UNTANGLING THE ORIGINS OF COMPETITIVE ADVANTAGE

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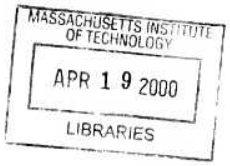

I. Introduction

Strategy studies... is systematic, like the system of touts at the race track...

(Stinchcombe, 2000)

What are the origins of competitive advantage? Although this question is fundamental to strategy research, it is one to which we lack a clear answer. As strategy researchers we believe that some firms consistently outperform others, and we have some evidence consistent with this belief (Rumelt, 1991; McGahan and Porter, 1997). We also have a number of well developed theories as to why, at any given moment, it is possible for some firms (and some industries) to earn supranormal returns. As of yet, however, we have no generally accepted theory — and certainly no systematic evidence — as to the origins or the dynamics of such differences in performance. We know, for example, why high barriers to entry coupled with a differentiated product positioning obtained through unique organizational competencies may provide a firm with competitive advantage. But we know much less about how barriers to entry are built: about why this firm and not that one developed the competencies that underlie advantage, and about the dynamic process out of which competitive advantage first arises and then erodes over time.

This conceptual ambiguity has always been problematic for many economists, who have tended to view persistent differences in performance as a function of "unobserved heterogeneity" (Mundlak, 1961; Griliches, 1986). For example, empirical work in industrial organization routinely controls for "firm fixed effects." These are usually statistically significant and often account for a substantial fraction of the total variation in firm productivity or performance. Whereas strategy researchers tend to emphasize the degree to which these kinds of results offer support for the importance of "capabilities" or "positioning" (Rumelt, 1991; Henderson and Cockburn, 1994; McGahan and Porter, 1997; Lieberman and Dhawan, 2000), economists tend to emphasize the possibility that fixed effects are simply controlling for a series of much more mundane measurement problems, ranging from the difficulty of computing appropriately depreciated capital stocks and of measuring firm-specific input and output price schedules, to the problem of controlling for difficult-to-observe factors such as worker effort or worker quality. In short, the evidence which strategy researchers view as the motivation for their intellectual agenda are interpreted by many economists in terms of "nuisance" parameters — things which must be controlled for but which are not of intrinsic interest.

This implicit critique has been reinforced by theoretical and empirical research in the tradition of population ecology (see for example Hannan and Freeman, 1989). In summarizing the contributions of this literature and its application to strategy, Stinchcombe (2000) charges that the preponderance of strategy scholars have simply failed to understand (and certainly to systematically account for) the implications of population dynamics for performance heterogeneity. Stinchcombe suggests that if superior performance arises from the degree to which a firm's resources and/or strategy "match" the

competitive environment, and if resources are randomly distributed at "birth" (or if the environment which firms face at the time strategies are chosen and resource investments are made is sufficiently uncertain), then performance heterogeneity simply reflects the fact that the realized competitive environment favors some strategies and some resource bundles over others. Such a critique implies that the cases which motivate so much of strategy research, and indeed even some of our theoretical frameworks, are roughly equivalent to ex post accounts of the way in which a winning gambler chose to put her money on red rather than on black at the roulette table.

In this paper we argue that grappling with this problem should be of central concern to strategy researchers: that while many of us are aware of the issue that Stinchcombe raises, without a more detailed understanding of the origin and dynamics of the development of competitive advantage we run the grave risk of meriting Stinchcombe's taunt that we are indeed "touts at the racetrack." We suggest that empirical strategy researchers need to move beyond studies of differential performance to more integrated studies which not only identify those factors which are correlated with superior performance but also attempt to explore the origins and the dynamics of their adoption.

We begin the paper with a brief literature review. By and large, Stinchcombe's critique — and population ecology more generally — suggests that most performance differentials, particularly differences in the probability of survivorship, can be explained by differences in a firm's initial conditions, and, moreover, that differences in initial conditions are largely the result of difficult-to-explain (and even harder-to-measure) differences in each firm's initial allocation of resources and capabilities. In contrast, strategy is centrally concerned with the process of how firms and managers *respond* to and exploit environmental signals. For example, in the last twenty years, there has been an explosion of powerful frameworks for evaluating the determinants of differential performance, from Porter's five forces framework to the resource-based view to transaction-cost economics. While each of these frameworks offers a somewhat different explanation for heterogeneous performance, all share two assumptions: that competitive advantage arises through earlier or more favorable access to resources, markets, or organizational opportunities; and that exploiting such opportunities reflects some degree of active interpretation of internal and external environmental signals by managers. Indeed, we argue that these literatures often share the implicit view that the *origins* of competitive advantage lie in the unusual foresight or ability of the firm's managers.

Of course, this characterization of the two schools of thought is unrealistically stark: population ecologists recognize the possibility that firms may be able to adapt to their environment and their competitive experience (Barnett and Sorenson, 1998), and strategy researchers understand that firm strategy and capabilities are subject to powerful inertial forces (Christensen and Bower, 1994). But as we discuss in some detail in Section II, substantial differences in focus do exist: while population ecology is principally focused on exploring the performance implications of strong organizational inertia, one of the core agendas of strategy is understanding which organizational structures allow firms to first identify and

then exploit opportunities offered by their environment and so (potentially) overcome organizational constraints.

We then turn in Section III to a discussion of an empirical methodology that might enable us to explore the relative importance of initial conditions and strategic choice in shaping competitive advantage. Our goal is to lay out an empirical framework that might allow us to compare and contrast the distinctive implications of the strategic perspective alongside the predictions of the population ecology literature, and thus to both offer a preliminary response to Stinchcombe's critique and to begin disentangling the origins of competitive advantage.

We begin by distinguishing between differences among firm in terms of their "initial conditions" versus differences in the rate at which they adopt a particular performance-enhancing practice (or strategy) that has been linked to superior performance. Using Stinchcombe's analysis, we would expect the primary determinant of each firm's degree of adoption at any particular point in time to be the initial condition or founding state of that firm. This is not to imply that Stinchcombe's analysis suggests that firms cannot change, only that we believe that in general he would argue that change will not be systematically tied to the kinds of environmental cues which would be readily amenable to empirical analysis by strategy researchers.

We contrast this hypothesis with two explanations for diffusion which are consistent with a strategic perspective, and are more difficult to reconcile with Stinchcombe's hypothesis. First, a strategic orientation would suggest that, in the absence of organizational failure, those firms whose early history places them in a particularly unfavorable position will tend to be the firms that respond most aggressively in terms of the rate at which they adopt particular performance-enhancing practices or strategies. We label this the "convergence" hypothesis, under which the key empirical question is not somuch whether differences between firms will persist but how long they take to erode. From this perspective, the dynamics of competitive advantage are driven by two distinct processes: the exploitation of particularly favorable combinations of practices and/or market positions by firms whose initial positions "match" their environment, and the erosion of these rents as competitors "catch up" by mimicking the successful strategies of market leaders.

Second, we suggest that, beyond initial conditions and the process of convergence, adoption rates may be associated with environmental cues which are more intensively experienced by some firms rather than others. Firm strategy may thus be responsive to factors which provide information about a distinctive opportunity to invest in resources or strategies which will ultimately be associated with competitive advantage. For example, if firms are in different "niche" markets during the early stage of an industry, then the information these firms will possess about the future evolution of the industry may be different and their strategy should in principle respond to these signals. From an empirical perspective, this hypothesis suggests that strategy will be a function of the firm's *current or recent* environment; of course, a second issue exists as to whether we should focus on environmental cues which tend to be

associated with internal (organizational) factors, external (market) factors, or both.

To illustrate these ideas, we then turn in Sections IV and V to an application of this empirical framework through the evaluation of the adoption and diffusion of one particular strategy — the use of science-driven drug discovery — in the context of the worldwide pharmaceutical industry. We begin by briefly motivating the study of the adoption of science-driven drug discovery as a useful context in which to think about the origins of competitive advantage, and then turn to a discussion of our data sources and variable construction. We explore the measurement of both initial conditions and convergence, and then use our qualitative knowledge of the industry to identify five distinct "environmental cues" that might drive "strategic" adoption: a firm's distance from public science, whether or not the CEO is a scientist, its accumulated stock of scientific knowledge, its market position, and the composition of its sales portfolio.

Our analysis is by no means definitive. We offer it as a preliminary descriptive analysis of a complex phenomenon that raises as many questions as it answers. However we believe that it illustrates concretely one approach to taking Stinchcombe's hypothesis seriously while also evaluating the origins of competitive advantage in a systematic manner.

Our findings are consistent with a perspective in which both population ecology and strategy have an important role to play in explaining patterns of organizational heterogeneity. On the one hand, "initial conditions" — or the position of each firm at the beginning of the period covered by our data — play an important role. Firms differ very significantly in the degree to which they had adopted the techniques of science-driven drug discovery in the first years of our period, and these differences persisted for many years. But there is also evidence for a powerful convergence effect, with the firms which were furthest from best practice at the beginning of the period moving most aggressively to adopt it. Finally, after controlling for initial conditions and convergence, additional time-varying characteristics of the firm play a modest role in explaining patterns of diffusion: both the composition of the firm's sales portfolio and its market share are significantly correlated with the rate at which the practice of science-driven drug discovery is adopted by the firm. Our results therefore provide substantial support for both Stinchcombe's view of the sources of competitive advantage and for a more traditional, "strategic" view, the implications of which are addressed in the concluding section of the paper.

II. The Origins of Competitive Advantage.

Early studies of competitive advantage were rooted firmly in historical analyses and careful qualitative research. This work could be interpreted as suggesting that competitive advantage was a complex phenomenon, that depended crucially on the active presence of superior leadership (Andrews, 1971; Selznick, 1957; Chandler, 1962). For example, Chandler's early work can be read as implying that those firms who adopted the new M-form before their competitors gained a strategic advantage, and, moreover, that the choice to adopt the new organizational form reflected the structure and leadership qualities of a company's top management. Through the 1960s and 1970s, the study of "strategy" was

thus the study of what general managers or "leaders" should do and it was generally assumed that doing these things would make a difference: firms with better leaders would make better choices and would ultimately do better than their competitors.

Porter turned this paradigm on its head (Porter, 1980). In transforming the study of "imperfect competition" into the analysis of "competitive advantage," Porter shifted the focus of strategy research *outward*, towards the analysis of the firm's microeconomic environment. Porter's approach yielded sharply defined tools for understanding exactly why some firms (and industries) were likely to be more profitable than others. A "five forces" analysis is essentially a structural map of the underlying economics of an industry: a map of the degree to which competitors, entrants, substitutes and vertical bargaining power exert pressure on the margins of a firm in a particular industry. A firm operating in an industry in which there are substantial returns to scale coupled with opportunities to differentiate, that buys from and sells to perfectly competitive markets and that produces a product for which substitutes are very unsatisfactory (e.g. the US soft drink in the 1980s), is likely to be much more profitable than one operating in an industry with few barriers to entry, and a large number of similarly sized firms who are reliant on a few large suppliers and who are selling commodity products to a few large buyers (e.g., the global semiconductor memory market).[1]

Structural analysis is a powerful tool for understanding why a particular strategic action (e.g., branding or investment in complementary product areas) may be associated with supranormal returns, but in and of itself says nothing about the role of senior management — or the process of strategic choice — in determining profitability. Consider the case of Crown Cork and Seal.[2] This classic HBS case describes the metal can industry: an industry that has a classically unfavorable structure and in which, in consequence, the vast majority of firms are relatively unprofitable. A structural analysis provides concrete insight into why it is so difficult for most firms to make supranormal returns in steel can production. In addition, the case can be read as suggesting that Crown itself earns supra normal returns because it has developed unique capabilities that have allowed it to differentiate its product in a way that is difficult for competitors to imitate. Does the case therefore imply that Crown was particularly well managed or that it had chosen a "good" strategy? Analogously, does it also imply that those metal can producers that are not performing well are managed by "bad" managers who have chosen "bad" strategies? Certainly this is the way that the case is often taught: as if the vision and determination of John Connelley, who developed Crown's strategy, was a critical determinant of its success. To take

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[1] Structural analysis has, of course, moved much beyond Porter's original book, and we do not even attempt to summarize this literature here. For some recent contributions, see, Brandenberger and Nalebuff (1998) and Besanko, Dranove and Shanley (2000).

[2] HBS #: 9-378-024