Chapter 2

Nothing Endures but Change: Studying Changes in Industry Choice and Determinism*

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Abstract

Much of the extant management research implies that the existence of industries and organizations depends on variables and factors largely beyond their control, and survival is the result of a happy confluence of their origins, events, and growth rather than actions of conscious volition. The authors suggest that industry circumstances can be overcome. So, rather than studying rates of organization population change as effects of environmental change, the authors propose that some managerial actions can be taken that, in the aggregate, will affect the industry context. Changes in concentration should influence the environment in which industry members will compete later. Migration moves and rationalization of production facilities, along with organization population pressures, should exert strong influences on changes in the industry environments. Such findings suggest that some degree of strategic choice is at work and that firms have some discretionary choice in their industries.

Keywords: Change; environmental determinism; organizational task environment; overshooting; population ecology; strategic choice

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Introduction

The assertion that "nothing endures but change" is no less true today than when Heraclitus said it 2,500 years ago. Environmental change – especially if radical – obligates a population to adapt for survival (Suarez & Olivia, 2005). Thus, adaptation to environmental change figures prominently in organization and strategy research (Weick & Quinn, 1999). Often management research implies that the survival of industries and entities in them are, in Curly Howard's words, "a victim of circumstance" (White, 1936). Organizational existence is portrayed as dependent upon variables largely beyond management control, and survival is the result of a union of events related to historical accidents rather than actions of conscious volition. So our fate, as Shakespeare put it, may be more "in our stars … [than] in ourselves …" (in *Julius Caesar, Act 1, Scene 2, pp. 139-141)*. This is more than a philosophical debate (Rummel, 2002).

Baumeister (2008, p. 18) notes, "The distinction between free choice and unfree action has enormous and widespread significance …." He notes that, minimally, belief in free will tend to hold societies together by driving people toward more socially desirable acts. In the world of commerce, Altman (2006) notes "the assumption of free will in … economic theory [is a] critical … assumption in economics."

Closer to the study of management, researchers have debated the extent to which organizations are masters of their fates versus pawns to the whims of the environment (e.g., De Rond & Thietart, 2007; Hrebiniak & Joyce, 1985; Lawless & Finch, 1989). Some see organizations as having primacy (e.g., Astley & Van de Ven, 1983; Marlin, Lamont, & Hoffman, 1994), while others see environment as being of principal importance (e.g., Aldrich & Pfeffer, 1976; Hannan & Freeman, 1977; McKelvey & Aldrich, 1983). These two groups represent the extremes regarding how we view the degree to which fate and free will play in the destinies of the organizations in which we spend most of our working lives.

However, others have sought to resolve the gap between the two perspectives (e.g., De Rond & Thietart, 2007; Mellahi & Wilkinson, 2004) and recent empirical studies make use of in-depth multilevel longitudinal observations (e.g., Murmann, 2013) to address "the joint and dynamic outcome of strategic choice, and environmental and institutional effects" (Abatecola, 2013, p. 25). Such studies may bring together the views of choice and determinism, but their multilevel analysis may introduce idiosyncratic organizational and individual variables that make testing the impact of industry variation and selection difficult (see Child, Tse, & Rodrigues, 2013). Our approach is to study both choice and determinism while maintaining the level of analysis at a manufacturing sector level that there is an interplay of this–then–that states (Edelman & Benning, 1999), where the environment may influence the population and aggregate population actions influence the environment.

By viewing choice and determinism in this dynamic manner, we address the criticism aimed at Hrebeniak and Joyce (1985) and subsequent empirical work by Lawless and Finch (1989) of failing to address issues of environmental change and adaptation over time (Bedeian, 1990; Lawless & Finch Tegarden, 1990). This criticism has genuine merit since populations that advanced their position in one set of environmental conditions may later find that they are badly mismatched to a changed environment. It is thus incumbent upon researchers to gain a better

understanding of change and the ways populations address change at the industry level. Hence, the main purpose of this study is to empirically explore how industries respond to discontinuity in environmental determinism and choice. A second related purpose is to examine how such actions impact later changes in determinism and choice to see the degree of match, or lack thereof, between change and adaptation over time.

By looking for changes in the degree of choice and determinism in organizational task environments one can investigate the impact between the environment and the aggregate population that exists within it. Such an approach is grounded in Hrebeniak and Joyce's (1985) proposition that choice and determinism are orthogonal independent dimensions that can each be weak or strong. Their proposition creates a two-by-two matrix in which a change from one quadrant to another represents a discontinuity that may be difficult for industry populations to address. Given that such discontinuities must be addressed, (1) how do industry populations respond to them and (2) is there any way in which they (can) act proactively to address them? Such a study would make three contributions to our current state of knowledge. First, it would expand earlier studies by Hrebeniak and Joyce (1985) and Lawless and Finch (1989) by mapping types of environmental change onto their independent dimensions of choice and determinism in task environments and thus address the concerns of Bedeian (1990) and Lawless and Finch Tegarden (1990) noted above. Second, such a study would provide an opportunity to understand how economic sectors respond to environmental changes and modifies its choices in a relatively under-explored unit of analysis (notable exceptions include McGahan & Porter, 1997; Rumelt, 1991; Schmalensee, 1985). Third, it provides an opportunity to understand environmental change and adaptation by industries over time.

This chapter is organized as follows. The first section presents a brief review of the literature highlighting a typology of choice–determinism interactions. The second section presents a discussion of four industry strategies based on industry behavior given different types of change. The final section presents discussion and conclusions.

Literature Review

One perspective sees those at the top of organizations as having little power in the face of deterministic environmental forces (Aldrich & Pfeffer, 1976; Hannan & Freeman, 1977). This perspective is known as population ecology (Aldrich, 1979; McKelvey & Aldrich, 1983), organizational ecology (Mellahi & Wilkinson, 2004), or the minimum choice view (Marlin et al., 1994). This perspective assumes that organizational conduct is so constrained by past institutional arrangements that firms are unlikely to change even in the face of a strong impetus to do so (Hannan & Freeman, 1984; Singh, House, & Tucker, 1986). "Classical industrial organization and organization ecology scholars …" as Mellahi and Wilkinson (2004, p. 21) note, perceive

> a deterministic role of the environment and argued that managers are constrained by exogenous industrial and environmental constraints leaving them with little real strategic choice, and hence managers' role should be ignored.

This tends to lead to an overall focus on environmental or industry level variables. Because of its primary focus on populations, this perspective attaches little or no importance to the role of strategic choices managers may make to guide their organization and, arguably, only industry-wide analysis is possible (Baum & Shiplov, 2006).

The second perspective, known as strategic choice (Thompson, 1967), managerial choice (Child, 1972; Lawless & Finch, 1989), or maximum choice (Marlin et al., 1994) views managers as having extensive free will (D'Aveni, 1987). The firm's fate is in managers' hands and they are viewed as being able to craft and execute strategy, modify firm structure, and impact environmental elements to their advantage (Child, 1972). Mellahi and Wilkinson (2004, p. 21) note that

> organization studies and organizational psychology literature … argues that managers are the principal decision makers of the firm and, consequently, their actions and perceptions are the fundamental cause of organizational failure.

There is, of course, a middle ground between the two perspectives calling for a merger of the two views (e.g., Hrebiniak & Joyce, 1985; Lawless & Finch, 1989; Mellahi & Wilkinson, 2004). As well, the study of organizations and their survival speaks to a need to merge the two perspectives. Sheppard and Chowdhury (2005) note that

> it is critical to our understanding of organizational survival and failure that … a firm's management, its environment, and the way the firm interacts with its environment all play a role in determining its ultimate fate.

Given how important the fit between the organization and its environment is, one would logically expect attempts to merge the two perspectives.

Mellahi and Wilkinson (2004, p. 32) merge such views by bringing various perspectives together; noting,

> A fundamental axiom of the integrative framework is that the different theoretical assumptions and linkages underlying each perspective are not only reconcilable but … provide a more comprehensive understanding … than any single perspective by itself.

They call for the study of the interaction of external environmental and ecological factors with internal organizational and psychological factors. A caveat is that there is a bias to "dismiss insights from the other perspective based on perceived methodological weaknesses" (Mellahi & Wilkinson, 2004, p. 33). From an organizational view, ecological views are seen as insensitive to the organizational, cognitive, and individual contexts in which managers make decisions. From an ecological view, organizational and psychological approaches have validity and comparability problems due to individual organization's idiosyncrasies, lack of environmental

observations, and small samples. In the absence of querying all businesses and people that have been in an industry over a long period, the ecologist's methodological objections appear nearly insurmountable.

A way of addressing the methodological problem is to use the approach taken by one side and include variables that would provide evidence as to the veracity of claims by the other. For example, using industry level variables can provide an indication that managers are making certain choices that affect their survival. This would allow for sufficient sample sizes and environmental observations by using industry level variables to provide evidence that industry actors may be taking logical actions to insure better survival outcomes. Thus, evidence may be found in industry level statistics that managers exercise choice as a way to overcome protests regarding data that may rely on idiosyncrasies in individual firms.

In this vein, the institutional perspective (Judge & Zeithaml, 1992) recognizes that firms exhibit isomorphic behaviors such that responses to changes in the environment create firm level changes that spread across the entire population and would thus be revealed by industry level statistics. This begs the question as to whether such behaviors are truly a matter of choice, or if people making such choices are truly free in doing so. Staddon (1995) argues that making a logically predictable choice is still free will. Isomorphic behaviors that spread to the general population are still an exercise of the decision makers' free will.

Despite the contradictory nature of the two perspectives, strategic choice theorists do not wholly discount the influence of the environment. McGahan and Porter (1997) attribute 39.5 percent of the variance in profitability to industry in agriculture/mining, wholesale/retail, lodging/entertainment, and services. Industry effects account for about 30 percent of the profitability variance in transport and for about 11 percent in manufacturing. Earlier work by Hansen and Wernerfelt (1989), Rumelt (1991), and Schmalensee (1985) confirm that industry effects in manufacturing account for just under 20 percent of profitability variance.

If both population ecologists and choice theorists agree that environment is important, what impact will the environment have on the population that exists in that environment, and how, as has been argued (Beschta & Ripple, 2016), might that population affect the context? One environmental influence is likely to be on the size of the population of firms, as population size influences the processes of variation, selection, retention, and competition inherent in the population ecology model (Aldrich, 1979; Baum, 1999; Baum & Shiplov, 2006; Campbell, 1965; McKelvey & Aldrich, 1983). Unlike actors in nature, firms can merge to avoid the liability of smallness (Hannan & Freeman, 1984) and insure their own survival.

If populations have some influence over their environment, what would they do? They may act to insure survival of the population. To do so they may seek to adapt to their environments by (a) moving their location to address issues of resource scarcity or resource competition (Boschma & Lambooy, 1999), or (b) seek to reduce resource competition through increased concentration (Bain, 1951). These items are more suggestive than exhaustive of some primary ways populations may move their environment toward a more benign state.

Environmental Change as Variation in the Choice/ Determinism Framework

In their classic work, Dess and Beard (1984) defined dimensions of organizational task environments as complexity, munificence, and dynamism. These dimensions are considered as important environmental influences on an organization's strategy (Abatecola, 2013; Castrogiovanni, 2002; Keats & Hitt 1988). For Dess and Beard (1984), munificence reflected a degree of resource availability or scarcity. Growth rates influence the firm's ability to attract resources and industry growth rates are related to munificence. Complexity deals with "the heterogeneity of and range of an organization's activities" in an environment (Dess & Beard, 1984, p. 56) that increases with environmental density (Aldrich, 1979). Dynamism makes it hard to predict change (Lawless & Finch, 1989). Uncertainty and turbulence in industries represent the absence of a regular pattern of environmental change with high deviation from linear growth rates (Dess & Beard, 1984).

Hrebiniak and Joyce (1985) postulate that choice and determinism can be thought of orthogonally where the environmental impact of choice and determinism can be weak or strong. Thus, choice and determinism can be thought of as independent dimensions forming a two-by-two matrix (Fig. 1). Lawless and Finch's operationalization of the choice and determinism model was developed via a cluster analysis of Dess and Beard's (1984) dimensions of organizational task environment. The relationship between Dess and Beard's dimensions of organizational task environment and Hrebiniak and Joyce's framework is summarized in the Appendix.

Lawless and Finch (1989) adopted Dess and Beard's values calculated for munificence, complexity, and dynamism for the years 1967–1977, and then clustered their factor scores to derive at Hrebiniak and Joyce's (1985) four environment types. The clusters produced Hrebiniak and Joyce's quadrants of (1) minimum choice (lower munificence); (2) differentiated choice (higher complexity); (3) maximum choice (higher dynamism); and (4) incremental choice (not distinguished along the three factors). Hrebiniak and Joyce's two dimensions and four environments are shown graphically in the figure below (Fig. 1).

		Environmental Determinism	
		Low	**High**
Strategic Choice	**High**	Quadrant 3 **Maximum Choice** (High dynamism environment)	Quadrant 2 **Differentiated Choice** (High complexity environment)
	Low	Quadrant 4 **Incremental Choice** (No favored environment)	Quadrant 1 **Minimum Choice** (Low munificent environment)

Fig. 1. The Strategic Choice and Environmental Determinism Framework

In a changing environment, a viable strategy one year may be a mismatch with the environment later. Mintzberg (1993) considers such environmental turbulence to be one of the pitfalls of planning. Farjoun (2007) goes as far as to call the speed of environmental change an end to strategy itself. In the face of environmental turbulence, managing becomes an exercise in picking an optimal business strategy as is currently possible and retaining business models and tactics that allow organizations to stay flexible (Casadesus-Masanell & Ricart, 2010). So, in the context of the choice and determinism framework, change and the ways organizations address it are measurable at industry level.

As shown in Fig. 2, Hrebiniak and Joyce's two-by-two choice and determinism framework can change over time. Thus, choice may decrease (top horizontal area) or increase (bottom horizontal area). As well, determinism may decrease (right side vertical section) or increase (left side vertical section). Both factors may remain stable over time (center) or they may both change (indicated by crosshatched corner sections). Thus, any Lawless and Finch quadrant may stay the same or change to any one of the other three quadrants (indicated by the boxes at the corners). The numbers at the bottom of each box indicate membership in quadrants one, two, three, or four over two periods of time (Fig. 2).

As noted and discussed further below, changes in quadrants may influence, or be influenced by, changes in industry concentration, location, and population size over time. The most serious of these changes for competitors are likely to be an unstable environment, that is, an undesirable minimum or a desirable maximum choice environment. Existing in a low choice, high determinism environment (a minimum choice environment) threatens the survival of actors in the population in a way that demands immediate attention. Alternately, existing in a high choice, low determinism environment invites participants to put pressure on the population to create change. Fig. 3 isolates those quadrants that may improve their situation through either increased choice or decreased determinism. Therefore, it is legitimate to ask how these industries respond to changes.

Strategic Actions and Pressures

Given the potential for instability in the environment, how can businesses cope with such disruptions? For our purposes, there are three measurable industry-related strategic variables that may influence the industry players' outcomes: concentration, migration, and population.

Concentration. Pursuing higher levels of industry concentration is one way in which organizations may stabilize their environments. One reason this occurs is that high levels of concentration allow more resources to flow to organizations in the form of profit, which leads to organizational survival. There is a (long) history of close correlations between concentration and profit (Bain, 1951; Gisser & Sauer, 2000). Whether these excess profits are caused by collusion, as in the classic oligopoly model (Chamberlin, 1933; Stigler, 1964), or efficiencies derived from large market share (Demsetz, 1973; McGee, 1971), pursuing consolidation in the industry is certainly one that should create a more benign environment.

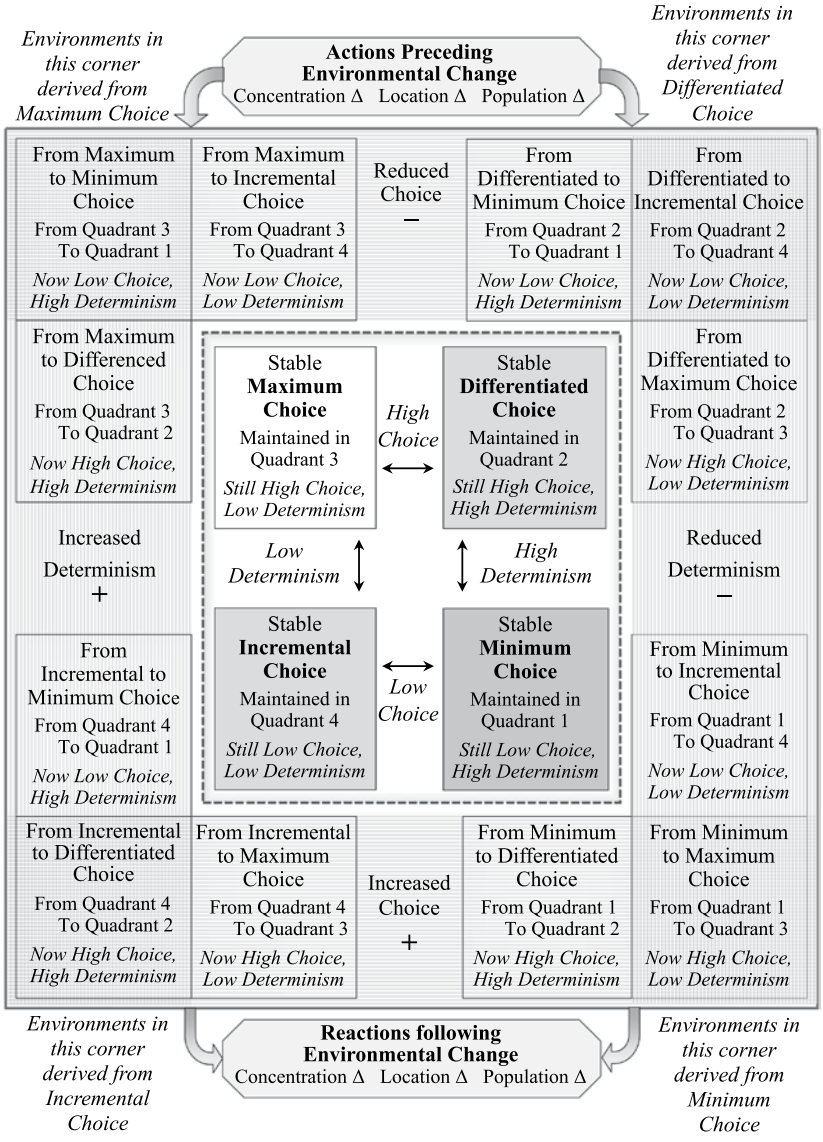

Fig. 2. Quadrant Change Over Time

P1. Increasing concentration is a strategy that permits industry members to improve their situation by moving them out of minimum choice environments or into maximum choice environments.

Migration. A second strategic dimension we have labeled is "migration." Migration represents the movement of business locations to address needs that place the organization closer to some resource. Such resources may include customers

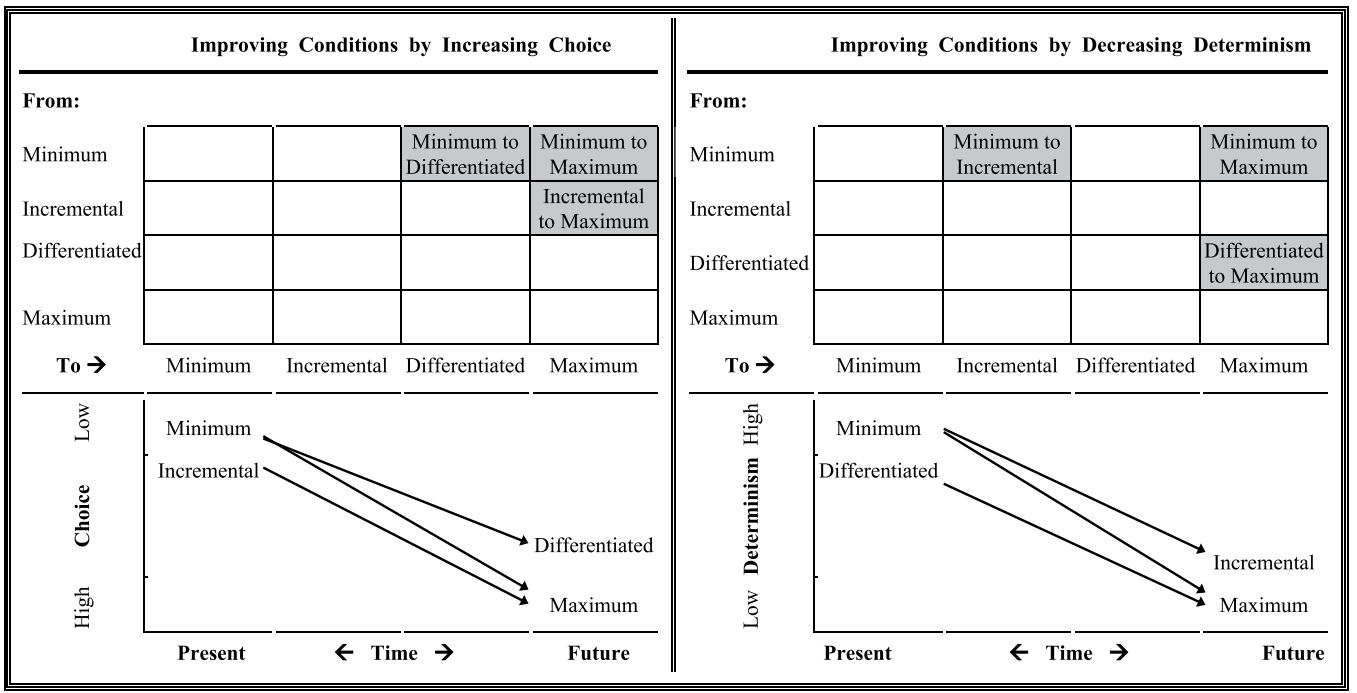

Fig. 3. Opportunities for Positive Environmental Change

or suppliers, or other important factors of production like raw materials, skilled employees, and access to new process or product innovations. This may mean that organizations are attempting to agglomerate or cluster together in a way that allows them to provide each other with sets of complementary assets. Maine, Shapiro, and Vining (2010, pp. 127–129) note that "Many high-technology firms co-locate, or cluster, spatially (Audretsch & Feldman, 1996; Porter, 2000) … a long tradition of studies in economics, economic geography, and industrial organization that investigate firm agglomeration (Jacobs, 1969; Krugman, 1991; Marshall, 1920)." This even occurs in what we may think of as traditional industries. Klepper and Simons (2000, p. 758) note that firms in the tire industry located around Akron, Ohio were "found to be closer to the technological frontier, which contributed to their longer survival."

This does not mean all migration derives from clustering. The reverse, disagglomeration or deagglomeration, may occur as well. Lahti (2006) suggests, infrastructure innovations like the Internet may disperse routine activities and produce forces of deagglomeration. Deagglomeration could stem from diseconomies in clustering. The US steel industry was centered around Pittsburgh and relied on blast furnaces for years. This may have led to successive delays in the adoption of new technologies like basic oxygen steelmaking and electric arc furnaces. This allowed foreign manufactures and later mini mill producers to take substantial market share from major players and thus dispersed manufacturing locations to change the landscape of the industry (Warren, 2001).

This implies that spatial movement of industry facilities influences survival. Actors in an industry will address issues of industry competition via such moves. Certainly the past decades provide ample evidence that both clustering (e.g., Silicon Valley high technology) and deagglomeration (e.g., meatpacking plants going to rural areas, or more generally, rationalization of production facilities) have occurred.

> *P2.* Increasing migration or location change is a strategy that permits industries to improve the situation by moving members out of minimum choice environments or into maximum choice environments.

Population pressure. We also consider the effect of changes in the size of the population on the direction of quadrants. Demographics (like overall population size of organizations in the environment or ages of organizations in that environment) are an important indicator of the economic health of an industry (Baum & Shiplov, 2006). Population pressures affect the demand for environmental resources and, in turn, influence quadrant membership.

One can view the influence of changes in choice determinism quadrant on industry population as a test of the population ecology model. While reductions in population are not normally thought to be voluntary – particularly if the organization ceases operations – firms may exit an industry without closing down. For example, industry populations may decrease via corporate mergers, takeovers, or firms discontinuing lines of business.

P3. Decreasing the number of competitors active in an industry is a strategy that permits industry members to improve the situation by moving out of minimum choice environments or into maximum choice environments.

To replicate Lawless and Finch's (1989) categorizations, discriminant analysis employing their classification of industries as the dependent variable can be used to create a predictive model. Concentration can be operationalized as the four-firm or eight-firm concentration ratio. Migration can be calculated as a percentage change in the number of establishments in each geographic census district (a variation of Dess and Beard's, 1984 measure of geographic concentration). Lastly, changes in the population can be measured by changes in the number of companies in the industry reported in the census.

Discussion and Conclusions

We suggest that results from tests of the three propositions follow a less population ecology oriented perspective where population correction is not the only method to address overshooting the carrying capacity of the environment. One response in situations where an industry enters the minimum choice quadrant fits the population ecology view, that is, populations decline in size. However, such a response is also likely to include some consolidation of competitors and relocation of facilities.

From an ecological perspective, minimum choice environments are likely to present situations when actors in an environmental niche overshoot the carrying capacity where population density is too high and the pattern of resource availability is inadequate. Yet, instead of total population collapse, the members may change location (agglomeration or dis-agglomeration) and travel to where resources are more efficiently obtained.

From a strategic choice perspective, conscious and successful effort on the part of population actors to get out of minimum choice environments is very likely. Besides changes in population, changes in location and consolidation are likely to move out of minimum choice environments. Strategic choices are thus made "… through pro-action as well as re-action" (Child, 1997, pp. 45–46).

In environments that are minimum choice, or inherently unstable, it may be difficult to gain a fit between environment and strategy. The notion of environmental fit that is so essential to strategy (Farjoun, 2007) remains useful under unstable circumstances where managers will need to create strategies that are flexible and able to achieve a series of temporary advantages (e.g., D'Aveni, 1999). The need for flexibility and temporary advantage may explain why high-performing strategies that Lawless and Finch (1989) and Marlin et al. (1994) expected did not materialize. In uncertain environments, this means that a viable strategy is to determine the options that are open to the firm and how it can best hedge its bets (Janney & Dess, 2004). Thus, firms should employ strategic flexibility to a degree that one is prepared, at times, to reverse ineffective strategic decisions (Shimizu & Hitt, 2004).

The need for environmental scanning and be proactive with change means that higher concentration that indicates inter-organizational arrangements (Pfeffer & Nowack, 1976) will enhance in environmental scanning. This argues for a strategy of being well-connected, informed, and fast-acting to insure organizational survival (D'Aveni, 1989; Sheppard, 1994; Shimizu & Hitt, 2004).

In conclusion, we would expect that there is a constant interplay between the forces of choice and determinism. Thus, at one point in time industry forces may be highly deterministic and proactive and reactive choices must be made on an ongoing basis to keep current with competitive forces. That does not necessarily mean that managers can ensure a smooth insulation of firms, even though they are proactive, from the vagaries of the larger external environment in which industries are embedded. Changes in the broader external environment may affect individual industries in different ways. Therefore, successful navigation of their firms will depend on the degree to which they are able to isolate and maneuver the interactions of both sets of forces: those from the larger industry environment and the narrower set of competitors in the industry. Therefore, at the industry level, future researchers would be well served to study how industries can better create, influence, anticipate, and react to environmental changes.

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Appendix: Hrebiniak and Joyce's Typology and its Relationship to Dess and Beard's Factors

	Munificence	Dynamism	Complexity
Generally	Munificence reflects resource slack, or scarcity. Growth rates impact the ability of firms to attract resources and are closely related to munificence (Dess & Beard, 1984)	Dynamism is change that is hard to predict (Lawless & Finch, 1989). Uncertainty and turbulence are the absence of a pattern of environmental change (Dess & Beard, 1984)	Complexity is "heterogeneity of and range of an organization's activities" (Child, 1972). It rises with environmental density due to firms dealing with more stakeholders
Quadrant 1:	*Low munificence*	*Higher dynamism*	*Higher complexity*
Minimum choice High determinism and low choice	Strategic choice is difficult due to scarce resources and firm resource dependence (Hrebiniak & Joyce 1985; Lawless & Finch, 1989; Pfeffer & Salanick, 1978)	Firms are price takers whose survival depends on a well-drawn market change response. Firms adapt, are selected out, or move to other environments (Lawless & Finch, 1989)	Firms face price competition or other environmental constraints (Hrebiniak & Joyce, 1985) that require them to closely monitor other actors and adapt accordingly (Lawless & Finch, 1989)
Quadrant 2:	*Higher munificence*	*Lowest dynamism*	*Highest complexity*
Differentiated choice High determinism and high choice	Resources are greater. Strategic choice is greater since there are a range of tactics, which can be pursued to serve a variety of niches (Hrebiniak & Joyce 1985; Lawless & Finch, 1989)	To reduce dynamism, firms segment homogeneous elements of their environment (March & Simon, 1958) and form inter-firm contacts as environmental buffers (Pfeffer & Salanick, 1978)	Niche variety means firms need to monitor more environmental elements. Choice is high since firms can adapt by picking niches within deterministic constraints (Hrebiniak & Joyce 1985)

	Munificence	Dynamism	Complexity
Quadrant 3:	*Higher munificence*	*Highest dynamism*	*Lower complexity*
Maximum choice Low determinism and high choice	Resources and strategic choice are greater. "Firms can define and choose their domains, environmental influence is relatively low" (Lawless & Finch, 1989, p. 354)	Increased dynamism due to the greater environmental munificence attracting new entrants (Aldrich, 1979). In turn, new entrants create a less certain environment	Higher munificence, slack resources, and flexibility mean lower dependencies. Firms change/reduce institutional arrangements by choice (Lawless & Finch, 1989)
Quadrant 4:	*Higher munificence*	*Lower dynamism*	*Lower complexity*
Incremental choice Low determinism and low choice	Benign environment, yet firms have low choice due to an "inappropriate mix or insufficient number of internal capabilities [that] … prevent organizations from acting …" (Hrebiniak & Joyce, 1985, p. 342)	What little dynamism there is has few felt impacts on firms since connections between the firm and the environment are weak (Emery & Trist, 1965)	Internal arrangements prevent development of relations outside the firm (Hrebiniak & Joyce, 1985). Few links between the firm and its environment lead to lower complexity (Lawless & Finch, 1989)