of the firm’s boundaries. Each is described here in only a cursory manner. The microfoundations of these capabilities are outlined in Teece (2007).

A firm’s dynamic capabilities stem from the particular capacity firms have to shape, reshape, configure, and reconfigure idiosyncratic and often cospecialized assets

so as to respond to changing technologies and markets. Dynamic capabilities, therefore, relate to the firm’s ability to sense, seize, and transform to generate and exploit internal and external firm-specific competences, while both responding to and shaping the environment (Teece and Pisano 1994, Teece et al. 1997). Collis (1994), Winter (2003), and Helfat (2007) note that one element of dynamic capabilities is that they govern the rate of change of ordinary capabilities. But as Teece (2007) notes, dynamic capabilities relate more fundamentally to the ability to sense, seize, and reconfigure.

If a firm possesses resources/competences but lacks dynamic capabilities, it has a chance to make a competitive return for a short period, but superior returns cannot be sustained. It may earn Ricardian (quasi) rents, but such rents will dissipate in a changed environment, often rather quickly. It cannot earn Schumpeterian rents because it has not built the capacity to be continually innovative. Nor is it likely to be able to earn monopoly (Porterian) rents, because these require exclusive behavior or strategic manipulation.

The possession and employment of dynamic capabilities provides the business enterprise with a chance to generate superior profitability over the longer run. When firms are dynamically competitive, management will be active at sensing and seizing opportunities. This will in turn require their ability to orchestrate nontraded (and nontradable) assets, so that they are in their first best use and so that cospecialization economies are captured.

The dynamic capabilities framework is not based on optimization assumptions. Rather, it is assumed that managers are at best boundedly rational. A profit-seeking but not profit-maximizing framework is (implicitly) adopted throughout. Path dependencies exist but are not inexorable. Disequilibrium is rampant, and great uncertainty with respect to plans and outcomes is the norm. Organizations both adapt to and help shape their environments. Technological innovation frequently overturns the status quo in the marketplace.

#### 3.2. Antecedents

Although the dynamic capabilities paradigm is barely two decades old, its conceptual underpinnings are much older. Its roots lie in Carnegie School concepts emanating from the 1950s and 1960s. These concepts have been laced with contemporary ideas about technological innovation, the theory of the firm, and business strategy.

Ideas from the Carnegie School have been crucial for developments in economics, simulation models, organization theory, and management (Augier and Prietula 2007, Argote and Greve 2007, Augier and Sarasvathy 2004). Within the field of strategy, in particular from the mid-1980s, strategy scholars began to realize the usefulness of the Carnegie and post-Carnegie developments. For example, Teece (1984) argued that the evolutionary

ideas of Nelson and Winter (1982) would help in providing a theory of the firm's distinctive competencies. Routines could be thought of as the skills of the organization, and the firm as an entity with a limited range of capabilities based on its available routines, other intangibles, and of course its tangible assets. Routines reinforce the idea of path dependency; a firm's capabilities are defined at least to some degree by where it has been and what it has done. The firm's current performance is also a function of engrained repertoires (Dosi 1988, Teece 1984, March 1994) as well as its tangible assets. Path dependencies and established technological trajectories shape the addressable opportunities faced by firms.<sup>4</sup>

To position important themes in the dynamic capability framework, we outline in more detail how some of the Carnegie and post-Carnegie ideas have been important to the development of the dynamic capabilities framework. Our purpose is to explain how dynamic capabilities provide an interdisciplinary foundation for understanding strategic management, and how it pragmatically draws from, and integrates, earlier traditions.

*3.2.1. Behavioral Theory of the Firm.* The foundations for a new (behavioral) theory of the firm were laid by the Carnegie School in the 1950s and 1960s. The ideas of Simon (1947), and of Cyert and March (1963) on "bounded rationality," opportunistic behavior, slack, and routines, provided the underpinnings. Transaction cost economics and evolutionary theories of the enterprise were also built on some of these foundations (Williamson 1996, 2002; Nelson and Winter 2002; Dosi 2004). Both paradigms have, in turn, enriched the theory of the firm. Furthermore, it had long been in the tradition of evolutionary economists to emphasize innovation and technological change. Nelson and Winter (1982) were champions of this view.

Unlike the dynamic capabilities framework, the behavioral theory of the firm was not built with strong prescriptive goals. However, several insights from the behavioral perspective are used in more prescriptive approaches found in the field of strategic management, including the resource-based view (Barney 1991) and dynamic capability theory (Pierce et al. 2002). Indeed, dynamic capabilities can perhaps be viewed as the "new" behavioral theory of the firm extended to recognize the importance of intangible assets, outsourcing, offshoring, and rapid change. These phenomena are now central features of the global economies in which firms compete.

The behavioral theory of the firm was built around a political conception of organizational goals, a bounded rationality conception of expectations, an adaptive conception of rules and aspirations, and a set of ideas about how the interactions among these factors affect decisions in a firm (Cyert and March 1963). Whereas goals in neo-classical theory are pictured as given alternatives, each with a set of consequences attached, goals within behavioral theory are pictured as reflecting the demands of

political coalitions, changing as the composition of that coalition changes. Thus, the theory treats the demands of shareholders, managers, workers, customers, suppliers, and creditors as components of the operational goals of a firm. At the same time, not all goals are salient at all times. Rather, specific goals are evoked by the presence of coalition members in the decision neighborhood, by the divisional organization of the firm, and by the recognition of particular problems. Aspirations with respect to each dimension of the goals were pictured as changing in response to the experience of the organization and its components as well as the experience of others to whom they compare themselves. Thus, it is the dynamic nature of aspirations which enables the generation of new decision alternatives. Therefore, the firm must engage in active search and imagination to create sustainable strategic opportunities (Winter 2000).

In the behavioral view, agents have only limited rationality, meaning that behavior in organizations is intendedly rational—neither emotive nor aimless (March and Simon 1958). Firms are seen as heterogeneous, boundedly rational entities that have to search for relevant information. Because information is costly, it is generated by search activity. The intensity of search depends on the performance of the organization relative to aspirations and the amount of organizational slack (March and Simon 1958, pp. 47–52). The direction of search is affected by the location (in the organization) or search activity and the definition of the problem stimulating the activity. Thus, the search activity of the organization furthers both the generation of new alternative strategies, and facilitates the anticipation of uncertain futures.

Decision making in the behavioral theory is seen as taking place in response to a problem, through the use of standard operating procedures and other routines, and also through search for an alternative that is acceptable from the point of view of current aspiration levels for evoked goals. Choice is affected, therefore, by the definition of a problem, by existing rules (which reflect past learning by the organization), by the order in which alternatives are considered (which reflects the location of decision making in the organization and past experience), and by anything that affects aspirations and attention.<sup>5</sup>

Cyert and March (1963) emphasized the uniqueness in firms; organizations and organizational actors differ in terms of their aspirations, their knowledge, and their decisions. In terms of relevance to strategy, the most basic contribution of the behavioral theory of the firm is the importance of firm heterogeneity (Pierce et al. 2002). Winter (2000) also uses ideas on satisficing and dynamic aspiration levels to suggest an ecological and evolutionary perspective in which learning is a dynamic capability.

Clearly, the dynamic capabilities framework is sympathetic to these perspectives. Decision makers are not

hyperrational; they are intendedly rational. Entrepreneurs will sense opportunities ahead of others and be able, through various means (including through leadership), to get others to share their vision and help them execute upon it. Incentive alignment is assumed to be satisfactory. Biases in decision-making proclivities are recognized, and mechanisms identified to help override identifiable biases.

**3.2.2. Transaction Cost Theory.** The transactions cost approach is widely accepted as a framework for helping to understand economic organization. This perspective sees markets and hierarchies as alternative mechanisms for organizing transactions. To economize on transaction costs, production is frequently required to be organized in firms. Transaction cost economics builds on the assumptions of bounded rationality and opportunism (Williamson 1975, 1985). Contractual efficiency is impaired when switching costs have to be incurred to change suppliers. In such circumstances, vertical integration is likely to be superior according to transaction cost analysis.<sup>6</sup> The dynamic capabilities theory also borrows from transaction costs, but less extensively than it does from the behavioral theory of the firm.

There is considerable explanatory power in the transaction cost framework. However, the contractual scheme upon which it is built deals with existing resources and does not examine how new resources are discovered, how they are accumulated, and how firms learn.

The structure and behavior of the modern business firm cannot be fully explained by appealing to transaction costs alone. The focus for the “main case” in transaction cost economics is governance, i.e., how things should be organized. Governance is an important element of management, but good governance is unlikely to be sufficient to support sustained competitive advantage. Whereas it is important to have the right governance, it is of equal—if not greater—importance to make the right investment choices, select the right assets to “govern,” create, and capture complementarities, and establish the correct business model. Superior organizational capabilities require not just astute initial asset selection; but also require continuous reconfiguration and improvement. The transaction cost framework, by contrast, is primarily about asset or value protection, not value creation.<sup>7</sup> It tends to be static, not dynamic.

Williamson (1975, 1985) clearly recognizes that even in the world of transaction cost economics, governance costs are not the only costs that are relevant to the firm. “Production costs” are indeed mentioned, but not analyzed deeply. However, much lies within “production costs” that economists and management scholars need to understand. They include not just operational issues, but strategic issues too. Some production related issues are operational—such as the establishment of flexible procurement, enabling the firm to take advantage of changing competitive pricing—and some highly strategic, such

as whether or not to invest in a new plant, or whether to advance a new generation of products now, later, or never. Clearly, the performance of a business is going to be very significantly impacted by production and investment choices, as well as by governance choices.

The (dynamic) capabilities framework suggests that the scope of the firm cannot be explained just by transaction cost considerations. Rather, asset selection (internalization) decisions must also make reference to cospecialization economies, learning, and the appropriability of profits from innovation (Teece 1986; 2006a, b).

Nevertheless, the complementarity between transaction cost economics and dynamic capabilities is evident. Williamson (1999, p. 1098) notes that transaction cost and internal firm perspectives “deal with partly overlapping phenomenon, often in complementary ways.” Indeed, the very first empirical study to show the predictive power of asset specificity in setting firm boundaries (Monteverde and Teece 1982) also showed that even greater predictive power was associated with cospecialization or “systems integration,” causing Teece (1990, p. 59) to observe that, to fully develop its capabilities, transaction cost economics must be joined with a theory of knowledge and production (also see Winter 1988). As a result, scholars began looking elsewhere to develop more robust theories of the firm. Behavioral and evolutionary economics has been recognized as another source of useful insights (Winter 2003). These latter traditions also address another, and perhaps deeper, limitation with transaction cost theory: that it attempts to explain most organizational behavior as fundamentally the result of opportunistic behavior driven by incentives. Although these are important considerations, they are certainly not the only ones, as discussed later.

**3.2.3. Evolutionary Theory.** The evolutionary theory of the firm goes back to (at least) Marshall’s (1925) construction of the industry equilibrium. He analyzed how a population of firms in disequilibrium would produce industry-level supply-demand equilibrium. He frequently used biological analogies.<sup>8</sup> A representative firm was hypothesized to bridge the dynamic analysis of firm level and the static industry level. “[F]irms rise and fall,” Marshall (1925, p. 367) said, “but the representative firm remains always of the same size.”

Other ideas significant for the development of the evolutionary view were also introduced by Schumpeter (1934). For instance, although the idea of rules based or bounded rationality became associated with Simon (1955) and March and Simon (1958) (and then later embedded in Nelson and Winter (1982)), Schumpeter (1934, p.80) was early to recognize that bounded rationality is necessary for a theory of innovation and dynamics:

The assumption that conduct is prompt and rational is in all cases a fiction. But it proves to be sufficiently near

to reality, if things have time to hammer logic into men. Where this has happened, and within the limits in which it has happened, one may rest content with this fiction and build theories. . . . Outside of these limits our fiction loses its closeness to reality.

Evolutionary ideas also surfaced during the profit maximization debate in economics involving Machlup (1946), Friedman (1953), Alchian (1950, 1953), and Penrose (1952, 1953). The debate (concerning, among other things, the role of intentionality in economic selection and the use of a population of heterogeneous firms as a basis for selection) led to the formal evolutionary work by Winter (1964, 1971, 1975).<sup>9</sup> Despite these prominent predecessors, an evolutionary view of the firm was not developed until decades later. In what was first intended to be entitled “A Neo Schumpeterian Theory of the Firm,” Nelson and Winter (1982) integrated insights from Schumpeter (1934) with ideas from Alchian (1950), Hayek (1945), and Cyert and March (1963). The firm in their view is seen as a profit-seeking entity whose primary activities are to build (through organizational learning processes) and exploit valuable knowledge assets. Firms in this view also come with “routines” or “competencies,” which are recurrent patterns of action that may change through search and learning. Routines will seldom be “optimal” and will differ among agents, and behaviors cannot be deduced from simply observing the environmental signals (such as prices) that agents are exposed to. The resultant variety drives the evolutionary process, because firms develop rent-seeking strategies on the basis of their routines and competencies, and competition in the product market constitutes an important part of the selection environment confronting firms.

To fully understand these (and related) issues and their implications for theories of the firm and strategic management, scholars have appealed to the idea of firms as knowledge-creating and learning entities. The firm is seen as endogenously generating its productive opportunity set. This line of thought was developed by Penrose (1959), who argued that the firm is a repository of capabilities and knowledge, and that learning is central to firm growth. Productive knowledge is often related to other organizational (material) assets.<sup>10</sup> According to Penrose (1959, p. 320), the firm is “both an administrative organization and a collection of productive resources, both human and material.”

In the Penrosian conception, the services rendered by the firm’s resources are the primary inputs into a firm’s production processes and are firm specific in the sense that they are a function of the knowledge and experience that the firm has acquired over time. When services that are currently going unused are applied to new lines of business, these services fuel the growth engine of the firm. Learning enables the organization to use its resources more efficiently. As a result, even firms that maintain a constant level of capital may nevertheless be

able to grow as services are freed up for new uses as a result of organizational learning.

#### 4. Dynamic Capabilities and the Economic Theory of Coordination

In addition to synthesizing and expanding upon ideas from different theoretical traditions, the dynamic capabilities approach seeks to provide a coherent framework that can both integrate existing conceptual and empirical knowledge and facilitate prescription. As discussed, the dynamic capabilities approach builds upon the theoretical foundations provided by Schumpeter (1934), Penrose (1959), Williamson (1975, 1985), Cyert and March (1963), Rumelt (1984), Nelson and Winter (1982), and Teece (1982, 1984). In particular, it is consistent with the view that the emergence of new products and processes results from new combinations of knowledge sensed and then seized by management. The processes of organizational and strategic renewal are essential for the long-term survival and prosperity of the business firm. Enterprises must also combine the exploration of new opportunities with exploitation and renewal.

The essence of the dynamic capabilities approach is that competitive success arises from the continuous development, alignment, and reconfiguration of firm-specific assets (Augier and Teece 2006, Teece and Pisano 1994, Teece et al. 1997). Whereas Penrose (1959) and the resource-based scholars recognize the competitive importance of firm-specific capabilities, researchers within the dynamic capabilities paradigm attempt to outline specifically how organizations can sense (and shape) new opportunities, seize them, and then transform once again as the environment inevitably shifts. The latter approach is concerned with how firms create and/or access new knowledge, make investment choices, and achieve necessary business model and organizational transformation. The framework by its very nature involves understanding both technological and organizational change.

The dynamic capability perspective follows Hayek (1945) (and the behavioral and evolutionary theorists) in emphasizing that coordination is a central economic problem when there is technological and/or market change. In a static environment, a short period of “set up” would be required to organize economic activity, but absent change in consumer tastes or technology, economic agents (both traders and managers) would sort out the optimal flows of goods and services (together with methods of production). Thereafter, there would be no need for their services. Dynamic capabilities at the enterprise level would be irrelevant.

Now introduce change into the environment. If there were a complete set of forward and contingent claims markets, adjustments would occur automatically; absent

a complete set of futures and contingent claims markets, there is the need for individuals and organizations to engage in trading activities, and for managers/entrepreneurs to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece et al. 1997). Coordinating and adapting effectively to changing environments (Cyert and March 1963) is one of several elements of a firm's dynamic capabilities. Barnard (1938) and Richardson (1960) were early to develop these themes. In the dynamic capabilities framework it is also recognized that the business enterprise and managerial decisions also shape the environment, as when compatibility and other standards get set in the marketplace.

Barnard's (1938) view of the firm was that it was fundamentally a structure to achieve coordination and adaptation. But as Williamson (1990) observes, Barnard did not compare the firm to markets in terms of their coordinative or adaptive capabilities. One key difference is that the firm achieves coordination and adaptation with respect to nontraded or thinly traded assets; the market, on the other hand, enables rapid adaptation with respect to assets that are actively traded in thick markets.

However, dynamic capabilities involve much more than "coordination" and "adaptation," and the functions of the (strategic) manager go beyond what Barnard and Williamson have identified. In particular, coordination and adaptation do not convey very well notions such as proactive search, selection, and subsequent implementation of particular courses of action critical to firms' business strategies. Nor do they convey the importance of asset alignment, opportunity identification, and the creation of critical cospecialized assets, both tangible and intangible. These are all critical elements of management's dynamic capabilities, and are important to value creation.

Put another way, the need for firms' to have dynamic capabilities stems from what can be thought of as "market failures" that occur when there is rapid change.<sup>11</sup> The market "failures" at issue are not due just to high transaction costs and contractual incompleteness.<sup>12</sup> Rather, they are associated with the nonexistence of certain markets and the need to identify, align, adapt, and coordinate activities and assets, especially complementary assets, that are at best only thinly traded.

Complementarities frequently exist among assets used within the firm, and frequently exist with assets currently not owned by the firm. These complementarities are easy to manage when markets are thick, because standard purchase and sale agreements or term contracts ought to suffice. But when markets are thin, or nonexistent, alignment is not necessarily achieved by trades. It is the job of the (strategic) manager to decide what investments are to be made, what assets are to be purchased, and how complementarities are to be achieved. Inside the firm, the strategy manager can ensure that new

task boundaries are created and existing ones ignored. Under guidance from the strategy manager, the ability of (complementary) asset owners to block innovation can be eliminated through acquisition or worked around through additional investment.

Richardson (1960) has remarked upon the information problems associated with achieving coordination and investment decisions. However, his focus is on industry-level coordination of investment. He identified situations where limited information about competitor's investment decisions may impede efficient investment. This is not the focus here. The essential coordination task identified in the dynamic capabilities framework is internal to the firm, though it may well involve strategic alliances with other firms too.

Needless to say, the proficient achievement of the necessary coordination is by no means assured inside the firm. To achieve the necessary coordination, decision makers need information on changing consumer needs and technology. Such information is not always available, or if it is available, is likely to be incomplete or highly subjective (Casson 2000, p. 119; Simon 1993).

Managers are of course decision makers, and they must collect information, analyze it, synthesize it, and act upon it inside the firm. Situations are dealt with in many ways, sometimes by creating rules, which specify how the organization will respond to the observations made (March and Simon 1958). If this path is chosen, then rules may become codified and routinely applied (Casson 2000, p. 129) whenever certain changes are detected.<sup>13</sup> However, such rules need to be periodically revised and decision-making biases eliminated.

The coordinating and resource allocating capabilities featured in the dynamic capabilities framework shape markets, as much as markets shape firms (Chandler 1990, Teece 1993, Simon 1991). Put simply, firms and markets coevolve. Hence, although the need for asset coordination and orchestration and associated investment choices may be the fundamental problem that the firm's dynamic capabilities help address, the firm's dynamic capabilities—particularly its ability to introduce new products and services into the market—alone do not shape markets; they also require firm-level responses by competitors, suppliers, and customers.

## 5. Explicating the Role of the Manager in the Economic System

Dynamic capabilities, when they are well developed, enable firms to achieve coordination and benefit from complementarities. Developing decision-making skills and organizational processes to sense and seize opportunities is an essential managerial function and it is embedded in the dynamic capabilities framework. These functions can be the cornerstone of an economic approach to management.

Others have noted that economic theory lacks a role for management. Indeed, Nobel Laureate Ronald Coase (1988, p. 38) has noted that “economists have tended to neglect the main activity of the firm, running a business.”

Indeed, there simply is no role for the manager in the economic theory of the firm. Although Williamson (1999, p. 1101) claims that the role of management is “significant” in transaction cost economics, his support for the assertion makes reference to the emphasis in transaction cost economics on the adaptive properties of organization, and recognition that management can exercise “fiat.” This is insightful but insufficient for our purposes.

In the dynamic capabilities framework, management plays distinctive roles in selecting and/or developing routines, making investment choices, and in orchestrating nontradable assets to achieve efficiencies and appropriate returns from innovation. This is a more robust role for management than transaction cost economics or evolutionary theorizing has so far afforded.

But whatever shortcomings transaction cost economics have with respect to incorporating the role of the manager, they pale next to models of the neoclassical firm in economic theory where entrepreneurs, managers, and the management function have been blotted out.<sup>14</sup> Teece and Winter (1984) also observed that entrepreneurship has been suppressed in the theory of the firm. Serious questions are raised with respect to the value of neoclassical economic models for management theory, management education, and, by implication, management practice. Indeed, Miles (2007) summarizes an emerging perspective in management education that claims that the teaching of economic theory in business schools has shaped managerial attitudes in a manner that puts too much stock on incentives and opportunism and too little stock on trust, culture, and leadership.

Perhaps more fundamental, the dynamic capability theory has a broader behavioral foundation than transaction cost theory (leading to a more integrative and interdisciplinary framework). Williamson (1985) is clear with respect to the behavioral assumptions of transaction cost theory. They are bounded rationality and opportunism. The dynamic capability perspective shares the emphasis on limited rationality; but we would argue that it is insufficient to view economic organizations just in terms of opportunism and incentives. Whereas these are important, so are organizational identification, loyalty, and even culture.

In short, the modern business organization is a complex entity, and understanding and improving its performance as well as designing strategic processes involves creating internal organizational systems with rewards and incentives that also support the creation of organizational identification and loyalty. As Simon (1997, p. 201) noted, “It requires organizational identification, as well as sticks and carrots, to direct behavior towards

achieving organizational objectives, and in highly effective organizations, the former plays the dominant role. To state the matter in classical terms, if members of organizations are maximizing their utilities, the organizational goals must constitute major parts of their utility functions.”

This has important implications for the choice and design of business models as well as for managing strategic change in organizations. Furthermore, the mechanisms of organizational identification are not just motivational and can serve as acting contra to other’s opportunistic behavior—but they have an important cognitive function as well: decision makers bounded in their rationality are inclined to simplify their decision situations by reflecting the environment in which they find themselves (Augier and Sarasvathy 2004). Organizational structures can provide reference points for more efficient decision making. It has furthermore been argued that relatively decomposed organizational structures are better to encourage the mechanisms of identification (Simon 2002). Thus, while many of the theories in the past emphasized the behavioral foundations for organizational behavior that was often found in large organizations and hierarchies, dynamic capabilities theory recognizes broader behavioral foundations and also more flexible organizational structures that are needed today.

The dynamic capabilities framework also looks beyond the concept of routines. Winter (2003) and others suggest that dynamic capabilities should be defined mainly around high-level routines. If this were to be the case, the role of (strategic) management would be reduced and relegated to selecting new routines. Certainly, if innovation becomes truly a routine in large firms, then the manager/intrapreneur has a modest role to play after the routines are in place. The dynamic capabilities framework presented above suggests a bigger role for managers because it also references asset selection and asset orchestration. Indeed, in a strict evolutionary view of the world, there is no specific agent and no hierarchy responsible for regulating the evolutionary process (Cohendet et al. 2000). However, in a less rigidly evolutionary view of the world, there is room for a managerial and entrepreneurial function. The manager/entrepreneur need not be an individual; in the modern corporation, it is a function. As Schumpeter (1949, pp. 71–72) noted, “The entrepreneurial function may be and often is filled cooperatively—in many cases, therefore, it is difficult or even impossible to name an individual that acts as ‘the entrepreneur.’”

The manager/entrepreneur must articulate goals, help evaluate opportunities, set culture, build trust, and play a critical role in the key strategic decisions. Clearly the role of the entrepreneur and the manager overlap to a considerable extent. The manager/entrepreneur plays a key role in achieving asset selection and the



“coordination” of economic activity, particularly when complementary assets must be assembled. The manager/entrepreneur can bargain, negotiate, and buy or sell or swap investments/assets, orchestrate internal assets (intrapreneurship), transact with the owners of external assets (entrepreneurship), and design and implement new “business models,” which define the architecture of new businesses (Chesbrough and Rosenbloom 2002). The astute performance of these functions will help achieve what Porter (1996) calls “strategic fit,” not just with internally controlled assets, but with the assets of alliance partners.<sup>15</sup>

Thus, the entrepreneur/manager function in the dynamic capabilities framework is in part Schumpeterian (the entrepreneur introduces novelty and seeks new combinations) and in part evolutionary (the entrepreneur endeavors to promote and shape learning). Whether intrapreneur or entrepreneur, the function senses new opportunities and leads the organization forward to seize them. The entrepreneur/manager must lead. These are roles not recognized by economic theory; but these roles are the essence of dynamic capabilities and are critical to the theory of strategic management. We suggest they should be central to economic theory, too.

## 6. Conclusion

Several decades of research on organizational and strategic change and capabilities has brought a reassessment of fundamental issues in strategy. Concepts such as routines, competencies, capabilities, cospecialization, and learning have attained near parity with older concepts in organization and management theory. Ideas on competences and capabilities have begun to emerge as viable complements not only to neoclassical economics, but also to transaction cost theory (Dosi 2004).

The dynamic capabilities framework invites further research into entrepreneurship, organizational learning, and the role of managers and leaders in enterprise performance. The dynamic capability paradigm sees the firm as an incubator and repository for difficult-to-replicate cospecialized assets. Technological and other intangible assets are more central than tangible assets. Distinctive processes support the creation, protection, and augmentation of firm-specific assets and competences. Competences reflect both individual skills and experiences as well as distinctive ways of doing things inside firms.

Dynamic capability was intended in the beginning as a set of ideas to help explicate scope economies, flexibility, adaptability, integration, and disintegration. The contemporary focus on changing technology has spurred increasing focus on organizational change and how environments and the histories of business firms shape organizational forms, practices, and competencies. The dynamic capabilities framework is offered as a guide to the understanding of complex business organizations and contemporary management practices in high-performing enterprises.

## Acknowledgments

The authors are very grateful to Connie Helfat, Linda Argote, and two anonymous referees for very helpful comments on previous drafts of this paper, and to Sid Winter and Giovanni Dosi for helpful discussions during research and writing. The skillful assistance of Patricia Lonergan is gratefully acknowledged.

## Endnotes

<sup>1</sup>There is a large literature exploring how managerial discretion can be used to advance the interests of management at the expense of shareholders (e.g., Williamson 1963). What has received less attention is how managers assist the operations of a market economy. One exception is Chandler (1977).

<sup>2</sup>See Teece et al. (1997) and Teece (2007). Also see Helfat et al. (2007), Adner and Helfat (2003), and Winter (2003) for relevant discussions.

<sup>3</sup>The emphasis on intentionality, or purposeful design, is consistent with the views of Penrose (1959), on which the dynamic capability literature builds. We have discussed this elsewhere (see Augier and Teece (2007), in particular regarding the role of intentionality in the creation of capabilities).

<sup>4</sup>Many writers have pointed to Schumpeter’s ideas of “creative destruction” underlying the modern emphasis on technological change. However, it is worth noting that Schumpeter did not reserve the term for just technological change; for him, it was useful for analyzing many areas of the economy. As he noted, “This concept covers the following five cases: (1) The introduction of a new good—that is one with which consumers are not yet familiar—or of a new quality of a good. (2) The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially. (3) The opening of a new market, that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before. (4) The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created. (5) The carrying out of the new organization of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position” (Schumpeter 1934, p. 66).

<sup>5</sup>Within this framework, four concepts were developed. The first is the quasi-resolution of conflict, the idea that firms function with considerable latent conflict of interests but do not necessarily resolve that conflict explicitly. The second is uncertainty avoidance. Although firms try to anticipate an unpredictable future insofar as they can, they also try to restructure their worlds to minimize their dependence on anticipation of the highly uncertain future. The third concept is problemistic search, the idea that search within a firm is stimulated primarily by problems and directed to solving those problems. The fourth concept is organizational learning. The theory assumes that firms learn from their own experiences and the experiences of others.

<sup>6</sup>The link between transaction cost economics and strategy was present already when Williamson (1975) demonstrated the relevance of transaction cost ideas to issues of corporate

strategy (such as efficient firm boundaries); and the Chandler-Williamson *M*-form hypothesis quickly became a key insight in the strategic management field, in particular after being supported by a number of empirical studies, beginning with Armour and Teece (1978).

<sup>7</sup>The way in which governance (choice of firm boundary) issues do come into play in strategic management is well illustrated in Teece (1986), where there is extensive discussion of complementary assets and whether or not these should be internalized. Deciding whether to “own” or “rent” (i.e., integrate or outsource) complementary assets depends on whether the assets were available in competitive supply.

<sup>8</sup>As Marshall explains in his *Principles of Economics*, “we may read a lesson from the young trees in the forest as they struggle upwards through the benumbing shade of their older rivals. Many succumb on the way, and a few only survive; those few become stronger with every year, they get a larger share of light and air with every increase of their height, and at last in their turn they tower above their neighbors. One tree will last longer in full vigor and attain a greater size than another; but sooner or later age tells on them all. And as with the growth of trees, so was it with the growth of business as a general rule before the great recent development of vast joint-stock companies, which often stagnate, but do not readily die” (Marshall 1925, pp. 315–316). For excellent discussions of Marshall’s evolutionary ideas, see the work of Loasby (1976, 1989).

<sup>9</sup>In contrast to the position of Friedman (1953) and others, evolutionary theory emphasizes that selection does *not* always lead to efficient outcomes because firms operate in a context or environment of other firms. “In fact,” Nelson and Winter (1982, p. 154) write, “there is good reason to expect the opposite, since selection forces may be expected to be ‘sensible’ and to trade off maladaptation under unusual or unencountered conditions to achieve good adaptations to conditions frequently encountered. In a context of progressive change, therefore, one should not expect to observe ideal adaptation to current conditions by the products of evolutionary change.”

<sup>10</sup>As Penrose (1959, p. 76) writes, “For physical resources the range of services inherent in any given resource depends on the physical characteristics of the resource, and it is probably safe to assume that at any given time the known productive services inherent in a resource do not exhaust the full potential of the resource. . . . The possibilities of using services change with changes in knowledge. . . . there is a close connection between the type of knowledge possessed by the personnel in the firm and the services obtainable from its material resources.”

<sup>11</sup>The use of the term “market failure” is only relative to the theoretical norm of absolute static and dynamic efficiency. Of course, a (private) enterprise economic system as a whole achieves an efficient allocation of resources, because strategic managers and the organization they lead are an inherent part of the economic system. However, the framework does highlight the fact that management systems and corporate governance must function well for a private enterprise market-oriented system to function well.

<sup>12</sup>To the extent that transaction costs are relevant, it is of the dynamic variety (see Langlois 1992).

<sup>13</sup>Casson argues that rule making is entrepreneurial, but that rule implementation is routine, and is characterized by managerial and administrative work.

<sup>14</sup>Consider the nature of the model of the firm. In its simplest form, the theoretical firm must choose among alternative values for a small number of well-defined variables: price, output, perhaps advertising outlay. In making this choice, management is taken to consider the costs and revenues associated with each candidate set of values, as described by the relevant functional relationships, equations, and inequalities. Explicitly or implicitly the firm is then taken to perform a mathematical calculation that yields optimal (i.e., profit-maximizing) values for all of its decision variables, and it is these values which the theory assumes to be chosen—which are taken to constitute the business decision. There matters rest, forever or until exogenous forces lead to an autonomous change in the environment. Until there is such a shift in one of the relationships that define the problem, the firm is taken to replicate precisely its previous decisions, day after day, year after year.

<sup>15</sup>As Porter (1996) notes, “[S]trategic fit among many activities is fundamental not only to competitive advantage but also to sustainability of that advantage. It is harder for a rival to match an array of interlocked activities than it is merely to imitate a particular sales force approach, match a process technology, or replicate a set of product features” (p. 73). And “when activities complement each other, rivals will get very little benefit from imitation unless they successfully match the whole system—frequent shifts in positioning are costly—strategy is creating a fit among a company’s activities. The success of strategy depends on doing many things well—not just a few in an integration among them. If there is not fit among activities, there is not distinctive strategy and little sustainability” (p. 77). See Peteraf and Reed (2007) for a relevant discussion on dynamic managerial capabilities in this context.

## References

- Adner, R., C. Helfat. 2003. Dynamic managerial capabilities and corporate effects. *Strategic Management J.* **24**(10) 1011–1027.
- Alchian, A. 1950. Uncertainty, evolution, and economic theory. *J. Political Econom.* **58** 211–222.
- Alchian, A. 1953. Biological analogies in the theory of the firm: Comment. *Amer. Econom. Rev.* **43**(4) 600–603.
- Argote, L., H. Greve. 2007. A behavioral theory of the firm—40 years and counting: Introduction and impact. *Organ. Sci.* **18** 337–349.
- Armour, H., D. J. Teece. 1978. Organizational structure and economic performance: A test of the multidivisional hypothesis. *Bell J. Econom.* **9**(2) 106–122.
- Augier, M., M. Prietula. 2007. Historical roots of a behavioral theory of the firm model at GSIA. *Organ. Sci.* **18**(3) 507–522.
- Augier, M., S. Saravathy. 2004. Integrating cognition, evolution, and design: Extending Simonian perspectives to strategic organization. *Strategic Organ.* **2**(2) 169–204.
- Augier, M., D. Teece. 2006. Understanding complex organization: The role of know-how, internal structure, and human behavior in the evolution of capabilities. *Indust. Corporate Change* **15**(2) 395–416.
- Augier, M., D. Teece. 2007. Dynamic capabilities and multinational enterprise: Penrosian insights and omissions. *Management Internat. Rev.* **47** 1–18.
- Barnard, C. 1938. *The Functions of the Executive*. Harvard University Press, Cambridge, MA.
- Barney, J. 1991. Firm resources and sustained competitive advantage. *J. Management* **17**(1) 99–120.

- Casson, M. 2000. An entrepreneurial theory of the firm. N. Foss, V. Mahnke, eds. *Competence, Governance, and Entrepreneurship*. Oxford University Press, 116–145.
- Chandler, A. 1977. *The Visible Hand: The Managerial Revolution in American Business*. Belknap Press, Cambridge, MA.
- Chandler, A. 1990. *Scale and Scope*. Belknap Press, Cambridge, MA.
- Chesbrough, H., R. S. Rosenbloom. 2002. The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology. *Indust. Corporate Change* 11(3) 529–555.
- Coase, R. H. 1988. The nature of the firm: Origin, meaning, influence. *J. Law, Econom., Organ.* 4(1) 3–47.
- Cohendet, P., P. Llerna, L. Marengo. 2000. Is there a pilot in the evolutionary firm? N. Foss, V. Mahnke, eds. *Competence, Governance and Entrepreneurship*, Oxford University Press, Oxford, UK.
- Collis, D. J. 1994. Research note: How valuable are organisational capabilities? *Strategic Management J.* 15 143–152.
- Cyert, R., J. G. March. 1963. *A Behavioral Theory of the Firm*. Prentice Hall, Englewood Cliffs, NJ.
- Dosi, G. 1988. Sources, procedures and microeconomic effects of innovation. *J. Econom. Literature* 26 1120–1170.
- Dosi, G. 2004. A very reasonable objective still beyond our reach: Economics as an empirically disciplined social science. *Models of a Man: Essays in Memory of Herbert A. Simon*. MIT Press, Cambridge, MA.
- Friedman, M. 1953. The methodology of positive economics. *Essays in Positive Economics*. University of Chicago Press, Chicago.
- Hayek, F. A. 1945. The use of knowledge in society. F. A. Hayek, ed. *Individualism and Economic Order*. University of Chicago Press, Chicago, 77–91.
- Helfat, C., S. Finkelstein, W. Mitchell, M. A. Peteraf, H. Singh, D. J. Teece, S. Winter. 2007. *Dynamic Capabilities: Understanding Strategic Change in Organizations*. Blackwell, Oxford, UK.
- Langlois, R. 1992. Transaction-costs economics in real time. *Indust. Corporate Change* 1 99–127.
- Loasby, B. 1976. *Choice, Complexity and Ignorance*. Oxford University Press, Oxford, UK.
- Loasby, B. 1989. *The Mind and Method of the Economist*. Edward Elgar, Cheltenham, UK.
- Machlup, F. 1946. Marginal analysis and empirical research. *Amer. Econom. Rev.* 36(4) 519–554.
- March, J. G. 1994. *A Primer on Decision Making*. Free Press, New York.
- March, J. G., H. A. Simon. 1958. *Organizations*. Wiley, New York.
- Marshall, A. 1925. *Principles of Economics*. MacMillan, London.
- Miles, R. 2007. Innovation and leadership values. *California Management Rev.* 50(1) 192–201.
- Monteverde, K., D. J. Teece. 1982. Supplier switching costs and vertical integration in the U.S. automobile industry. *Bell J. Econom.* 13(1) 206–213.
- Mowery, D. C., R. Nelson, eds. 1999. The global computer software industry. *The Sources of Industrial Leadership*. Cambridge University Press, UK.
- Nelson, R., S. G. Winter. 1982. *An Evolutionary Theory of Economic Change*. Belknap Press, Cambridge, MA.
- Penrose, E. 1952. Biological analogies in the theory of the firm. *Amer. Econom. Rev.* 42 804–819.
- Penrose, E. 1953. Biological analogies in the theory of the firm: Rejoinder. *Amer. Econom. Rev.* 43(4) 603–609.
- Penrose, E. 1959. *The Theory of the Growth of the Firm*. Blackwell, Oxford, UK.
- Peteraf, M., R. Reed. 2007. Managerial discretion and internal alignment under regulatory constraints and change. *Strategic Management J.* 28 1089–1112.
- Pierce, L., C. Boerner, D. J. Teece. 2002. Dynamic capabilities, competence, and the behavioral theory of the firm. M. Augier, J. G. March, eds. *The Economics of Choice, Change and Organization: Essays in Honor of Richard M. Cyert*. Edward Elgar, Cheltenham, UK, 81–95.
- Porter, M. 1996. What is strategy. *Harvard Bus. Rev.* (November/December).
- Richardson, G. B. 1960. *Information and Investment*. Oxford University Press, Oxford, UK.
- Rumelt, R. 1984. Towards a strategic theory of the firm. R. B. Lamb, ed. *Competitive Strategic Management*. Prentice Hall, Englewood Cliffs, NJ.
- Sachs, J. 2005. *The End of Poverty*. Penguin Press, London.
- Schumpeter, J. 1934. *The Theory of Economic Development*. Harvard University Press, Cambridge, MA.
- Schumpeter, J. 1949. Economic theory and entrepreneurial history. Prepared by the Harvard University Research Center in Entrepreneurial History. *Change and the Entrepreneur*. Harvard University Press, Boston, 63–84.
- Simon, H. A. 1955. A behavioral model of rational choice. *Quart. J. Econom.* 69 99–118.
- Simon, H. A. 1991. Organizations and markets. *J. Econom. Perspectives* 5 25–44.
- Simon, H. A. 1993. Strategy and organizational evolution. *Strategic Management J.* 14 131–142.
- Simon, H. A. 1997. *An Empirically Based Microeconomics*. Cambridge University Press, Cambridge, UK.
- Simon, H. A. 2002. We and they: The human urge to identify with groups. *Indust. Corporate Change* 11(3) 607–610.
- Teece, D. J. 1982. Towards an economic theory of the multiproduct firm. *J. Econom. Behav. Organ.* 3(1) 39–63.
- Teece, D. J. 1984. Economic analysis and strategic management. *California Management Rev.* 26(3) 87–110.
- Teece, D. J. 1986. Profiting from technological innovation. *Res. Policy* 15(6) 285–305.
- Teece, D. J. 1990. Contributions and impediments of economic analysis in the study of strategic management. J. Frederickson, ed. *Perspectives on Strategic Management*. Harper Business, New York, 39–80.
- Teece, D. J. 1993. The dynamics of industrial capitalism: Perspectives on Alfred Chandler's *Scale and Scope*. *J. Econom. Literature* 31 199–225.
- Teece, D. J. 1996. Firm organization, industrial structure, and technological innovation. *J. Econom. Behav. Organ.* 31 193–224.
- Teece, D. J. 2006a. Reflections on the Hymer thesis and the multinational enterprise. *Internat. Bus. Rev.* 15(2) 124–139.
- Teece, D. J. 2006b. Reflections on profiting from innovation. *Res. Policy* 35(8) 1131–1146.
- Teece, D. J. 2007. Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management J.* 28(13) 1319–1350.

- Teece, D. J., G. Pisano. 1994. The dynamic capabilities of firms: An introduction. *Indust. Corporate Change* 3(3) 537–556.
- Teece, D. J., S. G. Winter. 1984. The limits of neoclassical theory in management education. *Amer. Econom. Rev.* 74(2) 116–121.
- Teece, D. J., G. Pisano, A. Shuen. 1990. Firm capabilities, resources and the concept of strategy. Working Paper 90-9, Consortium on Competitiveness and Cooperation, Center for Research in Management, University of California, Berkeley.
- Teece, D. J., G. Pisano, A. Shuen. 1997. Dynamic capabilities and strategic management. *Strategic Management J.* 18(7) 537–533.
- Williamson, O. E. 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. The Free Press, New York.
- Williamson, O. E. 1985. *The Economic Institutions of Capitalism*. The Free Press, New York.
- Williamson, O. E. 1990. Chester Barnard and the incipient science of organization. O. E. Williamson, ed. *Organization Theory: From Chester Barnard to the Present and Beyond*. Oxford University Press, New York, 172–206.
- Williamson, O. E. 1996. Transaction cost economics and the Carnegie connection. *J. Econom. Behav. Organ.* 31 149–155.
- Williamson, O. E. 1999. Strategy research: Governance and competence perspectives. *Strategic Management J.* 20 1087–1108.
- Williamson, O. E. 2002. Empirical microeconomics: Another perspective. M. Augier, J. G. March, eds. *The Economics of Choice, Change and Organization: Essays In Honor of Richard M. Cyert*. Edward Elgar, Cheltenham, UK, 419–441.
- Winter, S. G. 1964. Economic “natural selection” and the theory of the firm. *Yale Econom. Essays* 4(1) 225–272.
- Winter, S. 1971. Satisficing, selection and the innovating remnant. *Quart. J. Econom.* 85 237–261.
- Winter, S. 2003. Understanding dynamic capabilities. *Strategic Management J.* 24 991–995.
- Winter, S. G. 1975. Optimization and evolution in the theory of the firm. R. Day, T. Groves, eds. *Adaptive Economic Models*. Academic Press, New York, 73–99.
- Winter, S. G. 1988. On Coase, competence, and the corporation. *J. Law, Econom., Organ.* 4(1) 163–180.
- Winter, S. G. 2000. The satisficing principle in capability learning. *Strategic Management J.* 21 981–996.