

# **Firm Performance and the Axis of Errors**

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*- abstract -*

Firms sometimes fail to capture opportunities, fail to imitate perfectly-imitable resources, and do not solve their solvable problems. The persistence of errors creates intra-industry performance variation that is usually attributed to the competitive advantages of successful firms. However, firms compete on two axes: the axis of competitive advantage, where performance is driven by the inimitable resources and capabilities of high-performing firms; and the axis of errors, where performance is driven by failures to attend to the activities, resources and opportunities that are equally available to all firms. This paper investigates the latter, showing how errors produce performance variation not attributable to competitive advantages, and discussing their consequences for strategy theory, empirical research and management practice.

# **Firm Performance and the Axis of Errors**

## **Introduction**

Well-publicized errors by companies such as Airbus, Merck, and Arthur Andersen remind us that organizations sometimes blunder, lapse and misjudge. They fail to capture opportunities, fail to imitate imitable resources, fail to solve solvable problems, and fail to execute fundamental strategies. These failures need not be due to bounded rationality, causal ambiguity, isolating mechanisms, mobility barriers or other cognitive or market failures. Even the most powerful, highly-resourced, and fully-informed firms allocate resources inefficiently and neglect sound business practice. As a result, firms are always heterogeneous and they always perform differently, even in the absence of sustainable competitive advantages.

Existing strategy theories assume that intra-industry performance differences arise from imperfectly imitable resources, capabilities or competitive positions, and that avoidable errors normalize in equilibrium. These assumptions are defensible in carefully-selected cases, and they shed light on the behavior of high-performing firms. However, as foundations for a comprehensive theory of intra-industry performance variation they are inadequate and misleading. If avoidable errors are commonplace and persistent, it is false to attribute performance heterogeneity to economic barriers, market failures or “causal ambiguity,” and misleading to recommend that firms invest scarce resources in the pursuit or protection of sustainable competitive advantages. A more parsimonious explanation is that managers make mistakes, and more sensible advice to executives is to attend to the execution of sound, fundamental business strategies.

Existing strategy theories offer a plausible account of the characteristics of “great firms” such as Microsoft, Wal-Mart, and Anheuser-Busch. However, theories of competitive advantage cannot explain performance variation in commonly-observed industry conditions – for example, when no firm has sustainable competitive advantages, or when several firms have them, or when a firm with sustainable competitive advantages is squandering them by committing large, avoidable errors.

This paper examines the performance effects of organizational errors such as missed opportunities, lapses in judgment, and failing to attend to the valuable activities, resources and capabilities that are equally available to all firms. If there is an “axis of competitive advantage” on which firm performance arises from the accumulation of inimitable competitive assets, there is also an “axis of errors” on which firms avail themselves to varying degrees of perfectly-imitable opportunities and resources. The paper explores the role of organizational errors in producing firm heterogeneity, and discusses the consequences of errors for strategy theory, empirical research and management practice.

### **Firm performance and sustainable competitive advantage**

The hypothesis of sustainable competitive advantage evolved from historical and case-based attempts to explain the persistent superior performance of prominent firms, focusing originally on companies such as General Motors, Dupont, Standard Oil, and IBM (Chandler, 1962; Learned, Christensen, Andrews and Guth, 1965). Beginning in the 1960s, strategy consultants and business school academics proposed performance hypotheses such as “strategy-structure fit” (Chandler, 1962), “distinctive competence” (Andrews, 1965), “experience” (Henderson, 1970), and “mobility barriers” (Caves and Porter, 1977). By the early 1980s – due largely to the work of Porter (1980) – the hypothesis of sustainable

competitive advantage was firmly established as the predominant account of sustained superior performance: firms earned monopoly rents by adopting profitable market positions in attractive industries, and protected these rents by creating or exploiting barriers to mobility and market entry.

As Strategic Management emerged as an academic discipline in the 1980s, researchers began to challenge Porter's emphasis on structural effects and strategic positioning, focusing instead on the large firm-specific effect in the statistical partitioning of returns (Wernerfelt and Montgomery, 1988; Rumelt, 1991). These empirical findings, combined with early theoretical work on factor-market advantages and alternative forms of economic rent (Wernerfelt, 1984; Rumelt, 1984; Barney, 1986), gave rise to the "resource-based" theory of competitive advantage: performance variations are attributable to variability in firm-specific resources and capabilities, protected from imitation by "isolating mechanisms" such as social complexity and causal ambiguity. From the late 1980s to the present day, the resource-based view has been extensively refined and elaborated (Dierickx and Cool, 1989; Barney, 1991; Peteraf, 1993; Grant and Spender 1996; Teece, Pisano, and Shuen, 1997; Lippman and Rumelt, 2003), and is now the theoretical basis for most empirical work on competitive advantage (e.g., Cockburn, Henderson and Stern, 2000; Ahuja, Coff and Lee, 2005).

Like its intellectual ancestors, the resource-based view is primarily a theory of the "great firm," adapted to explaining the sustained successes of modern performance exemplars such as Wal-Mart, Microsoft and Google. To this extent, the theory is insightful, and its emphasis on internal and intangible sources of firm heterogeneity represents a significant advance over purely structural theories of competitive advantage derived from the structure-conduct-performance model of industrial economics.

At the same time, and with the benefit of hindsight, the continuing emphasis on great firms raises impediments to the development of an empirically robust theory of firm performance. For example, if Strategic Management were truly concerned with explaining intra-industry performance, theorists might have focused less on the behavior of a few extreme positive outliers, and more on the dynamic behavior of entire performance distributions (Denrell, 2004; Powell, 2003; Powell and Lloyd, 2005). Extreme cases are useful for classroom teaching but are not well-suited for producing general theories, and the emphasis on competitive advantage has deflected intellectual resources from the essential scholarly work of describing whole longitudinal performance distributions. As Wiggins and Ruefli (2002: 83) point out: “Little attention has been paid to the “topography” of performance itself. This is akin to an epidemiologist studying the various factors that might affect a medical condition – without determining the incidence and prevalence of the condition in the population.”

The field’s preoccupation with high-performing firms has perpetuated three beliefs for which empirical evidence is, at best, weak: (1) Intra-industry performance is highly variable across firms; (2) Performance variability persists in the long run; and (3) Performance variability is largely attributable to the inimitable advantages of high-performing firms. These three beliefs inform all modern theories of competitive advantage.

The first belief – that intra-industry performance is highly variable across firms – stems from a combination of case studies, anecdotal evidence, and the handful of statistical projects comparing variability in returns within and across industries (e.g., Schmalensee, 1985; Rumelt, 1991; McGahan and Porter, 1997). On the whole, the evidence suggests that intra-industry returns vary across firms, and that this variability is, to a moderate degree, stable over time. However, the case studies and empirical projects neither ask nor answer the

essential question: “Variable compared to *what?*” The fact that more statistical variance in returns is attributable to firms than to SIC codes (Rumelt, 1991) may eventually settle one debate in strategy (the “industry vs. firm” debate), but it is not a null model for performance variation among firms. The mere existence of performance heterogeneity, even extreme heterogeneity, does not make it theoretically significant.

It is possible, for example, that observed performance variation could be replicated by relatively simple statistical heuristics or random processes. Denrell (2004) used simulation models to produce long-term performance distributions under varying assumptions about underlying firm heterogeneity, and found that profitability differences emerged and persisted even when firms had no differences in initial resource stocks or expected resource flows, and when path-dependent processes were absent. In other words, performance heterogeneity was consistent with random resource accumulation, and unequal firm performance did not entail the presence of competitive advantages.

In an empirical study, Powell (2003) compared 20-year intra-industry profit rate variance in 21 industries with outcomes in 107 non-business domains such as table games, sports, electoral politics, talent contests and beauty pageants. The means and standard deviations of the Gini coefficients (a 0-1 measure of performance inequality) were virtually identical in the business and non-business contexts, suggesting that business performance distributions are statistically indistinguishable from those found in games, sports, pageants and other forms of competition.

Powell (2003) argued that performance theories can easily fall into the trap of “over-explaining” performance by incorporating false null models about how performance *should* be distributed under fair competitive processes. In the absence of parity by force, all competitive processes (including random processes) produce unequal outcomes, and highly-

skewed performance distributions can arise from random walks or simple statistical heuristics. By focusing on whole performance distributions and the statistical processes through which they emerge, we gain new insights on the appropriate null models for firm performance. As Powell suggests: “The simple fact is that nothing unusual is happening in the performance of most industries.” (2003: 83)

On the other hand, longitudinal performance distributions do take different mathematical forms, and describing these distributions, along with their underlying generative processes, is an important task for future strategy research. For example, Powell and Lloyd (2005) conjectured that the dynamic probability models used to study other complex systems (random walks, Bose-Einstein statistics, Gibrat’s law, Polya’s urn, Markov processes) may enable strategy researchers to describe the generative processes driving intra-industry performance distributions. In Powell’s (2003) study, the three industries with the greatest competitive dominance were pharmaceuticals, brewing, and computers, which are among the industries most often used to support theories of competitive advantage. However, these industries were far from typical: in industries such as metals, transportation equipment, forest and paper products, crude oil production, and textiles, performance was consistent with a random walk or other simple statistical heuristics that do not support a presumption of sustainable competitive advantages.

The second belief – that performance variability persists in the long-run – is not entirely false. If we select the companies, time periods and performance measures carefully enough, we find examples of persistent superior performance: Microsoft’s return on assets in software from 1988-2004, Wal-Mart’s revenue growth in mass merchandising from 1984-1999, Southwest’s return on equity in air travel from 1989-1998. There is also some large-sample empirical evidence: in a study of large UK firms, Cubbin and Geroski (1987) found



that, although profit rates regressed to the mean for two-thirds of firms, 17% of firms experienced sustained above-average profit rates; among U.S. firms, McGahan (1999) found that roughly 20% of firms classified in the top quarter of industry performance remained in the top quarter seventeen years later; and Mueller (1986) found that profit convergence was incomplete, with some firms retaining above-average profit rates for years or decades.

As we have seen, it would be surprising if this were not the case, given that random processes produce persistent “winners” (Denrell, 2003, Levinthal, 1991), and that performance inequality is a general feature of human competition (Powell, 2003). On the other hand, over the broad sweep of time, across a full range of service and manufacturing industries, the evidence for large-scale sustained performance advantages is far from convincing: there is much evidence that firm performance regresses to the mean, and that only a very small number of firms dominate their industries for periods as long as twenty years (Waring, 1996; Wiggins and Ruefli, 2002; Powell, 2003). From an objective appraisal of the evidence, it is difficult to escape the conclusion that the predominant dynamic pattern in industry performance is the long-term convergence, albeit incomplete, of profit rates (Fama and French, 2000; Ghemawat, 1991; Goddard and Wilson, 1999; Jacobsen, 1988; Wiggins and Ruefli, 2002).

If profit rates do not generally persist, an unbiased observer might find it odd that theories of firm performance try to explain why superior profit rates persist, rather than simply explaining observed performance distributions. This, in all likelihood, has less to do with statistical evidence than with the context of performance attribution. Strategy theories are of practical and economic interest to multiple audiences – academics, executives, consultants, governments, MBA students – and strategy theories that emphasize random effects, or focus on structural distributions and statistical processes, are unlikely to generate a

broad constituency. From attribution research we know that people prefer causal theories involving human agency to those involving structures (the “fundamental attribution error”) and prefer familiar causes to unfamiliar ones (Abrahamson and Park, 1994; Bradley, 1978; Kahneman and Tversky, 1984; Folkes, 1988; Miller and Ross, 1975). Because most unsuccessful firms are no longer available for observation, and the surviving unsuccessful firms are fairly uninspiring to managers and researchers, there is an “undersampling of failure” (Denrell, 2003), in which organizational errors are systematically neglected. Given this context of attribution, it may not be surprising that a mixed audience of academics, consultants, and practicing managers jointly prefers theories attributing performance to high-achieving executives and excellent firms to those involving statistical processes, whole performance distributions, and organizational errors.

The third belief – that performance variability stems largely from the inimitable advantages of high-performing firms – brings us to the axis of errors. Even if performance disparities were large, persistent and theoretically significant, it is not clear that sustainable competitive advantage is the best explanation for them. Aside from the structural theories based on whole performance distributions, many alternative firm-specific explanations are possible. For example, performance disparities may arise from errors of commission or omission (Ghemawat, 1991), differences in strategic weaknesses or liabilities rather than strategic assets (Arend, 2004; Leonard-Barton, 1992; West and DeCastro, 2001), “explorative foolishness” (March, 2006), “efficiency profits” (Jacobides, 2006), “knowing-doing gaps” (Pfeffer and Sutton, 2000), “execution holes” (Powell, 2004), or from a litany of avoidable corporate mistakes (Lowenstein, 2000; Finkelstein, 2003). Performance may be driven almost entirely by strategic assets that do not satisfy the criteria for resource-based advantage – for example, a valuable capability such as market research or airline baggage handling may

be perfectly imitable but not imitated, or imitated heterogeneously across firms. A firm with sustainable competitive advantages may have offsetting disadvantages, or may be outperformed by firms with no competitive advantages, as in the case of Harley-Davidson, which had admirable brand recognition but found itself on the verge of bankruptcy in the 1980s.

In discussing errors of commission and omission, Ghemawat (1991) produced the typology shown in Figure 1 (adapted from Ghemawat, 1991, p. 147). In Figure 1, the organization faces a strategic choice and must decide whether or not to act – for example, whether to build a plant, invest in a new technology, or expand into an international market. Failing to take an action that should be taken constitutes an error of omission, or Type I error; taking an action that should not be taken constitutes an error of commission, or Type II error. Ghemawat argued that, although all organizations make errors, some organizations – such as bureaucracies with multiple levels of decision review – tend to commit errors of Type I, whereas others – such as horizontally-structured firms following differentiation strategies – tend to commit errors of Type II. Neither type of error is desirable, and Ghemawat suggested that the performance of the two types of organizations is probably contingent on the decision-making context – for example, on market strategy, technology, and the degree of environmental stability.

– INSERT FIGURE 1 ABOUT HERE –

Three elements of Ghemawat’s model are of particular interest. First, as Ghemawat points out, errors have large performance consequences: “The way the organization handles its failures may be as (or even more) important as how it rewards success” (1991, p. 153). Second, there has been a marked tendency since the development of the resource-based

view for strategy theorists to advocate a Type II approach to strategic choice – i.e., urging firms to err on the side of commission by promoting notions such as “radical experimentation,” “corporate reinvention,” “industry revolution,” and “organizational transformation.” As Ghemawat observes, neither reason nor evidence suggests that errors of commission are preferable, but the strategy literature, focused on the competitive advantages of leading firms, understates the risks associated with Type II error.

Finally, Ghemawat refers to an “error of the third type”: the failure to recognize the trade-offs between errors of commission and omission. In Ghemawat’s model, organizations commit Type III errors when they assume that errors are unimportant, unavoidable, or not a significant source of heterogeneity among firms. It seems likely that Type III error is widespread in organizations, a problem driven by the undersampling of failure both in theory and practice. If firm performance variations arise out of a combination of successes and failures, then theories of firm performance need to acknowledge both sides of the performance equation.

### **The axis of errors**

All theories of competitive advantage share the same logical structure, derived by extension from standard microeconomic models of product and factor markets (Lippman and Rumelt, 2003). This structure is perhaps best described as “barrier-driven”: intra-industry performance variation is caused by valuable characteristics that are distributed non-uniformly across firms, and that resist diffusion to uniform distribution due to market imperfections. Thus, Microsoft’s large installed base of computer operating systems produces network externalities that act as market imperfections and barriers to competitive replication; and Apple Computer’s capabilities in product design and innovation are deeply

situated in the firm’s history, culture and management practices, which act as socially-embedded, “causally ambiguous” barriers to capability diffusion.

In theories of competitive advantage, relatively few resources are protected by diffusion barriers. Most resources either do not generate net economic value or are not subject to the market imperfections that impede resource diffusion. Hence, most resources cannot act as sustainable competitive advantages. When a firm does have sustainable competitive advantages, these are generally few in number, or comprise highly idiosyncratic alignments of a few underlying resources (Montgomery, 1995; Miller and Shamsie, 1996).

Figure 2 provides a stylized typology of organizational resources. In the figure, resources can be classified either as sustainable competitive advantages (valuable and barrier-protected), unsustainable competitive advantages (valuable and not barrier-protected), or competitive disadvantages (not valuable). More nuanced approaches are possible – for example, by quantifying time periods of advantage, or showing theory-specific properties of advantage-producing resources (scale, embeddedness, non-substitutability, appropriability, etc.). However, Figure 2 makes the essential point that, whatever properties we assign to advantage-producing resources, most firm-specific resources and resource bundles lack the properties defined of sustainable competitive advantages. In the terminology of Figure 2, most resources are either unsustainable competitive advantages or competitive disadvantages.

– INSERT FIGURE 2 ABOUT HERE –

Theories of competitive advantage allow for the existence of unsustainable competitive advantages and competitive disadvantages – if the theories are true, such resources clearly must exist, and they must be relatively abundant. However, because the theories are

grounded in standard economic models, their primary concern is with firm heterogeneity in market equilibrium. In equilibrium, rational firms have had sufficient opportunity to divest non-valuable resources (competitive disadvantages) and to imitate valuable resources that are not protected by diffusion barriers (unsustainable competitive advantages) – and firms that fail to behave this way have become inconsequential or bankrupt. Errors may remain, but they approach an irreducible minimum, and are not a significant source of heterogeneity. In equilibrium, all remaining heterogeneity derives from value-generating, barrier-protected factors (sustainable competitive advantages), and neither the failure to adopt unsustainable competitive advantages (errors of omission) nor the persistence of competitive disadvantages (errors of commission) has intra-industry performance consequences.

This explanation is theoretically attractive, not least because it preserves the continuity from microeconomic theory to the strategic theory of the firm. However, it does not fit the empirical evidence on firm heterogeneity. For example, studies using stochastic frontier analysis and data envelopment analysis consistently find large intra-industry variations in the adoption of widely-known production and management techniques. In a seven-year study of Australian prawn fisheries, Kompas (2002) reported productive inefficiencies ranging from 7% to 81%. In a study of 20 branches of the same commercial bank in the same city (Athens), Vassiloglou and Giokas found a 35% range of operating efficiency. In a 25-year study of U.S. railroads, Kumbhakar (1988) found persistent inefficiencies ranging from near-zero to 53%. In French manufacturing, Meeusen and Van den Broeck (1977) found industry inefficiencies ranging from 6% to 30%; and in a longitudinal study of U.S. manufacturers, Caves and Barton (1991) found value-added inefficiencies averaging 37%, and ranging from 3% to 74%.

Similarly, Pfeffer and Sutton (1999) cited a study in which 42 food manufacturing plants in the same company experienced performance variability of 300% between the best- and worst-performing plants, despite performing the same tasks with similar technologies. The authors also cited a survey from the Association of Executive Search Consultants in which “three-quarters of the responding CEOs said companies should have ‘fast track’ programs, [but] fewer than half have one at their own companies.” (Pfeffer and Sutton, 1999: 86)

Harvey Leibenstein’s x-inefficiency theory (Leibenstein, 1966; 1976) produced a sizeable empirical literature showing the persistence of adoption failures in a variety of industry contexts (Bergsman, 1974; Button, 1985; Button and Weyman-Jones, 1992; Frantz, 1992; Jameson, 1972; Leibenstein and Maital, 1992; Peristiani, 1997; Shen, 1973). Leibenstein (1966) also cited studies by Salter (1960), who found 20-year delays in the adoption of well-known cost-saving rail technologies in the copper mining industry, and by Johnston (1963), who found that consulting engagements produced permanent efficiency gains averaging over 200%. Subsequent literature reviews suggest that remediable inefficiencies may be ten to fifty times as great as inefficiencies attributable to imperfect product or factor markets (e.g., Frantz, 1988).

These studies show that avoidable errors vary significantly across firms, and do not vanish or normalize in any time horizon of interest. Rather, organizational errors represent a significant, persistent source of firm heterogeneity. If firm performance is tied to heterogeneity, then it is essential for strategy theory to recognize heterogeneity arising from the persistence of organizational errors.

It should be noted that the persistence of organizational errors in “equilibrium” is not a serious problem for deductive microeconomic theory, which is primarily concerned with predictive instrumentalism (Friedman, 1953). However, for strategy theory – concerned with

explaining actual performance variation in ways that inform management practice – the empirical validity of underlying assumptions is essential (Tsang, 2006). In recent years, strategy scholars have noted the increasing tendency of strategy theories to conflate the terms “competitive advantage” and “firm performance” into a single construct, rather than treating the former as one possible cause of the latter (Powell, 2001; Priem and Butler, 2001). This is symptomatic of a theory that has defined alternative performance explanations out of existence, rather than subjecting them to empirical tests. If organizational errors have performance consequences, and the errors are remediable by managers, then they should be recognized explicitly in strategy theory.<sup>1</sup>

At the same time, the notion of organizational errors should contribute something new to strategy theory, and address the legitimate concerns of strategy researchers. For example, as pointed out in the footnote, it may be objected that errors are already incorporated into existing theories, since a persistent error by a firm such as Airbus can be interpreted as a competitive advantage for a rival such as Boeing (Arend, 2003). Arguably, it is a matter of theoretical indifference whether we define performance gaps as errors or advantages, since both stem from incapacities to eliminate firm heterogeneity.

Although this objection leads to tautology in existing theories, it points to the deeper concern that errors are not recognizable *ex ante*, and are therefore limited in their potential contributions to theory or methodology. Indeed, in many cases errors are the stochastic by-products of advantage-producing processes such as innovation, experimentation and entrepreneurship, and should therefore be regarded as necessary and desirable costs of doing business. It could be argued that if errors are costly to eliminate, and are no more

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<sup>1</sup> One objection to a theory of errors is that errors reflect differences in resources, the persistence of which can only be attributed to diffusion barriers – hence, heterogeneity is caused by competitive advantages. Of course, this objection defines out of existence not only errors but all sources of heterogeneity except competitive advantages, leading to the conflation noted above – see Priem and Butler (2001) and Powell (2001, 2004).



recognizable *ex ante* than competitive advantages, then it is not clear how introducing them sheds light on firm performance.

It is true that many errors are recognizable *ex post* but not *ex ante* – for example, most analysts now agree that the Daimler-Chrysler and HP-Compaq mergers were strategic errors, although these mergers were approved at the time by shareholder majorities. Similarly, the Airbus A380 entailed a major capital commitment, but was not obviously an error to analysts or shareholders at the time, and may yet be re-evaluated depending on future outcomes.

In our view, the persistence of error is a strategically significant empirical phenomenon distinct from the exploitation of sustainable competitive advantages, and this is true whether errors are costly or costless to avoid, or recognized *ex post* or *ex ante*. Since the same problems arise in theories of competitive advantage (due to causal ambiguity and unobservability), it is inconsistent to argue that costs or *ex post* observation should invalidate a theory of firm performance.

However, in defining what we mean by organizational errors, it is useful to conduct a thought experiment on the nature of *ex ante* errors. For this purpose, we define a specific class of error which we call an “x-error,” where an x-error has five characteristics: (1) It involves acts of omission or commission by one or more organizational members; (2) It is value-destroying (avoiding the error generates more value than committing the error); (3) It is avoidable (the omission or commission is a choice); (4) Avoiding the error does not generate competitive advantages (avoiding the error is a hygiene or parity factor, not a valuable, scarce, difficult to imitate activity); and (5) The error is recognizable *ex ante* as error.

An act that satisfies (1) and (2) may be called an “ordinary error.” However, it is theoretically important to consider whether some organizational errors satisfy all five criteria. For example, consider the following:

From 1995 to 2005, Jeep, the leader in SUV brand recognition, introduced no new products despite a doubling of the SUV market.

WorldCom switched customers to more expensive phone plans without their knowledge and refused to adjust billing errors. The company led its industry in FCC complaints and spent vast sums defending class-action lawsuits and government investigations.

In recent years, Fiat has neglected its retail dealerships and failed to supply spare parts.

Boeing CEO Harry Stonecipher, competing in a duopoly against a weakened Airbus, allegedly bribed government officials, committed securities fraud, spent lavishly on corporate retreats, forged documents, and had an affair with a female vice-president, before being fired in March, 2005.

A well-known business school did not keep records of its alumni, and failed to contact them for 40 years.

Consultants working for an electrical utility discovered that management already had a 500-page strategic plan produced by a different consulting firm. They reported: “The old document was very good. The problem was not analysis (but) implementation ... The client already had the basic information we were giving them.” (Pfeffer and Sutton, 1999, p. 85).

In 2007, the two most senior executives at Siemens resigned and two others were convicted by a German court, as prosecutors uncovered a long-standing, institutionalized system of bribery of suppliers, union organizers and federal officials.

Although we can never be certain that an error is recognizable *ex-ante*, we can use the same stochastic or “reasonable person” standards that apply in other evidentiary contexts. For example, it seems probable that most objective, reasonable and informed people would classify Harry Stonecipher’s behavior *ex ante* as error, irrespective of its outcomes. The avoidance of fraud, forgery and lavish spending is not a source of sustainable competitive advantage, but committing these acts generates less value than not committing them, and has large consequences for industry performance distributions. This is true in aggregate even if specific perpetrators are maximizing their own utility, or are not caught, since such acts expose firms to risks that would be unacceptable if known to reasonable owners, employees, or other stakeholders.

It could be argued that such behavior, if it does exist, can be attributed to agency problems that are, in practice, rectified in equilibrium by restructuring incentives or terminating offending employees (Ross, 1973). However, some organizational errors evidently persist, as shown in research on organizational efficiency and in the above example of the business school. Contacting alumni is not a costless activity, but a reasonable person would conclude *ex ante* that the failure to keep records or contact alumni is an organizational error – i.e., that at any plausible cost, keeping records and contacting alumni generates more value than not doing so. Of course, contacting alumni does not generate competitive advantage – it is an imitable hygiene factor, or “x-factor” (Powell, 2001), and is already widely practiced. Nonetheless, the error should have been avoided rather than transcending deans and university administrations, influencing the long-run distribution of business school performance.

If x-errors exist, they are often in the nature of risk management, strategy execution, operational efficiency, and corporate social responsibility. Indeed the problem with touting Enron’s competitive advantages in strategy textbooks was not that the claims were false – Enron did have competitive advantages – but that strategy theory had no vocabulary for discussing the existence, nature or performance effects of Enron’s errors. If x-errors were taken seriously in strategy theory, corporate social responsibility would find a more natural home in strategy research, and its performance consequences could be properly recognized.

In our view, x-errors are not merely a thought experiment, but a significant and frequently-observed strategic phenomenon in firms, with consequences both for strategy theory and research methodology. To develop these ideas conceptually, Figure 3 presents an organizational typology based on heterogeneity derived both from competitive advantages and from organizational errors. On the axis of competitive advantage, firms either have

competitive advantages or they do not. On the axis of errors, firms either minimize organizational errors of omission and commission or they do not. Combining these two axes produces four types of organizations: the Advantaged organization (Type A); the Non-advantaged organization (Type N); the Disadvantaged organization (Type D); and the Counter-advantaged organization (Type C). The remainder of this section discusses these types, their dynamic competitive interactions, and their consequences for strategy theory and practice.

– INSERT FIGURE 3 ABOUT HERE –

**The Advantaged organization (A).** Type A organizations combine sustainable competitive advantages with the minimization of avoidable errors. As in current theories, such organizations control value-creating, distinctive attributes protected by barriers; attend to the adoption of unsustainable competitive advantages (minimizing errors of omission); and minimize investments in value-destroying resources. Type A organizations do commit errors, but they operate at or near the industry’s efficiency frontier, and their errors do not jeopardize or offset their competitive advantages.

**The Non-advantaged organization (N).** Type N organizations also exist in theories of competitive advantage, combining error minimization with a lack of sustainable competitive advantages. In an oligopoly comprised of a single Type A firm and a few firms of Type N, performance variation may be entirely attributable to Type A’s competitive advantages.

**The Counter-advantaged organization (C).** Some organizations perform poorly in spite of sustainable competitive advantages. Type C organizations combine competitive advantages with significant errors – such as ethical lapses or the failure to imitate well-known

industry practices – to produce outcomes in some cases indistinguishable from those of Type N. The distinction between Type C and Type N is essential, although not recognized in current theory. From a resource-based perspective, researchers have argued that unfavorable appropriability regimes may prevent firms from realizing rents from valuable, imperfectly-imitable resources (Coff, 1999; Blyler and Coff, 2003; Ray, Barney and Muhanna, 2004). This is one possible scenario, but the existence of Type C organizations implies something quite different: that the rents may be fully appropriated, but cancelled in their net effects by unrelated errors of omission or commission, as when a company with inimitable brand recognition fails to attend to inventory management or human resources practices. It is likely that such errors are prevalent in advantaged firms, as in the Boeing and Jeep examples, and that Type C organizations are relatively common in organizational populations.

**The Disadvantaged organization (D).** In equilibrium theories, an organization that makes significant errors and has no competitive advantages does not survive. However, the fate of Type D organizations depends also on the resources and errors of competitors, and some error-prone organizations may survive for decades (Gimeno, Folta, Cooper, and Woo, 1997). The survival of Type D organizations is problematic for current theories, because these organizations, like the business school that does not contact its alumni, create intra-industry performance variation for which the competitive advantages of leading organizations provide inadequate explanations – and if no firms in the industry have competitive advantages, current theories cannot account for any performance heterogeneity.

**Industry configurations and competitive dynamics.** An industry's long-term performance distribution depends on the dynamic interaction of organizational types. These

competitive interactions produce industry configurations that may evolve over time. Many industry configurations are possible, but for illustration we consider five stylized industries.

Figure 4 gives performance rank-orderings for four competitors in five hypothetical industry configurations. Industry I has one firm of Type A and three firms of Type N (the Type A firm is the first-ranked performer); Industry II has one firm of Type A, one firm of Type C and two firms of Type N; Industry III has four firms of Type N; Industry IV has four firms of Type D; and Industry V has four firms of Type A.

– INSERT FIGURE 4 ABOUT HERE –

Industry I is the stylized form most commonly cited in traditional theories of competitive advantage – the Type A firm has competitive advantages, the Type N firms do not, there is no significant heterogeneity produced by organizational errors, and the Type A firm outperforms the Type N firms.

Industry II illustrates the effects of organizational errors and the Counter-advantaged firm. Here, the Type A and Type C firms have competitive advantages, but the Type C firm is outperformed by the Type A firm, and by one of the Type N firms. It would be mistaken to assume that the third-ranked firm does not have competitive advantages by the usual research method of *ex post* inspection of relative performance. When competitive advantages are decoupled from performance, a firm with competitive advantages may be outperformed by a firm without them.

Industry III has no firms with sustainable competitive advantages (Type A or C), and existing theories explain none of the performance variation, which is due entirely to variation in organizational errors. Existing theory would possibly suggest that  $N_1$  has competitive advantages, but this claim could only be based on *ex post* inspection of the rank-ordering, not

on the characteristics of firms. In this industry, the leading performer does not have sustainable competitive advantages.

Industry IV has no firms with sustainable competitive advantages, and also no firms of Type N. Theories of competitive advantage cannot explain performance variation in such an industry, and may disallow its existence in equilibrium. In this industry, no firm has sustainable competitive advantages and all firms are making significant errors of omission or commission. This, for example, may characterize competition in global mega-banking, or between Boeing and Airbus in large aircraft production. In Type IV industries, performance variation depends entirely on the nature and severity of organizational errors, and the general level of financial performance may be suboptimal. Such industries may not attract new entry or adequate capital investment by incumbents, and this competitive structure may persist.

Industry V has four Type A firms, an unusual scenario but theoretically possible. By the definition of sustainable competitive advantages, no two firms can have the same advantages. However, there is nothing to prevent firms from having different advantages – for example,  $A_1$  may have an advantage in customer access, and  $A_2$  may have an advantage in technological innovation – and this certainly occurs in some industries. When it does, performance variation cannot be explained by the existence of competitive advantages, but may again revert to differences in avoidable errors.

Decoupling performance from its causes suggests alternative interpretations of observed competitive dynamics and industry performance. For example, it has been suggested that a common form of industry evolution is the gradual loss of a dominant firm's competitive advantages due to "hypercompetition" (D'Aveni, 1994; Wiggins and Reufli, 2005), evidenced by a narrowing of intra-industry performance variance – for example, the evolution of a Type I industry to Type III. However, in light of the above discussion, a richer set of

candidate explanations emerges: for example, the Type A firm may have evolved to Type C by committing avoidable errors; or competitors may have evolved from Counter-advantaged to Advantaged, so that the industry is now Type V; or the industry may have been Type III from the outset, and what has changed is the inter-firm variation in avoidable errors.

Such explanations have consequences, and their plausibility is subject to empirical test. For example, if the industry has evolved to Type III, then future performance variability will be declining but fairly stable; whereas the presence of a Type C firm suggests that future industry performance will be highly unstable, and dependent on the Type C firm's capacity to manage organizational errors. If the industry is now Type V, then all firms have sustainable competitive advantages, and heterogeneity in organizational errors may play an even greater role in determining future outcomes.

By emphasizing successful firms and competitive advantages, strategy theory has probably fostered beliefs about intra-industry advantages that are not empirically true: for example, that most industries have at least one firm with competitive advantages; that all successful firms have sustainable competitive advantages; that few firms in an industry can have competitive advantages at the same time; and that poor performers do not have competitive advantages. By decoupling advantages from firm performance, the "axis of errors" introduces other possibilities, which we summarize in the following empirical conjectures:

Conjecture 1: Most firms with sustainable competitive advantages are Type C, not Type A; their primary strategic task is not creating or overcoming competitive advantages, but reducing organizational errors

Conjecture 2: Most industries have no firms of Type A; in such industries, performance variability is not attributable to competitive advantages

Conjecture 3: Some industries have several firms of Type A; in such industries, performance variability depends on the types of competitive advantages, and on organizational errors.



Conjecture 4: The most common type of firm is Type N; for such firms, the primary strategic task is not creating or overcoming competitive advantages, but reducing organizational errors

Conjecture 5: Type D firms exist and persist; their primary strategic task is not creating or overcoming competitive advantages, but reducing organizational errors

In sum, the conventional wisdom that the strategic objective of the firm is to create and sustain competitive advantages derives from the exclusion by tautology of other possibilities. If the above conjectures are correct, most firms do not have sustainable competitive advantages and have no prospects of achieving them, and most industries have no firms with competitive advantages. As such, the primary strategic challenge for most firms is to minimize errors of omission and commission, while attending to fundamental activities such as basic research, financial discipline, product commercialization, and customer service. In a balanced theory of strategy, competitive advantages are neither necessary nor sufficient for superior performance, and the firm cannot rely on imitation barriers to sustain its success.

### **Strategy research and the axis of errors**

All firms, successful and unsuccessful alike, make mistakes, and their errors may persist unchecked for years or decades. If a firm lapses severely or often, like WorldCom or Schwinn, then it may fail utterly. This does not imply that performance variation can be attributed to the “competitive advantages” of successful survivors, or that firms with competitive advantages are free from significant errors of omission or commission. If anything, advantaged firms are more susceptible to avoidable errors (Miller, 1992, 1993; Probst and Raisch, 2005; Sull, 2003; Weitzel and Jonnson, 1989), and must show even greater vigilance toward error.

Theories of competitive advantage provide an evocative account of the performance of successful firms, and have survived intense competition among rival performance theories. These are important achievements and should be taken seriously. However, as a general account of intra-industry performance heterogeneity, we believe these theories are incomplete. By focusing on great firms, they fail to address the performance of more typical firms and industries, and offer no causal mechanisms for explaining whole dynamic performance distributions. As accounts of firm-specific heterogeneity, they neglect the effects of organizational errors.

For strategy research, determining whether firm heterogeneity is caused by imitation barriers or avoidable errors is a matter of theoretical substance, not mere semantics. Theories of competitive advantage are correct in claiming that the difference between a resource that can be imitated and one that cannot is essential, both in theory and practice (Durand, 2002; Arend, 2003). If firms fail to imitate valuable, barrier-free resources, then the resulting performance variance is remediable by the short-term actions of managers or consultants. If industry performance variation declines over time, it need not be due to the increasing loss of competitive advantages (“hypercompetition”), but may instead be due to error-reduction, or “economizing behaviors” (Williamson, 1991). Unsuccessful firms eliminating errors (e.g., imitating unsustainable advantages) is not the same thing as successful firms losing competitive advantages. In general, if imitation barriers are an important construct, then they should be operationalized and subjected to empirical tests, rather than resting unchallenged as theoretical assumptions.

Research on firm performance can be advanced in three directions. First, as already discussed, an empirical account of intra-industry performance variation requires attention to entire performance distributions rather than to central tendencies or to extreme positive or

negative outliers. In our view, long-range, industry-wide performance studies, combined with statistical inferences based on the generative processes capable of producing the observed distributions – drawing largely on stochastic complexity theory – offer the most promising research program on the structural drivers of firm performance variation (Powell, 2003; Powell and Lloyd, 2005). Since this approach is theoretically “neutral” – i.e., indifferent to the identities and behaviors of individual firms – it is unlikely to connect directly with the concerns of strategy practitioners, although it does provide many insights into dynamic competitive processes.

For research addressing behavioral issues in management practice, we believe that theories of competitive advantage must be augmented by a theory of errors. A theory of errors stands in roughly the same relation to strategy theory as x-efficiency theory stands to conventional microeconomic theory, and similar frontier-based methodologies can be employed. There are many avenues of approach, but one that seems particularly promising is to combine recent work on mindfulness and the attention-based view of the firm (Levinthal and Rerup, 2006; Ocasio, 1997) with empirical methodologies such as data envelopment analysis and stochastic frontier analysis (Aigner, Lovell and Schmidt, 1977; Charnes, Cooper, and Rhodes, 1978). If strategy entails the allocation of organizational attention across a problem space – where “attention” includes time, capital, technology, projects, people, and other resources – then well-established methods for studying the efficiency of dynamic capital allocations can be brought to bear on the study of strategic resource allocation (see Koopmans, 1951; Farrell, 1957). With a theoretical perspective that recognizes the possibility of x-errors and persistently inefficient resource allocations, it is possible to conduct field research on organizational errors; to use simulation methods to explore their effects; to treat resource allocations as intertemporal capital investments, employing the mathematical tools

of dynamic optimization (Kamien and Schwartz, 1981; Dixit and Pindyck, 1994); to examine the error-reducing effects of consulting interventions and CEO hirings; and to study the psychological environment of intertemporal choice (Loewenstein, 1988; Postrel and Rumelt, 1992). On the whole, a theory of errors enables the testing of genuine theoretical alternatives, and suggests a variety of empirical directions for conducting such tests.

Finally, there is considerable scope for improving our understanding of the behavioral sources and consequences of organizational errors. To date, nearly all empirical work on organizational errors has taken a learning perspective, framing organizational errors either as the natural (and often instrumental) by-product of experimentation (Barrett, 1998), or as impediments in the accumulation of advantage-producing capabilities, typically caused by cognitive biases or the persistence of outworn routines. Thus, for example, it is argued that organizational inertia impedes learning or adaptation to change, causing core capabilities to devolve into commodities or “core rigidities” (Leonard-Barton, 1992; Tripsas and Gavetti, 2000).

This approach is useful, but it does not address the existence and persistence of errors unrelated to competitive advantages – for example, the ethical lapses of Merck or Andersen, or AT&T’s inability to correct customer billing errors. As noted earlier, strategy theory has coped poorly with ethical malfeasance largely because the theory has no error mechanism to account for it. As Vermeulen (2006) points out, bad practices can persist independently of competitive advantages, and even when the practices are known *ex ante* to be bad, as with unreliable products, fraudulent bookkeeping, or neglect of customer billing. Using computer simulations, Vermeulen showed that value-destroying practices persist as long as they disseminate faster than they terminate firms. Understanding these “error dynamics,” and their underlying behavioral foundations, is a promising direction for future strategy research.

For strategy practice, the field's decades-long adherence to theories of competitive advantage, and the exclusion of viable alternatives, has probably encouraged the view that competitive advantages are a costless, unambiguous "good": that firms should invest time and executive energies in the analysis of competitive advantages or "core competences," survey the advantages of rivals, develop unique and inimitable competitive advantages, and protect them through market-sheltering behaviors (mobility barriers or isolating mechanisms).

The endorsement of rent-seeking behavior almost certainly underestimates the risks and opportunity costs of pursuing sustainable competitive advantages, and encourages "explorative foolishness" (March, 2006). If remediable errors are a significant source of heterogeneity, then managers have endogenous opportunities to enhance firm performance (Powell, 2001). These opportunities may not entail firm transformation or industry revolution, but in most industries the "mundane" fundamentals of sound management practice probably account for the greater proportion of performance variability. In our view, a theory of errors provides an essential corrective to theories of competitive advantage, and offers promising new directions for empirical research in strategy.

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**FIGURE 1: GHEMAWAT'S MODEL OF ERRORS**

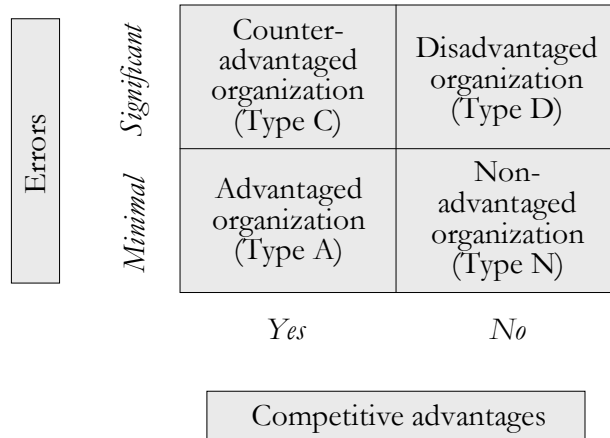
The firm's choice	<i>Act</i>	Correct action	Error of commission (Type II)
	<i>Do not Act</i>	Error of omission (Type I)	Correct omission
		<i>Act</i>	<i>Do not Act</i>

The correct choice

**FIGURE 2: A TYPOLOGY OF ORGANIZATIONAL RESOURCES**

		Barrier-protected	
		<i>Yes</i>	<i>No</i>
Value-generating	<i>Yes</i>	Sustainable Competitive Advantages	Unsustainable Competitive Advantages
	<i>No</i>	Competitive Disadvantages	

**FIGURE 3: FOUR TYPES OF FIRMS**



**FIGURE 4: INDUSTRY CONFIGURATIONS**

	Industry Configuration				
Rank	I	II	III	IV	V
1	A	A	N <sub>1</sub>	D <sub>1</sub>	A <sub>1</sub>
2	N <sub>1</sub>	N <sub>1</sub>	N <sub>2</sub>	D <sub>2</sub>	A <sub>2</sub>
3	N <sub>2</sub>	C	N <sub>3</sub>	D <sub>3</sub>	A <sub>3</sub>
4	N <sub>3</sub>	N <sub>2</sub>	N <sub>4</sub>	D <sub>4</sub>	A <sub>4</sub>