SCHUMPETER'S GHOST:

IS HYPERCOMPETITION MAKING THE BEST OF TIMES SHORTER?

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ABSTRACT

At the center of Schumpeter's theory of competitive behavior is the assertion that competitive advantage will become increasingly more difficult to sustain in a wide range of industries. More recently, this assertion has resurfaced in the notion of hypercompetition. This research examines two large longitudinal samples of firms to discover which industries, if any, exhibit performance that is consonant with Schumpeterian theory and the assertions of hypercompetition. We find support for the argument that over time competitive advantage has become significantly harder to sustain and, further, that the phenomenon is limited neither to high technology industries nor to manufacturing industries but is seen across a broad range of industries. We also find evidence that sustained competitive advantage is increasingly a matter not of a single advantage maintained over time but more a matter of concatenating over time a sequence of advantages.

KEYWORDS: Schumpeter, hypercompetition, performance, persistence, sustainability

INTRODUCTION

While Schumpeter's (1942: 84) notion of a "gale of creative destruction" has garnered the most attention in the research and practitioner literatures, it is the role profit plays in motivating innovation as a precursor to creative destruction that is the key to his theories. Schumpeter (1939: 105) said that profit is "the premium put upon successful innovation in capitalist society and is temporary by nature: it will vanish in the subsequent process of competition and adaptation." Drucker (1983) observed:

> Schumpeter's Economic Development does what neither the classical economists nor Marx nor Keynes was able to do: It makes profit fulfill an economic function. In the economy of change and innovation, profit, in contrast to Marx and his theory, is not a Mehrwert, a "surplus value" stolen from the workers. On the contrary, it is the only source of jobs for workers and of labor income. The theory of economic development shows that no one except the innovator makes a genuine "profit"; and the innovator's profit is always quite short-lived. But innovation in Schumpeter's famous phrase is also "creative destruction." It makes obsolete yesterday's capital equipment and capital investment. The more an economy progresses, the more capital formation will it therefore need. Thus what the classical economists - or the accountant or the stock exchange - considers "profit" is a genuine cost, the cost of staying in business, the cost of a future in which nothing is predictable except that today's profitable business will become tomorrow's white elephant.

Schumpeter's gale of creative destruction would create a disequilibrium in which "practically every enterprise [is] threatened and put on the defensive as soon as it comes into existence (Schumpeter, 1939: 107)." For decades Schumpeter's theory was occasionally mentioned but did not figure prominently in many analyses of business behavior.

Over the past decade, however, there has been increasing attention given to Schumpeterian theory and to hypercompetition in the academic literature. Primary, of course, is D'Aveni's seminal book (1994), where he defines hypercompetition as "an environment characterized by intense and rapid competitive moves, in which competitors must move quickly to build advantage and erode the advantage of their rivals." (1994: 217-218), as well as

Christensen's (1997) book on the problems of industry-leading companies facing competition from upstarts. Beyond that there have been two special issues of Organization Science (July & August 1996) devoted to hypercompetition, an edited book (Ilinitch *et al.*, 1998) that overlaps with the special issues, and some articles in academic journals. Few of these research studies have been empirically based, but those that were will be reviewed below. In particular the current research and its findings will be compared to McNamara, Vaaler, and Devers (2003) since it is the most comprehensive and comparable study to date.

The purpose of our study is to add substantially to the base of empirical evidence concerning Schumpeter's theory in terms of the nature and magnitude of the claimed shift in the U.S. economy. Given Schumpeter's emphasis on the role of profits, the underlying subject of our study will be a recognized hallmark of traditional firm and industry behavior: sustained competitive advantage. The reason for this is as D'Aveni (1994: 7) has noted: "The pursuit of sustainable advantage has long been the focus of strategy." The key predictions of Schumpeterian theory for strategy researchers are: (1) that firms are increasingly less able to sustain a strategic advantage over their competition, (2) that such behavior is characteristic of a wide range of industries, and (3) that sustained competitive advantage has become less a matter of finding and sustaining a single competitive advantage and more a case of finding a series of competitive advantages over time and concatenating them into a sustained competitive advantage. Thus all of the three key Schumpeterian outcomes cited relate to sustained competitive advantage.

Our approach will be to develop a theoretical framework and hypotheses that relate Schumpeterian theory to sustained competitive advantage. We then examine not only 6,772 firms in forty industries over a 25-year period but also all 13,899 business units in 8,806 firms

over a 17-year period (a superset of the sample employed by the most recent and comparable study of hypercompetition, McNamara, Vaaler, and Devers (2003)) and identify in a rigorous way those firms and business units that have been able to maintain, for a sustained period of time, a competitive advantage in a fashion that yielded superior economic performance. We will examine these periods of superior performance to determine if, in consonance with hypercompetition, those periods have become significantly shorter over time—and, if so, for which groups of industries. Then we will examine these same firms for evidence that sustained competitive advantage is increasingly not singular, but is instead composed more and more often of multiple short advantages over time.

THEORETICAL FRAMEWORK AND ANTECEDENT LITERATURE

Historically, traditional theories of strategic management eschewed the Schumpeterian theory of disequilibrium as a base framework and chose instead the equilibrium-oriented approach of industrial organization. In so doing they placed emphasis on what Schumpeter (1947: 153) called the "adaptive response" of managers and on creating a sustained competitive advantage for a firm. Thus for decades sustained competitive advantage has been a dominant concept in strategic management research. Emerging from the structure-conduct-performance paradigm of industrial organization economics (Bain, 1959; Mason, 1939, 1949) and popularized by the Harvard Business School and the work of Michael Porter (1985), sustained competitive advantage is the most influential mechanism for explaining the persistence of superior economic performance.[1] The increasingly popular resource-based view of the firm extends the influence of

[1] Coff (1999) points out that there may be cases in which firms have a competitive advantage in the market for outputs, but not for inputs—and thus may not realize superior economic performance. We shall explicitly assume that competitive advantage obtains overall for a firm.

sustained competitive advantage and its result, above-normal returns, by making achieving sustained competitive advantage the very reason for firms' existence (Conner, 1991: 132).

A firm's ability to maintain superior economic performance has a long and varied history in economic and strategic management research. Neoclassical economics argues that persistent superior economic performance is an anomaly, a temporary condition that will vanish when equilibrium is reached (Debreu, 1959). Industrial organization economics argues that any persistence is the result of industry structure, with mechanisms such as entry barriers preventing the equilibrium of neoclassical economics from being achieved (Bain, 1959). Evolutionary economics (Nelson *et al.*, 1982) as well as the related Austrian school of economics (Jacobson, 1992; Schumpeter, 1939) both argued that persistent superior economic performance is the result of cycles of entrepreneurial innovation and imitation that create a continuing disequilibrium where some firms can achieve persistence of performance although it will be eventually eroded. Organizational and strategic management theories have incorporated most of these ideas and added the concept of sustained competitive advantage (Porter, 1985) that can lead directly to persistent superior economic performance.

There have been a large number of empirical studies (summarized in Table 1) of the persistence of economic performance. Some of the major exemplars of this line of research include Mueller (1986), which, in a time-series regression-based study of ROA of 600 large industrial firms over the period 1950-1972 utilizing COMPUSTAT and FTC databases, found that profit levels tended to converge toward the mean, but that the highest-performing firms converged the most slowly, and some of the high-performing firms' profitability even increased over time. Geroski and Jacquemin (1988), Schohl (1990), Droucopoulos and Lianos (1993), and Goddard and Wilson (1996), all using non-U.S. samples found similar results to Mueller (1986),

as did Waring (1996) in a large-scale study of 68 U.S. industries. Jacobsen (1988), in a time-series regression-based study of ROI over the period 1970-1983 utilizing the PIMS SBU-level database, also found that profit levels converged over time but did not find persistence, and concluded that "the conditions under which market forces do not drive return back to its competitive rate seem remote, if present at all" (Jacobsen, 1988: 415). All of these studies were concerned with the pattern of loss of abnormal profitability positions—but none focused on the length of time superior performance was maintained nor distinguished between above and below normal profits. McGahan and Porter (1999) examined shocks to profitability (both positive and negative positions) and estimated the effects of the factors of industry, firm and business unit level on the persistence of those shocks, but did not examine either the degree of persistence of abnormal profitability or its incidence across specific industries. Their methodology relied on an autoregressive approach that makes assumptions (e.g., that abnormal profits will decay) that we avoid. Their results neither support nor conflict with results reported here. The primary insight to be gained from Table 1 is the sheer number of studies that found persistent superior economic performance. Of the 27 studies listed, only one did not find any evidence of persistence of performance, and that was Jacobsen (1988), which is also the only study to use the PIMS data base.

None of these studies examined the effects of time on persistence, and all of them, by using autoregressive techniques, confounded low and high performance regression and found it difficult to identify *which* firms achieve persistence or for how long they sustain it. All of these previous studies were focused on examining the *assumed rate of decay* of persistence (both positive and negative), rather than the timeframes of persistent superior performance—which is the test of the heart of Schumpeter's theory and the focus of this study. By using a nonparametric

methodology that is better suited to the identification of both modal performers and outliers, this research avoids the problems of the autoregressive time-series methodologies and their parametric assumptions in particular. Further, the time frame of this research, 1972-1997, complements the time period (1950-1972) used by Mueller (1986). Finally and importantly, the present research also supplements the accounting measures of performance used in these prior studies with a market-based performance measure. Barber & Lyon (1996) showed that the accounting performance data for all firms in the COMPUSTAT database has been trending down over time. This latter point calls into question any findings of autoregressive studies of decay of performance—since such decay could be confounded with the decline of the central tendency of all firms. However, this decline could also be indicative of precisely the effects of proposed by Schumpeter.

Some have argued that hypercompetition is so pervasive that "all competitive advantage is temporary" (Fine, 1998: 30). But not everyone agrees. Michael Porter stated "in many industries, however, what some call *hypercompetition* is a self-inflicted wound, not the inevitable outcome of a changing paradigm of competition" (1996: 61) and that it is most likely to be limited to a subset of firms in high-technology industries. The question of which of these arguments should prevail is ultimately an empirical one, and that is the purpose of this research, to examine this question by a longitudinal examination of the nature of the timing of the loss of sustained competitive advantage, the scope across industries, and the unitary or multiple nature of competitive advantage. In short, we seek to test whether there is a basis on which the call for "advocates of the hypercompetitive paradigm to back up their sweeping generalizations about the ubiquity of hypercompetition with rigorous large-sample empirical evidence" (Makadok, 1998) can be answered.

While the above focuses on the state of empirical research on persistent superior performance, there have also been some investigations specifically into hypercompetition. In the first notable antecedent empirical test of some of the aspects of hypercompetition, Thomas (1996) performed a large-scale study, examining over 200 manufacturing industries during the period from 1958 to 1991 and found that a "hypercompetitive shift" has indeed occurred in this sector of the U.S. economy. These models used growth rates in stock market value as the dependent variable, the results came from pooled cross-section time-series data analyzed using regression-based methodologies, and the sample was restricted to manufacturing firms. Our study will build on Thomas' approach, but will use alternate measures and methods to directly focus on the signature aspects of hypercompetition. Both accounting and market measures of performance will be employed to provide immediate comparisons with antecedent research. Longitudinal data will be employed to better enable the examination of possible effects of hypercompetition over time. We also use a unique stratification methodology applied industry by industry to identify superior performers and to control for the common effects of general economic and industry conditions and then employ event history analysis to better discern over time which firms and which industries are involved in the possible effects of Schumpeterian dynamics. Further, we include not only manufacturing firms but also mining, natural resource, transportation, utility, financial, and service firms, thus providing evidence about the scope of possible hypercompetitive effects.

Another empirical study that bears on hypercompetition is that of Young, Smith and Grimm (1996) who, in an examination of single business firms in the software industry obtained results that indicated that competitive moves, unless they were extreme, contributed more to increased performance than to industry rivalry. These results were extended and greatly

expanded upon by Ferrier, Smith and Grimm (1999) who, in a paired sample empirical study of single or dominant business firms, examined the possible market share erosion and dethronement of market leaders when confronted by challengers. Their findings indicate that across a wide range of industries market leaders which are faced with relatively more aggressive challengers are likely to be subject to market share erosion and dethronement as market leader. This finding is confirmed by Foster and Kaplan (2001) which, working with a McKinsey sample of 1008 firms over 36 years, found that even the most admired firms could not maintain their above-market performance for more than ten to fifteen years.

The most recent large-scale empirical examination of hypercompetition was assayed by McNamara, *et al.* (2003) and is the study most comparable to the one reported here. Their study of a subset of the firms in this study, covering the period 1977-97, included an autoregressive model similar to that used by Mueller (1986) and Jacobson (1988), but included an interaction term to examine changes in the rate of decay of performance (both superior and inferior). This interaction term was not significantly different from zero, indicating no significant change in the decay rate over time. These studies also reported no increase in mortality rates, no increasing trend in industry dynamism, and no decreasing trend in industry munificence. Based on these findings, they argue that the tendency for researchers to believe in hypercompetition may be a result of researcher hindsight. While we do not dispute their findings on mortality, dynamism, and munificence, and we applaud their focus on changes in the rate of decay in their autoregressive models, we reiterate our arguments about the use of autoregressive models that admix superior, average, and inferior performers, do not compensate for over-all trends in performance, require parametric assumptions, and that are sensitive to outliers. Our approach will be to focus *only* on the persistent superior performers and any effects on *their* rate of loss of

performance. After all, the primary effect mentioned in Schumpeterian theory and argued by D'Aveni (1994) is increased difficulty in sustaining a competitive advantage. To enhance direct comparability with McNamara *et al.* (2003), we will include analyses utilizing the same COMPUSTAT segment dataset that they (as well as McGahan and Porter (1999)) used.

THE RESEARCH QUESTIONS

Has persistent superior economic performance become more difficult to maintain over time, as the Schumpeterian theories would suggest? In which industries? Have firms increasingly sought sustained competitive advantage through concatenation of a set of shorter-term competitive advantages? These are the chief research questions that will be addressed through the formulation of hypotheses and via a novel empirical study.

HYPOTHESIS DEVELOPMENT

Hypercompetition and Loss of Persistent Superior Economic Performance

Conventional strategic management theory does not give a prominent role to either Schumpeterian theory or hypercompetition. Porter (1980; 1985; 1996) has long argued that classic industrial organization solutions such as "increasing barriers to entry and gaining market power over rivals, suppliers and buyers will reduce rivalry within an industry" (Ilinitch *et al.*, 1998: xxvi). Indeed, such reasoning argues that we should see over time an increase in the length of time that competitive advantage can be maintained. McNamara, *et al.* (2003) indicate there has been no change. On the other hand, D'Aveni (1994) clearly argues that hypercompetition is making it more and more difficult for firms to maintain a competitive advantage. Therefore, we should see the average period for which firms sustain a competitive advantage decrease over time. Following Schumpeterian theory and D'Aveni's line of reasoning, the hypothesis is proposed:

Hypothesis 1: *Periods of persistent superior economic performance have decreased in duration over time.*

Hypercompetition across Multiple Industries

Schumpeter (1939), followed by D'Aveni (1994: 4), originally argued for the near-ubiquity of hypercompetition: "There are few industries and companies that have escaped this shift in competitiveness." Porter (1996) argued that hypercompetitive effects are likely to be limited to high technology industries. D'Aveni, in a more recent publication (1999), proposed that there are four environments of varying turbulence ranging from "equilibrium" to "disequilibrium." The latter environment he identifies with hypercompetition, but he does not in this work specify the degree of prevalence of any of his environments in the economy. To formulate our next hypothesis we revert to Schumpeter and to D'Aveni's original position which leads directly to this formulation:

Hypothesis 2: *Hypercompetition is not limited to high technology industries, but occurs throughout most industries.*

Hypercompetition and Series of Temporary Competitive Advantages

D'Aveni specifically stated, "instead of seeking a sustainable advantage, strategy in hypercompetitive environments now focuses on developing a set of temporary advantages" (D'Aveni, 1994: 7). He reiterated this when he said, "If companies are not seeking a sustainable competitive advantage, what is the goal of strategy in hypercompetitive environments? The primary goal of this new approach to strategy is disruption of the status quo, to seize the initiative through creating a series of temporary advantages" (D'Aveni, 1994: 10). Brown and Eisenhardt (1998) also argued that success can only come from a continuous stream of

temporary advantages when the environment is "relentlessly shifting" (Brown *et al.*, 1997). These arguments lead directly to the following hypothesis:

Hypothesis 3: *Over time firms increasingly have sought to sustain competitive advantage by concatenating a series of short-term competitive advantages.*

METHODS

Data

Data were collected from three primary sources: the COMPUSTAT PC-Plus database (both active and research files) for the twenty years from 1978 to 1997 inclusive, the COMPUSTAT Back History database for the five-year period from 1972 to 1977, and the COMPUSTAT Segment Tapes for 1978-1997. We included data from the COMPUSTAT Back History database to provide 20 overlapping five-year periods (1974-1997), as well as two additional years (1972-1973) to alleviate some of the left-censoring problem. SIC codes for firms that exited the database prior to 1978 are not included in the Back History database; these firms were classified employing the CRSP/COMPUSTAT Cross Reference database maintained by the Johnson Graduate School of Management at Cornell University, and also the Moody's Industrial, OTC, Transportation, Financial, and Utilities Manuals. Two samples (a firm-level and a business-unit-level sample) were derived from the primary source data.

Dependent Variables

While the theories used to develop the hypotheses relate to sustained competitive advantage, we are unable to directly operationalize the concept. Barney (1991: 102), for example, defines a sustained competitive advantage as a competitive advantage that "continues to exist after efforts to duplicate that advantage have ceased." What we can operationalize is the consequence of sustained competitive advantage, persistent economic performance. While some

may find this less desirable, it is consistent with the work of Porter, who refers to "long-term profitability" (Porter 1985, p. 1) and "above-average performance in the long run" (Porter 1985, p. 11) when discussing the outcomes of sustained competitive advantage.

Two measures were used to operationalize economic performance: return on assets (ROA), an accounting measure, and Tobin's q (the ratio of firm market value to the replacement cost of its assets), a market measure, because some studies have shown results that vary between accounting and market measures (Hoskisson *et al.*, 1993). ROA (net income divided by total assets for firms, segment net income divided by identifiable assets for business units) was selected primarily for comparability with earlier economic and strategic management research in this area (see Table 1, where most of the studies use ROA as their primary or only measure of performance). Tobin's q was selected because, although he did not use it in his study, Mueller (1990: 8-14) suggested its potential, and because Tobin's q was utilized by McGahan and Porter (1999) and Wiggins and Ruefli (2002), and so its inclusion enhances comparability with their results. Tobin's *q* was operationalized as the ratio of market value to the book value of assets. This ratio has been shown to be not only empirically equivalent (Perfect *et al.*, 1994) but also theoretically equivalent to Tobin's *q* (Varaiya *et al.*, 1987).

Superior economic performance was operationalized as statistically significant above average economic performance (relative to other firms in the same industry for the firm-level analyses, and relative to all business units, or all industries, or all firms for the segment-level analyses) over a five-year period. Note that this is consistent with Besanko, *et al.* (1996), who define competitive advantage as a firm outperforming its industry. This was determined using the Iterative Kolmogorov-Smirnov (IKS) technique which stratifies time-series data into statistically significantly different levels of performance using iterative comparisons described in

detail in Ruefli and Wiggins (2000). A rolling five-year window (Cool *et al.*, 1988; Fiegenbaum *et al.*, 1988) was used for all measures. Since this technique yields ordinal categorical data (Argresti, 1984), factors such as the common effects of general economic conditions, industry cycles and product life cycles are controlled in the stratification process.

However, IKS analysis can generate varying numbers of performance strata over time, which makes longitudinal comparisons difficult. We are interested only in the firms with performance above the industry or reference set modal stratum. Therefore, as a form of *a fortiori* analysis (because it is conservative in regard to the hypotheses being tested), the number of performance strata was compressed in each time period to three by creating two supersets of strata: those above the modal stratum and those below the modal stratum. To validate the stratification supersets, discriminant function analysis was employed in a confirmatory mode on the industries studied. For these industries, all of the discriminant functions were significant ($p<0.05$) for all variables, demonstrating the validity of the superset performance strata.

Persistent superior economic performance at the corporate level was operationalized as superior economic performance lasting for six or more windows (i.e., a ten-year period), inasmuch as there were two non-overlapping five-year windows in such a period, which eliminated potential bias owing to the effect of a single year of outstanding performance. This establishes a very stringent test for the performance effects of hypercompetition and one that is tied directly to Schumpeterian theory, in that it is only the significant shortening of the periods during which *only those firms with significant sustained competitive advantage* (i.e., over periods of ten years or more) that will be accepted as evidence. The first five-year window in the firm-level models is 1977-1981 since that is the first window in which an exit from the persistent

superior economic performance stratum could occur. For the business unit level data, five years (one window) was used to enhance comparability with McNamara *et al.* (2003).

Independent and Control Variables

Because the primary question we are investigating is the change over time of the rate at which firms lose superior profitability positions, the only independent variable is time period. The stratification methodology controls for the common effects of general economic conditions, thus other control variables included market share, industry concentration, firm size, diversification, industry density, and dummy variables for each industry. These variables were operationalized as follows. For market share we used the ratio of each firm's total revenues to the total revenues of all firms in the industry. Table 2 shows that market share ranged from 0 to 0.69 with a mean across all firms of 0.04. Industry concentration was operationalized by calculating the four-firm concentration ratio by dividing the combined total revenues of the four largest firms in each industry by the total revenues of all firms in the industry. As seen in Table 2, the industry four-firm concentration ratio ranged from 0.13 to 0.98, with a mean across all forty industries of 0.57. For firm size the natural logarithm of total sales was employed. Table 2 shows the range of firm size as –10 to 10.93 with a mean of 5.08. For diversification we used the Jacquemin-Berry entropy measure of diversification (Jacquemin *et al.*, 1979; Palepu, 1985), which is defined as

$$E = \sum_{i=1}^{n} P_i \ln(1/P_i)$$

where P_i is the *i*th segment's share of the firm's total sales, which operates in *n* segments. As seen in Table 2, entropy ranged from 0 to 2.18 with a mean of 0.25. For density we used the total number of firms in each industry in each period, which as Table 2 shows ranged from 5 to 336

with a mean of 81.38. Because the dependent variables represent five-year windows, all of the control variables were five-year moving averages matched to the dependent variables' five-year windows. Finally, the industry dummy variables were coded using the deviation method, which compares the effect of each dummy variable to the overall effect. The descriptive statistics and correlations of the study variables are shown in Table 2.

Insert Table 2 about here

Samples

For the firm-level sample we selected the same forty industries (listed in Table 3) used by Wiggins and Ruefli (2002). The industries in this sample represent 7 out of 10 one-digit SIC level categories. This sample thus includes an overlap with Thomas' (1996) sample, although most of the industries considered are outside the manufacturing sector and is a superset of the sample used by McNamara, *et al*. (2003). Table 3 shows the complete firm-level sample, along with some descriptive statistics. For the segment-level sample we used all of the available COMPUSTAT segment data, since we were not utilizing regression and therefore did not face the same methodological issues as McGahan and Porter (1999) and McNamara *et al.* (2003) and therefore did not have to screen the data and lose observations.

Insert Table 3 about here

Identification of Superior Performance

In essence, our research concentrates on an outlier or frontier phenomenon (Starbuck, 1993), i.e., the loss of superior economic performance. In order to identify firms that have lost superior economic performance, we first identified firms that obtained superior economic performance. Most statistical techniques, however, are based on measures of central tendency, and consequently their focus is on means and averages. In his study referenced earlier, Waring

(1996) went so far as to remove outliers as a means of improving his autoregressive models of decay (Waring, 1996: 1262). Our argument, on the other hand, holds that these very outliers, those firms that gained, then possibly lost superior performance, are of primary interest, which is another reason why we eschew autoregressive models.

After the data were classified by the IKS analysis into three performance strata (superior, modal, and inferior), the modal and inferior strata were discarded, and the rest of the analysis concentrated solely on those firms in the superior stratum. Further, for the corporate level hazard models, we only include those firms that remain in the superior stratum for ten years—the firms that achieved truly *persistent* superior economic performance. In other words, our analyses were driven by the *small but significant differences* between the firms that maintain persistent superior economic performance and those that attained it but lost it, as opposed to the *very large differences* between above average performers and average and below-average performers used by all previous studies.

Event History Analysis

We tested hypotheses one and two by using discrete time event history analysis techniques (Allison, 1984; Tuma *et al.*, 1984) to estimate models of the rates at which firms exit the superior performance stratum. In the study of discrete state change processes, event history methods are considered preferable to linear regression models, as the major problem with linear regression models is their failure to account for the timing of state changes — which may be relevant (Allison, 1995). Moreover, we were interested in the dependence of the hazard rate on time, which cannot be readily accomplished with linear regression models (Allison, 1995).

Event history analysis estimates a hazard function that allows the calculation of the instantaneous rate of change for a firm at time *t*. In the case of persistent superior economic performance (PSP), the hazard function was defined as follows:

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr[\sim PSP\, t, t + \Delta t \mid PSP\ at\ t]}{\Delta t}$$

where $\Pr[\sim PSP\, t, t + \Delta t \mid PSP\ at\ t]$ is the probability of a firm exiting the superior performance stratum between time *t* and time $t + \Delta t$, if and only if the firm is *in* the superior performance stratum at time *t*. Firm transition rates were estimated using discrete time maximum likelihood models (Allison, 1984; 1995), which apply logistic regression to the analysis of time-series data.

Pattern Analysis

To test hypothesis three it was necessary to examine the patterns of superior and not-superior performance over time. If firms were increasingly forced by creative destruction to seek a series of short-term competitive advantages, those that were most successful would be expected to concatenate them in a seamless fashion, one following the other, so the effect on performance would not be distinguishable from that achieved by a single sustained competitive advantage. Thus the data set here would not allow for a test of this type of success. On the other hand, it would be expected that superior performing firms which were less successful in concatenating a series of advantages would reveal themselves by occasionally failing to achieve it, giving them a period of less than superior performance, following which superior performance would resume. This would give a performance pattern of superior, then not superior, then superior performance over time. If the assertions surrounding hypercompetition were true, this pattern should become significantly more prevalent over time. In the context of the methodology employed here, the fraction of firms that were above modal performance levels then fell to a

below superior performance level for one five-year period and then rose back into the superior performance strata should increase over the study period. To test hypothesis three therefore, for both performance measures the incidence of the pattern: superior performance, then modal or below performance, then superior performance, was noted in each three-period window as the window was rolled through the 24 periods in the study. These numbers were then subjected to a 2×2 contingency analysis that compared the incidence and non-incidence of the pattern in the first and last ten three-period windows of the study. The likelihood ratio chi-square test of association was then employed for the patterns produced by ROA and by Tobin's q.

RESULTS

As the first step toward testing the hypotheses, the two sets of forty industry samples were individually stratified with the iterative Kolmogorov-Smirnov method as previously described. For each sample this method formed multiple strata of statistically significantly different performance levels. Table 4 shows the modal strata means and standard deviations for both samples for all 40 industries in columns 3 and 4 (ROA) and columns 13 and 14 (Tobin's *q*), and the above-average or superior performance (SP) strata means and standard deviations in columns 10 and 11 (ROA) and 20 and 21 (Tobin's q). The strata sizes were consistent between the two measures of performance. The segment level data were similarly stratified at the three levels of analysis (industry, corporate, and SBU) to determine the superior performing industries, corporations, and SBUs. We retained only the superior performance strata to conduct the analyses to test hypotheses one and two.

Hypothesis One: Hypercompetition and Persistence

Hypothesis 1 was represented in the model by the time variable Period. For both performance measures, the hazard of exiting the persistent superior performance stratum did

indeed significantly increase over time, as shown in Tables 4 and 5 for the corporate-level sample, and Table 6 for the business-unit-level sample. Hypothesis one was thus supported. (Note: the corporate event history models were also estimated with non-linear time axes, just as the business-unit models were, but the effect in these samples proved to be linear, so only the linear models are reported here.) As can be seen from the first column of Tables 4 and 5 (the All models), the hazard rate for the ROA sample increased more rapidly than the hazard rate for the Tobin's q sample, indicating that at the corporate level, accounting performance was more affected by Schumpeterian dynamics than was market performance. Table 6 shows that while the hazard rate at the business-unit level increased more slowly than at the corporate or industry levels, at all three levels the hazard of losing superior performance positions was significantly increasing over time (although at a very slightly decreasing rate, as indicated by the non-linear time axis).

Insert Tables 4, 5, and 6 about here

Hypothesis Two: Hypercompetition across Multiple Industries

Because none of the three and four-digit industries contained enough spells of persistent superior economic performance to yield adequate statistical power, Hypothesis Two was examined in two ways. First, the overall samples were divided into "high tech" industries (SIC codes 357x, 365x, 3661, 3674, 481x, and 7372) and "low tech" industries (all other SIC codes). Second, the forty industry samples were aggregated to the one-digit SIC level yielding seven one-digit industries. The "low tech" models shown in Tables 4 and 5 show that for both performance measures, the hazard of exit was statistically significantly increasing for the non-high-technology industries over time, although the magnitude of the hazard was lower than for the high-tech industries. This supports Hypothesis Two. The industry models (which contain

significantly fewer spells than the total sample and are therefore less powerful) show more mixed results by performance measure. Table 4 shows that for only two of the six industries with sufficient data was the Tobin's *q* Period variable significant (in part because these sub-samples contain few spells), providing little additional support for Hypothesis Two. However, Table 5 shows that for six of the seven industries the ROA Period variable was statistically significant at the 0.05 level or better, providing additional support for Hypothesis Two. The phenomenon was not limited to high technology industries, although they appear to be affected more strongly.

Hypothesis Three: Hypercompetition and Series of Temporary Competitive Advantages

The results for the likelihood ratio chi-square test of association for the patterns (superior, then less-than-superior, then superior performance) produced for ROA and for Tobin's *q* are given in Table 7. Here it can be seen that the chi-squares are significant in both cases at the $\alpha = 0.001$ level, indicating that the performance pattern is relatively more prevalent in the last decade of the study than it was in the prior decade. Thus hypothesis three is supported.

Insert Table 7 about here

DISCUSSION AND IMPLICATIONS

The results presented above provide evidence that periods of sustained competitive advantage, as evidenced by its consequence, superior economic performance, have been growing shorter over time. To answer the question in the title, this is evidence that Schumpeter's ghost has indeed appeared in the form of hypercompetition. These results hold across a wide range of sectors of the economy. These results provide direct support for Schumpeter's theory and for the occurrence of hypercompetition. Coupled with the findings of Thomas (1996) of a hypercompetitive shift in the behavior of the manufacturing sector, results here provide additional support for the contention that a substantial portion of the US economy is

characterized increasingly by hypercompetitive behavior. Further, there is evidence to support the notion that managers have responded to this hypercompetitive environment by seeking in relatively more situations, not a single sustained competitive advantage, but rather a series of short advantages that can be concatenated into competitive advantage over time.

In the absence of the innovative dynamic change that characterizes hypercompetition, one possible alternative explanation for the results here might be deregulation. The most formerly regulated sub-sample, Transportation and Utilities, shows evidence of this in terms of Tobin's *q* (but not in terms of ROA), however, the rest of the sample included many non-regulated industries—and these show strongly diminishing duration of superior economic performance in terms of ROA. Another alternative explanation for the results reported above might be largely due to increased levels of static competition. But, as in Thomas' (1996) study of manufacturing, there is no clear mechanism for such an increase in static competition alone—especially across such a wide range of industries. Yet another alternative explanation for the decrease in duration of competitive advantage might be turbulence in the macroenvironment. Such turbulence would, however, not be likely to have a more significant effect on only those firms with a sustained competitive advantage—at least not in the absence of substantial dynamic competitive effects. Further, McNamara *et al.* (2003: 272) found no evidence of fundamental changes in industry stability, dynamism, or munificence. Thus the logical explanation for the reduced duration of sustained competitive advantage across a variety of different industries appears to be attributable to a shift to hypercompetition. The independent empirical evidence presented by Thomas (1996) and the anecdotal evidence in D'Aveni (1994) reinforce this conclusion.

The finding that hypercompetition characterizes a wider number of firms than just a limited number in high technology industries (Porter, 1996), and industries even beyond those manufacturing industries studied by Thomas (1996) is important. The mechanisms for the spread of hypercompetition beyond those industries with a rapidly changing technology base cannot be determined by this research. We can however speculate that those industries with stable traditional technology bases are increasingly subject to the effects of changes in information technology which is being ubiquitously deployed across all industries. Better sources of competitive information, business intelligence and higher levels of internal flexibility can shorten competitive response time. Further, even in these stable industries, managers who observed the successful employment of hypercompetitive strategies in more dynamic industries may import such strategies into their industries and innovatively destabilize them. The wide appearance of hypercompetitive effects has significant implications for both practice and research.

Insert Figure 1 and Table 8 about here

Finally, an obvious question that these findings inspire concerns why our results differ from those of the most comparable study, McNamara *et al.* (2003). First, as previously noted, there is the difference in methods: their study utilized the same (albeit a more sophisticated version) autoregressive techniques used by most of the studies outlined in Table 1. Second, their study examined the decay of persistence for all business units (including average as well as poorly performing business units). In their own words, “with this model, we can assess the degree to which abnormally higher *or lower* business returns decay over time to the mean” (McNamara *et al.*, 2003 (emphasis added)). Our primary method only examined persistently superior performing business units and firms, which is a more direct link to the Schumpeterian

theoretical question regarding the effect of creative destruction on the sustainability of competitive advantage. Third, while both studies used multiple samples and multiple methods, their study included many other variables (dynamism, mortality, stability) that no proponent of the hypercompetitive approach has directly discussed, making most of their tests indirect tests, while our primary methods all focused solely on direct tests of Schumpeterian theory regarding persistent superior performance. Further, our secondary analysis at the business-unit level, using the same dataset as McNamara *et al.* (2003), shown graphically in Figure 1 and using simple linear regression reported in Table 8, found a clear and significant decline in business unit performance over time at all levels of performance (with over 87% of the variance in ROA explained by time alone, indicating a very strong trend in the performance data over time, similar to the downward trend in the corporate level data reported by Barber and Lyon (1996)). Note that McNamara *et al.* (2003) focused their analysis on the *variance* of returns, which they found to not change significantly over time, whereas we focused on the *mean* returns, which do change significantly over time. Again, neither Schumpeter (1939) nor D'Aveni (1994) theorize about variance of returns.

Limitations and Future Research

The primary limitation of this research is that while a key theoretical underpinning is sustained competitive advantage, we are unable to actually measure competitive advantage and are forced instead to use its generally accepted consequence, persistent superior economic performance. The logical and philosophical issues of the relationship between competitive advantage and superior performance have been extensively discussed recently (Arend, 2003; Durand, 2002; Powell, 2001, 2002, 2003), and we will not revisit these arguments here. Whether or not there is a connection between hypercompetition and competitive advantage, or

competitive advantage and superior performance, the fact remains that this study shows that *something* is clearly affecting the ability of firms and business units to sustain performance, and in the absence of compelling alternative explanations, we argue that that *something* is likely hypercompetition.

Another limitation of this study its reliance on the corporate and segment level data available in the COMPUSTAT databases, which is further exacerbated by potential industry identification problems caused by using SIC codes. However, the problem of diversified firms has been shown empirically to be not significant. Yet another limitation is in the minimum time frame, ten years, selected to represent persistent superior economic performance. It may be that the appropriate time frames are shorter, varying by industry or by competitive arena, and future research to examine this would be of interest. An associated limitation is that the data employed are both right and left-censored. However, they do cover almost three decades, and precisely the three decades in which the concepts of both sustained competitive advantage and hypercompetition rose to prominence in strategic management research. The use of additional data (1972-1973) to ameliorate the left-censoring problem was also of benefit.

Our findings that hypercompetitive forces have indeed affected the ability of firms to sustain superior performance taken together with the findings of McNamara *et al.* (2003) that these same forces do not appear to affect all firms equally suggests several avenues for further research. First, the fact that both studies found that the effects varied over time invite temporal extensions. It will be of particular interest to extend the study to the time when the current economic downturn concludes. The examination of market measures during the boom and bust cycle of the 1987-2003 timeframe should prove interesting. Likewise, it would be interesting to extend the study geographically to see if different economic arrangements in Europe and Japan

have an effect on the existence and extent of hypercompetition. The finding of patterns of series of short-term competitive advantages linked over time to yield an on-going competitive advantage invites a step back and the examination of under what conditions such behavior is possible and analysis of the competitive responses to this phenomenon. Finally, strategic management theory might be revisited to investigate how Schumpeterian theory might better be integrated and used to enrich existing approaches.

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Table 1

Summary of Empirical Studies of the Persistence of Superior Economic Performance

Study	Data base	Years included	Industry types	Number of firms	Dependent variable	Statistical technique	Findings
Carey (1974)	Compustat	1963-72	19 4-digit SIC	252	Net Profit Margin, ROA, ROE	Coefficient of concordance	Persistence in all industries
Mueller (1977)	Compustat	1949-72	Unspecified	472	ROA	OLS regression	Persistence for some firms
Connolly & Schwartz (1985)	Compustat	1963-1982	Nonregulated	751	"Excess value" (market value – book value/sales)	OLS regression, autoregression	Persistence for positive profit firms (higher profits associated with higher persistence)
Mueller (1986)	FTC Compustat	1950-72	Manufacturing	1000	ROA	OLS regression	Persistence for some firms associated with market share, industry; M&A dampens persistence
Cubbin & Geroski (1987)	UK DTI and DAE Cambridge University	1951-77	48 3-digit (UK only)	217	"Profit rate" (industry average compared to sample average)	OLS regression and full info. max. likelihood	Persistence associated with firm-specific effects (and not with industry-specific effects)
Geroski & Jacquemin (1988)	Cubbin Schwalbach BALO	49-77 UK 61-81 Ger 65-82 Fr	8 sectors	51 UK 28 Ger 55 Fr	ROA	3rd order autoregression	Persistence much higher in UK than France and West Germany; no factors systematically associated with persistence
Jacobsen (1988)	PIMS CRSP & Compustat	1970-83 1963-82	unspecified	2000 bu 241	ROI	AR(1) regression	Little persistence No effect of industry concentration Some effect of market share
Contini (1989)	ISTAT Annual Survey of Mfrs.	1973, 1977, and 1981	Manufacturing (Italy only)	NA	Gross profit ratio	Contingency tables	Persistence in all industries
Cubbin & Geroski (1990)	UK DTI and DAE Cambridge University	1948-77	48 3-digit (UK only)	243	"Profit rate" (industry average compared to sample average)	1st order autoregression	Persistence associated with firm-specific effects (and not with industry-specific effects)
Jenny & Weber (1990)	Public disclosures	1965-82	Manufacturing (France only)	450	ROA (before tax)	OLS regression	Persistence for both high performers and low performers
Kessides (1990)	Compustat	1967-82	344 4-digit	NA	ROS	GLS regression	Industry persistence associated with small numbers of firms, concentration, growth, scale, high capital requirements
Khemani & Shapiro (1990)	Compustat	1964-82 1968-82	Manufacturing and mining (Canada only)	129 161	ROA (both before and after tax)	OLS regression	Persistence (greater than in U.S.) associated with product differentiation
Mueller (1990)	FTC Compustat	1950-72	Manufacturing (63 3-digit and 4-digit)	551	ROA	OLS regression	Persistence associated with market share, product differentiation, growth; negatively associated with concentration, M&A
Odagiri & Yamawaki (1990)	Corporation Enterprise Survey	1964-82	Manufacturing (Japan, and U.S. comparisons)	376	ROA (after tax)	OLS regression	Persistence for both high and low performers, associated with industry concentration, market share, industry advertising intensity
Odagiri & Yamawaki (1990)	Various	64-82 Ca 65-82 Fr 61-	Manufacturing and nonfinancial	161 Ca 450 Fr	ROA (after tax)	OLS regression	Persistence highest in US, followed by Canada and France, followed by UK, followed by Japan, with

		82 Ger 64-82 Jap 67-85 Swe 51-77 UK 50-72 US 64-80 US		299 Ger 376 Jap 43 Swe 243 UK 551 US 413 US			West Germany the lowest.
Schohl (1990)	Public disclosures	1961-84	Manufacturing (West Germany only)	283	"Profit rate" (firm profit – sample avg. / sample avg.)	OLS regression (PA and PC models)	Persistence under both partial adjustment and polynomial convergence models
Schwalbach & Mahmood (1990)	Public disclosures	1961-82	Manufacturing (West Germany only)	299	ROA (both before and after tax), Marris's V	Autoregression	Persistence associated with firm size, mobility barriers, product differentiation
Droucopoulos & Lianos (1993)	Annual Industrial Survey (NSSG)	1963-88	Manufacturing (Greece only)	500	"Profit rate" (value added – depreciation – wages/capital + wages)	OLS regression	Persistence associated with advertising intensity, export intensity, foreign firms; negatively effected by capital intensity, size, and risk
Levonian (1994)	Compustat	1986-91	Banking	83	ROE	Nonlinear LS regression	Persistence that decays slowly over time
Kambhampati (1995)	Reserve Bank of India, Bombay	1970-85	Multiple (42) (India only)	NA	"Profit differentials" (industry relative to economy-wide)	OLS regression	Persistence in a large number of industries associated with high growth and high concentration ratios
Goddard & Wilson (1996)	ACROBATS (University of Bath)	1972-91	Manufacturing and services (UK only)	425 UK	"Profit rate" (firm profit – sample avg. / sample avg.)	AR(1) regression	Service industries more persistent than manufacturing industries
Waring (1996)	Compustat	1970-89	All (68 2-digit)	12,986	ROA	AR(1) regression	Persistence varies by industry
McDonald (1999)	IBIS	1984-93	Manufacturing (Australia only)	246	ROS as proxy for price-cost margin	Instrumental variables	Strong degree of persistence
McGahan & Porter (1999)	Compustat Segment	1982-94	All but depository institutions and miscellaneous	7,005	ROA (Operating income/identifiable assets)	OLS regression	Industry persistence 76.6-81.8% Corporate persistence 53.6-71.7% Segment persistence 47.9-65.5%
Roberts (1999)	IMS, Compustat, GlobalScope	1977-93	Pharmaceuticals	42	ROA (Firm ROA - ind. ROA / ind. ROA)	Autoregression	Persistence associated with innovative propensity
Foster & Kaplan (2001)	McKinsey Corporate Performance	1962-98	15 industries	1008	TRS (Total Return to Stockholders)	Dynamic Performance Analysis	Firms cannot beat market for more than 10 to 15 years.
Wiggins & Ruefli (2002)	Compustat	1972-97	40	6,772	ROA Tobin's q	Event history analysis and ordinal time series analysis	ROA persistence in all 40 industries (5% of firms; attainment positively correlated with size, negatively with diversification); Tobin's q persistence in 35 industries (2% of firms; attainment negatively correlated with size)
Ruefli & Wiggins (2003)	Compustat Segment	1980-96	All (278 3-digit; 392 4-digit)	8,806	ROA (Operating income/identifiable assets)	Ordinal (PLUM) regression and Cox regression	Industry persistence 62.6% Corporate persistence 54.4% Segment persistence 43.4%

Table 2

Means, Standard Deviations, Minimums, Maximums, and Bivariate Correlations for All Study Variables*

	Variable	Mean	S.D.	Min.	Max.	1	2	3	4	5	6	7	8	9
1	ROA PSP	0.0542	0.2300	0	1	1.000								
2	q PSP	0.0801	0.2700	0	1	.192•••	1.000							
3	Density	81.3800	66.1800	5	336	.040••	.024	1.000						
4	Entropy	0.2464	0.4228	0	2.1818	.014	-.007	-.184•••	1.000					
5	Market Share	0.0404	0.0933	0	0.6925	.018	-.003	-.211•••	.428•••	1.000				
6	Size	5.0841	2.6080	-10	10.9256	.030•	.045	-.178•••	.341•••	.446•••	1.000			
7	4-Firm Conc.	0.5702	0.1761	0.1301	0.9751	.006	.006	-.264•••	.082•••	.254•••	-.114•••	1.000		
8	Period	12.7000	5.8700	1	22	.107•••	.106•••	.126•••	-.137•••	-.025	.069•••	-.080•••	1.000	
9	Period**2	195.6842	144.1698	1	484	.103•••	.103•••	.101•••	-.130•••	-.020	.082•••	-.091•••	.974•••	1.000
10	SIC1000	0.0104	0.1017	0	1	.010	-.021	-.090•••	.011	.083•••	-.003	.173•••	.061•••	.067•••
11	SIC104X	0.0308	0.1727	0	1	.014	.023	-.047•••	-.067•••	-.010	-.094•••	-.092•••	.033•	.034•
12	SIC1311	0.0924	0.2897	0	1	.030•	-.026	.655•••	-.040•••	-.090•••	-.241•••	.103•••	-.035•	-.051•••
13	SIC1531	0.0101	0.0998	0	1	.026	.020	-.062•••	-.025	.012	-.035•	-.049•••	-.077•••	-.069•••
14	SIC2621	0.0192	0.1370	0	1	.012	-.025	-.125•••	.005	-.009	.077•••	-.103•••	-.026	-.024
15	SIC267X	0.0201	0.1404	0	1	-.015	-.017	-.123•••	.166•••	.352•••	.111•••	.192•••	-.028•	-.020
16	SIC2711	0.0093	0.0960	0	1	.019	-.007	-.097•••	.083•••	.018	.022	.012	-.043••	-.035•
17	SIC2721	0.0170	0.1294	0	1	-.008	-.004	-.142•••	.086•••	.149•••	-.010	.195•••	-.021	-.030•
18	SIC2731	0.0114	0.1062	0	1	.007	.012	-.098•••	.112•••	.067•••	-.001	.010	-.095•••	-.093•••
19	SIC2834	0.0969	0.2958	0	1	-.043••	.025	.047•••	.150•••	-.032•	.096•••	-.390•••	.083•••	.088•••
20	SIC2835	0.0211	0.1437	0	1	-.037•	.012	-.070•••	-.035•	.023	-.106•••	.077•••	.123•••	.127•••
21	SIC2851	0.0087	0.0929	0	1	.011	-.022	-.100•••	-.037••	-.011	.012•••	.160•••	-.008	-.009
22	SIC2911	0.0097	0.0979	0	1	-.010	.025	-.068•••	.047•••	-.034•	.029•	-.089•••	.022	.017
23	SIC3089	0.0311	0.1737	0	1	.003	-.029	-.129•••	.068•••	.056•••	.010	.121•••	.016	.021
24	SIC331X	0.0335	0.1798	0	1	.025	-.005	-.103•••	.148•••	-.052•••	.069•••	-.083•••	-.097•••	-.084•••
25	SIC355X	0.0116	0.1071	0	1	.010	-.006	-.058•••	-.031•	-.036•	-.072•••	-.045•••	.039••	.043••
26	SIC357X	0.0592	0.2360	0	1	.013	.012	.313•••	-.109•••	-.048•••	-.074•••	.116•••	.041••	.026
27	SIC365X	0.0099	0.0988	0	1	.000	-.013	-.087•••	-.010	-.023	-.012	.169•••	.072•••	.081•••
28	SIC3661	0.0145	0.1196	0	1	.023	.000	-.058•••	-.057•••	-.010	-.017	.208•••	-.003	-.013
29	SIC3674	0.0151	0.1219	0	1	.022	-.017	-.047•••	-.072•••	-.008	.011	.120•••	.056•••	.068•••
30	SIC3714	0.0259	0.1589	0	1	-.027	.014	-.094•••	.013	-.066•••	.050•••	.079•••	-.033•	-.027•
31	SIC3812	0.0124	0.1106	0	1	.019	.020	-.084•••	.040••	.017	-.026	.108•••	-.059•••	-.055•••
32	SIC3841	0.0234	0.1512	0	1	.004	.030	-.100•••	-.028•	-.046•••	-.104•••	.238•••	.006	.000
33	SIC3845	0.0193	0.1377	0	1	.000	-.020	-.031•••	-.073•••	.040••	-.061•••	-.015	.082•••	.076•••
34	SIC3861	0.0073	0.0854	0	1	.004	.016	-.076•••	.001	.082•••	.043•	.157•••	-.014	-.016
35	SIC421X	0.0253	0.1572	0	1	.005	.009	-.098•••	-.094•••	.045•••	.040•	.047•••	-.021	-.021
36	SIC4512	0.0093	0.0959	0	1	.025	.012	-.071•••	-.055•••	-.032•	.003	-.064•••	-.100•••	-.096•••
37	SIC481X	0.0547	0.2275	0	1	-.009	.018	.072•••	-.036••	-.102•••	-.113•••	-.221•••	.062•••	.053•••
38	SIC4833	0.0054	0.0734	0	1	.006	.000	-.073•••	.012	-.030•	-.047•••	.149•••	-.072•••	-.069•••
39	SIC4911	0.0128	0.1123	0	1	-.013	.006	-.017	-.026	-.040••	.035•	-.235•••	.023	.027
40	SIC5311	0.0205	0.1417	0	1	-.001	-.013	-.113•••	.042••	-.003	.147•••	.069•••	-.026	-.022
41	SIC5411	0.0599	0.2374	0	1	-.037•	-.006	-.143•••	-.083•••	-.034•	.238•••	-.195•••	-.047•••	-.031•
42	SIC5812	0.0567	0.2312	0	1	-.024	.005	.024	-.063•••	-.057•••	.034•	-.081•••	.007	.000
43	SIC602X	0.0422	0.2010	0	1	.039••	.013	.308•••	-.122•••	-.079•••	.044••	-.344•••	-.105•••	-.106•••
44	SIC6211	0.0193	0.1377	0	1	-.008	-.015	-.093•••	.019	.092•••	.011	.166•••	-.004	-.005
45	SIC6311	0.0151	0.1219	0	1	.004	-.015	-.089•••	.151•••	.062•••	.112•••	.014	.039••	.041••
46	SIC7011	0.0315	0.1747	0	1	-.014	.002	-.130•••	.100•••	.077•••	-.008	.269•••	-.049•••	-.052•••
47	SIC731X	0.0015	0.0393	0	1	.013	.000	-.041•••	-.023	.019	-.001	.015	-.042••	-.040••
48	SIC7372	0.0236	0.1518	0	1	-.001	-.007	.051•••	-.091•••	-.019	-.011	-.072•••	.097•••	.088•••
49	SIC7812	0.0019	0.0439	0	1	-.011	.000	-.034••	.075•••	.141•••	.061•••	.050•••	.036••	.036••

* Note: Bivariate correlations for industry dummy variables omitted. The ROA sample contained 4376 total spells and the Tobin's *q* sample contained 1436 total spells.

••• is significant at the 0.001 level.
•• is significant at the 0.01 level.
• is significant at the 0.05 level.

Table 3

Descriptive Statistics for All Industries including Modal and Superior Strata Statistics for ROA and Tobin's q 1974-1997

SIC	Industry Name	1 N	2 Avg n (ROA)	3 Total Spells ROA	4 PSP Spells ROA	5 % PSP Spells ROA	6 #PSP Firms ROA	7 PSP Ratio ROA	8 Modal Mean ROA	9 Modal StDev ROA	10 SP Mean ROA	11 SP StDev ROA	12 Avg n (q)	13 Total Spells q	14 PSP Spells q	15 % PSP Spells q	16 #PSP Firms q	17 PSP Ratio q	18 Modal Mean q	19 Modal StDev q	20 SP Mean q	21 SP StDev q
1000	Metal Mining	66	21.45	429	37	8.62%	5	7.58%	-12.87	73.71	13.54	32.74	14.70	294	7	2.38%	1	1.52%	2.10	8.44	12.25	22.45
104x	Gold and Silver Ores	180	57.35	1147	106	9.24%	14	7.78%	-32.08	705.76	8.25	19.74	45.70	914	23	2.52%	3	1.67%	-5.02	243.21	6.45	10.05
1311	Crude Petroleum and Natural Gas	739	234.25	4685	327	6.98%	39	5.28%	-9.07	257.15	8.26	18.02	171.30	3426	157	4.58%	18	2.44%	1.84	101.26	10.42	65.92
1531	Operative Builders	107	43.60	872	25	2.87%	3	2.80%	0.54	16.08	9.10	8.03	33.55	671	0	0.00%	0	0.00%	0.93	4.01	2.41	1.68
2621	Paper Mills	39	23.15	463	55	11.88%	5	12.82%	4.23	7.27	11.03	3.24	19.95	399	27	6.77%	3	7.69%	1.22	0.57	2.49	0.99
267x	Paper and Paperboard	70	27.10	542	39	7.20%	2	4.29%	3.79	10.90	12.89	6.13	22.40	448	41	9.15%	3	4.29%	1.55	3.89	5.63	12.98
2711	Newspaper Publishing and Printing	44	17.90	358	17	4.75%	2	4.55%	8.25	5.30	12.23	2.66	14.75	295	19	6.44%	2	4.55%	2.38	4.74	4.28	2.00
2721	Periodical Publishing	38	11.55	231	45	19.48%	4	10.53%	-1.72	23.02	9.65	6.81	8.20	164	36	21.95%	3	7.89%	2.21	8.06	3.85	2.40
2731	Book Publishing	47	18.10	362	42	11.60%	5	10.64%	4.09	8.12	11.02	5.74	13.65	273	7	2.56%	1	2.13%	1.56	1.01	3.78	2.14
2834	Pharmaceuticals	258	82.60	1652	319	19.31%	32	12.40%	-16.61	45.89	10.89	9.00	69.45	1389	104	7.49%	13	5.04%	4.13	11.76	12.94	21.00
2835	In Vitro In Vivo Diagnostics	112	32.80	656	101	15.40%	11	9.82%	-59.54	481.25	-2.82	45.76	24.70	494	7	1.42%	1	0.89%	3.49	24.56	13.87	34.87
2851	Paints and Allied Products	22	11.10	222	27	12.16%	2	9.09%	5.59	10.52	10.91	3.69	8.85	177	8	4.52%	1	4.55%	1.64	0.88	8.92	25.20
2911	Petroleum Refining	85	43.35	867	8	0.92%	1	1.18%	4.32	4.84	9.04	4.56	35.85	717	37	5.16%	5	5.88%	1.11	12.45	11.49	66.96
3089	Misc. Plastic Products	107	37.75	755	77	10.20%	7	6.54%	2.36	7.33	9.75	3.40	30.00	600	49	8.17%	6	5.61%	1.33	1.99	6.32	14.13
331x	Steel Works and Blast Furnaces	118	49.30	986	41	4.16%	4	3.39%	1.74	10.14	9.55	4.80	39.60	792	68	8.59%	6	5.08%	0.76	5.20	2.11	1.24
355x	Special Industrial Machinery	160	48.15	963	26	2.70%	4	2.50%	0.39	15.79	11.01	8.03	39.60	792	28	3.54%	4	2.50%	1.16	12.95	5.88	18.26
357x	Office Equipment and Elec. Computing	557	161.30	3226	183	5.67%	22	3.95%	-3.96	43.78	11.97	7.34	131.30	2626	96	3.66%	12	2.15%	1.38	49.62	7.73	62.91
365x	Household Audio and Video Equipment	87	23.95	479	29	6.05%	4	4.60%	0.61	11.27	9.61	4.67	18.85	377	19	5.04%	3	3.45%	1.55	3.41	6.79	15.26
3661	Telephone and Telegraph Equipment	164	48.95	979	62	6.33%	8	4.88%	-2.65	20.75	11.07	8.62	39.30	786	0	0.00%	0	0.00%	0.41	47.46	9.52	20.47
3674	Semiconductors and Related Devices	159	50.25	1005	44	4.38%	7	4.40%	1.53	17.03	12.27	4.86	42.50	850	16	1.88%	2	1.26%	2.24	4.31	4.33	6.28
3714	Auto Parts and Accessories	133	44.40	888	89	10.02%	7	5.26%	2.55	20.65	59.25	1041.64	35.95	719	23	3.20%	3	2.26%	1.43	3.38	3.27	2.21
3812	Navigation and Guidance Systems	69	30.45	609	36	5.91%	4	5.80%	3.69	10.71	11.65	5.29	25.80	516	12	2.33%	2	2.90%	2.05	5.03	7.21	11.87
3841	Surgical and Medical Equipment	159	40.85	817	74	9.06%	8	5.03%	-3.19	45.85	12.25	7.08	30.30	606	22	3.63%	3	1.89%	4.48	33.04	19.86	61.18
3845	Electromedical Apparatus	185	50.75	1015	71	7.00%	7	3.78%	-8.20	30.12	10.80	6.93	39.30	786	24	3.05%	3	1.62%	6.62	91.74	43.84	255.41
3861	Photographic Equipment and Supplies	66	24.40	488	27	5.53%	3	4.55%	-0.37	29.36	10.37	4.63	18.05	361	6	1.66%	1	1.52%	2.23	7.02	6.17	10.81
421x	Trucking (except local)	148	42.15	843	91	10.79%	9	6.08%	1.62	12.50	9.76	3.85	30.05	601	23	3.83%	3	2.03%	1.50	12.60	4.59	30.16
4512	Airlines	110	33.80	676	28	4.14%	4	3.64%	-1.56	20.00	6.38	9.41	25.20	504	0	0.00%	0	0.00%	1.60	6.41	4.58	9.53
481x	Telephone Communications	305	117.00	2340	240	10.26%	27	8.85%	5.05	6.56	9.93	4.61	45.60	912	75	8.22%	9	2.95%	2.13	23.21	11.63	46.89
4833	Television Broadcast Stations	75	20.15	403	23	5.71%	3	4.00%	2.97	15.09	11.03	6.35	15.55	311	0	0.00%	0	0.00%	2.31	8.38	6.09	7.04
4911	Electrical Services	168	71.55	1431	48	3.35%	5	2.98%	4.18	1.41	5.71	1.67	63.55	1271	8	0.63%	1	0.60%	1.14	0.95	1.64	2.93
5311	Department Stores	78	29.75	595	71	11.93%	7	8.97%	2.86	7.05	7.43	3.21	22.45	449	19	4.23%	2	2.56%	0.92	8.65	2.90	15.69
5411	Grocery Stores	133	45.05	901	178	19.76%	14	10.53%	3.26	4.49	9.24	3.45	35.70	714	98	13.73%	10	7.52%	2.35	38.93	3.01	1.95
5812	Eating Places	316	91.75	1835	227	12.37%	20	6.33%	0.23	13.82	10.78	6.62	68.80	1376	28	2.98%	5	1.58%	2.11	4.71	6.23	36.07
602x	Commercial Banks	678	203.35	4067	120	2.95%	13	1.92%	0.73	1.37	1.26	2.99	190.35	3807	45	1.18%	6	0.88%	1.12	0.65	1.81	0.89
6211	Securities Brokers and Dealers	107	37.95	759	68	8.96%	7	6.54%	-0.68	34.88	5.85	8.14	30.95	619	14	2.26%	1	0.93%	1.20	1.15	3.68	2.74
6311	Life Insurance	103	33.40	668	48	7.19%	5	4.85%	1.68	2.51	3.83	2.35	31.35	627	20	3.19%	3	2.91%	1.00	0.60	2.22	1.29
7011	Hotels and Motels	102	35.20	704	117	16.62%	10	9.80%	-1.07	30.81	7.65	7.95	21.55	431	22	5.10%	2	1.96%	1.40	3.01	4.14	5.31
731x	Advertising Agencies	64	14.25	285	7	2.46%	1	1.56%	1.11	15.33	8.76	3.30	11.50	230	0	0.00%	0	0.00%	1.97	9.26	13.20	25.71
7372	Prepackaged Software	512	75.00	1500	99	6.60%	13	2.54%	-4.89	43.10	15.91	8.75	54.90	1098	31	2.82%	4	0.78%	4.83	32.67	14.04	105.53
7812	Motion Picture Production	102	24.90	498	10	2.01%	1	0.98%	-15.27	394.81	4.94	15.34	20.00	400	7	1.75%	1	0.98%	2.53	13.85	5.72	17.27
	Totals/Averages	**6772**		**42201**	**3282**	**7.78%**	**350**	**5.17%**			**10.48**	**166.38**		**32822**	**1239**	**3.77%**	**139**	**2.16%**			**8.65**	**62.27**

Table 4

Maximum Likelihood Estimates of Persistent Superior Performance Exit (Tobin's q), 1977-1997

	Model								
Variable	All*	HiTech	LoTech	SIC 1	SIC 2	SIC 3	SIC 4	SIC 5	SIC 6
Period	.1056•••	.164	.083••	.0929	.1294••	.0559	.4670•	.0149	-.0193
	(.0267)	(.170)	(.028)	(.0704)	(.0496)	(.0338)	(.1857)	(.0549)	(.0958)
Density	.0024	-.022	.005	-.0077	.0069	.0036	-.1835•	.1057••	.0120
	(.0057)	(.023)	(.006)	(.0077)	(.0088)	(.0037)	(.0933)	(.0382)	(.0124)
Size	.1364••	.200	.140•	.1070	.0648	.2121•	.0674	1.8823•	.5805
	(.0029)	(.111)	(.057)	(.0874)	(.0883)	(.0853)	(.2505)	(.7596)	(.4027)
Entropy	-.2013	-.401	-.206	-.0712	.2028	-.0544	-.6151	.6349	-1.2539
	(.3319)	(1.441)	(.352)	(1.5334)	(.5256)	(.5479)	(1.4927)	(1.1327)	(2.3288)
4-Firm	-3.0668	-10.888	-2.705	-8.1127	-.6766	1.8730	-25.9281•	10.7668	3.5486
Conc. Ratio	(2.8403)	(12.667)	(3.100)	(4.0253)	(1.7509)	(1.4900)	(12.2061)	(6.1061)	(7.6483)
Market	.3339	-11.229	.571	-1.7927	.5061	-10.6449	141.0405	-51.8844	-1.6021
Share	(1.6170)	(13.784)	(1.619)	(11.0903)	(1.8993)	(6.5968)	(116.7311)	(27.0414)	(5.7924)
SIC3812	2.1056•								
	(.9809)								
SIC3841	2.5042•		2.411•						
	(1.0077)		(1.130)						
Log-likelihood	-369.06	-53.84	-304.33	-51.14	-91.48	-117.09	-28.21	-40.07	-25.24
Spells	1436	234	1129	221	348	443	107	173	104

* Notes: Non-significant industry dummy variables omitted. SIC 7 model had too few events to be estimated.

•• is significant at the 0.01 level.

• is significant at the 0.05 level.

Table 5

Maximum Likelihood Estimates of Persistent Superior Performance Exit (ROA), 1977-1997

	Model									
Variable	All*	HiTech	LoTech	SIC 1	SIC 2	SIC 3	SIC 4	SIC 5	SIC 6	SIC 7
Period	.1563•••	.152••	.122•••	.2337•••	.1312••	.0831••	.0745	.1412••	.1531•	.2566•
	(.0189)	(.061)	(.018)	(.0478)	(.0425)	(.0273)	(.0449)	(.0548)	(.0724)	(.1121)
Density	-.0078	-.016	-.001	.0037	-.0479•••	-.0001	-.0101	.0125	.0266•	-.0342
	(.0043)	(.011)	(.004)	(.0022)	(.0111)	(.0026)	(.0075)	(.0121)	(.0104)	(.0210)
Size	.0099	.180	-.008	-.0317	.1358	.0971	.2032	.4019	.0213	.1389
	(.0540)	(.103)	(.055)	(.1030)	(.1789)	(.0951)	(.1886)	(.3583)	(.2203)	(.2439)
Entropy	.5441•	.561	.160	.4797	.9483	.2342	.8936	1.1201	.8982	-2.2531
	(.2290)	(.562)	(.231)	(.5546)	(.5354)	(.4013)	(.5820)	(.6466)	(.7505)	(1.6678)
4-Firm	-.4001	-5.255	.367	.9339	-2.3239	-.3455	.6542	2.6870	5.0832	-6.4580
Conc. Ratio	(1.8570)	(4.839)	(1.931)	(1.1356)	(1.8382)	(1.1441)	(1.3748)	(2.6019)	(3.9076)	(4.9201)
Market	.4192	-2.174	.304	-2.5558	-2.0569	-.9033	-9.7181	-8.4810	3.9099	3.3328
Share	(1.2727)	(3.337)	1.284	(3.5270)	(2.3705)	(2.3306)	(8.2464)	(11.3193)	(3.1217)	(4.8130)
SIC3714	2.6850•									
	(1.1286)									
SIC3812	2.1411•									
	(.9648)									
SIC3841	2.3901•									
	(1.0848)									
SIC4512			1.800•							
			(.853)							
Log-likelihood	-723.81	-172.95	-663.32	-131.57	-92.49	-217.14	-87.73	-79.44	-65.62	-42.33
Spells	3735	662	2897	522	755	918	449	536	292	263

* Note: Non-significant industry dummy variables omitted.

••• is significant at the 0.001 level.

•• is significant at the 0.01 level.

• is significant at the 0.05 level.

Table 6

Maximum Likelihood Estimates of Superior Performance Exit (ROA), 1980-1996

Variable	Industry	Model Corporate	SBU
Period	0.329•••	0.251•••	0.204•••
	(.097)	(.043)	(.033)
Period^2	-0.027•••	-0.010•••	-0.009•••
	(.006)	(.002)	(.002)
Density	-0.035•••	-0.002•••	-0.002•••
	(.008)	(.001)	(.000)
Log-likelihood	-488.30	-4932.61	-8100.52
Spells	1,276	12,446	17,900

••• is significant at the 0.001 level.

Table 7

Maximum Likelihood Estimates of Performance Pattern: Superior-Not Superior-Superior 1978-1997

Measure	ROA		Tobin's q	
	1978-87	1988-1997	1978-87	1988-1997
Incidence of pattern	133	188	72	140
Incidence of non-pattern	12087	15366	15562	19571
N =	27774		35345	
Likelihood chi-square	100132.04•••		150484.29•••	

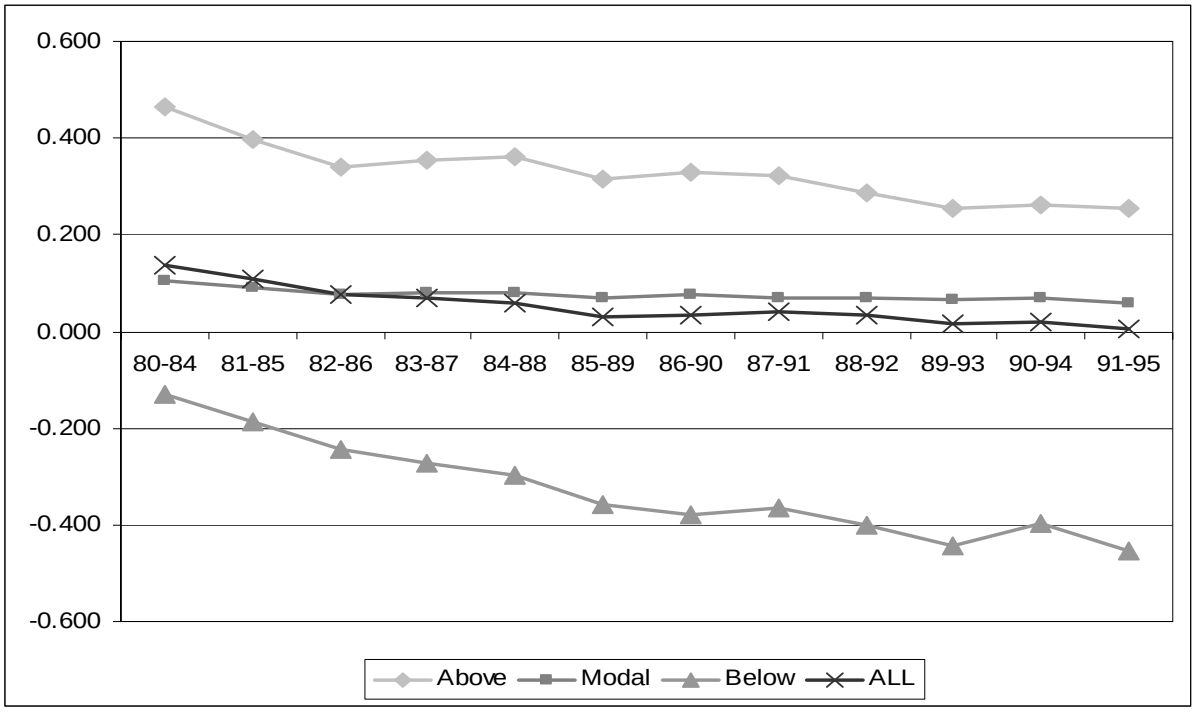
••• is significant at the 0.001 level.

Table 8

Business Unit Level Mean ROA Performance Versus Time, 1980-1996

Variable	All	Model Superior	Modal	Inferior
Constant	0.118•••	0.432•••	0.096•••	-0.152•••
	(.009)	(.015)	(.004)	(.020)
Period	-0.010•••	-0.016•••	-0.003•••	-0.027•••
	(.001)	(.002)	(.001)	(.003)
F	67.241•••	59.104•••	30.277•••	102.293•••
R^2	0.871	0.855	0.752	0.911
d.f.	11	11	11	11
N	71,607	14,843	43,063	13,701

••• is significant at the 0.001 level.

Figure 1

Mean ROA of Business Unit Performance Groups, 1980-1996