# The Rise of Hypercompetition in the US Manufacturing Sector, 1950 to 2002

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**Abstract:** Recent theoretical work has posited that many industries have become hypercompetitive, characterized by volatile or transient competitive advantage. This study documents the spread of hypercompetition in the US manufacturing sector from 1950 to 2002. In so doing, the study provides careful definition of different types of competition, offers specific constructs to measure types of competition within industries, and estimates these constructs. We find a monotonic shift towards more temporary advantages as well as indicators of increasing structural instability. These results indicate a shift towards hypercompetition in most manufacturing industries, with acceleration in this transition around 1980. These findings are consistent with theoretical work about the decreasing sustainability of competitive advantage and they suggest that the field of strategy must develop new approaches for winning with a series of unsustainable advantages.

**Key words**: hypercompetition, competitive advantage, structural destabilization, pervasive innovation, disequilibrium, creative destruction

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There is growing debate about the existence of hypercompetition. Hypercompetition is "characterized by intense and rapid competitive moves, in which competitors must move quickly to build [new] advantages and erode the advantages of their rivals" (D'Aveni, 1994, pages 217-218). It has also been described as "high velocity competition" (Brown and Eisenhardt, 1998) because of the speed of technological change. Many authors note that hypercompetition is catalyzed by more than just intense rivalry or technological change in a focal industry, attributing it to globalization, more appealing substitute products, more educated and fragmented customer tastes, deregulation, and the invention of new business models—all contributing to structural disequilibrium, falling entry barriers, the dethronement of industry leaders, and the undermining of long-established, national oligopolies during the 1980s and 1990s (Bettis and Hitt, 1995; Brown and Eisenhardt, 1998; Christensen, 1997; D'Aveni, 1994, 1995; Hamel, 2000; Quinn, 1985, 1992; Slywotzky, 1996). Studies of hypercompetition usually assert that hypercompetition is a relatively new phenomenon, becoming widespread only in the late 1980s (Thomas, 1996).

It is important to resolve questions about the existence and nature of hypercompetition. As McNamara, et al. (2003) and Makadok (1998) note, hypercompetition raises a central question in the field: whether advantage is sustainable and based on gentlemanly competition, stable market positions, and resource configurations that tightly fit together (as argued by Barney, 1991; Porter, 1980, 1985 and 1996), or whether advantage is more temporary and based on continuous creative destruction, improvement, and out-maneuvering of competitors, as argued by the scholars cited above on hypercompetition.

Many researchers have embraced hypercompetition's underlying ideas about the unsustainability of traditional advantages in rapid-change environments (MacMillan, 1988, 1989; Nault and Vandenbosch, 1996; Williams, 1992). But the literature indicates that support for the

hypercompetition characterization of business performance is far from universal. Porter (1996), for example, argues that hypercompetition is a "self-inflicted wound," dismissing it as a form of perfect competition to be avoided. And there is mixed empirical support for the hypercompetitive viewpoint in rigorous empirical studies. Makadok (1998) does not find evidence of hypercompetition in the money market mutual fund industry, demonstrating that sustained first mover advantages exist despite low entry barriers and the many changes in the industry that might encourage temporary competitive advantages. Most recently, McNamara, et al. (2003) find at best partial empirical support, showing that periods of hypercompetition come and go.

In contrast, Wiggins and Ruefli (2002) find very few firms with superior advantage, and little persistence of superior performance during 1978 to 1997, suggesting that advantages are very difficult to sustain and are relatively rare—a result consistent with the hypercompetition viewpoint. Wiggins and Ruefli (2004) also find support for hypercompetition, showing that the hazard rate for "exiting" persistent superior performance has increased over time and that high performers increasingly succeed by concatenating temporary periods of superior performance and average performance. And Thomas (1996) provides evidence of what he calls dynamic resourcefulness and a hypercompetitive shift during the 1980s and 1990s, finding that a large number of industries had increasing price, innovation and advertising wars and that this heightened competition is associated with *better* stock market performance during this period.

This study employs the now nearly two-decade-old approach of Schmalensee (1985) to shed light on the hypercompetition controversy. For our contribution, we will add several additional descriptive statistics, and will examine the direction and magnitude of changes in these statistics over an extremely broad period of time, 1950 to 2002. In so doing, this paper

examines nature and evolution of hypercompetition, in particular whether hypercompetition was restricted to a short period of time, as McNamara, et al. (2003) argue, or whether there has been a more permanent shift in the basis of competition, as Thomas (1996) argues.

## THEORY: COMPETITIVE ADVANTAGE AND TYPES OF COMPETITION

The debate over hypercompetition is an empirical issue regarding the nature, magnitude, and duration of competitive advantage. The most accepted approach to competitive advantage defines this phenomenon as sustained positive economic rents for a firm. Grant (1995, 151) defines competitive advantage as the "ability to outperform rivals on profitability." Hill and Jones (1995, 104) define competitive advantage as a "profit rate" that is "higher than the average." Bresanko, Dranove, and Shanley (1996, 441) concur. Porter (1985, 11) argues that "sustained" advantage is evidenced by "above-average performance *in the long run*." [1]

We decompose profitability into its long term and temporary components, employing the basic model used by Mueller (1986), Cubbin and Geroski (1987), Waring (1996), and McGahan and Porter (1997, 1999, 2003). That model estimates a basic difference equation for the profit rate (return on assets) of firm *i* in time *t*:

$$(1) \qquad R_{i,t} = \alpha_i + PERSIST*R_{i,t-1} + \varepsilon_{i,t}$$

The terms of this difference equation are the sector-wide persistence rate (PERSIST), the firm-specific intercept term $\alpha_i$, and the error term for each firm in each time period. The sustained profit rate for the firm is its permanent component of the solution to this difference equation, or:

[1] Powell (2001, 2002, 2003) argues against using performance as a way of defining advantage. If advantage is equated to high performance one-to-one—meaning that advantage can't exist without high performance and that high performance can't exist without advantage—then we have reduced the concept to a tautological assertion. But several papers have rebutted this view (Durande, 2002; Arend, 2003) on a philosophical basis and the use of superior, sustainable returns to identify sustained advantage (and its sources) is commonplace in the empirical literature. In addition, in the sections that follow we will decompose returns and competitive advantage into a long run component and a temporary component that varies around the long run component. The temporary component goes a long way toward removing the tautology because it captures a stochastic aspect of advantage where temporary competitive advantage results in high performance only intermittently.

$$(2) \qquad LRCA_i = \alpha_i / (1\text{-}PERSIST)$$

Note that long run competitive advantage (LRCA) is independent of time, though it varies for each firm. The deviation around LRCA represents the temporary component of competitive advantage (TCCA).

$$(3) \qquad R_{i,t} = LRCA_i + TCCA_{i,t}$$

Those who are mathematically inclined might note that the temporary component is a weighted sum of the historic error terms, with each error term weighted by the persistence rate raised to a power that is the difference between the current time and the historic time when the error shock occurred. Put formally, the temporary component is computed as follows.

$$(4) \qquad TCCA_{i,t} = \sum_{j=0}^{t} [\beta^{(t-j)} \varepsilon_{i,j}] \qquad \text{where } [LRCA_i - R_{i,0}] \equiv \varepsilon_0$$

Hypercompetition represents a particular type of competition, or a particular configuration or topography or "landscape" of competitive advantage across firms in an industry (Ghemawat, 1999). The literature on competitive type has developed in a distinguished, but distinctive way, following the seminal work of Schmalensee (1985). That literature has long eschewed formal structural models in favor of practical comparisons of the relative magnitudes of simpler statistics. We develop our theory in terms of this preeminent literature.

The established literature distinguishes two important types of competition. The first type is commonly labeled *monopolistic*, though Schmalensee (1985) called it "classical" in his seminal paper. In the economics literature, this type of competition is often called oligopolistic, and the canonical reference is Bain (1959). In monopolistic competition, firms collude to raise prices above competitive levels and exclude potential entrants that might compete away high prices. Collusion and exclusion benefit all existing firms in an industry, and thus successful

collusion and exclusion represent "shared assets" for established firms (Porter, 1980). The literature thus specifies that in monopolistic competition, the differences in competitive advantage across the various firms in an industry are small (Schmalensee, 1985; Rumelt, 1991). In terms of the model above, the within-industry variance in $LRCA_i$ is small.

The second type of competition we will label *resource-based* (Barney, 1991; Peteraf, 1993; Prahalad and Hamel, 1990). Resource-based competition represents an extensive advance on the early work of Demsetz (1973) and Peltzman (1977), work that Schmalensee (1985) labeled "revisionist". In resource-based competition, profits arise through profound efficiency differences across firms, and these profits represent rents to superior resources or intangible assets. When firms in an industry hold significantly different levels of resources, the efficiency rents across firms can be quite large. The literature thus specifies that under resource-based competition, the variance across firms within an industry for competitive advantage would be high (Schmalensee; 1985; Rumelt; 1991). In terms of the model above, the within-industry variance in $LRCA_i$ is large.

While there are obvious differences between these two types of competition, the monopolistic and resource-based positions share a common focus on durable positions (what Rumelt (1991) called the "stable effect" of competitive advantage). In part, this focus derives from the interests of strategic management scholars in sustained competitive advantage. But it also derives from the reality that volatility erodes both monopoly and resource-based advantages.

Successful shared monopolies do not simply occur. Rather, they are created and sustained by deliberate strategic action (Porter, 1980). Collusion and exclusion require constant coordination and information exchange among actors external to the firm, not only immediate competitors, but also upstream and downstream related industries, and even government

regulators. Firms achieve this coordination by altering basic processes in the industry to minimize volatility, maximize clarity, and signal potential entrants (Scherer and Ross, 1990). The immediate inefficiencies of these coordination routines are more than offset by the profits of the successful shared monopoly. For example, colluding firms may "administer" prices, keeping output prices stable and absorbing price shocks for key raw materials. The artificial stability in output price is costly and suboptimal compared to pure monopoly, but necessary to coordinate and monitor prices among self-interested competitors. Also, firms may schedule launches of new generations of innovations for a common time window. Again, this tactic is costly and suboptimal for each firm, but minimizes volatility and uncertainty and thereby facilitates collusion. Exclusion is usually achieved by further distortions of industry process, such as proliferation of brands, vertical linkages with distributors, or carrying excess capacity that will deter entry. These business practices for "managing monopoly" act together to dampen volatility in monopolistic competition. Hence, the average across firms for the absolute values of $TCCA_{i,t}$ will be small in monopolistically competitive industries.

Successful resource-based competition also does not simply occur. The differences across firms must be created with significant internal coordination in order to fit with the external environment. The valuable resources of profitable firms are accumulated over time through a stable process (Diereckx and Cool, 1989). The strategic resources of successful firms remain valuable and rare precisely because of the stability and predictability of this accumulation process. The value and rarity of resources are also sustained as their deployment often requires the presence of related or complementary resources (Dosi, 1982; Helfat, 1997; Klepper and Simmons, 2000). Finally, the resources of successful firms are sustained by organizational routines that are consistent over time for the firm and consistent across its diverse operations.

The collective resources of a successful firm thus "fit" together in a consistent and mutually reinforcing whole (Milgrom and Roberts, 1990, 1995; Porter, 1996), which makes them valuable and also difficult to imitate. We again expect that the average across firms for the absolute values of $TCCA_{i,t}$ will be small in resource-based competition.

A new literature, focusing explicitly on this volatility in modern industry, has identified a third type of competition, labeled *hypercompetition* (Bettis and Hitt, 1995; Brown and Eisenhardt, 1998; D'Aveni, 1994, 1995; Hamel, 2000; Quinn, 1980, 1985; Slywotzky, 1996). Hypercompetition is defined as an "environment of frequent competence-destroying turbulence" (D'Aveni, 1999), often approaching a "constant condition of disequilibrium" (D'Aveni, 1994: xiii and 345). Brown and Eisenhardt (1998) describe it as being on the "edge of chaos." In hypercompetition, firms suffer the continuous erosion of existing advantages and enjoy the continuous creation of new advantages. Competitive advantage is transitory, and successful firms migrate from one competitive position to another amidst the turbulence (Wiggins and Ruefli, 2004). Hypercompetition thus represents a significantly different landscape of competitive advantage across firms (Lengnick-Hall and Wolff, 1999).

We distinguish the phenomenon of hypercompetition from its causes and consequences. Hypercompetition is caused by *pervasive innovation* throughout the extended value chain and over time. We define the extended value chain as the traditional value chain of an industry, plus consumers and the social trends that underlay consumption behavior, plus the institutional environment that supports economic activity throughout the value chain. A prominent feature of hypercompetition is that innovation occurs in rapid sequence at various and moving points of the extended value chain. The specific changes that erode established competitive positions and make possible the creation of new competitive positions are thus highly varied. These changes

range from upstream innovation in components, transportation, or distribution; to downstream innovation in consumption patterns powered by immigration, new wealth, or information; or to institutional change such as deregulation, new bankruptcy laws, reform of capital markets, globalization, or privatization.

The most prominent consequence of hypercompetition is volatility in corporate performance and a shift toward temporary competitive advantage. The timing of new competitive positions against depreciated old positions will not be smooth or stable. The matching of new and old positions across firms will similarly be disorderly and unstable. Firms that are successful in hypercompetition are able to act strategically with speed and to focus on competitive adaptation. Such speed and adaptation are rarely the result of accumulation of historic resources or other advantages that were valuable in the past, nor are they the result of investment in specific assets and commitments that lock a firm into a single course of action (Ghemawat, 1991). Adding complementary assets to stabilize the value of traditional core competencies is also not helpful. Indeed, Christensen (1997) has argued that complementary assets are usually strategic substitutes for effective competitive response in hypercompetitive industries. The process of rapid creation and destruction of advantages is by its nature firm-specific and highly volatile over time. In terms of the descriptive statistics for this study, we expect the average across firms for the absolute values of $TCCA_{i,t}$ to be high, and the within-industry variance in $LRCA_i$ to be high as well.

A second consequence of hypercompetition is decline in long-run competitive advantage. We expect there to be more losers from the decay of existing competitive positions than winners from the creation of new competitive positions. Profits will be lower for firms that fail to create new competitive positions faster than their old positions erode, and will be higher for firms that

rapidly create new positions. Typically, there will be only a few winners and many losers from hypercompetition, because the adjustment costs of continuous change will weigh down average profits (even for the adaptive firms). In addition, in established industries hit by the drivers of hypercompetition, the number or size of inflexible, committed firms with obsolete traditional advantages will typically be larger than the number of disruptive, flexible and adaptive firms. Thus, the average $LRCA_i$ across firms should decline as hypercompetition increases.

It is useful to distinguish hypercompetition from two other sorts of competition. Schumpeter (1950) has described a process of innovation among direct competitors, who seek to best each other through new products, processes, or technologies. These direct innovations indeed act to depreciate established strategic positions and accumulated historical assets, and over time cumulatively destroy them (Jacobson, 1992; Eisenhardt and Roberts, 2002). But Schumpeterian competition is only one form of hypercompetition. More often than not, hypercompetition is triggered and driven by innovation external to the immediate industry—by suppliers or consumers, by government deregulation, or by falling tariffs and transaction costs enabling the entry of foreign competitors. These innovations come from diverse and ever-changing sources throughout the extended value chain. As such, hypercompetition is far less predictable and less orderly than Schumpeterian competition.

Perfect competition is, by definition, a form of static competition, with fixed technology and demand as well as zero adjustment and transactions costs. Perfect competition achieves the highest form of static efficiency, or the best allocation of given resources for a given technology and given demand. Perfect competition thus represents the calm after the storm of innovation (assuming that the storm ever ends). In contrast, hypercompetition is caused by pervasive and persistent innovation, and thus represents dynamic competition. This innovation is not possible

without adjustment and transaction costs that enable innovators to cover their fixed costs of innovation. Hypercompetition represents a social choice of tradeoff between some loss of static efficiency in order to gain dynamic efficiency (Sengupta, 2002).

To summarize, we posit three basic types of competition, or three landscapes of competitive advantage. If an industry demonstrates monopolistic competition, it will have low within-industry variance in $LRCA_i$ across firms and low average absolute values for $TCCA_{i,t}$. If an industry demonstrates resource-based competition, it will have high within-industry variance in $LRCA_i$ across firms, and low average absolute values for $TCCA_{i,t}$. Finally, if an industry demonstrates hypercompetition, it will have high within-industry variance in $LRCA_i$ across firms and high average absolute values for $TCCA_{i,t}$. We also expect hypercompetitive industries to have low average $LRCA_i$ across firms.

We note again that we do not propose formal structural models of the destruction and creation of competitive advantages, nor do we engage in the heroic task of locating and parsing among the innumerable innovations throughout the extended value chain that cause this destruction and creation. Rather, in the tradition of an extensive literature, we will examine descriptive statistics that represent the plausible consequences of various types of competition, and examine the trajectory of these statistics over time.

## HYPOTHESES: THE HYPERCOMPETITIVE SHIFT

The literature on hypercompetition has stressed that the pace, scale, and spread of innovation have steadily increased over time (D'Aveni, 1994, 1999; Christensen, 1997; Quinn, Baruch, and Zien, 1997; Hamel, 2000). This phenomenon is not just more of the same, but occurs in combinations, magnitudes, and frequencies never seen before. This confluence of innovations erodes established competitive positions and enables creation of new competitive

positions. If we accept that, on average, the pace and magnitude of this creative destruction has increased over time for most industries, then we will observe greater performance heterogeneity across firms and increased performance volatility across time. This heterogeneity and volatility will undermine and ultimately destroy the external coordination necessary to sustain collusion and exclusion in industries. This volatility will also undermine the environmental fit, accumulation process, and consistent internal routines necessary to sustain resources and durable efficiency rents. These trends suggest four key hypotheses:

> **Hypothesis 1**: The persistence rate in Equation 1 has declined over time.
>
> **Hypothesis 2**: The average long-run component of competitive advantage (LRCA) in the manufacturing sector has declined over time.
>
> **Hypothesis 3**: The across-firm within-industry variance for both the long-run component (LRCA) and the average absolute value of the temporary component (TCCA) of competitive advantage has increased over time.
>
> **Hypothesis 4**: The average absolute value of the temporary component of competitive advantage (TCCA) for manufacturing firms has increased over time.

In sum, the nature of competitive advantage has shifted if hypercompetition has spread.

Implicit in the discussion above is another theme: if a hypercompetitive shift indeed occurred during recent years, then industry structures will also become more unstable. Not just the competitive advantage for individual firms, but the topography of the competitive landscape itself will become more volatile. Structural destabilization has negative consequences for the feasibility of stable oligopolies as a source of competitive advantage (Porter, 1980). Structural destabilization also implies alteration in the gradient for rents across resources, with some resources becoming more valuable and others less so.

The first aspect of structural destabilization is dethronement, or increasing fluctuation in the rank order among the established firms within an industry. This change in landscape is

evidenced by frequent changes in industry leadership and overall performance rankings of rivals within an industry. As hypercompetition increases, it encourages ambitious firms to displace industry leaders whose long-term advantages have weakened. Smith, Ferrier, and Grimm (2001) found that hypercompetitive maneuverings of the type discussed by D'Aveni (1994, 1995)—aggressive, unpredictable, and complex repertoires of tactics—were used successfully by challengers to dethrone industry leaders in their study of 41 industries over seven years. Ferrier (2001) found similar results in his study of 16 industries. In Ferrier's view, these aggressive tactics successfully shocked, befuddled and ultimately dethroned slower industry leaders, taking their market share away and forcing them to play a losing game of constant "catch up".

A second aspect of structural destabilization—churn in industry membership—is also expected to increase as a result of the hypercompetitive shift. Entries and exits destabilize an industry's structure, bringing new players with new advantages to replace old ones. In monopolistic competition, structural barriers block entry. Entry barriers decline in hypercompetition due to disruptive technologies, new business models, substitutes, industry convergence, deregulation, and so on (D'Aveni, 1994, Chapter 3; Slywotzky, 1996; Christensen, 1997; Hamel, 2000). Moreover, changes in capital markets that encourage IPOs and the rise of venture capital investors would also contribute to entry and the disruption or dethronement of established industry leaders.

Exits are also expected to contribute to churn as competitive intensity rises among firms in hypercompetition and as old advantages are destroyed by the turbulence of the environment. Competitively weak firms are expected to fail, yielding market share and profits to the successful hypercompetitive firms and making room for even more entries to replace them. Thus, exits contribute to the increasing degree of churn in an industry's membership.

A third aspect of structural destabilization—the increase in the number and duration of financially unstable firms—is also expected. We categorize firms as financially unstable if they are insolvent (current assets are unable to cover current liabilities), technically bankrupt (negative equity), or below operating breakeven (revenues are below selling, general and administrative overhead expenses.) A major increase in the number of financially unstable firms would result from the increased competitive intensity—including the wars of price, innovation, and advertising observed by Thomas (1996)—associated with hypercompetition.

At first consideration, we might be surprised by an increase in the number of financially unstable firms in hypercompetitive industries. Such firms might just exit, and contribute only to churn. Despite the hypothesized increase in exits, some unstable firms will persist longer in hypercompetitive environments because the turbulent nature of the environment offers the possibility of new opportunities and new periods of temporary advantage in the future. Thus, "pulling the plug" as soon as financial instability appears may be particularly premature in hypercompetitive industries. Investors may see the option-value of investing in a seemingly unstable firm while it is down to capture the potential upside when the environment changes once again, providing investments to keep the firm alive longer. In addition, hypercompetition should trigger a proliferation of young firms investing in new opportunities, technologies, or business models available because of pervasive innovation. These new firms are likely to be financially unstable in the short-run, with risky but highly lucrative prospects in the long-run, creating more incentive to keep them alive longer. Thus, paradoxically, we expect the simultaneous increase of exits and of financially unstable firms, with financial instability persisting for longer periods of time. We label this last consequence of hypercompetition the "increasing durability of instability."

Thus, four key hypotheses regarding structural destabilization are suggested:

**Hypothesis 5**: Dethronements (shifts in the performance ranking among firms within industries) have increased over time. These shifts occur across all firms, and in particular for industry leaders (those in the top quartile).

**Hypothesis 6**: Churn (the percentage of new firms traded on public markets and old or new firms exiting public markets) has increased over time.

**Hypothesis 7**: The number of financially unstable firms (the presence of firms that are below breakeven, technically bankrupt or insolvent) has increased over time.

**Hypothesis 8:** The durability of instability (the average length of time that financially unstable firms remain unstable before exit or return to financial stability) has increased over time.

The structural destabilization hypotheses (5 to 8) lead to a corollary about the importance of industry structure to long-run competitive advantage. If structural destabilization is on the rise, industry structure as a source of monopoly-based competitive advantage becomes much less important. Using data from 1981 to 1994, McGahan and Porter (1997) found that only 7.2 percent of the variance in returns of manufacturing firms was explained by industry effects, although they found it was closer to 19 percent when non-manufacturing firms were added to the sample. Most recently, Ruefli and Wiggins (2003), using 1980 to 1996 data and a very different non-parametric approach, also found that industry effects were very small. Using an earlier sample from 1974 to 1977, Rumelt (1991) found that industry effects were already generally small, identifying that only 8.3 percent of the variance in returns were due to industry effects (and another 7.8 percent due to transient industry effects). This suggests that the change in type of competition may have begun in the manufacturing sector far earlier than most of the literature on hypercompetition suggests. In any event, the following hypothesis is suggested:

**Hypothesis 9**: The importance of industry structure as a source of long-run competitive advantage has declined over time.

In sum, the literature on hypercompetition suggests that the proportion of industries that demonstrate monopolistic competition has decreased over time. In addition, it suggests that hypercompetitive trends have undermined the internal consistency and complementarity of assets needed for sustained resource-based differences in innovation and efficiency. Consequently, the proportion of industries that demonstrate resource-based competition has decreased over time. Finally, hypercompetitive trends erode and eliminate the benefits of previous commitments and encourage experimentation with new strategic moves, suggesting that the proportion of industries that demonstrate hypercompetition has increased over time.

## ALTERNATIVE THEORIES FOR THE "SHIFT"

The literature contains several alternate characterizations of competition and competitive advantage in our turn-of-the-century economy. A demonstration that hypercompetition prevails in many industries of the US manufacturing sector must consider these alternate hypotheses and demonstrate why they provide a weaker and less convincing characterization of the data.

The most obvious and theoretically important alternate hypothesis is that hypercompetition is a "self-inflicted wound"—that is, the hypercompetitive shift is movement towards the state that neoclassical economists label *perfect competition*. In a perfectly competitive industry, the "frictions" that allow competitive advantage to exist evaporate away, leaving atomistic competition and static efficiency, with no firm earning abnormal profits. The hypothesis that our economy is moving towards perfect competition is quite radical and unlikely upon careful examination. It rests on the reduction of competitive frictions, including the costs of information and decision-making. As such, this would imply that large organizations become unnecessary. When the costs of information and decision-making, as well as other transaction costs, decrease, then the need for organizational hierarchy decreases. The outcome of perfect

competition is homogeneous, normal returns for every firm in any industry. If such were the case, then, we would expect shifts in LRCA and persistence rates that are similar to those hypothesized above for a hypercompetitive shift. However, if the shift were toward perfect competition, we would also expect, contrary to hypotheses 3 and 4, to see a decline in across-firm within-industry variance in LRCA and a decrease in the average absolute value of TCCA. In addition, if the shift were to perfect competition, entry would die down, contrary to hypothesis 6. Finally, we would also expect to see a reduction in the durability of financial instability, as financially unstable firms would exit sooner, contrary to hypothesis 8. In sum, a shift toward perfect competition can be distinguished from a shift toward hypercompetition.

A second important alternative hypothesis is that competition has shifted from monopolistic to resource-based competition (Prahalad and Hamel, 1990; Quinn, 1992). Similar to a hypercompetitive shift, a shift to resource-based competition would result in declining average LRCA and persistence rates as firms lose their industry structure-based advantages. However, this decline would be temporary. As resource-based competition sets in, persistence rates and average LRCA should recover because firms with inimitable, unique and valuable resources would contribute to sustained advantages not available in hypercompetition. In addition, if the shift were to resource-based competition, industry stability would eventually be restored. New industry leaders with unique and inimitable assets would emerge, discouraging entry by firms who cannot match or accumulate the resources necessary to compete effectively. This would decrease rank order fluctuations (dethronements and shifts in performance rankings) as well as entries, contrary to hypotheses 5 and 6. Thus, we can distinguish between a resource-based and a hypercompetitive shift.

For this study, we hypothesize monotonic or unidirectional trends over time. The third and fourth alternative hypotheses dispute this monotonicity and posit that our existing economy is merely a turbulent interregnum between stable periods. The third alternative hypothesis is that the messy process of globalization has created most of the instability we document in this study. However, some scholars expect that globalization will in time run its course, ending with the formation of global oligopolies after a merger wave (Bryan, 1999). If global industries indeed become significantly more concentrated, then any heterogeneity and volatility in current industries may be simply a transition between periods of national and global oligopolies—effectively, a U-shaped trend for the proportion of industries demonstrating monopolistic competition. There is in fact historical precedent for this U-shaped trend. The formation of the US national economy at the end of the 19th century severely eroded local monopolies, initially yielding outcomes such as those hypothesized by this study. But by 1905, the "Great Merger Wave" contributed to the rise of numerous national oligopolies and monopolistic competition that persisted through much of the 20th century US economy (Lamareaux, 1985).

A fourth alternate hypothesis is that competition is tied to macroeconomic cycles, and so again, we will not observe monotonic trends. In recessions, falling demand and excess capacity undermine the advantages of both monopoly and corporate resources. In periods of economic boom, these advantages are restored. McNamara et al. (2003) posit that hypercompetition was merely a temporary period in the late 1980s and early 1990s, punctuating two periods of good performance. If macroeconomic conditions drive competitive type, then the late 1980s period of hypercompetition has happened many times in the past, rather than being a new phenomenon. If the type of competition changed from monopolistic to hypercompetitive and back again due to a

transition to global oligopolies or fluctuating macroeconomic conditions, then we will observe curvilinear trends in the nature of competitive advantage and industry structure.

Right censorship of the data (due to ending the analysis in year 2002) could leave open the question of whether the type of competition will change from monopolistic to hypercompetitive and then back to monopolistic in the future. However, if the data show that the shift started in the 1980s and continued into the early 2000s, hypercompetition is more than a "temporary interim period" between two monopolistic periods. How long must the period of hypercompetition be before it is no longer a "temporary" or "transitional" stage? Are two decades enough? If not, for how long must the hypercompetitive shift persist before we cease to regard it as some sort of transitional period?

**DATA AND ESTIMATION**

The sample for our study consists of every publicly-listed manufacturing firm in the US economy. Each observation is a firm in a year, 1950 to 2002. The primary source of data is the Compustat compilation of accounting data. However, Compustat is comprehensive only after 1980, and omits roughly 300 firms in the early 1970s, 500 firms in the 1960s, and 300 firms in the 1950s. Virtually all the omitted firms ceased to exist before 1980. Were we to ignore these failed or acquired firms in our analysis, we might well improperly minimize the asymmetry and instability of US manufacturing firms in the 1950s, 1960s, and 1970s, and thereby exaggerate any rise over time of these traits. We utilized the Wharton matching of the CRSP dataset of publicly-traded firms and the Compustat database to identify missing observations. Accounting data for these missing observations were then collected from Moody's (various). All our statistical analyses rely on this augmented dataset.

Empirical studies in the literature have used a variety of different datasets. We note here the central issues for data among these studies, and place our own study in the context of previous research. The first data issue concerns the range of firms studied. The earliest studies in this literature examined the US manufacturing sector (Mueller, 1986; Schmalensee, 1985; Rumelt, 1981; Waring, 1996). More recent studies have examined firms in the entire US economy, including the service sector but excluding financial service firms (McGahan and Porter, 1997, 1999, 2003; McNamara, et al., 2003). We return to the original focus on the manufacturing sector. The laborious collection of data from the Moody's Manuals to supplement the Compustat database makes it infeasible to examine the entire US economy. Since we had to choose one sector for our empirical work, we selected manufacturing for continuity with the literature, both with the original empirical analyses cited immediately above and with the literature on hypercompetition that predominantly focuses on manufacturing for its theory development. Additionally, because our immediate analytical goal is to define, measure and document the existence of hypercompetition, we have no need to assert that the entire US economy is hypercompetitive.

The second data issue concerns the unit of analysis. The seminal study in this area examined firms as a whole (Mueller, 1986), and Waring (1996) followed this tactic. The more recent studies have examined the separate business units of diversified firms, using the FTC line of business data (Schmalensee, 1986; Rumelt, 1981) or the Compustat SBU data (McGahan and Porter, 1997, 1999, 2003; McNamara, et al., 2003). Use of business units severely limits the time period of analysis, to only four years in the mid-1970s with the FTC dataset and to the years after 1980 with the Compustat SBU dataset. We return to Mueller's examination of the firm as a whole, and are thereby able to access the full Compustat dataset from 1950 onwards.

A third data issue concerns the dependent variable for analysis. Mueller (1986), again followed by Waring (1996), examined economic rent, or ROA (return on assets) for an individual firm minus the sector average ROA. This specification tactic confounds the macroeconomic cycles of the sector as a whole with the stability of an individual firm. More recent studies use ROA for each firm as the dependent variable, and include fixed effects for each year to better control for business cycles. We adopt this latter, newer specification.

A fourth data issue concerns excluded firms and industries. The studies of Schmalensee (1985) and Rumelt (1991) excluded business units with less than one percent sales share and those with only one year of data. The studies of McGahan and Porter (1997, 1999, 2003) and McNamara, et al. (2003) omitted business units with sales or assets of less than $10 million and those with fewer than six years of data from their analyses. The cited studies adopt these tactics to better estimate persistence, and to better isolate sustained returns. While such exclusion of observations is reasonable in the context of the intended analyses, we are reluctant to similarly exclude smaller and newer firms, because such firms are precisely the most likely source of hypercompetition. Such exclusion also probably hides significant shifts in industry structure. We therefore conduct most of our statistical analyses using all firms, but we will usually repeat the analyses excluding firms with assets or sales of less than $10 million in 1990 inflation-adjusted dollars and also firms that have been publicly-traded for five or fewer years.

McGahan and Porter (1997, 1999, 2003) sensibly omit industries with only one firm in computing industry effects. Inclusion of such "industries" would exaggerate the actual homogeneity across competitors in true industries. Because we examine a broad range of statistics, we will not usually adopt this tactic. However, when we compute the standard deviation across firms (for Hypothesis 3) and industry effects (for Hypothesis 9), we will indeed

exclude all firms in four-digit SIC industries with only one firm for a given year. Further, when we compute rank-order correlation coefficients and turnover rates for leading firms (for Hypothesis 5), we will exclude all firms in four-digit SIC industries with two or fewer firms.

A fifth and final data issue is that all privately-held and most foreign firms are excluded from all the analyses of the literature, and also from our own study. We know of no solution to this limitation. We posit, however, that the addition of private and foreign firms to the sample would favor finding a hypercompetitive shift because such firms are often seeking to disrupt or destroy established oligopolies. Thus, omitting these firms provides a conservative test of our hypotheses about the hypercompetitive shift in the manufacturing sector.

The central variable of our study is ROA, defined as the sum of net income plus interest, divided by total assets. These variables, along with total sales, are taken from Compustat, supplemented by Moody's, as noted above. The US GDP deflator is taken from the International Monetary Fund. We use the deflated value of sales in our estimation method below, and the deflated values of sales and assets to exclude firms to mimic the McGahan and Porter samples. Finally, we compute the age of each firm in our estimation method by treating the birth year of the firm as the first year that its equity was publicly traded. The birth years are taken from the CRSP dataset, matched to Compustat by Wharton. Finally, we include fixed effects for each firm and each year in our study.

The first hypothesized aspect of structural destabilization is dethronement. We measure dethronement in two ways. First, we compute the within-industry (four-digit SIC) year-to-year Spearman (rank order) correlation among firms for ROA. We then examine quartiles of these industry-level correlation coefficients across the manufacturing sector. Second, we employ a more traditional measure of dethronement, by computing the rate at which industry leaders

(those firms in the top quartile of a four-digit SIC in terms of ROA) in a given year fall out of the top quartile in the following year. Industries with only two or fewer firms are excluded from both of our dethronement calculations.

The second aspect of structural destabilization, churn, was measured using entries and exits from the sample. Entries were measured using the percentage of firms that entered the sample in each year. Entries include IPOs, spinoffs, and other divestitures that create new entities with new corporate identities. These were not necessarily newly-born firms, rather only those firms that had reached the critical mass to become public firms. Thus, these are significant entries that make a difference to industry performance, rather than the entry of mom-and-pop small businesses. Exits were measured using the percentage of firms exiting the sample each year for any reason (merger, bankruptcy, or dissolution).

The third aspect of structural destabilization—financially unstable firms—was measured using the percentage of financially unstable firms in each year of the sample. Three measures of financial instability were used: 1) technical bankruptcy (those firms with negative common equity), 2) operating below breakeven-performance (those firms with selling, general and administrative expenses in excess of sales), and 3) insolvency (those firms with current liabilities exceeding current assets). We also computed the average time that financially unstable firms spent in financial instability. We treat each spell of financial instability as a contiguous period of years.

Finally, when looking at the importance of industry as a source of competitive advantage, we used industry dummies for each of the four-digit SIC industries in the sample. This is the standard method used in the literature.

The core of our statistical analysis is estimation of Equation 1. This estimation is complicated by the fact that the error terms $\varepsilon_{i,t}$ are not independently, identically normal in distribution. In particular, the error terms are highly skewed, meaning that the predicted values and residuals are positively correlated. Also, the error terms are heteroskedastic, varying greatly across observations. We also expect the error terms to be higher for younger and smaller firms. McGahan and Porter (1997, 1999, 2003) exclude the smallest firms from their analyses as a partial approach to dealing with this problem. Our approach is to include these firms, but to correct for heteroskedasticity. We also very much expect that the error terms will increase over time.

The estimation methodology is pseudo-maximum likelihood, a version of iteratively-weighted least squares. We estimate the following extension of Equation 1:

$$(5) \qquad R_{i,t} = \alpha_i + \delta_t + \beta * R_{i,t-1} + \chi * R_{i,t-1} * (t-1950) + \varepsilon_{i,t}$$

The fixed effects for firms are given by the $\alpha_i$, the fixed effects for year are given by the $\delta_t$, and the persistence rate is given by $\beta$. We allow this persistence rate to trend with the $\chi$ parameter. To deal with nonnormality and heteroskedasticity of the $\varepsilon_{i,t}$ error terms, we weight each observation with the inverse of the following variance term.

$$(6) \qquad (R_{i,t} - \text{pred}(R_{i,t}))^2 = v_0 + v_1 * \text{pred}(R_{i,t-1}) + v_2 * \text{pred}(R_{i,t-1}) * (t-1950) + v_3 * \ln(\text{Sales}_{i,t}) + v_4 * \ln(\text{Age}_{i,t}) + v_5 * (t-1950) + \mu_{i,t}$$

Note that the variance for each observation is a nonlinear function of the predicted value, consistent with a nonnormal distribution for the error term (the $v_1$ and $v_2$ parameters). We also expect the variance to decrease with the scale of the firm (measured by sales, the $v_3$ parameter)

and with the age of the firm (the $v_4$ parameter). We finally expect the variance to increase with time (the $v_5$ parameter). The error term for the variance equation is denoted $\mu_{i,t}$.

We begin with start values for parameters of both Equations 5 and 6. We estimate parameters for Equation 5, weighting each observation with the inverse of the variance term from Equation 6, based on the start values. We then take the estimates for the predicted values from our newly estimated Equation 5, and estimate Equation 6 with OLS. We take the parameter estimates from Equation 6, compute new weights for each observation, and re-estimate Equation 5. Then, we take the predicted values from Equation 5 and re-estimate Equation 6. We continue this process until there are no changes in our parameter estimates for either equation.

We conduct estimation using a series of overlapping 10-year windows (1950-1959, 1951-1960, 1952-1961, and so on) to capture any volatility and discontinuity in trends over time. In these analyses, we do not allow parameter estimates to trend over time (so, $0 = \chi = v_2$). We also conduct estimation using annual data for the entire pooled sample, 1950 to 2002. These pooled estimates allow for trends in key parameters. The latter tactic forces continuity on the estimated parameter trends, but allows for formal tests of significance. As mentioned above, we usually conduct estimation for all sample firms, and again only for those firms that have sales and assets exceeding $10 million in 1990 dollars and which have been publicly-traded for at least five years. The latter, smaller sample is similar to that used extensively in the literature.

**STATISTICAL FINDINGS**

The results of estimating Equations 5 and 6 for the entire sample for the overlapping 10-year windows are reported in Tables 1 and 2. For each 10-year window, we iteratively estimate Equations 5 and associated weights in Equation 6 until we achieve convergence (which usually occurs in two or three rounds). The estimates for the persistence rate (beta) are plotted in Figure

1, Panel A. Similar estimation was conducted using only those sample firms that were large and established (as defined above). Those results are not reported in tabular form, but the estimates for the persistence rate in that sub-sample are also plotted in Figure 1.

We further estimate Equations 5 and 6 using the pooled sample. The results of this estimation are reported in Table 3 (for the entire sample in Panel A, and for only the larger, more established firms in Panel B). We introduce interaction effects into Equation 5 between the persistence rate and elapsed time (the year minus 1950). We estimate both a linear trend for the persistence rate, and a quadratic trend. The calculated estimates for the persistence rate using the quadratic trend (Specification B) are plotted in Figure 1, Panel B.

We note from estimation of Equation 5, as reported in Table 3, that the persistence rate declines over time, and that this decline is statistically significant. This finding supports our first hypothesis. From Equation 2, we note that LRCA is expected to decline for firms in the manufacturing sector. We also note from estimation of Equation 6, as reported in Table 3, that the variance around ROA for firms increases over time, and that this increase is statistically significant. These results support our second and fourth hypotheses.

Figure 2 reports quartiles for the estimated LRCAs (the long-run component of competitive advantage) for sample firms for the 10-year windows. The persistence rate and the fixed effect for each firm (the $\alpha_i$ of Equation 5) are recovered from the estimation reported in Table 1. These estimates are used to calculate LRCA for each firm in each 10-year window. Note that LRCA declines in the 1980s and does not recover in the 1990s. These findings support our second hypothesis.

Figure 3 reports the within-industry standard deviation for ROA, the long-run component of ROA, and the temporary component of ROA. Each industry is a four-digit SIC code, as

reported in Compustat. Note that the standard deviations for all three measures of competitive advantage trend steadily upward for all sample firms, until they plateau in the late 1980s. The trends for the large, established firms are quite different, being basically flat until the early 1970s, when they trend steadily upwards. There is no plateau for these within-industry standard deviations for the large, established firms. These findings support our third hypothesis.

Figure 4 reports quartiles for the estimated $TCCA_t$s (the temporary component of competitive advantage) for sample firms for the 10-year windows. The value of TCCA is computed using annual ROAs for each firm and the associated LRCA reported in Figure 2. Note from Equation 3 that the estimated TCCA will vary annually, and will be either positive or negative, with a typical mean of zero for a firm over the given time period. Note that the average, absolute values of the temporary components trend steadily upward, with an inflection point in the 1970s. These findings support our fourth hypothesis.

Figures 5 and 6 report trends for dethronement. Figure 5 presents the year-on-year rank-order correlation of ROA across firms in four-digit SIC industries for the various 10-year windows. For most industries, the rank order of firms in terms of profitability was quite stable in the 1950s and 1960s. Those correlations are still large for most industries, but have nonetheless declined steadily over time. Figure 6 presents the percentage of firms in the top quartile of ROA for four-digit SIC industries, for a given year, that fell out of the top quartile during the next year. Here, we also see a steady increase in dethronement. These results support our fifth hypothesis.

Table 4, Panel B, reports trends in entry of new firms into the manufacturing sector. We should remember that our data include only domestic, publicly-traded firms, and thus miss the significant entry of foreign firms through exports, direct investment, and outsourcing. To

correctly judge the trend of entry, we must control for the annual overall profitability of the manufacturing sector, and for the expansions of the American Stock Exchange in the 1960s and the birth of the NASDAQ in the early 1970s. Once we control for these factors, we find that entry indeed increases over time, in an apparently linear manner. These results provide somewhat qualified support for our sixth hypothesis. At the bottom of Table 4, we also estimate and report regressions of exits on basic time trends. Here, the linear trends perform best. These findings also support our sixth hypothesis.

Figure 7 reports the proportion of financially unstable firms among all firms in the US manufacturing sector. These proportions have increased almost continuously since the 1950s, with an inflection point in the late 1970s and a slight dip during the boom years of the mid 1990s. For completeness, basic time trends for these data are estimated and reported in Table 4, Panel A. The quadratic trends, allowing for the inflection in the 1970s, perform best. These findings support our seventh hypothesis.

Figure 9 reports the contribution of industry fixed effects as determinants of firm LRCAs in the 10-year windows. The percentage contribution of 4-digit SIC industry binary variables has been steadily interpreted in the literature as the extent of monopolistic competition's contribution to corporate profits (Schmalensee, 1985; Rumelt, 1991; McGahan and Porter, 1997, 1999, 2003). That percentage contribution declined steadily until the 1970s, and from then has bottomed out, or perhaps moderately increased. We interpret these findings as support for our ninth and final hypothesis.

## DISCUSSION AND CONCLUSIONS

Our study has devised and calculated a variety of descriptive statistics that shed light on the changing nature of competition in the US manufacturing sector. We highlight six

conclusions based on our estimation and findings, and the associated issues that require further research.

1) **Hypercompetition is real and pervasive (at least in the manufacturing sector)**. The heterogeneity and volatility of competitive advantage in US manufacturing industries has steadily and astonishingly increased since 1950. Industry structures are destabilizing. These results suggest that a shift towards hypercompetition has indeed occurred. However, the shift was gradual rather than precipitous, and began earlier than expected. The shift was not temporary or limited to the early 1990s. Nor was it a shift to perfect competition, as Porter implied, where the temporary component of competitive advantage would also have declined to zero, rather than increased, as we found. The increase in entries and the durability of financial instability also contradict the view that hypercompetition is merely perfect competition. Moreover, the monotonic increase in structural instability that we found also contradicts the alternative hypothesis that resource-based competition has risen, as suggested by Quinn (1992), Prahalad & Hamel (1990) and many others. Even during the boom years of the late-1990s, the persistence rate and LRCA did not recover, suggesting that a shift to resource-based, global oligopoly or monopolistic competition has not occurred (at least through 2002).

2) **Monopolistic competition is mostly dead (at least at the industry level).** The magnitude of heterogeneity and volatility for competitive advantage in most manufacturing industries is beyond any plausible compatibility with theories of shared monopoly based on collusion and exclusion. Monopolistic competition may still frequently occur at localized levels (for example, on certain city-pair routes in the airline industry or in certain therapeutic categories in the pharmaceutical industry), but only quite rarely at the industry level as a whole. Whatever broad

relevance the "classical" structure-conduct-performance theories of economists may once have had is long since gone.

To illustrate this argument, we segregate 4-digit SIC manufacturing industries into three competitive types, with the following boundaries:

- Monopolistic: $\text{std}(LRCA_i) < 5\%$ and $\text{mean}(\text{abs}(TCCA_{it})) < 5\%$
- Resource based: $\text{std}(LRCA_i) \geq 5\%$ and $\text{mean}(\text{abs}(TCCA_{it})) < 5\%$
- Hypercompetitive: $\text{mean}(\text{abs}(TCCA_{it})) \geq 5\%$

Industries with two or fewer firms are excluded from our computations. The resulting trends over the last five decades are plotted in Figure 10. Clearly, there are no well-agreed boundaries between these competitive types, so Figure 10 must be merely illustrative rather than definitive. Yet, any reasonable definitions of monopolistic or resource-based competition generate findings similar to Figure 10, as should be expected given the basic results of this paper. We find that the percentage of industries that can plausibly be interpreted as experiencing monopolistic competition (low within-industry variances and low volatility) dropped from 80 percent in the 1950s to around 10 percent in the 1990s.

We must be careful to note that the contemporary implausibility of monopolistic competition does not mean that "industry effects" no longer exist. While Schmalensee (1985) launched this stream of literature with the equation of ANOVA "industry effects" and "classical" models of monopolistic competition, recent work by McGahan and Porter (1999, 2003) has estimated far more subtle industry effects. These additional effects included those across industries for transitory profits (rather than just stable effects) and those interacting industry and firm effects. Exactly what these findings mean in terms of actual competitive processes is unclear. Perhaps we are reaching the limits of analysis in the Schmalensee-Rumelt vein, and we must begin to supplement our descriptive studies with estimation of formal structural models.

4) **Resource-based competition (at least the static version) is mostly an empty cell.** The initial empirical work in the "revisionist" (Demsetz, 1973; Peltzman, 1977) and resource-based traditions (Rumelt, 1991) posited durable, stable heterogeneity as the basis for competitive advantage in most industries. We have adopted this approach for our study. One of the more striking (and for one of the authors, unexpected) findings in Figure 10 is that only a small portion of manufacturing industries can be characterized by such stable heterogeneity, and this never-large proportion has shrunk to around 10 percent of industries. Investigation of this result led us to compute the correlation across industries between heterogeneity (std($LRCA_i$)) and volatility (mean(abs($TCCA_{it}$))). Among the 44 10-year windows for which we computed this correlation, it ranged between .77 and .87. Put simply, for most industries, the principle source of heterogeneity in competitive advantage is volatility in that advantage. This provocative stylized fact suggests that academic attention to the static version of the resource-based view has been overdone.

5) **Hypercompetition is compatible with some competitive advantage (at least in the near term).** We hypothesized hypercompetition to be associated with deteriorating performance and long-run competitive advantage for US manufacturing firms. This deterioration indeed exists, but it may still be in its earliest stages and some long-run advantage still exists among a group of exceptional firms. For larger and more established firms, the median LRCA declines from 8 percent in the 1950s and 1960s to 6 percent today. Declines in the other quartiles are more severe. The source and sustainability of the remaining long-run competitive advantage among some firms—if it is not based in either monopoly or static resources—is not clear. Many possibilities exist for the remaining long-run advantage: dynamic capabilities (such as innovativeness, adaptability, and flexibility), the availability and use of slack resources, the

continuous concatenation of a series of disconnected temporary advantages resulting from fundamentally unrelated advantages, the existence of mechanisms that buffer some firms from disruptive environmental changes, the judicious pruning of poorly-performing products or outsourcing of low value-added activities, the acquisition of innovative businesses, or pure luck.

There is a growing literature that suggests that the most likely source of this long run competitive advantage is dynamic capabilities (Teece, Pisano, and Shuen, 1997; and the papers of the October-November, 2000 special issue of *Strategic Management Journal*). The creation of a quasi-durable competitive advantage out of a connected sequence of individually transient advantages is an important area for future work, but many issues are raised by hypercompetition. For example, the degree to which such advantages are sustainable is unclear. Can firms continue being innovative, flexible, and aggressively adaptable forever? Will other firms, either new or old, build these capabilities or use outsourcing to acquire them temporarily, thereby neutralizing them as true advantages? Does one dynamic advantage, or the acquisition of a series of many, underlie a firm's ability to sustain a series of temporary advantages? How "non-durable" can a competitive advantage be before it ceases to be a competitive advantage and becomes instead a series of transient shocks?

6) **Concatenation of temporary advantages looks like the wave of the future**. In parallel with work on dynamic capabilities, our results concerning the rising importance of temporary advantages suggests the necessity for more research on strategies for prospering by using unsustainable advantages (Brown and Eisenhardt, 1998; D'Aveni, 1994, 1995; Wiggins and Ruefli, 2004). Do firms escalate rivalry and chaos, or can they reduce them, through constant creative destruction? Is there path dependence in a series of advantages or are the successful hypercompetitors truly unpredictable (Lengnick-Hall and Wolff, 1999)? Does it make sense to

alternate periods of advantage, by milking one's advantage while the rival takes the leadership, until he milks his advantage and cedes ground to the other's new advantage? Or does it make sense to rapidly cannibalize one's own advantage to sequentially pre-empt rivals (Nault and Vandenbosch, 1996)? Does the use of a series of self-cannibalizing temporary advantages sacrifice profits but create shareholder value by stimulating growth (Thomas, 1996)? Or do they create value by disrupting and weakening competitors (D'Aveni, 1995)? Numerous questions about how and when to use temporary advantages, and how to make them affordable, timely, and value-creating for shareholders still exist as well. These are important questions because, after all, the findings of this study are not inconsistent with the forecast that, within the lifetimes of most of us, most firms will be living from one unsustainable advantage to the next.

# Table 1: Estimates for Basic Difference Equation 5

| Ten-Year Interval | Estimate of Beta | t-Statistic for Beta | R-squared Statistic | Number of Observations |
|---|---|---|---|---|
| 1950-59 | .23 | 17.1 | .61 | 4951 |
| 1951-60 | .22 | 14.9 | .63 | 4981 |
| 1952-61 | .32 | 23.2 | .74 | 5675 |
| 1953-62 | .24 | 18.2 | .77 | 6142 |
| 1954-63 | .25 | 20.2 | .77 | 6771 |
| 1955-64 | .27 | 22.2 | .76 | 7563 |
| 1956-65 | .24 | 21.7 | .79 | 8306 |
| 1957-66 | .26 | 24.6 | .84 | 9217 |
| 1958-67 | .26 | 23.9 | .76 | 10,181 |
| 1959-68 | .23 | 22.1 | .72 | 11,199 |
| 1960-69 | .25 | 26.4 | .71 | 12,521 |
| 1961-70 | .27 | 27.7 | .68 | 13,494 |
| 1962-71 | .28 | 29.8 | .67 | 14,447 |
| 1963-72 | .28 | 30.7 | .67 | 15,310 |
| 1964-73 | .27 | 31.4 | .68 | 16,117 |
| 1965-74 | .29 | 32.7 | .69 | 16,877 |
| 1966-75 | .24 | 28.8 | .71 | 18,232 |
| 1967-76 | .18 | 25.6 | .66 | 19,542 |
| 1968-77 | .22 | 28.5 | .57 | 20,758 |
| 1969-78 | .28 | 35.3 | .64 | 21,794 |
| 1970-79 | .22 | 23.9 | .65 | 22,169 |
| 1971-80 | .20 | 25.9 | .58 | 22,710 |
| 1972-81 | .21 | 28.5 | .56 | 23,195 |
| 1973-82 | .20 | 27.8 | .54 | 23,604 |
| 1974-83 | .19 | 27.0 | .50 | 23,979 |
| 1975-84 | .15 | 20.6 | .51 | 23,734 |
| 1976-85 | .19 | 24.2 | .61 | 23,511 |
| 1977-86 | .12 | 14.7 | .47 | 23,418 |
| 1978-87 | .10 | 13.4 | .55 | 23,533 |
| 1979-88 | .14 | 18.4 | .56 | 23,724 |
| 1980-89 | .10 | 14.2 | .54 | 23,892 |
| 1981-90 | .10 | 13.7 | .48 | 24,046 |
| 1982-91 | .16 | 24.5 | .56 | 24,292 |
| 1983-92 | .10 | 14.2 | .62 | 24,508 |
| 1984-93 | .09 | 10.3 | .47 | 24,879 |
| 1985-94 | .05 | 8.5 | .60 | 25,387 |
| 1986-95 | .05 | 7.7 | .58 | 25,913 |
| 1987-96 | .06 | 9.9 | .54 | 26,633 |
| 1988-97 | .05 | 8.0 | .45 | 27,455 |
| 1989-98 | .09 | 7.1 | .56 | 28,213 |
| 1990-99 | .04 | 5.6 | .44 | 28,802 |
| 1991-2000 | .06 | 9.7 | .72 | 29,325 |
| 1992-2001 | .03 | 3.8 | .42 | 29,601 |
| 1993-2002 | .12 | 19.1 | .40 | 29,276 |

# Table 2: Estimates for Variance Equation 6

(t-statistics in parentheses)

| Ten-Year Interval | Intercept | Predicted Value of ROA | log(Sales) | log(Age) | R-Square Statistic |
|---|---|---|---|---|---|
| 1950-59 | -8.7 (-66.5) | 1.0 (1.1) | -.10 (-7.2) | -.06 (-1.5) | 0.02 |
| 1951-60 | -8.4 (-61.8) | -1.9 (-2.2) | -.17 (-11.2) | -.01 (-0.2) | 0.03 |
| 1952-61 | -8.2 (-59.3) | -5.6 (-7.2) | -.10 (-7.8) | -.08 (-1.8) | 0.03 |
| 1953-62 | -8.1 (-76.5) | -8.1 (-12.7) | -.13 (-9.3) | -.02 (-0.5) | 0.04 |
| 1954-63 | -7.8 (-78.2) | -8.3 (-13.2) | -.16 (-11.3) | -.11 (-2.7) | 0.06 |
| 1955-64 | -7.5 (-82.0) | -9.4 (-16.1) | -.20 (-13.7) | -.16 (-4.4) | 0.08 |
| 1956-65 | -7.4 (-84.2) | -10.1 (-18.5) | -.25 (-17.3) | -.13 (-3.5) | 0.10 |
| 1957-66 | -7.1 (-86.4) | -10.1 (-19.8) | -.23 (-17.9) | -.20 (-6.0) | 0.10 |
| 1958-67 | -7.6 (-89.4) | -8.9 (-18.5) | -.25 (-19.8) | -.22 (-6.9) | 0.11 |
| 1959-68 | -7.0 (-92.0) | -8.6 (-18.3) | -.27 (-21.6) | -.21 (-6.9) | 0.11 |
| 1960-69 | -7.0 (-95.9) | -7.7 (-17.2) | -.28 (-23.4) | -.21 (-6.9) | 0.11 |
| 1961-70 | -7.0 (-106.3) | -8.5 (-23.9) | -.30 (-25.0) | -.13 (-4.4) | 0.12 |
| 1962-71 | -6.8 (-107.1) | -9.5 (-30.4) | -.30 (-25.6) | -.14 (-4.6) | 0.14 |
| 1963-72 | -6.6 (-104.9) | -10.7 (-35.5) | -.31 (-26.6) | -.16 (-5.4) | 0.17 |
| 1964-73 | -6.5 (-102.6) | -11.4 (-37.9) | -.29 (-25.6) | -.19 (-6.6) | 0.17 |
| 1965-74 | -6.4 (-102.3) | -11.6 (-38.3) | -.29 (-23.9) | -.17 (-6.0) | 0.16 |
| 1966-75 | -6.3 (-104.0) | -11.1 (-39.9) | -.29 (-23.1) | -.18 (-6.2) | 0.16 |
| 1967-76 | -6.4 (-114.5) | -9.4 (-41.5) | -.30 (-24.8) | -.16 (-5.1) | 0.17 |
| 1968-77 | -6.3 (-114.6) | -9.5 (-43.2) | -.32 (-28.5) | -.11 (-4.2) | 0.19 |
| 1969-78 | -6.1 (-102.9) | -8.0 (-35.4) | -.35 (-33.9) | -.12 (-3.9) | 0.19 |
| 1970-79 | -6.0 (-101.0) | -7.8 (-37.8) | -.35 (-32.8) | -.15 (-5.1) | 0.20 |
| 1971-80 | -5.9 (-100.9) | -7.6 (-37.2) | -.36 (-33.8) | -.13 (-4.6) | 0.19 |
| 1972-81 | -6.0 (-101.5) | -7.2 (-37.4) | -.38 (-37.0) | -.08 (-3.2) | 0.20 |
| 1973-82 | -6.0 (-103.2) | -7.0 (-38.8) | -.37 (-37.2) | -.01 (-0.5) | 0.20 |
| 1974-83 | -6.1 (-103.3) | -6.6 (-39.6) | -.37 (-38.3) | .06 (2.2) | 0.20 |
| 1975-84 | -6.1 (-101.6) | -6.4 (-41.7) | -.36 (-37.5) | .08 (2.9) | 0.20 |
| 1976-85 | -6.1 (-101.0) | -5.8 (-42.4) | -.35 (-37.1) | .10 (3.6) | 0.20 |
| 1977-86 | -6.0 (-97.0) | -6.9 (-44.3) | -.32 (-33.6) | .10 (3.5) | 0.20 |
| 1978-87 | -5.9 (-97.4) | -6.7 (-44.8) | -.30 (-32.1) | .06 (2.3) | 0.20 |
| 1979-88 | -5.8 (-97.7) | -6.1 (-48.8) | -.31 (-34.5) | .03 (1.1) | 0.24 |
| 1980-89 | -5.7 (-98.9) | -5.9 (-49.7) | -.32 (-35.1) | .04 (1.6) | 0.25 |
| 1981-90 | -5.6 (-98.0) | -5.9 (-50.2) | -.31 (-35.5) | .01 (0.4) | 0.26 |
| 1982-91 | -5.5 (-96.6) | -5.9 (-51.0) | -.31 (-35.1) | -.01 (-0.3) | 0.26 |
| 1983-92 | -5.5 (-97.0) | -5.8 (-50.7) | -.28 (-33.3) | .00 (0.1) | 0.25 |
| 1984-93 | -5.5 (-97.0) | -5.7 (-50.6) | -.29 (-34.4) | .03 (1.4) | 0.25 |
| 1985-94 | -5.5 (-98.9) | -5.5 (-49.3) | -.30 (-35.8) | .06 (2.6) | 0.24 |
| 1986-95 | -5.5 (-98.7) | -5.4 (-48.1) | -.31 (-37.2) | .07 (3.4) | 0.24 |
| 1987-96 | -5.4 (-96.5) | -5.4 (-49.3) | -.30 (-36.9) | .03 (1.4) | 0.24 |
| 1988-97 | -5.4 (-97.2) | -5.2 (-49.7) | -.31 (-38.5) | .04 (2.0) | 0.24 |
| 1989-98 | -5.3 (-93.7) | -5.3 (-51.5) | -.28 (-35.4) | .01 (0.4) | 0.24 |
| 1990-99 | -5.2 (-92.1) | -5.3 (-52.0) | -.29 (-35.6) | -.034 (-1.4) | 0.23 |
| 1991-2000 | -5.1 (-92.1) | -5.1 (-52.0) | -.29 (-35.6) | -.04 (-2.6) | 0.24 |
| 1992-2001 | -5.0 (-86.8) | -5.1 (-52.9) | -.27 (-33.0) | -.11 (-5.5) | 0.25 |
| 1993-2002 | -5.0 (-82.9) | -4.9 (-52.9) | -.26 (-31.5) | -.12 (-6.1) | 0.25 |

# Table 3: Estimates for the Pooled Sample
*(Each Observation is an Individual Firm-Year)*

## Panel A: Estimates for Equations 5 and 6, All US Manufacturing Firms

*(Dependent Variable is $ROA_{it}$; t-statistics Reported in Parentheses; Number of Observations is 109,475)*

| **Basic Difference Equation 5** | | $ROA_{i,t-1}$ | $ROA_{i,t-1}$ *(Year-1950) | $ROA_{i,t-1}$ *(Year-1950)$^2$ | Fixed Effects for Years | Fixed Effects for Firms | R-Square Statistic |
|---|---|---|---|---|---|---|---|
| Specification A | | .39 (31.3) | -.04 (-13.5) | | Yes | Yes | .35 |
| Specification B | | .48 (22.5) | -.017 (-11.1) | .00019 (8.5) | Yes | Yes | .36 |
| **Associated Variance Equation 6** | Intercep | (Year-1950) | $Pred(ROA)_{it}$ | $Pred(ROA)_{it}$ *(Year-1950) | ln(Sale) | ln(Age) | R-Square Statistic |
| Specification A | -6.4 (-121.1) | .037 (12.3) | -2.32 (-12.1) | -.04 (-9.0) | -.17 (-48.9) | .03 (4.1) | .18 |
| Specification B | -6.5 (-122.1) | .038 (11.8) | -2.33 (-12.2) | -.06 (-14.3) | -.20 (-51.7) | .07 (9.1) | .18 |

## Panel B: Estimates for Equations 5 and 6, Large and Established Firms Only

*(Dependent Variable is $ROA_{it}$; t-statistics Reported in Parentheses; Number of Observations is 60,816)*

| **Basic Difference Equation 5** | | $ROA_{i,t-1}$ | $ROA_{i,t-1}$ *(Year-1950) | $ROA_{i,t-1}$ *(Year-1950)$^2$ | Fixed Effects for Years | Fixed Effects for Firms | R-Square Statistic |
|---|---|---|---|---|---|---|---|
| Specification A | | .45 (22.9) | -.057 (-12.3) | | Yes | Yes | .38 |
| Specification B | | .47 (15.1) | -.014 (-6.2) | .00011 (3.7) | Yes | Yes | .39 |
| **Associated Variance Equation 6** | Intercep | (Year-1950) | $Pred(ROA)_{it}$ | $Pred(ROA)_{it}$ *(Year-1950) | ln(Sale) | ln(Age) | R-Square Statistic |
| Specification A | -4.7 (-81.3) | .042 (9.5) | -4.42 (-15.1) | -.08 (-8.5) | -.16 (-37.5) | .02 (2.4) | .09 |
| Specification B | -4.8 (-82.6) | .041 (9.8) | -5.53 (-16.2) | -.08 (-8.3) | -.15 (-34.9) | .02 (2.7) | .09 |

# Table 4: Estimates for the Pooled Sample

*(Each Observation is the Overall Sector in a Given Year)*

Panel A: Estimates for Trends in Financially Unstable Firms in the Sector

*(Dependent Variable Is Number of Firms Suffering Any of the Three Forms of Financial Instability; t-statistics Reported in Parentheses; Number of Observations is 52)*

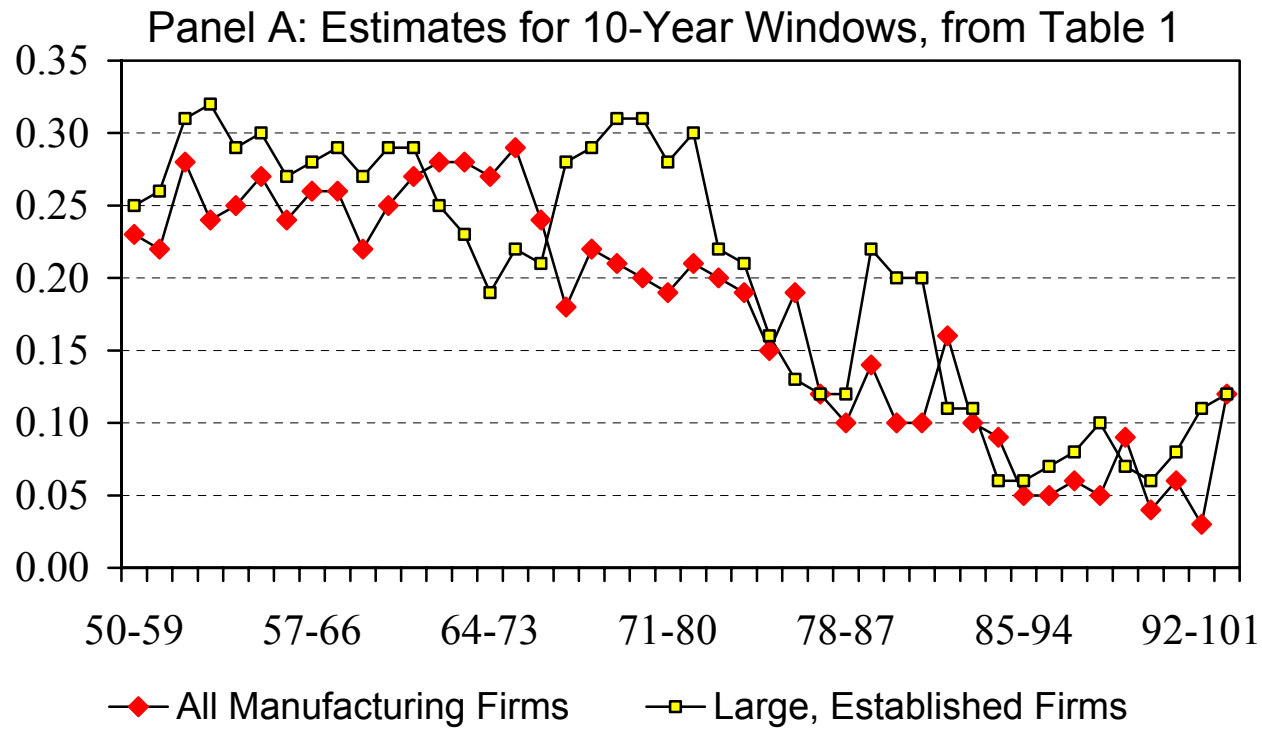
| **All Manufacturing Firms** | Intercept | (Year-1950) | (Year-1950)$^2$ | (Year-1950)$^3$ | R-Square Statistic |
|---|---|---|---|---|---|
| Specification A | -151.7<br>(-7.03) | 14,8<br>(20.7) | | | 0.89 |
| Specification B | -17.0<br>(-.92) | -1.06<br>(-.65) | .30<br>(9.97) | | 0.96 |
| Specification C | 35.6<br>(1.75) | -14.1<br>(-4.01) | .93<br>(5.94) | -.01<br>(-4.06) | 0.97 |
| **Large, Established Firms Only** | | | | | |
| Specification A | -63.9<br>(-5.45) | 5.06<br>(13.04) | | | 0.76 |
| Specification B | 18.7<br>(2.75) | -4.64<br>(-7.69) | .19<br>(16.62) | | 0.96 |
| Specification C | 4.73<br>(.57) | -1.26<br>(-.90) | .02<br>(.36) | .002<br>(2.67) | 0.97 |

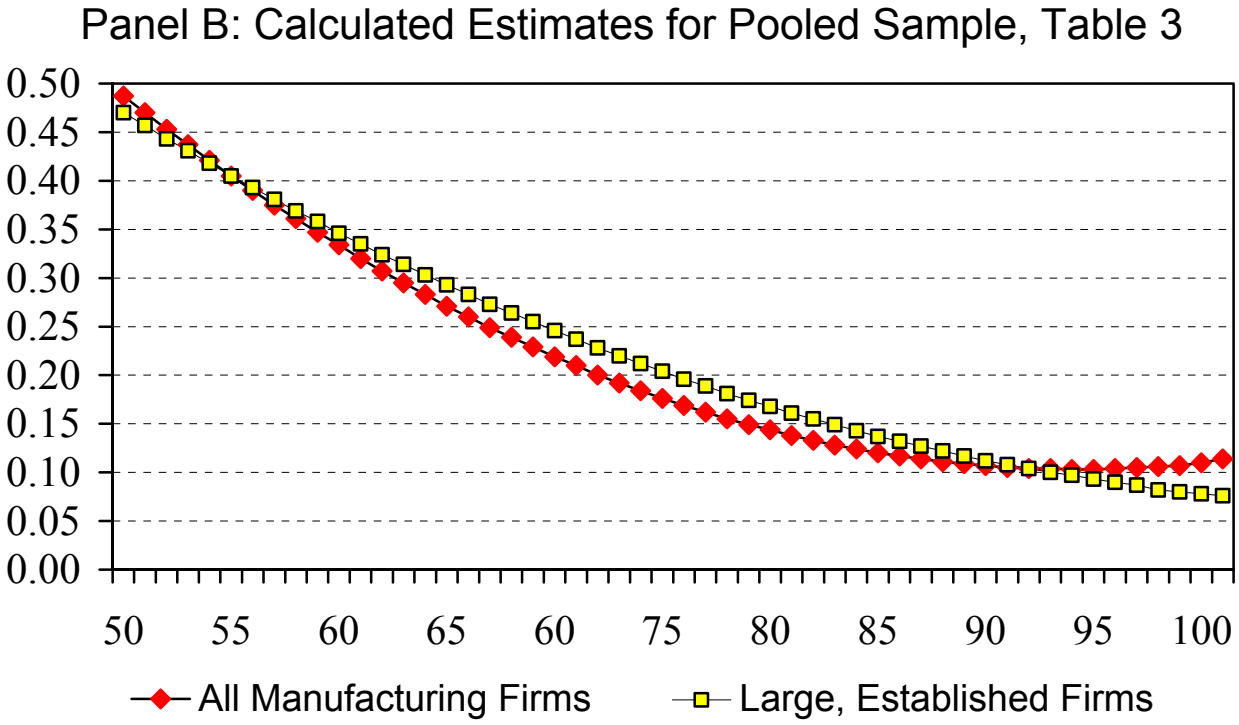
Panel B: Estimates for Trends in Entry and Exit of Firms in the Sector

*(Dependent Variables Are Percentage of Firms That Enter or Exit in Given Year; t-statistics Reported in Parentheses; Number of Observations is 52)*

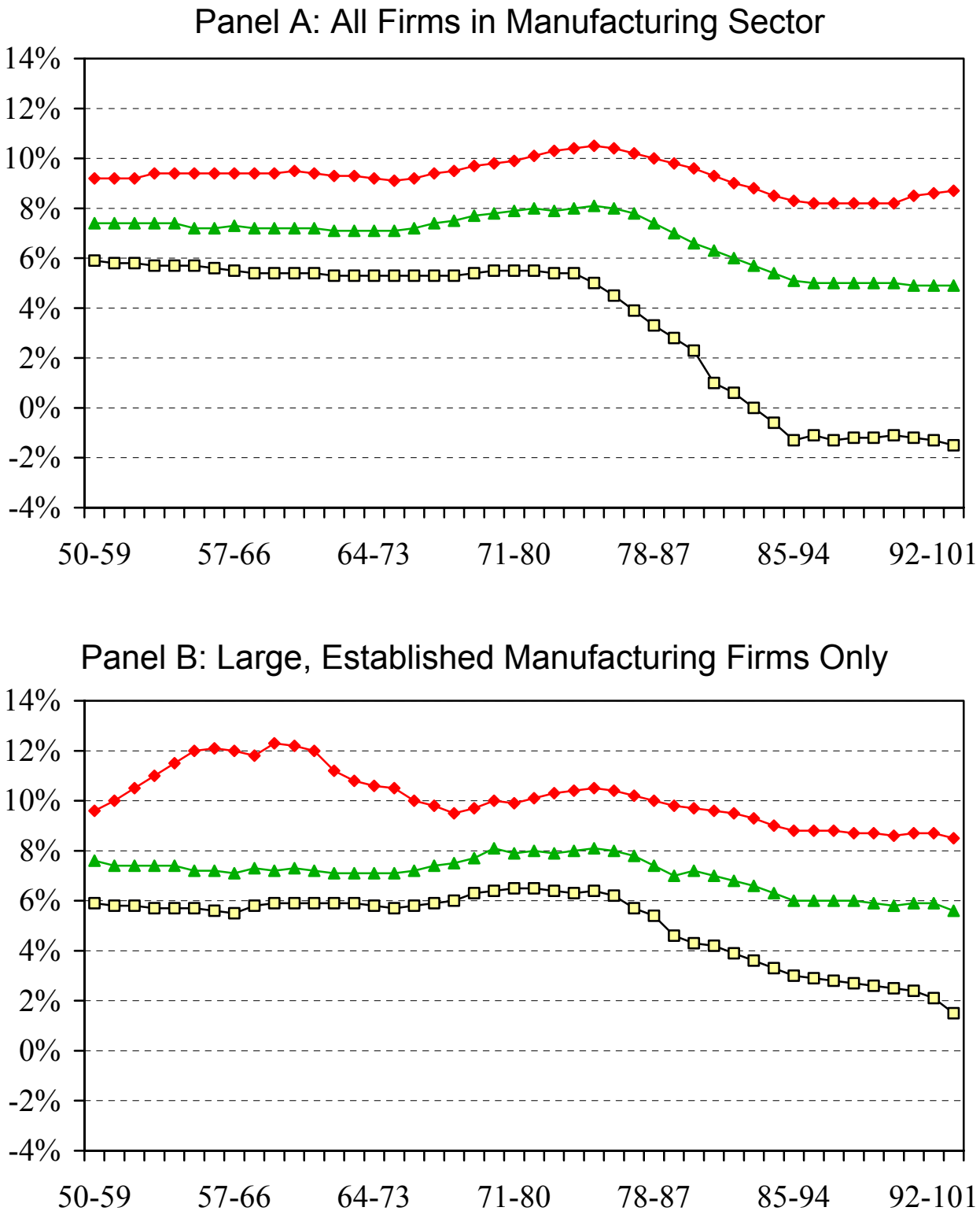
| **Entry for All Manufacturing Firms** | Intercept | (Year-1950) | (Year-1950)$^2$ | Mean Sector ROA | Binary Variables for Launch Years of Amex & Nasdaq | R-Square Statistic |
|---|---|---|---|---|---|---|
| Specification A | -.01<br>(-.77) | .002<br>(4.88) | | .52<br>(3.59) | Yes | 0.83 |
| Specification B | -.01<br>(-.65) | .001<br>(1.57) | .00001<br>(.84) | .57<br>(3.65) | Yes | 0.83 |
| **Exit for All Manufacturing Firms** | | | | | | |
| Specification A | .02<br>(1.14) | .002<br>(3.87) | | -.15<br>(-1.06) | No | 0.64 |
| Specification B | .02<br>(1.28) | .0005<br>(.71) | .00002<br>(1.48) | -.08<br>(-.53) | No | 0.65 |

# Figure 1: Estimated Annual Persistence Rate for Firms in Manufacturing Sector, 10-Year Windows

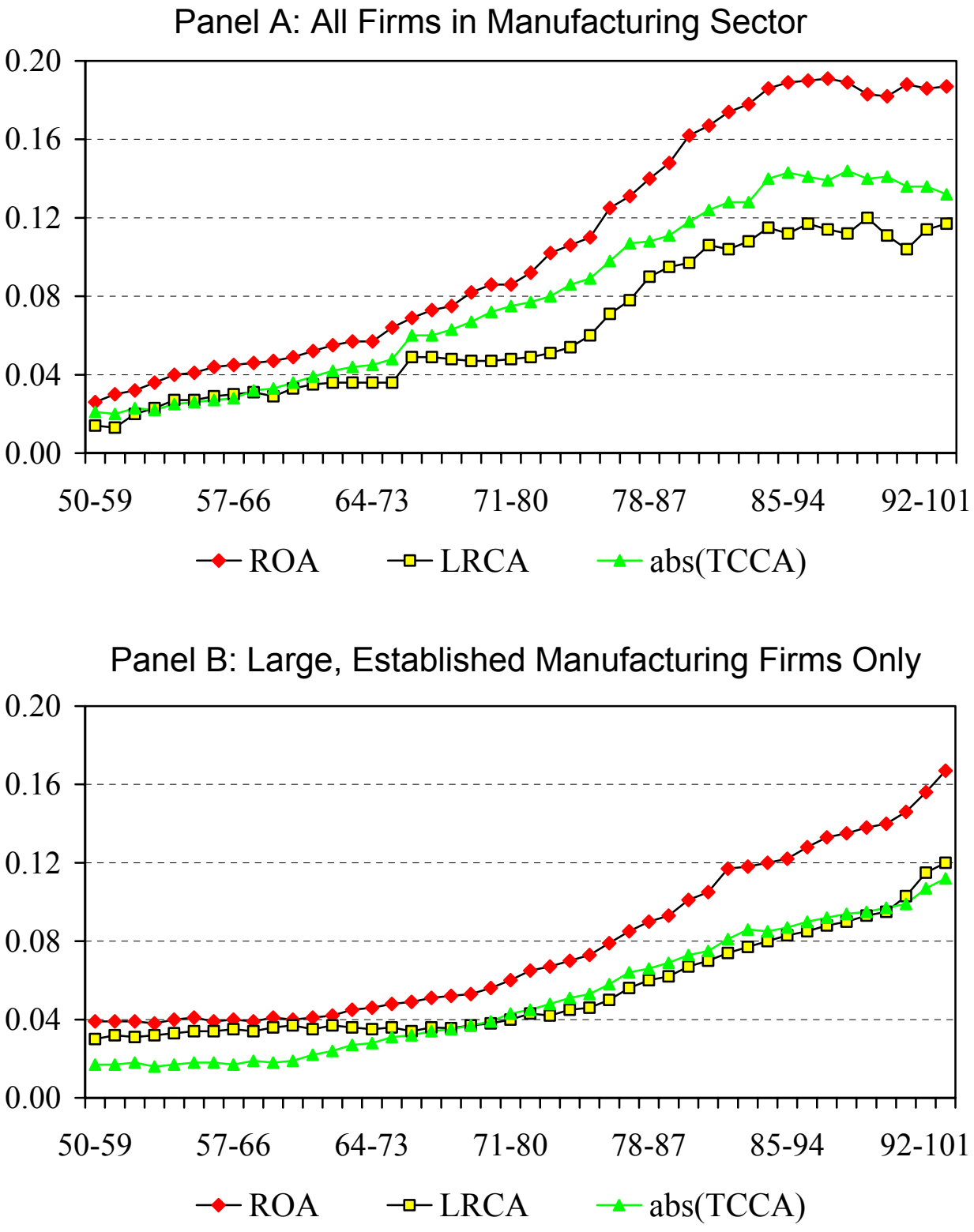


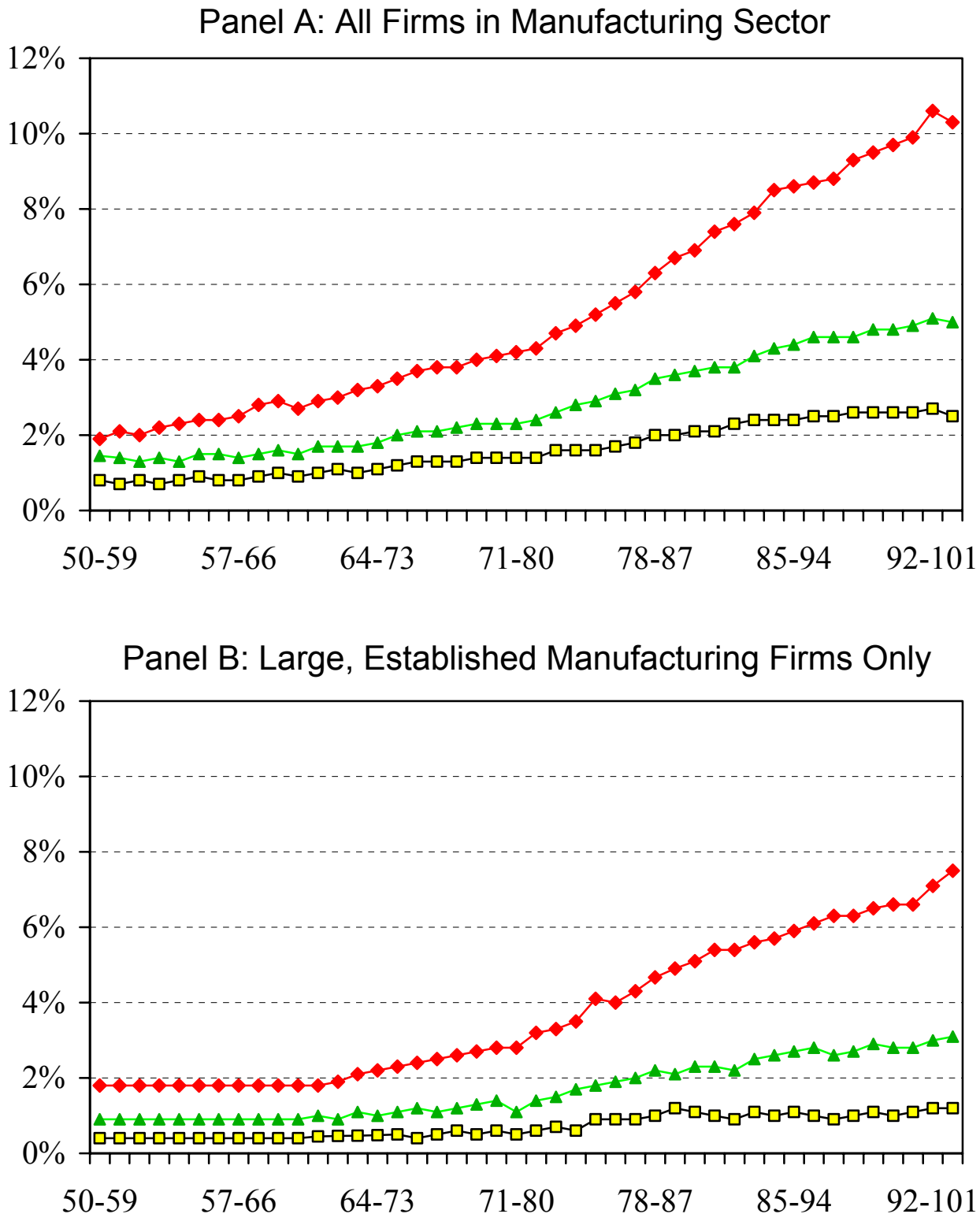
# Figure 2: Quartiles of Estimated LRCA Across Manufacturing Firms, 10-Year Windows



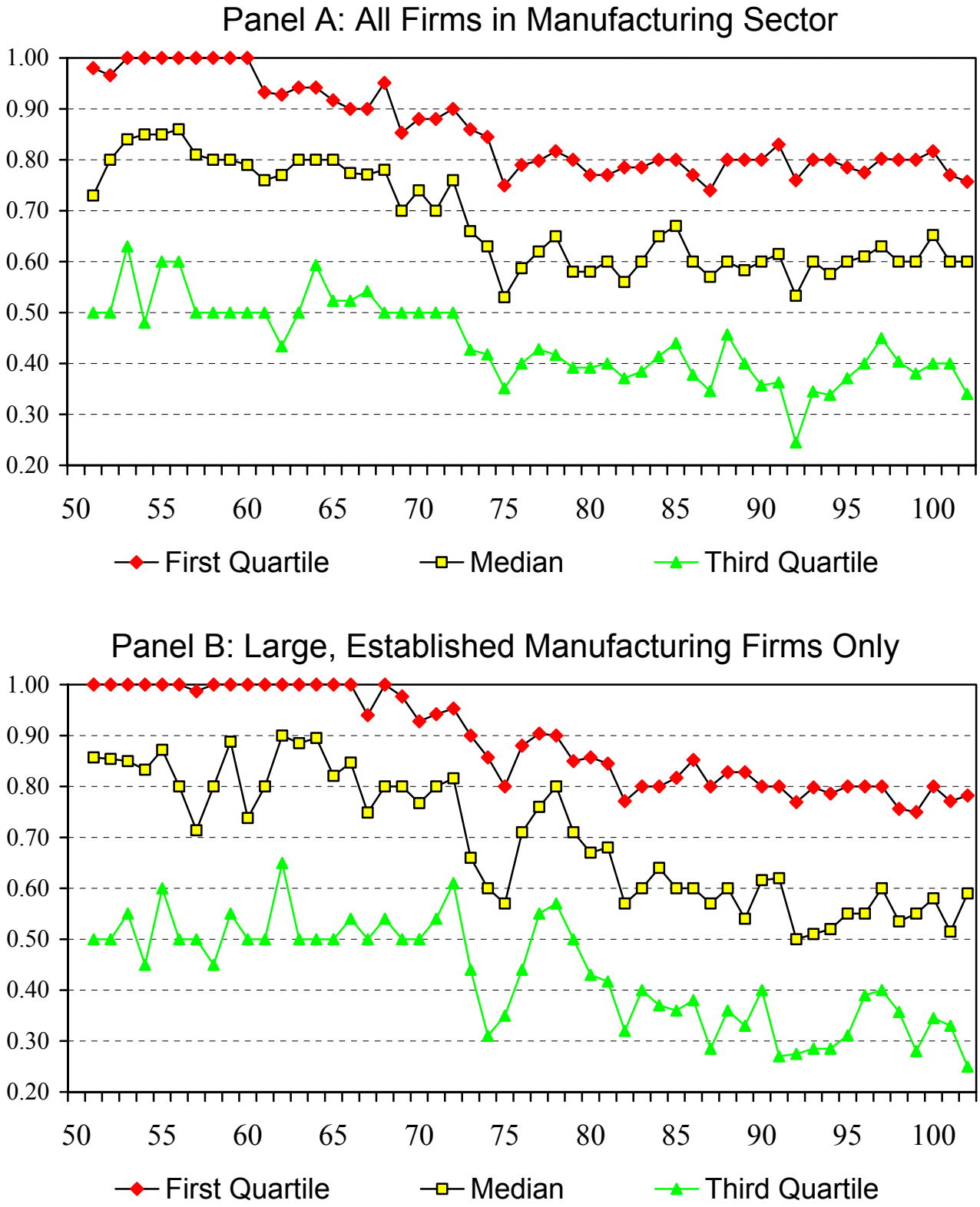
## Figure 3: Intra-Industry Standard Deviations: Medians Across Manufacturing Industries, 10-Year Windows



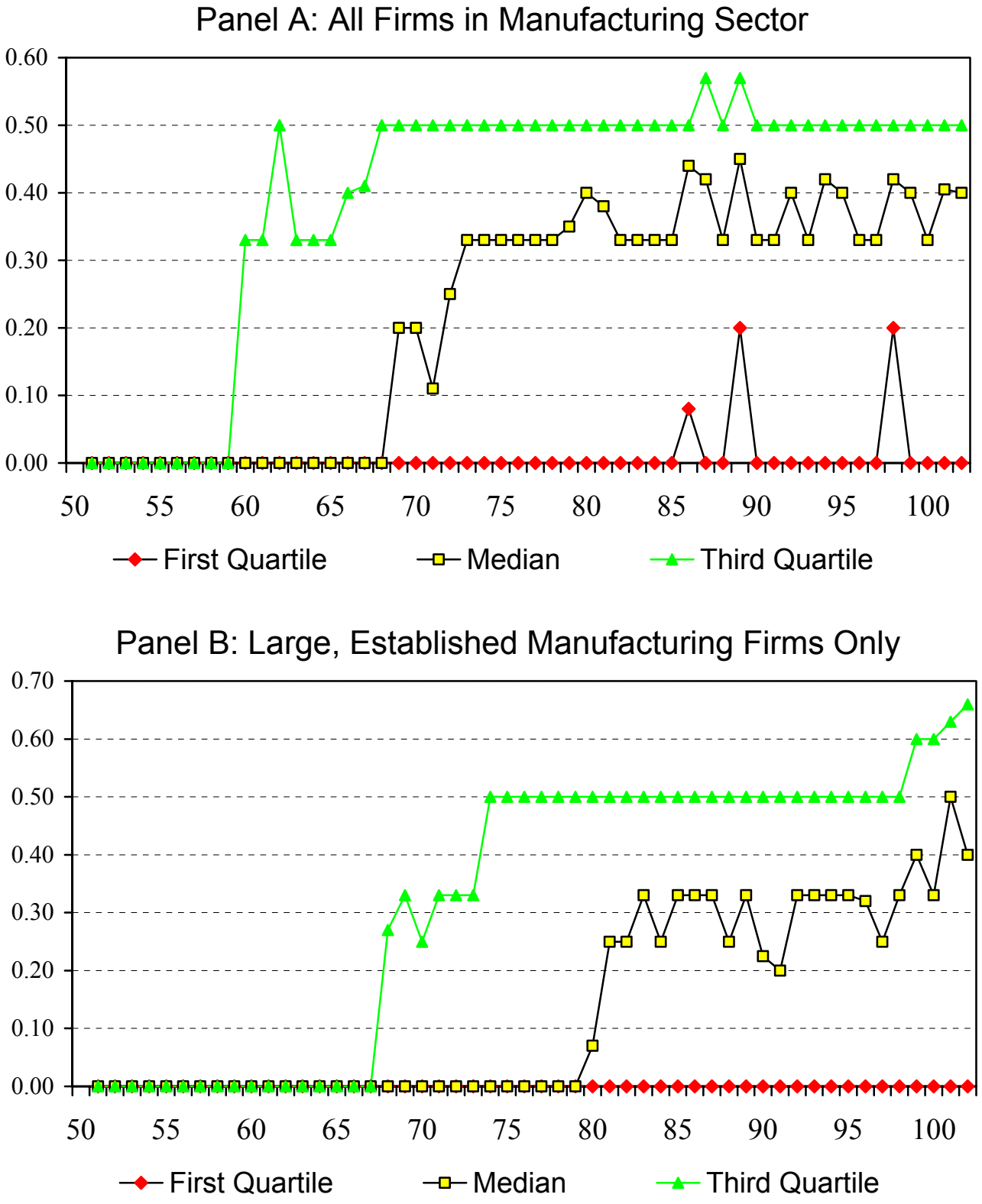
# Figure 4: Quartiles of Estimated mean(abs(TCCA)) Across Manufacturing Firms, 10-Year Windows



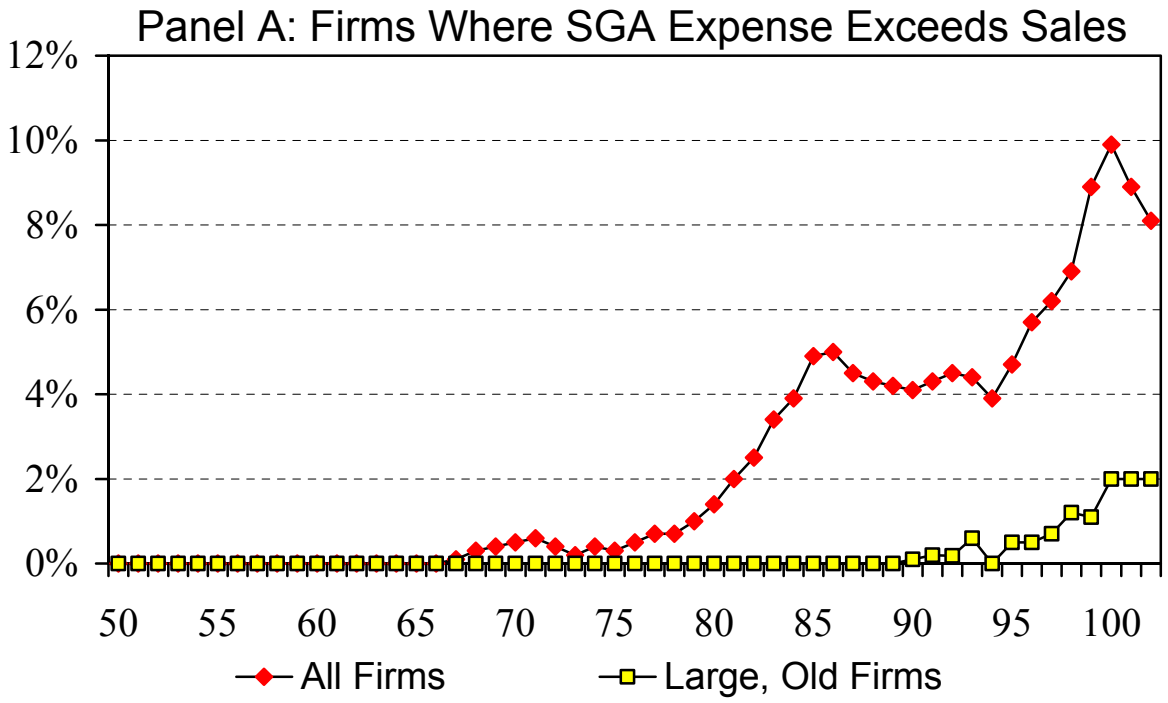
# Figure 5: Dethronement: Spearman Rank Order Correlations for Year-to-Year ROA Among Firms in 4-Digit SIC Industries

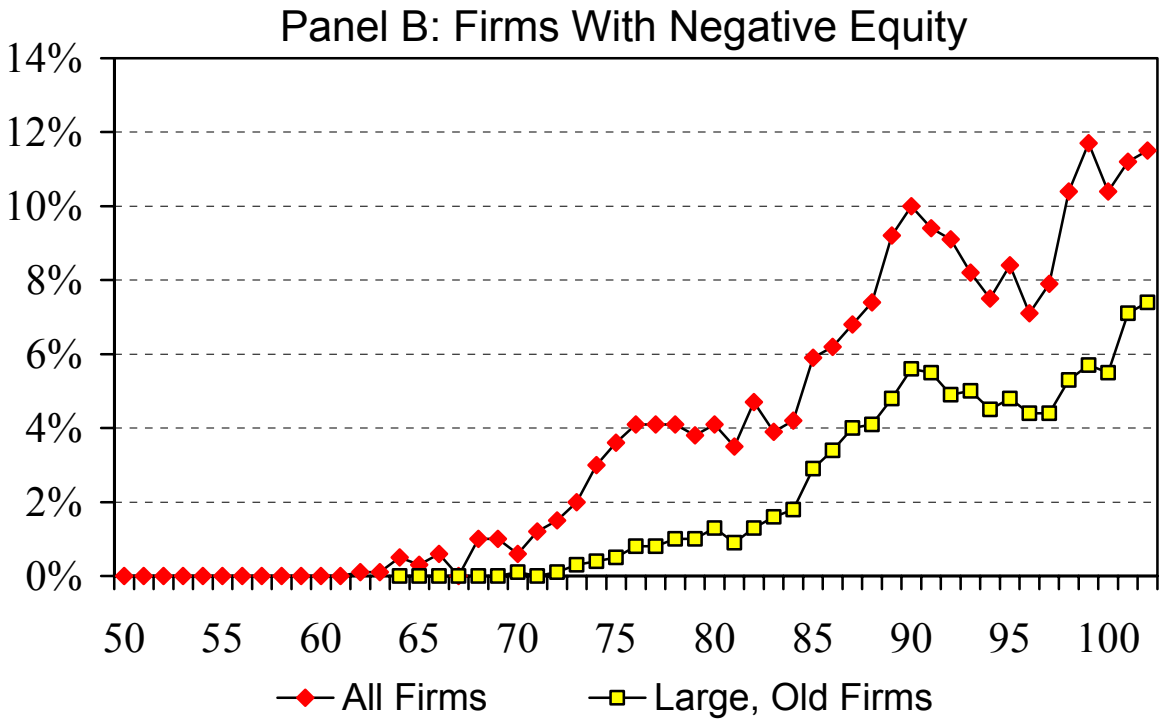


# Figure 6: Dethronement: Percent of Firms Losing Membership in Top Quartile for Year-to-Year ROA, 4-Digit SIC Industries

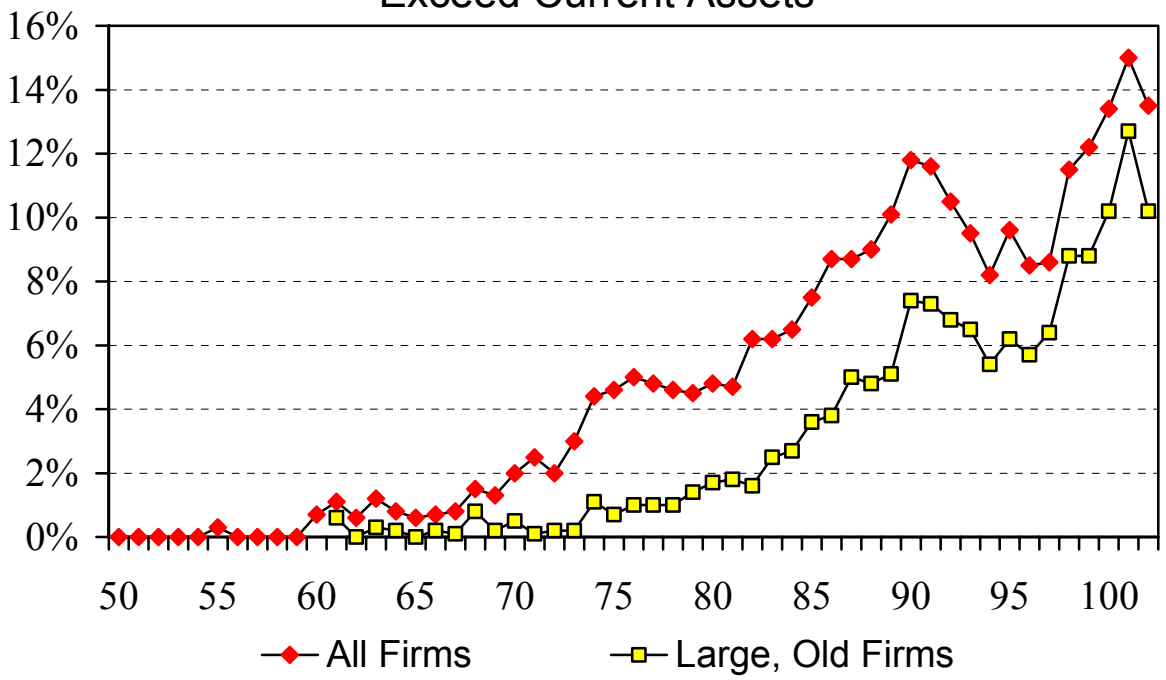


# Figure 7: Financially Unstable Firms as Percentage of US Manufacturing Firms, by Year

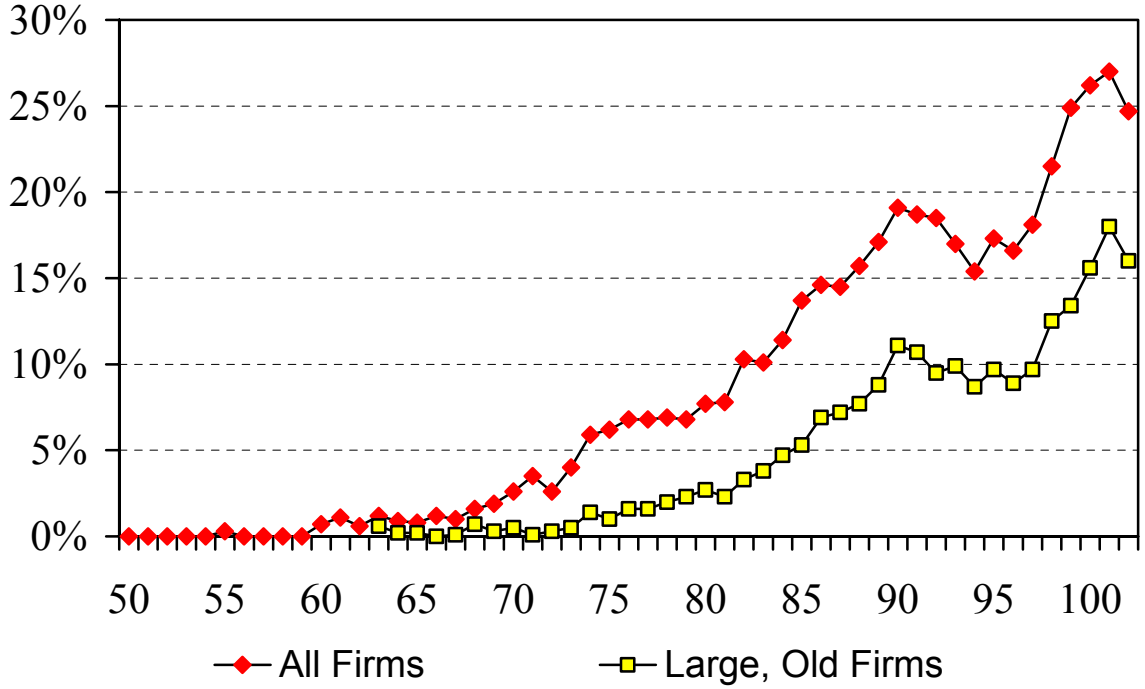


Panel C: Firms Where Current Liabilities Exceed Current Assets




Panel D: All Unstable Manufacturing Firms (Any of the Above Three Types)



# Figure 8: Average Duration of Instability for Unstable Firms

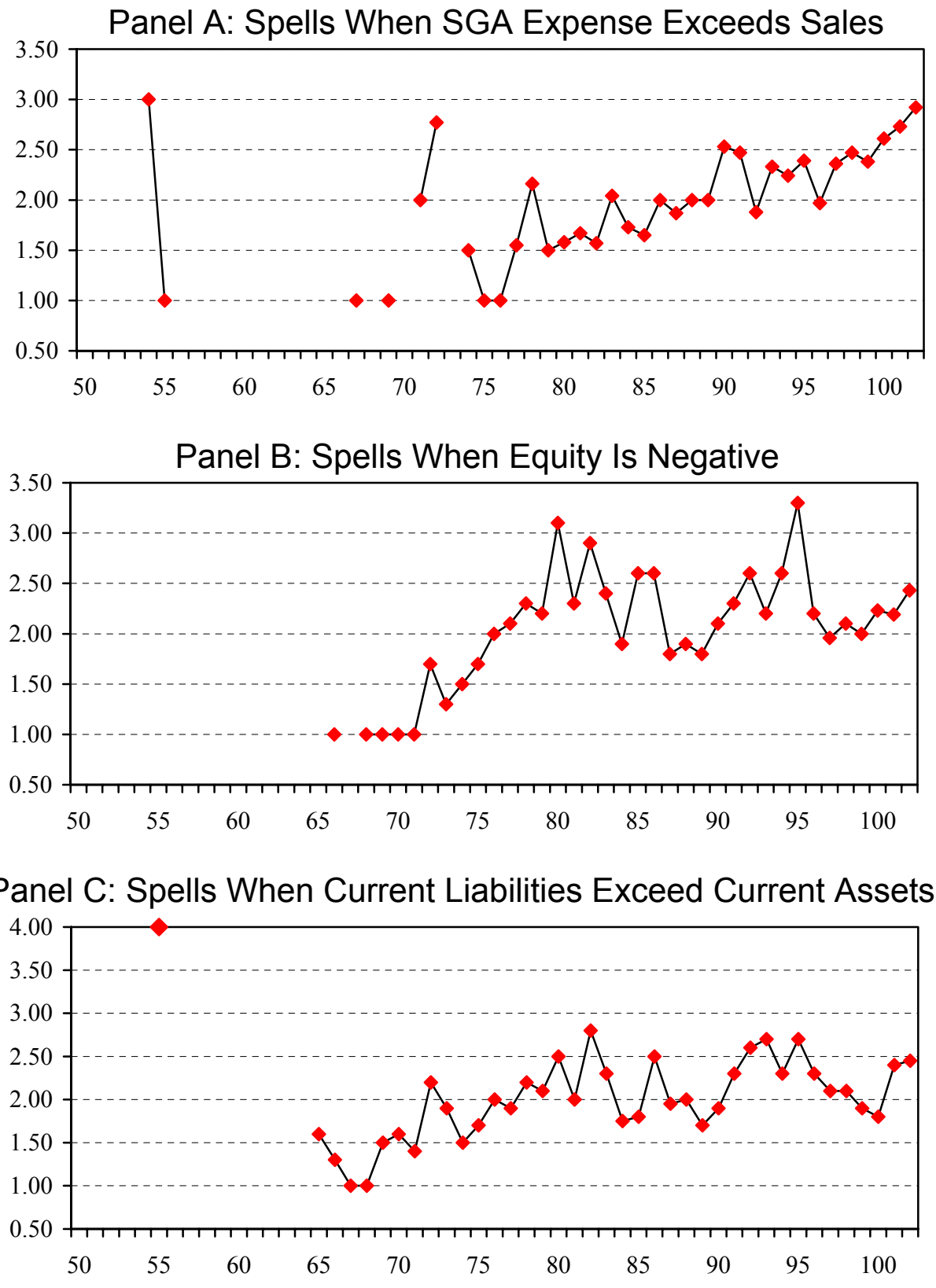


Figure 9: Industry (4-Digit SIC) Fixed Effects as Percentage Determinant of Firm LRCAs, 10-Year Windows, All Manufacturing Firms

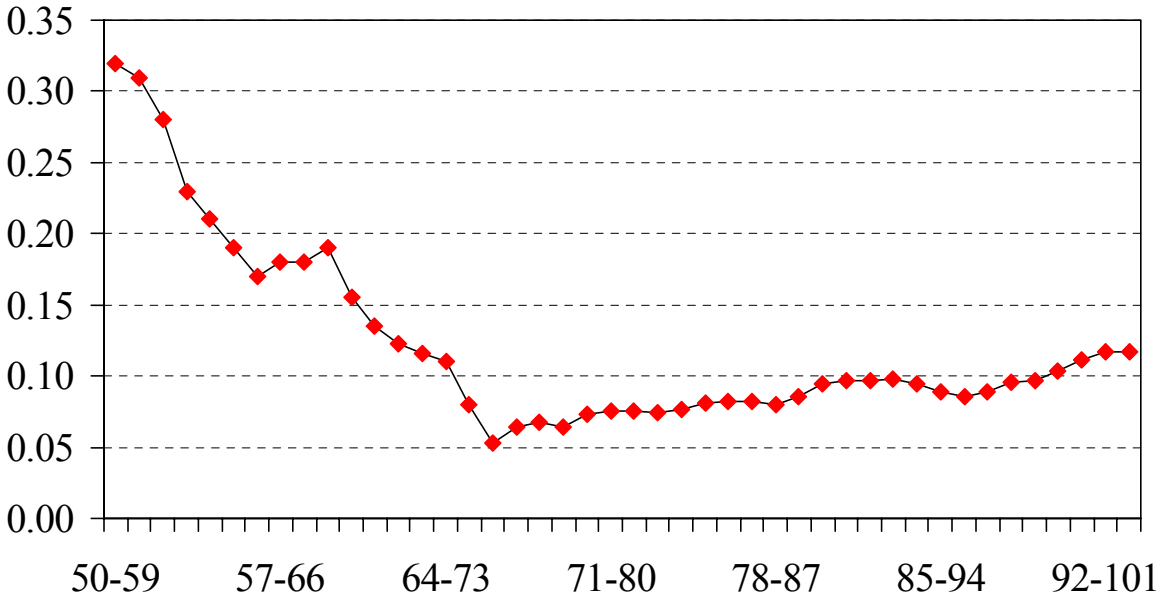
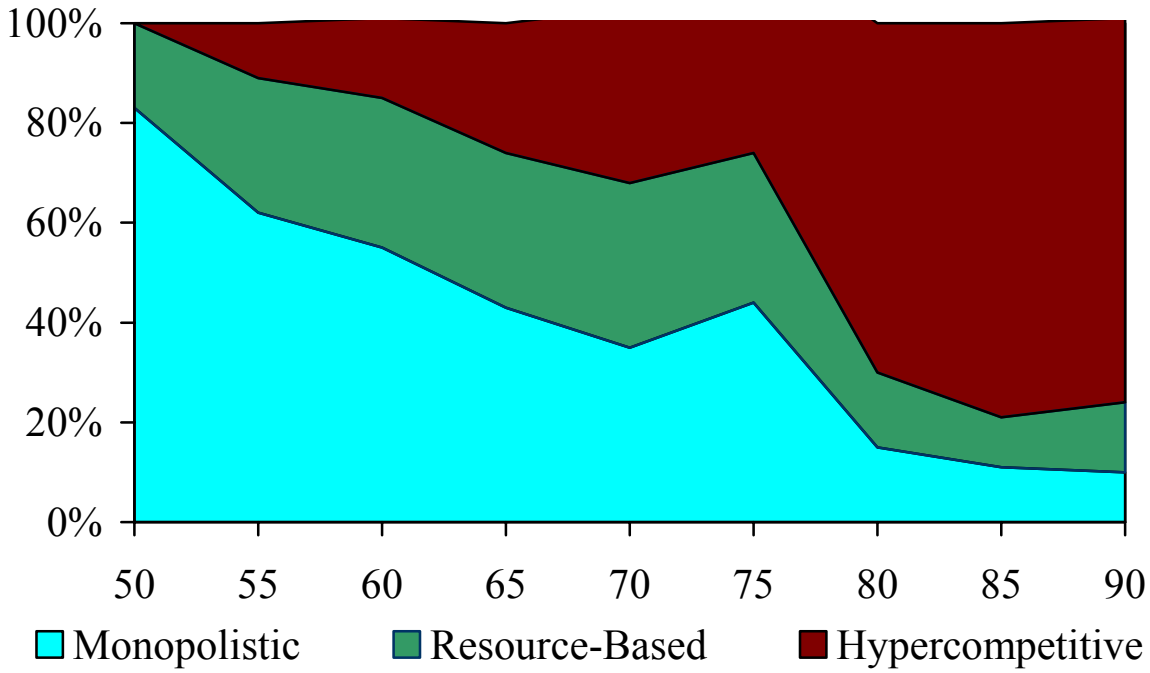



Figure 10: Calculated Competitive Types for Individual 4-Digit SIC Industries as a Share of All Manufacturing Industries, By Year, All Firms



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