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TO WHAT EXTENT IS SLACK CONDITIONED ON MUNIFICENCE? EXTENDING THE BEHAVIORAL THEORY OF THE FIRM

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TO WHAT EXTENT IS SLACK CONDITIONED ON MUNIFICENCE?
EXTENDING THE BEHAVIORAL THEORY OF THE FIRM

A Dissertation APPROVED FOR THE
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Acknowledgements/Dedication

This dissertation is dedicated to my father who has uncommon intelligence despite the lack of formal degrees, and who has asked me on numerous occasions "So, tell me again what you can do with this degree once you get it." If I can stand in his shoes someday, I will have accomplished much in life (and, I will own a nice pair of alligator boots). I also want to thank the many faculty members throughout graduate school, who, each in their own way, encouraged, pushed, gave me opportunities, and became role models. In particular, Mark Sharfman who first took me in as his graduate student because of shared interests and then chaired my committees throughout the doctoral program, thank you for challenging me learn more every time I thought I knew enough. I also want to thank my students who have indeed provided the psychic income that made me want to become a college professor in the first place. And finally, to the woman who has endured my long nights of reading and research, being sequestered in my office for countless hours, and showing her patience when she knew I wasn't paying attention all along at the dinner table…thank you, I owe you one.

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Abstract

TO WHAT EXTENT IS SLACK CONDITIONED ON MUNIFICENCE?
EXTENDING THE BEHAVIORAL THEORY OF THE FIRM

This dissertation studies the accumulation and "spending" of organizational slack dependent on environmental munificence. Over five decades have passed since the "behavioral theory of the firm" formally introduced the idea of organizational slack into organization theory. That theory constrained the accumulation of slack based on munificence in the organization's environment and suggested that in non-munificent environments organizations would shed themselves of slack. This dissertation extends the "behavioral theory of the firm" by showing that munificence is of limited practical significance as a determinant of slack growth and decline. Removing munificence as a constraint may make the "behavioral theory of the firm" more useful as a theory of organizational behavior. Prior slack strategies are the predominant determinant of current slack strategies. In studying slack patterns, this dissertation also notes the various slack strategies in the interorganizational relationship between manufacturers and their suppliers in the automobile industry. While relationships were poor predictors of slack compared to prior slack accumulation and decline patterns, the accumulation and decline of slack in suppliers versus manufacturers suggests that organizational structures based on resource ownership are changing. While this is not a new idea to those reading the relational contract or cooperative strategy literature, it does offer a "slack strategy" to the rationale for changing organizational forms. The myriad of positive rationale for holding slack competing with the performance penalties for holding slack may have found a solution in the control versus ownership of slack and serve as another reason to engage in cooperative and relational strategies.

Chapter One
Statement of the problem and contribution

1.0 Introduction

The Behavioral Theory of the Firm (Cyert and March, 1963) popularized the concept of *organizational slack* as the underutilization of resources that bind the coalition of constituents making up organizational systems. This occurred through a process of providing reserves for coalition members, or overspending to maintain membership. Often, organizational slack provided an idle set of resources that organizational theorists suggested was beneficial to the organization in other ways, such as being prepared for threats, increasing chances of survival or adaptation, controlling or buffering environmental variability, being ready to take advantage of opportunities, being innovative, or planning for future growth (Cyert and March, 1963; Cohen and Cyert, 1965; Katz and Kahn, 1966; Pondy, 1968; Thompson, 2003/1967). Yet, organizations are often penalized for underutilizing resources held in reserve. Penalties come from competitive responses, from owners and investors benchmarking their investments against alternatives, and from the market for corporate control wanting access to unused assets.

Perhaps characteristic of a "behavioral" theory of the firm, Cyert and March suggested that managers and coalition members negotiated for, accumulated, and spent these resource reserves (organizational slack) to ensure organizational survival. This suggests that managers have choices in their actions. Perhaps uncharacteristic of a

"behavioral" theory of the firm, Cyert and March constrained the build up or spending of organizational slack conditioned on the environment. That is, if the environment was rich in resources, the organization could accumulate slack, and, if the environment was lean in resources, the organization would spend slack. While this seemingly conventional wisdom of storing up in times of "plenty" allowing the use of reserves in times of "famine" appears to have some "choice" in it, it is also highly "deterministic", in effect saying that managers will/can only accumulate during times of plenty, or spend in times of leanness. This rich/lean condition of the environment was referred to as *munificence*, with munificence referring to richness of available resources in the environment and lack of munificence representing scarcity of resources.

This conventional wisdom seems to be prevalent. The constraints of munificence on organizational slack strategies have not been challenged, although Aldrich (1979, p. 63) suggested that "[s]tockpiling and hoarding of resources is probably not as prevalent in rich as in lean environments." Anecdotal evidence further suggests that in some environments, characterized as low in munificence, organizations might still accumulate slack. One example has a non-munificent environment with the organization increasing its "bench strength" of human resources for fear that in more munificent times personnel will not be available (Associated Press, 2000). Another example has an organization increasing orders for as yet unneeded capital equipment in a poorly performing industry because of anticipated unavailability in later periods (Ball, 2002). Both examples show the possibility that some organizations may exhibit a slack strategy contrarian to that suggested by the received view.

The purpose of this dissertation is to examine the relationship of slack accumulation and spending under varying environmental munificence conditions. When Hrebiniak and Joyce (1985, p. 143) looked at environmental factors, including munificence, they reflected that "control over scarce resources is central to the relationship between choice and determinism…" It seems as if simple ownership and control has exhausted its potential to explain the myriad organizational actions we currently see. This is in part evident by the growing literatures on new organizational forms, cooperative strategies, and relational control. This dissertation suggests that expanding the behavioral theory of the firm's explanation of slack accumulation and spending provides support and rationale for new theories of organizational structure. Control versus ownership offers expanded explanations for slack strategies and at the same time it supports theories expanding the explanations for organizational structure strategies.

This dissertation also tests the extent to which managerial choice is constrained by environmental determinism by asking whether, and how much, munificence contributes to our understanding of slack accumulation and spending strategies. Munificence, as a constraint or predictor, is juxtaposed with other interorganizational relationship characteristics as well as prior organizational slack behavior.

1.1 The research problems

While several interesting questions have surfaced, this dissertation limits its immediate scope to two research questions. First the removal of what I interpret as a limitation and unnecessary constraint in the Behavioral Theory of the Firm regarding the nexus of slack and munificence, and second, I question the extent to which slack

strategies are predicted environmentally by being conditioned on, or determined by munificence, versus predicted organizationally, suggesting more managerial choice and discretion.

Research Problem One: This research question tests a fundamental assumption of organizational theory that organizations accumulate slack in good times to be spent in bad. This is a test of the limited applicability of the received view. I want to know if managers increase slack when environmental conditions are not munificent; or if they spend slack in munificent conditions. Neither possibility is mentioned when the behavioral theory of the firm is cited in research incorporating slack as a variable.

While both variables (slack and munificence) have been used in research singly or together, either as control variables or to test their main effects and interaction on organizational performance, it appears that there has been no attempt to relate slack and munificence in any joint theory of organizational strategy or structure. This of course presupposes that the authors who are credited most with slack's original development had no intent to create a theoretical model of the nexus of slack and munificence. This may be surprising as the history of the concept unfolds in chapter two but there has essentially been no concerted attempt to claim a theory explaining this nexus. Slack first appeared in the literature as conditional on munificence, yet has not often been studied in that context. This dissertation challenges the notion that slack only accumulates during munificent conditions and is "spent" during non-munificence.

While managers may hide, recharacterize, change one form into another, or move slack within the organization, they may also place slack in their environment. Organizations might be moving slack to other channel members. I question whether this

type of strategic behavior is conditioned on environmental munificence. Organizations strive for some level of resources that provide them with optimal levels of control over their strategies and processes. Historically, this control often amounted to ownership of resources. Internalization of the value chain is supposed to limit costs and give the organization control over its unique combinations of resources, both of which fulfill a strategy of competitive advantage. At the same time, organizations have always been under pressure to provide an adequate return on the resources they own. Managers and investors alike, wanting acceptable returns on assets, review asset utilization and benchmark organizations against one another in an effort to either manage the business or place pressure on those who do. Competing organizations, when they have succeeded in finding a way to enhance their return on assets (getting more from less), also put competitive pressure on each other in the marketplace for their goods and services. Buyers and sellers in the task environment create pressure up and down the channel as they react to pressure from investors, competitors, and their own channel relationships.

Is this conflict one of resource optimality with differences of opinion on the best use of resources and how to measure the efficiency of that use? Is it that organizations are finding new ways to move resources within the organization to increase their utility (or mask the measurement of the resource) to achieve improvements in performance measures of return? Is it that organizations are finding new ways to maintain control of assets without ownership, thereby shifting the measurement outside the organization's boundaries? How do organizations do both things at once…control resources, but limit the penalties for holding them? I suggest that the issue is more then mere intra-

organization optimization and may provide support for theories that help explain asset management and organizational structure.

As research problem one tests the received view of environmental constraint it also provides insight into what certain groups of organizations seem to be doing with their slack resources. While the primary interest is expanding the theoretic possibilities of slack accumulation and spending, I also discuss any observations made in the slack movements.

Research Problem Two: This research question tests not only environmental factors but also organizational ones that might drive slack strategies. While the answer to problem one might show the possibilities that exist for creation or spending of slack under varying conditions, the answers to problem two will offer the extent to which we can predict slack growth by reviewing a set of environmental and organizational factors.

I reviewed the literature on munificence to understand what role the organization's environment played in the accumulation or use of slack. I wanted to know if the rise and fall of slack was conditioned solely on the munificence of the environment or if there were other factors that had a relationship to slack resource levels in the organization. Other than for performance outcomes, this relationship between environmental and organizational resources has not been explored. As suggested above, no theory of slack and munificence has been offered, although what might be termed a model of the relationship between slack and munificence has been described, and frequently appears as the received view in the literature. This dissertation offers an increased understanding of the relationship between slack and munificence and tests some commonly held (mis-?) conceptions. I occasionally make use of the phrase "theory

of slack" to suggest that one does indeed exist based on model development and posited relationships, although I put the phrase in quotes to remind us that in five decades of discussion there has been but two scant mentions of such a "theory".

The literature on slack suggests that slack rises and falls with the change in resources in the environment. This suggests that munificence is a valuable predictor variable for slack. If munificence is present, it has been posited, beginning with Cyert and March (1963), that slack is created in the organization. Some have interpreted Cyert and March as claiming that organizations are not consciously involved in the determination of slack levels (Bourgeois, 1981) thereby not crediting this "model" with any organization specific predictors. Bourgeois also reported that students of Cyert and March have pointed out "Slack is not planned" (Bourgeois, 1981, p. 38, referring to Carter, 1971, p. 413). Embedded within a behavioral theory of the organization this environmental determinism doesn't seem to fit. Looking at the forerunners of slack in Barnard's discussion of inducements and contributions (1938), it also doesn't make a lot of sense to eliminate management and organizations from the predictor side of the relationship. Somebody in the organization must play a role in creating the inducements and making the contributions. Slack does not occur by happenstance to sustain coalition membership. The organization is not an "unguided" system. Neither does the environment decide, in some reified embodiment, that an organization is a spot to store slack. It seems likely then that there are shared roles, if you will, for some environmental determinism for slack to be conditional on munificence, and for managerial discretion in the accumulation or spending of slack. This research tests that shared role.

1.2 The contribution

This research attempts to expand our thinking on the slack-munificence nexus by reviewing the importance of environmental versus organizational conditions for slack growth and decline. The first research question is largely limited to expanding the view of the behavioral theory of the firm. This seems to be no small matter as that theory is often cited indicating specific slack growth or decline conditioned on environmental munificence. Expanding on the behavioral theory of the firm, this research suggests that slack creation and decline strategies have much wider range and that the munificence constraints suggested actually limit the ability of the behavioral theory of the firm to be applied to many more organizational behaviors. The findings from studying research problem one remove munificence as an unnecessary constraint to the behavioral theory of the firm showing that slack creation occurs in non munificent environments and slack spending occurs in munificent environments. Heretofore, a combination of the behavioral theory of the firm as the received view, and anecdotal wisdom of saving in time of plenty to spend in time of "famine" failed to account for what appeared to be contrarian organizational strategies.

While the outcome of research question one is intended to enlarge the types of slack strategies possible under a variety of munificence conditions, research question two is designed to explore the extent to which slack creation or decline is explained by environmental conditions versus other organizational factors. It can perhaps be viewed as going beyond opening up the possibilities of slack creation and decline under varying conditions of munificence to testing the extent to which munificence explains slack strategy versus (or along with) organizational characteristics. The extent to which

organizational variables come into play suggests that managerial discretion plays a more important role than does environmental determinism.

This research suggests that, when possible, organizations are moving resources outside of organizational boundaries and into other members of the organizational set. While examples of this had been noted in the business press, I show that shifts of slack are occurring among the suppliers and manufacturers in this research. While tracing exact resource movement is problematic, reductions at manufacturers and increases at suppliers seem more than coincidental as one group in the organizational set seems to be storing the same type of slack that the other group is now ridding itself of. When organizational resources are placed in the environment of the organization it could be described as creating munificence, that is, the very same resources that were slack while under ownership control are now munificence under relational control. Munificence on a conceptual level is the liberal availability of resources from the environment. This may be nothing more than two ways in which to characterize resources, and in fact, the same resources, dependent on their placement vis-à-vis some boundary arbitrarily created for our conceptualizations of organization and environment (or a boundary that is convenient to accepted measurement practices).

Control without ownership provides the organization with many more strategic and structural configurational possibilities. Success at managing resources, without owning them, recharacterizes resources from slack, with its negative outcomes in performance measures, to a form of munificence that is not a part of organizational measures but yet can have a significant effect on them. In this research, for example, we see inventory decreasing at manufacturers while their suppliers are increasing in this

same type of slack. This allows the environment of the manufacturers to be more munificent as they continue to exercise relational and contractual control over this important resource yet do not suffer the adverse performance measures of carrying the inventory within their own organization. Understanding asset management in these terms provides a new theoretical basis for a reconceptualization of slack, its use, and new organizational forms associated with its use. This line of thinking is not entirely new to organizational theory as we consider virtual organizations, various cooperative strategies, and so on. This research on slack suggests that important resource categories once considered optimal to control via integration into the organization can be shifted outside the organization without affecting organizational success. Organizations in this research remain in munificent environments signaled by growth successes and yet are shedding resources to partners in the organizational set. Understanding resource positioning in these terms suggests that researchers wanting to understand resource utilization need to envision the entire value chain and not merely individual organizations within that value chain.

1.3 Structure of the dissertation

The remainder of this dissertation is in the following format. Chapter Two traces the conceptualizations and operationalizations of slack and munificence. I have chosen a chronological and historical perspective primarily because I think there is value in understanding the genesis and evolution of the concepts and because some of the theoretical model developed in Chapter Three will bear a great deal of similarity to earlier conceptualizations. While Chapter Two is a literature review, I also take the liberty to

"editorialize" to some degree to position the reader for what will become a synthesis of the slack-munificence relationship. This relationship is presented in Chapter Three as the model is developed and hypotheses for testing the received view are positioned against the alternative. Chapter Four describes sources of data and methodological issues. Chapter Five presents the results of tests of the hypotheses. Chapter Six discusses not only the ramifications of the findings but also addresses avenues for future research.

Chapter Two
Literature Review

2.0 Overview of the literature review

I trace foundational concepts for slack from the 1930s but the majority of slack's conceptual period lies in the late 1950s and early 1960s. This latter period describes how the concept of slack coalesced and became the area of interest to so many organizational scholars. I move on in the history of the slack concept with its refinement and early empirical work in the late 1960s, early disagreements and empiricism in the 1970s, the varied operationalizations of the 1980s, and an abbreviated current review in the 1990s and beyond. I then introduce a review of the munificence concept and how it relates to our discussion of slack. I end with a brief discussion of boundary issues that aid in our understanding of the nexus of slack and munificence.

2.1 Slack: The history of a concept

Cyert and March (1963) are credited and cited most often for the idea of slack as it entered our conceptualizations of administrative behavior and subsequently most fields of business related study. The notion was that the organization's input was, at least for some period of time, in excess of that needed for its output and that this balance had

many uses. The core conceptualization was for this excess (slack) to be payments over the minimum "necessary" required to maintain the organization. Slack took on the additional idea of a reserve of resources that has led to a rich theoretical ground. Of course, the idea that resources could, or should, be held in reserve "for a rainy day," or for use "in time of famine," is at least as old as written history.

Cyert and March partially credit "the inducements-contributions schema" (1963, p. 27) of Chester Barnard's 1938 *The Functions of the Executive*. Barnard's view of the organization as having a wide membership of contributors (e.g. customers, suppliers, or investors) found its way into our thinking of organizations as having a large base of constituents, participants, publics, or stakeholders. Cyert and March (1959) described an organization as "a coalition of individuals, some of them organized into sub-coalitions. In the business organization, one immediately thinks of such coalition members as managers, workers, stockholders, suppliers, customers, lawyers, tax collectors, etc." (p. 78).

Cyert and March's thinking was representative of what became known as the Carnegie School of thought. Herbert Simon was a member and contributor of this school of thought. Simon's classic, *Administrative Behavior*, was begun the same year that Chester Barnard published *The Functions of the Executive* and Barnard provided the forward when *Administrative Behavior* was finally published in 1945 (Simon, 1948/1945). Simon also discusses the inducements-contributions schema and credits Barnard with the idea that an equilibrium is required in the input-output of resources for the organization to survive.

The Carnegie School writers were behavioral economists and likely influenced by the thinking of economists in general as the Carnegie School tried to improve upon economic theories of the firm. Machlup (1946), in his defense of marginal analysis (maximization), made it clear that economists of the day were well aware in their thinking that what was to become known as slack existed in areas such as unused capacity or excess payments over that required. Capacity and excess payments were both described by the Carnegie School as examples of slack. Interestingly, Machlup may have come closest to a discussion of slack when he noted that managers worked with wide safety margins in areas such as inventory and production buffers, or inflated sales estimates and lead times.

Reder (1947), another Carnegie School economist of the time, addressed issues that became known as slack in terms of underutilized capacity and bloated staffs. In fact, Williamson (in Cyert & March, 1963, p. 241, footnote) later credits Reder with the first conceptualizations of slack. Reder cites earlier work on the restriction of output by Mathewson (1931) and Roethlisberger and Dickson (1939). Reder discusses management's tolerance of inefficiency and suggests that any operation can be looked at in terms of a ratio of output (or return) compared to the maximum output (capacity) that is possible for the organization. The excess capacity or lower return would signal slack as we have come to understand it. Reder also makes statements about the use or release of slack in the firm.

The observations made by Barnard as well as those from the economic arena set the stage for what would coalesce into our conceptualizations of slack. These were refined in the Carnegie School environment. Simon and his colleagues (Simon,

Smithburg and Thompson, 1950) discussed organizational participants and the inducements/contributions schema more then a decade before our organizational lexicon included the term slack. Simon and his co-authors discussed what we today conceive as the reserve of resources containing slack with their "storehouse out of which an organization provides satisfactions or inducements to its members…" (p. 498).

As early as 1956 Cyert and March, as well as Simon, were publishing papers about slack. These papers were received at publishers or being read at conferences in early 1955 (Cyert and March, 1956; Simon, 1956). Starting with Cyert and March's 1956 discussion of the theory of oligopoly (Cyert and March, 1956) they give us: "The allocation of organizational resources…in excess of the minimum required for maintenance of the system gives rise to a form of organizational slack" (p. 46). These early conceptualizations began as theoretical constructs "as a feature of organizational behavior" (p. 63) and there was very little attempt to operationalize slack except at propositional levels. Cyert and March suggested "the desirability of introducing into organizational and economic theory a concept that we shall call organizational slack…[and that] there seems to be some evidence that under such circumstances the firm is able to take up slack in certain parts of its organization which may make it possible to achieve its goals" (p. 53).

While Cyert and March were discussing slack in *The Quarterly Review of Economics*, Simon introduced it in an entirely different venue in his article on rational choice and decision-making in *Psychological Review* (Simon, 1956). Simon used an analogy of a simple organism that could be useful for economic and psychological theory to explain the rational choice and decision-making scenario. In this description we not

only see the elements of the organization and its dynamic relationship with the environment but the idea of slack resources held in reserve and the concept of a rich environment which later becomes the idea of munificence.

Additional collaboration among Carnegie School members was evidenced in March and Simon's *Organizations* in 1958. The authors refine the "Barnard-Simon theory of organizational equilibrium" (p. 84) and the inducements-contribution scheme required for continued membership and attraction of new participants, ultimately allowing for the survival of the organization. Their comments form early ideas about the measures of slack. There were three important suggestions contained therein: First, that we cannot necessarily use the same metric to establish the "cost" and the "worth" of an inducement and that perspective will play a large role in determining what and how much of resources are considered slack, and by whom; second, the idea of determining efficiency or utility measurements as methods to quantify slack; and third, that slack may not be a continuous function. All three will be suggested and described over the ensuing decades of slack's conceptual refinement. Further complicating the issue, March and Simon suggest the idea of equifinality saying "there is not a single, unique set of conditions for organizational survival but various sets of alternative conditions that would produce a favorable inducements-contributions balance" (Simon, 1952/1953 p. 109). It would be plausible to assume that different conditions, different alternatives, and most likely different organizations may all have different inducements-contributions ratios and therefore different ideas of what resources, and in what quantities, they or outside observers consider slack.

March and Simon (1958) suggest that a benefit and contribution of slack may be as a tool for innovation. They concluded that slack could be used for "an 'investing' function and an 'entrepreneurial' function"(p. 187). Describing how slack is formed, March and Simon reflect on earlier Carnegie School contributions suggesting that slack resources are recoverable even when absorbed in the organization. Cyert and March (1959) continue to add to the developing picture of slack in describing the conditions under which slack forms. The following excerpt sets up the primary received view of the slack accumulation and spending model under conditions of munificence, or lack thereof.

> When the environment outruns aspiration-level adjustment, the organization secures, or at least has the potentiality of securing, resources in excess of its demands. Some of these resources are simply not obtained – although they are available…When the environment becomes less favorable, organizational slack represents a cushion. Resource scarcity brings on renewed bargaining and tends to cut heavily into the excess payments introduced during plusher times. It does not necessarily mean that precisely those demands that grew abnormally during better days are pruned abnormally during poorer ones… (p. 86)

While the environment has always played some part in the discussion of the organization's development of slack resources, it is now clear from the work of March and Simon (1958) and Cyert and March (1959) that favorable and unfavorable environments (and perhaps rates of change in this "favorableness") may have a significant effect on slack formation and use. The authors also allow for two interesting possibilities. The first is that organizations need not acquire slack even if resources in the environment are available. This point is often missed in the ensuing refinements and work on slack over the decades. The second is that slack absorbed by one member of the organization may not be the same slack that is recovered for use later. This latter allows

us to consider that slack absorbed in some form during favorable times may be of different form in the recovery and redistribution.

We know that Simon (1962) had additional musings on how slack fit into the growing behavioral theory of the firm from comments he made referencing work by Cyert, Dill, and March (Simon provides no date for the citation) but it is the seminal *A Behavioral Theory of the Firm* (Cyert and March, 1963) that coalesces and expands the construct "…[this] difference between total resources and total necessary payments is what we have called *organization slack.* Slack consists in payments to members of the coalition in excess of what is required to maintain the organization" (p. 36, emphasis in the original).

There is some ambiguity as to whether the "resources available to the organization" refer to resources within the organization available for its use or if they are the resources available to the organization from its environment. The seeming implication is that they reside within the organization, but a less restrictive view allows for more interesting theoretical possibilities (one that presented itself in the later writings of Bourgeois and Singh in their discussion of "potential slack"(Bourgeois, 1981; Bourgeois and Singh, 1983)). The intent of the original authors is unknown based on comments preceding the introduction of the slack concept. "In a business organization the coalition members include managers, workers, stockholders, suppliers, customers, lawyers, tax collectors, regulatory agencies, and so on. Drawing the boundaries of an organizational coalition once and for all is impossible" (Cyert and March, 1963 p. 27).

Depending on where the boundaries of the organization are drawn, we might measure slack as existing inside a more typical legal or accounting definition of an

organization. On the other hand, we might measure slack with the inclusion of one or more of the coalition members. Slack resources may be within a much narrower and perhaps more traditional definition of the organization, or they may reside in a wider definition of the organization. To the extent that payments are transferred or brokered by the organization, we could conceptualize the inclusion of the resources of one or more coalition members in what we measure. This changing memberships and boundaries in our consideration of slack is likely to influence what and how we measure different types of slack. Cyert and March (1963) suggest various forms of slack payments such as dividends, lower prices, excess wages, executive perquisites, growth without proportionate revenue, and public services in excess of those required. They note that "[f]rom time to time virtually every participant in any organization obtains slack payments" (p. 37).

Our definition of slack so far limits slack to the amount of resources that are actually paid out to members over the minimum required. The minimum required is more or less unknown. We have to therefore assume that almost all organizations have an amount of resources being paid out that can be considered slack. Arriving at a measurement of that amount of resources, trying to get at a total of slack represented by these overpayments, is a difficult proposition. Any amount of resources being held in reserve, not actually paid to a coalition member, seemingly resides outside our definitional boundary of slack to this point. However, it may very well be that this resource held in reserve is a requirement of some coalition member who has bargained for the reserve, including an underutilized capacity. In this instance the reserve is essentially a resource with a "hold" on it and in some ways is a payment to that member.

The organization may also be holding slack resources in reserve because of anticipated slack payments to coalition members who have not yet bargained for the resources. These nuances expand the definition of slack and also suggest a temporal nature in describing slack over the course of its existence.

> Cyert and March (1963) suggest other reasons for slack by saying that
>
> …it seems to be useful in dealing with the adjustment of firms to gross shifts in the external environment…When the environment becomes less favorable, organizational slack represents a cushion. Resource scarcity brings on renewed bargaining and tends to cut heavily into the excess payments introduced during plush times…the cushion provided by organizational slack permits firms to survive in the face of adversity. (pp. 37-38)

This scenario suggests that environmental adversity could lead to limiting future payments to those members who received them during plusher times. This, in turn, allows the organization to make payments to other members when resources are tight. This assumption only seems applicable for slack represented by ongoing expenditures and does not represent the ability to recover what has been spent already. What of slack payments represented by fixed or sunk costs? These might entail the exchange of resources of one type for those of another type as slack is recovered to whatever extent possible and then redistributed.

It is also possible that there is no slack change, in the aggregate, but that some change in a portion of the environment triggers recovery and redistribution of slack within the organization. Members of the organization may have different resource needs and different slack requirements with different types of environmental favorableness that trigger slack's recovery and redistribution. Slack as excess payments, excess resources, or overcapacity, could show up many different places in the organization. As slack is

recovered and redistributed within the organization we could find any of several conditions, such as no overall variance, decline in one form of slack with increase in another form, or total slack accumulation or decline. This will be dependent on where and how we measure slack. We may not measure slack correctly or inclusively because our organizational net for measurement is not spread widely enough.

The environment may provide clues in determining resource favorableness and therefore where we might look for slack. Remember, however, that Cyert and March (1959) suggested that resources might be available but not absorbed by the organization. The environment may not trigger slack accumulation in all scenarios and it is not clear how we might identify or measure the other variables that might affect the munificence-slack nexus. The preceding concerns about where slack resides in the organization and when its accumulation is triggered highlight the importance of the interchangeable nature of slack and the various ways that it can be measured. Cyert and March (1963) posit

> Organizational slack absorbs a substantial share of the potential variability in the firm's environment. As a result, it plays both a stabilizing and adaptive role…Slack operates to stabilize the system in two ways: (1) by absorbing excess resources, it retards upward adjustment of aspirations during relatively good times; (2) by providing a pool of emergency resources, it permits aspirations to be maintained (and achieved) during relatively bad times. (p. 38)

While the idea of an improving environment providing excess resources to the organization has been discussed before, we now see an expansion of the construct to cover the pooling of resources as a reserve. There is, however, no discussion of where and how excess resources are pooled. While the "theory of slack" previously discussed the absorption of resources as slack in the form of payments to members, it is unclear exactly how or where the organization temporarily stores uncommitted slack. Cyert and

March clarify this position for us suggesting "…a certain amount of the resources of the organization are funneled into the satisfaction of individual and subgroup objectives. This slack then becomes a reservoir of potential economies…" (Cyert and March, 1992 p. 116).

Note that to this point the developing model of slack states that excess resources can only be accumulated during good times and does not address the possibility of accumulating resources during bad times. This would seem to imply that slack absorption signals a favorable environment, and, if the environment was favorable to one organization it should be favorable to other organizations in similar environments. If other organizations do not accumulate slack in this instance, recall that the model allows for no requirement to accumulate slack. The model does not allow, however, that the same environment would contain organizations accumulating slack and other similar organizations spending slack. This seems to exclude contrarian behavior.

Another question in the model to this point is what happens when payments to meet old aspiration levels are now recognized as the minimum payments necessary? Is it possible that slack diminishes as it is recharacterized as minimum necessary payments at some future point in time? To the extent it might be, slack would not be recoverable. It also suggests that slack is a moving target to measure in more ways than just being placed in different accounts, but may have different quantification at different points in time as costs go up. If excessive administrative payments were tracked and found increasing, does that signal an increase in slack as an amount over the minimum required, or a true increase in the minimum cost of administration. Cyert and March go on to make a less tenable statement in regard to the possibility that slack is planned when they suggest that

"we have seen no significant evidence for the conscious rationalization of slack in business firms" (1963, p. 38). Coalition members arrange payments for themselves or other members to maintain stability. It seems unlikely that members bargain for overpayments yet do not plan on them being overpayments. Future theorizing as well as empirical research on slack formation will show that slack formation is a purposeful plan on the part of managers.

As noted above, slack may have many different forms. The ways in which slack is used to meet organizational goals gives evidence of this and forces the researcher to measure slack in terms of excess factors of production, excess inventories in various stages of completion, market share given up, sales performance that is smoothed, or profits during downturns. Slack may take many forms while meeting the same goals and when aggregated might make it difficult to tell which goal the slack has been designed to assist. Not understanding or being privy to the goals of the organization may make it very difficult for the researcher to determine where to look for slack. Not only is slack introduced as a powerful tool for the organization, but we are reminded that some managerial choice is assumed over environmental determinism in the "theory of slack". This may provide a partial answer for why firms in this model have a choice of acquiring slack in munificent conditions.

From the time that Cyert and March published *A Behavioral Theory of the Firm* in 1963 and the subsequent edition in 1992 several chapters were omitted. These missing chapters allow for some additional insight for a "theory of slack." In the earlier edition a "general model of price and output determination" was presented based on their behavioral theory. Therein inventory and sales goals respond to various pressures of the

organization to stay within certain limits. The model seems to describe any level of inventory above the minimum as organizational slack but also notes a tendency for the organization to increase inventory, or organizational slack, until the maximum is reached. Another missing chapter was one authored by Williamson in which he formalizes the organizational slack propositions. Williamson notes that slack, to the extent that it is expended, represents a form of discretionary spending by management. He also indirectly raises questions as to how the future researcher is going to use performance measurements such as profit to determine at what level slack becomes available to the organization. Williamson explains that dividends and internal growth funds are forms of discretionary spending by management. Dividend payments have been recognized in the theory as a form of side payments to coalition members to keep them in the game.

This section ends the initial development of the conceptual notion of slack by its original authors. The year 1963 was a pivotal year in our development of the concept. The next section presents the refinement of the "theory of slack" and the development of parallel theory in the balance of the decade.

2.2 Slack: The refinement of a concept and parallel theory– the late 1960s

Those intimately involved with the new behavioral theory of the firm and rational choice in decision-making continued to incorporate the ideas of "organization slack" in their work. The interest in this concept of excess resources as slack was remarkable and generated much additional conceptualization and parallel thinking about its benefits. This interest also provided the impetus for filling in the blanks and moving from concept to empirics as slack was operationalized. In the following pages I review the efforts both

to make slack a useful concept in a much wider arena and to add remarkable depth and insight into the "theory of slack."

Cyert continued to add to the theory in *Theory of the firm: Resource allocation in a market economy* (Cohen and Cyert, 1965). Speaking very broadly, he and Cohen addressed the need to fund future growth by increasing current capacity, a suggestion that slack capacity is desirable. Current slack may also become the minimum resources required in the future as costs rise, suggesting that slack measured in one period may not be present in an ensuing period unless a proportionate buffer were maintained. Potential recovery of current measured slack may not be possible in future periods if costs rise to absorb slack. Cohen and Cyert remind us of Williamson's model where "slack is absorbed as cost" (p. 357).

Paralleling the development and refinement of the slack concept other theorists were describing organizational processes using new or rekindled concepts. One parallel idea was the work on X-inefficiency (Leibenstein, 1966). There was evidence that firms did not always work toward maximizing profits and that the underutilization of capacity or assets was more typical. Reder earlier (1947) discussed the idea of firms not necessarily working only toward profit maximization. The difficulty of monitoring this underutilization was especially acute in human resources and in an area we now often term the knowledge assets of the firm.

While the concept of X-inefficiency never materialized in importance in the way slack did, another approach to efficiency and the reserve of resources important to organizations came from the systems theorists. The systems approach addressed the notion of slack in its discussions of stored energy. While the systems approach for

organizations received its biggest emphasis from Katz and Kahn in the late 1960s, early work on systems theory began in the 1920s (Lotka, 1925) and borrowed heavily from the physical sciences. Work in the 1930s and 1940s largely went unpublished but surfaced in the 1950s (Miller, 1955; Odum and Pinkerton, 1955; Bertalanffy, 1956). Important differences in how systems maintained themselves led to critical thinking for organization theory.

Using an open systems approach to organizations seemed appropriate because they import and export energy (resources) from coalition members. Systems theory reinforced the concept of equilibrium and discussed the notion of equifinality to explain why different firms may have different approaches to and different types of slack in their systems while still being successful. In contemplating a general theory for the behavioral sciences Miller (1955) built upon systems theory and noted that slack in a system was necessary:

> *Proposition 9. Systems which survive perform at an optimum efficiency for maximum power output, which is always less than maximum efficiency.* This is a principle suggested by Odum and Pinkerton…[and] applies to all systems the notion of efficiency from physics or economics, and the concepts of survival from evolutionary theory. It questions the traditional view that the most efficient system survives…(p. 529, emphasis in the original)

There is an optimal efficiency level that allows for the organization to have spurts of maximum efficiency in times of environmental stress. The most successful organization is the one who has the reserves to do this. Odum and Pinkerton (1955) suggest that the range in which the organization is able to deal with variables will be proportional to the storage level of resources or the slack in the organization. Katz and

Kahn (1966) lend a good deal of support for the open system approach to the study of organizations. In reference to slack they suggest that an organization

> "by importing more energy from its environment than it expends, can store energy…There is a general trend in an open system to maximize its ratio of imported to expended energy, to survive and even during periods of crisis to live on borrowed time…Social organizations will seek to improve their survival position and to acquire in their reserves a comfortable margin of operation…To insure survival, systems will operate to acquire some margin of safety beyond the immediate level of existence…the social organization will build up reserves" (pp. 21-24).

Katz and Kahn are very clear that systems require energy or slack resources in reserve to insure survival. They go on to describe how the efficient open system organization works by accumulating an "energic surplus" providing margins that can be distributed to members of the organization or retained as reserves for expansion, replacement, or various emergencies. Katz and Kahn point out that the stored energy can take many forms in the organization and whose general outcome is growth and survivability. Note that the system boundaries will pose measurement problems for where slack might reside. Note also that organizations may manage slack only to the extent they are providing better returns than their competitors, not maximum returns.

While systems theory conceptualizations closely paralleled those of slack theory, there were other noted organizational theorists referencing the concepts introduced by the Carnegie School before the decade of the 1960s came to a close. Thompson (2003/1967), for one, notes the positive side of slack allowing the organization to take advantage of opportunities in its environment by having uncommitted capacity. Rosner (1968) offered some empirical work on whether organizational slack determines innovation. Rosner also notes that measures such as profitability and rate of increase in assets are measures

of slack suggesting that "[e]conomic profitability is the ideal measure of organizational slack…" (p. 620).

Summarizing this period right after the critical year of 1963 finds some added clarity and some tests of the "theory of slack." The most important contribution may be the parallel development of systems theory and slack theory because in each we see the very same phenomenon described. The important points from this period to note are the potential differences between perceived or subjective levels of slack and objective measures; that short-term slack may become, in the future, minimum costs thereby absorbing slack; slack is stored energy; equifinality suggests that different organizations can have different slack strategies; that efficiency is likely not measured by the condition of zero slack, that is, optimal efficiency is better than maximum efficiency; profits or rates of change in assets may be slack proxies; and organizations use slack to control uncertainty.

2.3 Slack: Refinement, disagreements, and building empiricism – the 1970s

As is the case with much of scholarly research, there is a certain lag time between the introduction of new concepts and the interests of fellow researchers making its way into print. The 1970s still saw a good deal of refinement from the original Carnegie School group as well as from other organizational theorists who continued to find utility in the concept of slack.

Williamson (1970) introduced new examples of slack such as "leisure slack" and the underutilized capacity of human resources, a topic that Leibenstein (1966) broached in his discussion of X-inefficiency. Williamson spent most of his effort refining his

earlier ideas surrounding the discretionary spending of management and staff slack. Importantly, Williamson weighs in on the Katz and Kahn (1966) suggestion of optimization when he says that there is an "…'optimum' degree of slack involv[ing] a balance between marginal utility gains and weighted marginal utility losses…" (p. 70). He notes however "…fine discriminations are difficult to express beyond the dichotomy between slack and no slack…" (p. 77). This continuing idea of an optimum degree of slack, albeit it with the measurement warning, seems conceptually appealing yet signals a conundrum for looking at real world organizations.

Slack was still viewed both in negative efficiency terms and positive effectiveness terms during this period. Some authors reviewing the body of work and applying a more political and conflict perspective concluded that slack was critical to the organization. "Its presence may be viewed as a critical condition for the continuation of the organization" (Harvey and Mills, 1970). Still, early empirical work suffered from one dilemma in particular as noted by Aiken and Hage (1971, p. 77) that "slack does not lend itself readily to empirical measurement".

Wolf (1971) summarized much of the conceptual work on slack to this point and questioned some of the prevailing wisdom regarding slack's formation and recovery. One of Wolf's observations provides the first research problem for this dissertation because of the untested original conditions posited for slack accumulation and spending:

> …Schiff and Lewin…share Williamson's view (in contrast to Cyert and March) that slack is consciously bargained for – the purpose being to avoid uncertainty and to satisfy personal goals…Additionally, they reason that in good times slack is both accumulated and spent (pp. 31-32).

Wolf is also one of the lone voices when it comes to suggesting that there is a "theory of slack". In his summary of what we know about slack he adds that "the budget and accounting methods are the primary instruments employed to manipulate slack" and "Indications are that up to twenty-five percent of the operating expense can be considered slack" (1971, p. 35). Wolf also points out a measurement difficulty stemming from the current conceptualization of slack.

> While not explicit, Cyert and March note that 'in conventional economic theory slack is zero.' (at least at equilibrium). This statement and their definition of slack was interpreted to mean that they construed slack to occur, as in classical economics, when the available resources are not utilized at the margin…this definition makes a precise measure of slack impossible as perfect knowledge about all potential alternatives is required…Additionally, one would have to know the ultimate potential of the individuals employed…A similar problem exists with regard to the measurement of available resources which Cyert and March hypothesize regulate the quantity of organizational slack…because of the wide range of potential sources that the firm can turn to for resources and the many interacting variables which influence their acquisition. (pp. 39-40)

In his own research, Wolf chose as a proxy for slack

> "…a major component of these items which can be measured and whose pattern of behavior a priori is expected to parallel the total." Wolf uses operating profit as the measure of resources because it is "the basic generator of a firm's resources, [and]…also greatly influence[s] its ability to secure additional resources from external sources…and "S+G+A expenses are used as the quantitative measure of organizational slack." (p. 41-43).

Wolf reported some interesting findings that were opposite conventional thinking about slack. He concluded that organizational slack was somewhat inflexible in that there was no evidence for its rise and fall with the rise and fall of profits. While he noted that slack tends to increase when there is prosperity and excess resources, he posited that it is management that determines the level of slack (another research problem that this

dissertation tests). This is also true regardless of the size of the organization, although there may be proportionality between the amount of slack and size.

March, and co-authors, continued to make contributions to the "theory of slack", one of which is found in the now famous "garbage can" model (Cohen, March and Olsen, 1972). They tie the slack model of behavioral decision theory and the energy model of the systems approach together: "Slack is the difference between the resources of the organization and the combination of demands made on it" and "[t]he net energy load is the difference between the energy required within an organization and the effective energy available" (p. 12). Much more interesting, however, is a direct reversal of conventional and earlier thought on slack formation during good times. "For example, when there is a shortage of [resources]…the net energy load…is heavier than it would be when there is no shortage…[and] when the environment of the organization is relatively rich…the net energy is reduced" (p. 12). This apparent new possibility in the slack-munificence model is essentially forgotten in future references to slack. March, again with Olsen (1976), suggests that both real and perceived slack will play an important part in the management of slack.

Odell (1972) explored the ideas of slack perception and its temporal nature as a way to understand discretionary spending in organizations. "Top executives determine the amount of organizational slack ('surplus' resources) from their perception of the generated resources and from their perception of the current minimum needs" (p. 42). There is another way in which Odell is insightful in his model depicting the flow of financial resources and their effect. He shows the excess rate of inducements paid to non-stockholder groups as resulting in "goodwill" and residual inducements to

stockholders in the form of excess dividends resulting in "stockholder goodwill" whereas those residual inducements reinvested as "excess" earnings resulted in "competitive advantage". Slack, as goodwill, or competitive advantage, will exist as a transfer of resources from one asset type to another. The original slack resource might be measurable as an asset or as expenditure. The resulting resource as goodwill or competitive advantage may be intractable to measurement.

Galbraith (1973) suggests that under performing is more than just unused capacity of human or machine assets (slack). He suggests that there is a simultaneous cost in other slack resources for the organization to offset lack of performance. These costs could show up as increasing lead times or slack inventory creating the potential for slack to create additional slack. Galbraith also notes that slack reduces the level of complexity the organization must deal with.

The accounting discipline suggested that internal payments of slack are forms of "budgetary slack" (Onsi, 1973). In addition to intentional forms of budgetary slack, Onsi also pointed to undetected or invisible slack that may only show up later as cost reductions. Budgetary slack can exist due to inaccuracies in forecasting which is "…why top management, operationally, cannot objectively determine the level of slack…" (p. 538). Onsi points out that "[s]lack, however, is not necessarily undesirable *per se*. Its worth depends on the manner of its utilization, since it provides a source of funds that may not otherwise be available or approved because of scarcity of resources" (pp. 535-536).

Reflecting on excess managerial capacity, Miles, Snow, and Pfeffer (1974) point out that

> Penrose (1959)…offers a theory of organizational growth with excess managerial capacity as a prime ingredient. That is, Penrose believes that the organization whose managerial talent is fully employed in the operation of the existing technology and process is unlikely to perceive new environmental threats or opportunities, or, if they are perceived, to be able to respond…(p. 261)

Miles, et al. suggest that "…it appears that the price of excess adjustment capability is inefficiency, while the price of insufficient coping capacity is ineffectiveness" (p. 263). The good and bad sides of slack may be nothing more then the difference in measuring efficiency versus effectiveness. Later, Pfeffer (1978) makes use of the slack concept in his notion of "loose coupling" saying that slack is required and without it the subunits "could not be loosely connected and could not respond to their immediate environments without affecting the entire system" (p. 275).

The late 1970s prefaced a decade of intense interest in looking at the slack topic (Daft and Becker, 1978; Dimick and Murray, 1978; Litschert and Bonham, 1978) with insightful results. Litschert and Bonham, for example, suggest that slack is the moderating variable in the relationship between strategy and structure. While there is no easy demarcation chronologically in the genesis and growth of ideas, the decade was a prolific one for the "theory of slack." Three decades had passed with the idea largely a conceptual one. The concept was proving to be not only convenient for viewing the way in which an organization managed its resources but had a growing significance in viewing organizational strategy. This period can be summarized with continued emphasis on the optimum levels of slack; that change in expenses or resources provides a useful measure of slack; that slack still offers measurement intractability in its tangibility, changing form, perception, and efficiency versus effectiveness measures; that slack

reduces complexity; and that slack plays a role in determining the fit between strategy and structure.

2.4 Slack: New operationalizations and increasing empiricism – the 1980s

The 1980s provided a plethora of further conceptualizing and considerable empiricism with the Carnegie School's contribution. Slack appeared in papers presented at conferences, was fodder for more then a dozen indexed dissertations, and showed up in another dozen or more articles in respected journals. On the one hand slack continued as an accepted conceptual underpinning for researchers who found in slack the same utility for the explanation of organizational phenomena as did its originators. Weiner and Mahoney (1981) used slack in such a way when they reported low explanatory value in environmental variables in determining performance and concluded that slack was buffering the organization. On the other hand, conflicting findings and thorny operationalizations fought for some common ground across diverse disciplines. While the review below is by no means exhaustive, it unfolds some of the more important contributions as the "theory of slack" reached maturation.

Borrego (1980) pursued the open systems and negentropy idea of Katz and Kahn (1966) reminding us that

> "Negentropy is the characteristic of systems that import, in all forms, greater amounts of energy than they return to the environment as products…Any excess negentropy beyond that used for maintenance can be used to provide organizational slack…This excess energy can be stored in various forms" (p. 66).

Borrego considered the presence of organizational slack as the indicator of organizational efficiency rather than, as conventionally assumed, the lack of efficiency. This, rather

unique, conceptualization is addressed by Kmetz (1980). "…[W]hile slack may represent a functional adaptation to uncertainty, it may simultaneously be perceived as evidence of poor management, inefficiency, and other dysfunctional consequences" (p. 246). Kmetz builds on Pfeffer and Salancik's (1978) notion of loose coupling and makes an additional observation "If slack decouples the organization from its environment…this author argues that slack may be an important strategic variable for the design of organizations" (p. 246).

This strategic use of slack brings up a potential problem in measuring slack. When it is not clear what strategy is being used, it may also be difficult to determine which form of slack to measure in the organization. If several organizations are being compared, it may be that they have different strategies for success (equifinality) and have marshaled their resources differently, a point made where uniqueness in grouping resources is a key to success. Looking for slack may be difficult if it resides in different forms across organizations and if, as noted by Kmetz, the different forms (slack resources, slack performance or capacity, and production smoothing) within the organization can be used independently of each other. "…[T]he interchangeability of forms of slack makes it imprudent to measure only one or two forms as indicators – they should all be measured…These considerations would seem to favor the use of perceptual measures…" But as Kmetz points out: "…slack might be construed as evidence of poor performance, [and] respondents may be understandably reluctant to acknowledge its existence" (p. 247).

Perhaps the most oft cited works in this maturation period were those of Bourgeois and Singh (Bourgeois, 1981; Bourgeois and Singh, 1983; Singh, 1983; Singh,

1986). Bourgeois referred to slack as the absorption mechanism used by organizations to adapt to environmental discontinuities. Bourgeois (1981) provided a thorough review of the work on slack to date and reiterated the major conflict in the study of slack as well as suggesting a curvilinear behavior for slack.

> …slack is treated sometimes as something that both follows and promotes success, and sometimes as an analog for inefficiency. I do not equate efficiency with 'success'….Business firms with 'lots of slack,' for example, will be less 'efficient' by definition. But they might also be more effective (and, possibly, more profitable)…I would hypothesize that the correlation between 'success' and slack is positive, up to a point, then negative; in other words, the relationship is curvilinear (∩). p. 31.

Bourgeois (1981) sums up much of the early conceptualization and refinement period for slack noting that slack

> either 'causes' or serves four primary functions: (1) as an inducement for organizational actors to remain within the system, (2) as a resource for conflict resolution, (3) as a buffering mechanism in the workflow process, or (4) as a facilitator of certain types of strategic or creative behavior within the organization. p. 31

Bourgeois' later work with Singh (1983) made the contribution of categorizing slack by an

> 'ease-of-recovery' dimension…available, recoverable, and potential slack. Available slack consists of resources that are not yet assimilated into the technical design of the organization, e.g., excess liquidity. Recoverable slack consists of resources that have already been absorbed into the system design as excess costs (e.g., excess overhead costs), but may be recovered during adverse times. Potential slack consists of the capacity of the organization to generate extra resources from the environment, as by raising additional debt or equity capital. p. 43

They also noted the difficulty in determining the amount of slack in an organization "…since the 'zero-slack' level is somewhat difficult to know empirically for an organization, it is difficult to measure absolute levels of slack" (p. 43). They suggested using relative changes in slack as measures of slack year-to-year and offered a number of

measures including net profit, dividends, cash and equivalents, accounts receivable, inventory, general and administrative expenses (all the aforementioned standardized by sales to measure available or recoverable slack); and debt and price/earnings ratios to measure potential slack. Later, Singh (1986) posited a difference between absorbed (excess costs) and unabsorbed (uncommitted resources) slack, noting that both were related to good organizational performance.

Myers and Majluf (1984) also considered potential slack in their descriptions of financial slack. In addition to cash and liquid assets, they thought of unused borrowing power as financial slack. They also made it clear that managers and markets were both aware of the degree of financial slack in a firm, although managers would under certain conditions forego accessing the potential financial slack of unused debt capacity. Myers and Majluf suggested that firms might have no need for funds but still might build slack.

Marino and Lange (1982 and 1983) looked at high slack firms and found evidence of the smoothing properties of slack that had been theorized to date, but no evidence of the cost escalation thought to accompany slack. More importantly they pointed out the difficulties in slack research because of the number of different views of slack as well as how it was held and managed by the firm. They noted that several relative measures of slack seemed to differentiate firms well but that absolute measures had less convergence, indicating that absolute and relative operations would offer up different outcomes in research. This is important because "…empirical researchers will require a battery of operational definitions to accommodate different levels of analysis and objective and subjective properties of the construct" (p. 81). They go on to observe "…measurement is problematic because slack can be deployed in a variety of forms…" (p. 82). It is likely

that the form will be influenced by each organization's strategy. They also reiterate an earlier point that "…some behaviors in organizations may be predicated on perceived (as opposed to actual) resource levels…" (p. 82). If strategy is selected and implemented on the basis of perceived slack, objective measures of slack may or may not provide similar results.

Spencer (1985) revisited the Litschert-Bonham model that posed slack as a moderator of strategy and structure. She posited that "[o]rganization members are therefore free to choose any strategy they see fit. It follows that under conditions of high slack, organizations operating in a similar environment may choose a wide variety of different strategies" (p. 6). Spencer found partial support for the strategy-structure fit model based on slack. She also noted differential findings among the measures of organizational slack within the same industry with some organizations showing slack and others not. Researchers continued to lament the failure of slack metrics to be consistent within organizations, much less across them. Spencer found that "…it appears that different cut off points may be required in distinguishing between high and low slack firms in different industries" (p. 173). This being said she pointed out the potential problem for researchers using firms on the margins and suggested that continuous measures may be of more use then threshold measures. This is not to say however, that there may not be step functions as was pointed out much earlier by March and Simon (1958). Organizations may have to achieve some threshold of slack before it has strategic utility for the organization. This in part may support the curvilinear relationship suggested by Bourgeois (1981). This may also be akin to the ideas of indifference put forward in the discussion of slack payments to coalition members (March and Simon,

1958) or in the "lower bounds" and "optimal slack" conceptualization in capital budgeting (Antle and Eppen, 1985).

Additional support for the idea that slack was not a unidimensional concept came from Sharfman (1985) who noted that the three forms of slack used in his study (excess working capital, inventory, and capacity) were not positively correlated. Confirming what has been suggested about perceptions of slack and the importance of what managers or organizations think is slack, Sharfman noted "…management is making some decisions as to which forms of slack are useful under what circumstances" (pp. 99-100). He also makes the observation that researchers may not be able to discern the slack in an organization because the manager is trying to conceal it for either agency or strategic reasons. "If management wants to protect itself and yet not do so in an obvious way…they must use relatively untraceable slack" (p. 102).

Sharfman and colleagues also focus on slack in terms of perspective (Sharfman, Wolf, Chase and Tansik, 1988) pointing out an interesting, albeit contrary and constraining factor in our observation of slack, in that to consider resources slack "they must be visible to the manager and employable in the future" (p. 602). Let us rule out for the moment the poorly managed organization whose managers don't realize their organization is inefficient in terms of underutilized resources and overpayments to coalition members. Over time, this dimension may not be significant anyway because, as Singh (1986) noted, competition will force organizations to become more efficient. If competition doesn't, there is a cadre of owners, investors, and analysts who won't hesitate to point out inefficiencies, as will the market for corporate control. More problematic however, is the case in which slack is visible to the manager and not the

researcher, or when the resource is viewed as slack by the researcher, or manager, and not viewed as slack by the other.

The first problem of inefficiently run organizations is a problem especially in studies where organizations are positioned by their relative amounts of slack (typically done when organizations are compared to industry means to determine slack). If slack is present but not recognized by management, outcomes for performance, risk taking, innovation, and so on, may be more a function of poor management than of slack. In the second instance, relationships determined by a form of slack perceived (or measured objectively) by the researcher, may not be in the form perceived by the manager as useful for executing chosen strategies. Without a firm grasp of an organization's strategy, it is possible the viewer will not be able to compare forms of slack across a variety of organizations even within the same industry.

Another contribution by Sharfman and colleagues is the discretionary use of slack based on its form. Their examples are of highly discretionary slack such as cash and very low discretionary examples of slack such as unused capacity. One form is highly flexible in its uses and the other is not. There are conceptual correlations between the idea of the discretionary nature of slack and its absorption or recoverability in the organization.

There was a new phenomenon in slack research that began to appear in the 1980s. For the first time, the environment was specifically controlled for in the slack hypotheses being tested. The received view was that the environment conditioned growth or decline in slack. While it had been suggested that management was really the determining factor in slack creation, there was virtually no challenge to the original conceptualization of rich environments leading to the creation of slack and lean environments leading to the use of

slack. The review of this effect of the environment is reserved for the moment until we look at the 1990s research trend on slack. A summary of the 1980s would include the following: that slack can buffer performance, removing variance generated by other variables; slack can be an indicator of both efficiency and inefficiency; slack decouples parts of the organization, or even the organization itself from its environment; managers might purposely conceal slack for personal or competitive reasons; slack may have a non linear relationship with other variables; one type of slack may be measured as potential, or external, slack; slack measured in the absolute is difficult to measure; slack has an ease of recovery dimension; slack can be absorbed as costs or uncommitted resources; slack can be measured in multidimensional ways; slack is accumulated at multiple levels and can be aggregated across those levels; slack has a future option value; slack has to be visible or perceived before it is used; slack may be perceived by one observer and not another; and the discretionary use of slack depends on its perception, absorption, and recoverability.

2.5 Slack: Current directions – the 1990s and beyond

The richness of the slack concept continued with tests of the conceptualizations of slack as a strategic tool and as a signal of inefficiency. While slack's relationships to strategic choices were being tested by organizational and strategy theorists, tests of efficiency found more outlets in the finance and accounting literatures studying budgetary slack (Logan, 1990; Leavins, Omer and Vilutis, 1995). At the budgetary level the concerns were how slack came about and where it was stored. "Slack may be stored in different forms, such as financial slack, human resources, or technology, but it would

seem that not all forms of slack would be equally useful" (Logan, 1990). Providing the cornerstone of slack's importance in research, Dunk and Nouri's (1998) review of the literature indicates that 80% of managers admit to budgeting slack and that somewhere between 20 and 40 percent of costs could be related to slack. Wolf (1971) had suggested that the budget was the area used to manipulate slack and that 25% of expenses were likely slack.

The research studying the positive role of slack continued to challenge the notion of slack as resource inefficiency, positioning slack as an example of resource effectiveness. Finch (1991) repeated earlier suggestions that slack provided strategic flexibility. "Resource buffers or 'slack' should be maintained to provide managers with the flexibility to respond effectively to environmental opportunities and threats. Consequently, maximum internal efficiency must be sacrificed to provide a cushion or buffer of underutilized corporate resources" (p. 98). He suggested that R&D expenses represented the 'capacity to innovate' and were thus slack because in the short run they represented an 'excess' capacity" (p. 98). Finch suggested "resource buffers [were] planned inefficiencies over the short run…" (p. 98). Note that the earlier notion of managers not planning slack has essentially fallen by the wayside. The question of slack formation and spending being determined solely by environmental conditions is implicitly in doubt but the joint role of managerial discretion in slack strategies and environmental constraint or determinism is not yet tested.

In addition to looking at slack's strategic effect on innovation and flexibility, slack also found its way into the turnaround literature as a variable (Logan, 1990; Chowdhury and Lang, 1994; Lawrence, 1995). Lawrence provided a recap of the

literature and provided support for slack's role in retrenchment and recovery. Perhaps most interesting was another suggestion that organizations create slack to ward off the threat of entry (von der Fehr, 1992). "…[O]wners will generally accept below maximum profit performance (i.e. tolerate slack) in order to deter entry…" (p. 231). Citing work by Smiley (1988), von der Fehr suggested "…masking data on profitability is the most commonly chosen entry-deterring strategy."

Organizations choose to redirect discretionary profits to disguise true profitability. This takes the form of shifting profits into forms of slack such as increased benefits, redundant resources, and lowered productivity. These short-term attempts to make profits less visible are preferred by owners and managers to enhance long-term organizational effectiveness by keeping competitors at bay. von der Fehr also noted that even the type of slack chosen may not be of the highest utility for the firm to have it be less detectable. In many ways, this points to the original suggestion of Carnegie School behavioral economists that managers (or owners) will often choose satisfactory levels of performance (March and Simon, 1958) rather then maximum performance.

Little in the understanding of the relationships of slack has been agreed upon. Miller (1991) suggested interaction as well as threshold effects in slack's effect on other variables. In studies by Nohria and Gulati (1996) slack was shown to have a $\cap$ shaped relationship with innovation. In a study of flexibility in strategic decision-making Sharfman and Dean (1997) suggested "that increasing levels of slack are simply associated with increasing levels of openness to new ideas, sources of information, and roles" (p. 206). Greenley and Oktemgil (1998) criticize extant research on its lack of

> …theoretical agreement about the form of the association between slack and performance. Indeed, as both slack and performance can be measured

> in several different ways it may be that associations between different measures take different forms. Also, it does not necessarily follow that all measures of slack will be associated with all measures of performance (pp. 382-383).

This matching of predictor and criterion variables is of course a source of potential problems for more than just the relationship between slack and performance. Most research underscored the importance of a clear understanding of what was being measured and the operationalizations of the variables involved. Studies of slack's influence on risk taking provide a window to view part of the confusion. While continuing to provide mixed results following the tentative earlier support for slack's influence on risk taking (Singh, 1983; Singh, 1986; Singh, Tucker and House, 1986) new results showed a high dependence on how slack was measured (Bromiley, 1991; Damanpour, 1991). This included the continuing controversy over whether objective or perceptual measures were most appropriate (Sharfman and Dean, 1991; Panzano, 1992; Boyd, Dess and Rasheed, 1993; Leavins, Omer et al., 1995) or the extent that these matched the proper level of analysis (Boyd, Dess et al., 1993). Boyd and his colleagues also note that the controversy between archival (objective) measures and perceptual ones is a function of whether we measure individual slacks or the total slack in the organization and whether the organization's performance is high or low.

Bromiley's (1991) work suggested the same definitional problems were true for slack's effect on performance as well as that on risk. In addition to the lack of convergence on slack definitions (Moses, 1992), it should be pointed out that there is also little consistency in the definitions of the criterion variables in these studies. Risk and uncertainty (Miller, 1991) as well as performance (Weiner and Mahoney, 1981; Lawless

and Finch, 1989; Greenley and Oktemgil, 1998) enjoy little universal appeal in their operationalizations.

After more then five decades of conceptual and empirical work on the "theory of slack" the single point of agreement is that it exists. Slack is viewed both as a signal of resource inefficiency and as having strategic significance for the organization. Slack is dichotomized generally along the lines of efficiency versus effectiveness with the former being a measure of short-term utilization rates and the latter a measure of long-term success or survival. There is essentially no resolution to the relationship of slack to any variable of interest because there is little agreement on how slack should be measured, and in many cases, how the other variable of interest should be measured. As noted in the summary sections as this thesis has progressed, there are many propositional elements to slack theory that have received some support empirically and others that are contested. While slack has received an enormous amount of interest as an explanatory tool for organizational behavior, it may in fact be premature to label this the maturation period for the concept.

As mentioned earlier, there has been a purposeful gap in this literature review. That gap is the introduction of environmental variables as controls in studying slack's relationship with other organizational variables and outcomes. The primary variable of interest in the environment for this research is that of munificence. Munificence is the environmental correlate of organizational slack in that they both have to do with resources. While slack is the excess resources found in the organization, munificence can be considered the excess resources found in the environment that are available for organizations.

2.6 The nexus of slack and munificence

The originators of the slack concept were not entirely silent on the environment surrounding the organization for which slack became a useful concept in explaining organizational action. The environment was implicit even in the inducement-contributions schema of Barnard (1938) as he talked about maintaining the equilibrium of the "system." This system became the framework of "coalition members" in Cyert and March's (1963) work. Resource flows to and from the organization, or its environment were part and parcel to the discussion of slack. Conceptually, however, the boundary between the two remains unclear. On the one hand, Barnard's "system" and Cyert and March's "coalition" included all the resource exchange partners from employee and supplier to customer and community. In one sense they were part of the organization. On the other hand, it was still conceptually convenient to draw some boundaries around the entities in the system or coalition to facilitate our understanding and discussion of the relationships involved. It was difficult to discuss resource relationships without defining the players and disaggregating them from the system or coalition.

It is important to envision the nexus of resources and their conceptualizations in the literature to increase our understanding of slack and munificence. "Slack" entered the organization studies lexicon in the late 1950s and represented the extra or underutilized resources stored within an organization (Cyert and March, 1956). Munificence, at least in the organizational theory context, appeared about the same time (March and Simon, 1958) in the discussion of coalition members in conflict over available resources when

they said "The greater the munificence of the environment, the less the felt need for joint decision-making" (p. 123).

Early framers found no need to distinguish conceptual boundaries in their organizational discussions. In fact, in ensuing descriptions of the slack phenomenon, it seems clear that organizational slack as described by March and Simon is the same environmental munificence that is of concern to organizational members. Conceptually, it is a matter of perception, vantage point, and whether the resource lies within (is internal to) an entity's boundary or lies without (is external to) this perceived boundary.

Whatever the interface for resources, it is important to note that Barnard's, as well as the Carnegie School's, approach to organizations as systems falls into the framework of "open systems" theory (Miller, 1955; Odum and Pinkerton, 1955; Bertalanffy, 1956) which became more prevalent in organizational theory in the 1960s (Katz and Kahn, 1966; Yuchtman and Seashore, 1967) (For a review of open systems see Scott, 1998). This is not only important because open systems are dependent on system members for resource flows but also important because whatever space the organization takes up in this system may in fact be described differently by its members dependent on where they are positioned in the system. While not using the word "munificence", it was Yuchtman and Seashore (1967) who tied together the idea of this open systems approach and the abundance or scarcity of resources within that system.

> …the open systems model…emphasizes the interdependency processes that relate the organization to its environment…[and] points to the nature of interrelatedness between the organization and its environment as the key source of information concerning organizational effectiveness (p. 897)
> …difficulties arise primarily in cases in which the competing organizations have differential access to relatively rich or relatively poor environments… (p. 901)

Most readers of the Carnegie School conceptualizations on slack would make the assumption of the implicitness in slack theory that resources have to be available in the environment or they could not eventually be internalized in the organization to become slack. This is implied when we say that slack develops in the good times to be used in the bad. It was Williamson however who voiced the connection when he suggested that managerial discretion could lead to the creation of slack "…at least in a munificent environment…" (1970, p. 52). Williamson dichotomized "…two conditions of the environment, prosperity and adversity…" (p. 76). Child (1972) also discussed the limited availability of resources in the environment under the term illiberality.

Staw and Szwajkowski (1975) note the general situation in the literature: "One factor which is sometimes referred to in theoretical discussions, but is rarely included in empirical research on organizations, is scarcity-munificence of the environment" (p. 346). This point is reiterated by Pfeffer and Salancik in their discussion of resource dependency theory when they suggest that munificence is one of the "three most elemental structural characteristics of environments…" (1978, p. 68).

In Aldrich's (1979) seminal work on organizations and environments, one of his environmental dimensions is the "environment capacity (rich/lean) [or] the relative level of resources available to an organization within its environment" (p. 63). Mintzberg (1979) chose to focus on the environmental dimension of hostility where munificence anchored the opposite pole. This measure tried to combine the ideas of competition, relationships with others in the environment, and resource availability.

Measuring munificence has always been an interesting mélange of variables and proxies. Staw and Szwajkowski (1975) measured munificence as the ROE (return on

equity) and ROS (return on sales) of organizations compared to some referent group of organizations (using an internal measure of the organization to proxy an external condition of the environment). Aldrich (1979) measured environmental capacity in terms of population and median income relative to referent areas and profits of businesses. Weiner and Mahoney (1981) used GNP (gross national product) as a measure of munificence. Babcock (1981) used income and enrollment in a university setting to represent munificence. Miller and Friesen (1982) used Mintzberg's hostility framework but measured items that would describe environmental munificence such as market size and the availability of labor. Keats and Hitt (1988) use net sales and operating income as their measure of munificence (again, an internal measure as proxy for an external condition). Similar to the argument for perceptual measures of slack, Yasai-Ardekani (1989) measured manager's perceptions of the environment but only from the standpoint of environmental pressures and how they might interact with munificence, leaving open the question of whether some managers might perceive munificent conditions where others would not. Achrol, Reve and Stern (1983) reflect on the problem of measuring munificence:

> …the problem with using a subset of actual objective variables (elements in the environment) is that such an approach implies itemizing the environment. The inventory of environmental items…is…immense. For example, one could choose variables such as level of income, interest rates, technology, population trends, business cycles, and severity of competition, and still have only scratched the surface. Indeed, most of these variables can be broken down into subvariables…making the problem of specifying relevant variables a lifetime work… (p. 60)

Perhaps the most influential work in the area of munificence was that of Dess and Beard (1984) who used the Aldrich's codification of environmental dimensions. "The

primary variable in this cycle is the rate of sales growth, which is the primary factor determining an environment's munificence" (p. 55). They factor analyzed a composite of variables in their research and found the following loaded together as munificence, measured largely by industry growth: growth in sales, growth in price-cost margin, growth in total employment, growth in value added, and growth in number of establishments. Dess and Beard originally posited that industry concentration would also be a measure of munificence but found it loaded elsewhere. Sharfman (1985) however, included a form of concentration when he operationalized his munificence scale as the number of customers, the number of end users, the concentration of customers, gross margins, and the number of customers that equaled 50% of sales. Sharfman and Dean (1991) also used concentration ratios in their measure of munificence.

Most research still made the assumption that munificence led to the potential creation of slack (Dess and Origer, 1987; Keats and Hitt, 1988; Sharfman, Wolf et al., 1988). McArthur and Nystrom (1991) found no correlation between slack and munificence and no direct effects of munificence on performance (using ROI, or return on performance) but did report a significant direct effect of slack on performance and a significant interaction effect for performance when regressed on slack and munificence.

Perhaps the best critique of munificence research was that done by Castrogiovanni (1991) who points to two major problems that stem from our conceptualizations of the dimension we choose to study, and the level from which we view, munificence. He suggests that the literature is often ambiguous in its choice of munificence dimension, alternating between munificence as environmental capacity, growth/decline, or opportunity/ threat. The other source of conceptual confusion is the

level of the environment that the researcher uses as his or her vantage point. He suggests that levels of the environment provide the confusion.

> When only 'high' (i.e., more comprehensive but less specific) levels are examined, studies are vulnerable to problems of overabstraction (p. 544) …Holistic munificence concepts are attractive because it is much easier to discuss and theorize about 'environmental' munificence than it is to view the environment as a complex web of loosely coupled resource pools each having its own munificence level (p. 549)…To minimize overabstraction the environment should be disaggregated with munificence examined at the lowest environmental level possible. Observing several important lower levels is important because the munificence of one may be on the rise while another may not, e.g. more customers but less raw material (p. 548).

Castrogiovanni borrows from other organizational theorists to help us conceptualize the interface of organization and environment. He suggests that the disaggregation needed to understand the role of munificence is best understood at the task environment level where the organization faces its resource pool. The task environment is an organization's multiple sub environments and "…consists of all those organizations with which it must interact to grow and survive" (Osborn and Hunt, 1974 p. 233, in Castrogiovanni, 1991, p. 546). Holistic concepts of environmental munificence aggregate the munificence of those other environments below it.

Environmental variables such as munificence continue to play an important role in organizational research with interesting nuances in how they are measured. Munificence has been operationalized more directly (rather than industry growth as a proxy for munificence) in terms of business costs, labor availability, and competitive hostility by Ward, et al (1995) who also corroborated that environmental effects acted substantially as industry controls because they described the similar set of circumstances

that surrounded firms within the same industry. This particular study's use of hostility as an inverse of munificence follows Mintzberg (1979).

Anderson and Tushman (2001) revisited the Dess and Beard (1984) work on environmental uncertainty, munificence, and complexity in their study of the exit rates in the cement and minicomputer industries. In their operationalizations they modified the Dess and Beard measure of munificence somewhat by removing the growth in profitability portion of the measure with the rationale that profitability added to the measure the firm's ability to exploit the environment rather than being a purer measure of the environment's resource richness or capacity. They also focused on growth in the output sector, or demand for product, rather than on the input market of production factors. Their measure of uncertainty was in the unpredictability of munificence based on output sector demand, as well as technological ferment. Complexity was a measure of concentration and organizational activities. The authors found no association with munificence or complexity (or macroeconomic variables such as GNP and interest rates) and the exit rates (mortality) of firms but did find a relationship with uncertainty both in the form of demand unpredictability and technological uncertainty. The question of whether there was an association between the input portion of munificence or its unpredictability were left unanswered, as were the questions of interactions with munificence and uncertainty. In earlier work by these authors they show an association with technological change and growth (munificence) (Tushman and Anderson, 1986).

In a recent study on whether the task environments of organizations are changing, Castrogiovanni (2002) revisited the munificence (and complexity and dynamism) concepts with research concluding that munificence generally decreased over time in a

broad range of industries in the period 1967 to 1992. Pointing to the Emery and Trist (1965) view "that organizations increase their interdependencies with one another in transactions for increasingly scarce resources" (2002, p. 129). Castrogiovanni offered that "…established industry findings could suggest that organizations make changes (dynamism) that increase complexity, in efforts to enhance munificence and thus attenuate the tendency for munificence to decline that was observed…" (p. 143). Perhaps the new organizational forms and increasing interorganizational relationships are reflective of less munificence in the general and task environments leading firms to take steps to control munificence however possible. One way might be to include munificence within the task environment to offset the substitution and competition Castrogiovanni suggests is facing many industries.

Castrogiovanni also suggested (referring to Aldrich, 1979) that there might be some theoretical upper limit to munificence, as measured in growth, that is very much like a model of product or industry life cycle models where the environment at some point can only support so much growth and industry runs out of resource areas to exploit for this growth. He found, however, no significant differences between old and new industries in his sample.

A summary of what we know about munificence should start with the recognition that the environment and its characteristics were an essential element of the "theory of slack" from its inception, albeit it largely left out of the discussion. I suggest this was in part due to the original authors not feeling bound by more constraining notions of where the organization started and stopped. The work on munificence has left us with a number of important points including that, as slack describes the richness of resources within the

organization, munificence describes the richness of resources in the organization's environment; that, like slack, munificence is dependent on the vantage point of the observer; systems theory is as applicable to the munificence concept as it is to the slack concept; munificence can lead to, or perhaps more correctly, can be associated with the creation of slack; capacity can be a measure of munificence as it can be a measure of slack; munificence may interact in some way with other environmental characteristics such as concentration, or dynamism; there is little agreement among the many operationalizations of munificence; as with slack, there are perception problems with the measurement of munificence; munificence is often measured with proxies; and munificence can be aggregated or disaggregated in its measures.

2.7 Boundaries

The problem of the interface between organization and environment is part of the research problem. Castrogiovanni (1991) suggested that our conceptual problem stemmed from viewing the environment holistically or taking a view that was too macro oriented regarding the environment. It could be suggested that the problem is really one of taking too much of a micro view of the organization. Perhaps a more helpful conceptual view of the interface issue would be to look at the organization more holistically with a macro view more in line with earlier conceptualizations of the organization as a broader system or coalition of members. What follows is a short review of some of the rationale that might be used to explain why organizations would consider leaving resources in the environment, or moving some resources that might be considered

slack into their environments, where they might take on the characteristics of munificence.

> We have indicated one important reason why complex organizations grow – to incorporate what otherwise would be serious contingencies. The organization which extends its boundaries to incorporate the sources of contingencies often finds that it has acquired capacity in excess of that called for by its major mission. (Thompson, 1967, p. 44)

Thompson was primarily interested in discussing slack and its properties as a buffering mechanism for the technical core. Thompson also was well aware of both Barnard's and the Carnegie School's contributions to the growing "theory of slack." This latter suggests that he was aware of the broader view of membership in this thing called an organization. It was convenient however, for the exposition of theory, to contain some aspect of the organization within boundaries. Assumptions and constraints such as these make contributions such as Thompson's "buffering of the technical core" and "boundary activities" possible. They also allow the next generation of theorists to play with the constraints and envision other conceptualizations.

One such assumption to be relaxed is the definition of organizational boundary. In the quote above we have organizations growing by enveloping contingencies, which might very well be resources needed by the organization. In the classical sense being described, the organization extends its boundaries and acquires capacity in hierarchical integration. An alternative conceptual view is the organization that already includes these resource providers because they are members of the coalition of this organization, that is, accepting the larger view as offered by Barnard and the Carnegie School. In this view, the resources already exist in this organization. They are not, however, integrated into the more constrained description of what the organization is. The resources are

within the control of the organization but not owned by or measured within that organization, typically described in legal or accounting terms.

Control versus ownership is a particularly helpful way to begin to think about this type of organizational relationship, particularly with tangible resources. It is not wholly a new view however, as suggested by Staw and Szwajkowski (1975)

> …organizations may make their environments less uncertain by engaging in long-term contracts with other organizations (Macaulay, 1963) [or] by absorbing elements of the environment into the organization (Selznick, 1949)…Starbuck (1965) noted that organizations seek to grow, in part, to make their environments more munificent. (pp. 345-346)

Starbuck (1976) is perhaps more to the point in later comments on the issue of organizational boundaries

> Assuming organizations can be sharply distinguished from their environments distorts reality by compressing into one dichotomy a mélange of continuously varying phenomena…Organizations' environments are largely invented by organizations themselves…talking about an organization's environment implies that the organization differs from its environment. Yet the two are not separate, and a boundary between them is partially an arbitrary invention of the perceiver (Thompson, 1962; Child, 1969; Child, 1972). (pp. 1070-1071)

Aldrich (1979) in describing "environment capacity" or the richness or leanness of the environment suggested that organizations expand to obtain resources. He also suggested that there were essentially two alternatives for organizations facing lean environments: "move to a richer environment, or develop a more efficient structure" (p. 63).

On the one hand Poynter and White (1985) describe a structural variation wherein "[s]ubsidiaries can often rely on the slack in their parent organization" (p. 98). Here, one concept of organization has a parent portion with slack that provides the munificence of

scarce resources to the subsidiary portion. Another structural efficiency might just as well be the long-term relationships put forward by Macaulay (1963) or the co-opting suggested by Selznick (1949). More evident today are seemingly boundaryless organizations that form networks and various forms of alliances through cooperative strategies.

Our conceptual choices can be enriched by views such as those proffered by Yan and Louis (1999) where boundaries become the frontiers of exchange (marketplace) for the organization. In Yan and Louis' view, boundaries are highly permeable, as Scott (1998) cautions when he concludes that environments penetrate organizational boundaries at the subunit of the organization.

2.8 Summary

The concepts of slack and munificence have both enjoyed a good deal of conceptual and empirical space in the literature. They are both important contributions to organizational science. They both share many of the same problems in conceptual and operational exposition. Interestingly, I think they have more in common then might be evident on the surface, a point easier to envision as the concepts were juxtaposed. It is not much of a stretch, for example, to look at some of the conceptual work on slack, such as the contribution of "potential slack", and see the similarity to munificence. Potential slack does not exist within the organization although it is measured with an organizational metric. The metrics used could as easily refer to the munificence of the environment although they would be specific to a single organization to some degree.

The ending remarks on boundaries should have made the blurring between slack and munificence even more profound. The sections on both slack and munificence contained several references to vantage point and perception. I think it fairly clear that the position of the observer, defined by their place in the organization and environment, will determine their view of resources as either slack or munificence depending on some degree of accessibility to and control over those resources.

Chapter Three
Theoretical model and hypotheses

3.0 Restatement of the research problems

A number of interesting questions surfaced during the discussion of the development of slack as a construct in the behavioral theory of the firm and the related model of how slack interacts with the environmental characteristic termed munificence. While I suggest that this will provide a fertile research agenda for the future, this thesis is limited to answering the questions as outlined in the opening chapter as well as suggesting refinements to a model of how slack and munificence interact. I repeat those key problems from Chapter One below. I explore the organizational versus environmental conditions under which slack grows and declines after I test possibilities beyond those suggested by the behavioral theory of the firm.

1. Is slack conditioned on environmental munificence as outlined in the behavioral theory of the firm?

2. To what extent are slack predictors environmentally determined, or are they based on managerial discretion?

Problem One asks if the growth and decline of slack depends on munificence, as suggested in the received view. This question tests the received view that slack is accumulated in good times and spent in bad, specifically testing whether slack will grow or decline in conditions other than those suggested. The equifinality suggested by the parallel development of the systems approach and

Spencer (1985) and other's suggestions that slack growth and decline might not follow the suggested constraint of munificence on the environment has not been tested. Problem Two will explore the predictive properties of the environment versus the organization variables in determining slack growth.

3.1 Conceptual definitions

Before proceeding to how the problems are represented in a model of organizations in environments, and the resources present in that model, it is necessary to focus on some terms that will be employed. Operational definitions appear later as needed to test the hypotheses, but here a conceptual approach is taken to guide understanding of the model. I briefly discuss the basic system that the model represents (organizations in their environment) and the internal and external resources (slack and munificence) that represent the major variables of the model.

Organization. In the discussion of the problems, and the presentation of the literature review, there has been occasion to shift from the use of the term "organization" to the term "firm," often to retain an original author's use of words. Where possible I attempted to keep my own usage to "organization." The framers of the slack construct spoke very broadly about organizations, and slack is applicable to a wide range of organizational types, several of which have been presented in the literature review. One type of organization, the business firm, is of interest in this thesis and does, of course, appear in discussions of slack by the original framers of the model. The reader should consider "organization" and "firm" interchangeable for the purposes of this thesis as I empirically test the model with business firm data even though I speak broadly about

"organizations," with the intent that the model is generalizable to a broad range of organizations. Note also that the framers of the slack construct held a system view of the organization in that the organization was made up of many coalitions, some of which were outside traditional organizational boundaries, such as suppliers, investors, and so on.

Environment. The term "environment" has been used throughout the literature in a "perspective" oriented or "vantage point" of view. That is to say that the reader must know exactly what the locus of observation is before being able to determine what "environment" means. Looking at the organization as firm, the environment is everything that surrounds the organization.

My ending remarks in Chapter Two alerted the reader that any discussion and definition of resources within organizations and environments is dependent on boundary definitions for those organizations and environments. I am bound largely by measurement convention in the collection of data on organizations as firms. Boundaries are conceptual aids that allow theorists to construct models, but also act as measurement constraints for those models. I believe that business organizations both understand the constraints of boundaries as measurement conventions and have moved beyond boundary limitations to envision their organizational purpose being accomplished in new ways. With slack in mind, business organizations have found the way to limit the measurement of resource under-utilization within their organization but yet have maintained the control and management of the very same resources in their environment.

These environments of the organization have a rich discussion in the organizational literature. Thompson (2003/1967) provides a review of much of what I

am concerned with here in terms of organizations extending their boundaries in unique ways to control resources without owning them. Organizations that find themselves with constraints try to find new ways to exercise power in those constrained environments. Dill (1958) introduced the idea of the organization's *task environment* of relevant sectors such as buyers and suppliers while Evan (1966; 1972/1978) narrowed this relevant group of organizations relevant to the focal organization as being the *organizational set*. It is this set of organizations where we see the potential for creating access to and control of resources without the ill effects on performance measures created with ownership of resources.

Resources. Resources are any inputs that organizations seek for the accomplishment of their goals. Those goals may include maintenance, survival, production processes, payments to subunits or coalitions, or storage for future use. Resources originate in the organization's environment and at some point become owned as assets by the organization as it acquires them as inputs. Resources in the environment may be classified as munificent if the are liberally available to the organization. Conceptually, there is some total input of resources that just meets the organization's needs. Input of resources to the organization beyond that one-to-one ratio is the accumulation of slack, or temporarily underutilized resources.

Slack. The term slack is used to describe any resource that is not fully employed at some point in time or is an overpayment of a resource. Resources in the current time period may be more fully employed at some later date, thereby revaluing their slack characteristics. Slack could be removed in a future time period (Cyert and March, 1963) or may become the minimum payment necessary to maintain the coalition in a future time

period (Cyert and March, 1956). Slack resources can exist anywhere in an organization, its subunits, or in the organization-as-system. Slack in divisions or departments can be aggregated for a total level of slack in an organization. Slack may exist in any input factor and be made up of any tangible or intangible resource. Slack also includes the notion of capacity. Machine time that is not fully utilized, under-performing human resources, and unexploited opportunities might all be considered slack.

The most frequent conceptualization and operationalization of slack is based on the work of Bourgeois and Singh (1981, 1983) and Singh (1986). They allow for a conceptualization of "available slack," "recoverable slack," and "potential slack" with the latter described as "slack available from the external environment" (Bourgeois and Singh, 1983, pg. 43). Potential slack resources available from the environment are essentially the same resources that would be included under the concept of munificent resources. To the extent there was no potential slack, there would be no munificence for a particular resource. Bourgeois and Singh also discussed slack in terms of its level of absorption in the organization that helped determine its availability or recoverability. There is no attempt to characterize slack as either good or bad, rather, that it represents some level of resources beyond a theoretical equilibrium point for organizational functioning.

Munificence. Munificent resources can exist anywhere in the environment of an organization. Munificence is not usually thought of in terms of aggregation across levels although conceptually an organizational subunit could have resource munificence inside its organization as well as outside the organization. Munificence could characterize any input factor or resource, whether tangible or intangible. Munificence is also thought of in terms of capacity, in that an environment has the capacity to support an organization by

having the resources to absorb or purchase the output of the organization. When environments are considered munificent they have the capacity to allow growth in two ways: they provide input resources for the maintenance and production needs of the organization, and the customers and money to purchase the organization's production output. While munificence can be approached on a resource-by-resource basis, it is most often treated globally by aggregating the effects of all resource munificence into one factor, the growth allowed by the environment. Munificence is often characterized as an either/or condition, that is, the richness or leanness (scarcity) of available resources, although it is easy to envision degrees of munificence, as its proxy is growth, providing a continuous scale.

3.2 The slack-munificence model: Received and alternative views

Recall research Problem One:

1. Is slack conditioned on environmental munificence as outlined in the behavioral theory of the firm?

Throughout the literature, the received view has been retained with remarkable lack of critical test. Even the caveat of the Carnegie School suggesting that organizations do not necessarily have to accumulate slack resources when available (Cyert and March, 1959) has gone without test, meaning the interpretation of the received view has largely been distilled to the position that when the environment is munificent, organizations will, and do, increase slack. Conversely, in non-munificent environments, organizations "spend" slack. In large part, this may be a product of conventional, historical, and anecdotal wisdom such as that embodied in "saving for a rainy day." It is also in part the

result of a seemingly logical conclusion that organizations cannot accumulate resources if they do not exist in the first place in their environments.

Research Problem One suggests a test of the universal applicability of the received view that slack increases in good times to be spent in bad. There are really several potential tests in research problem one. I can test the accuracy of one of the received view's munificence-slack relationships, or test for the possibility of one of the alternative view's munificence-slack relationships. A test of those conditions and organizational reactions posited by the original model of slack would include two conditions of the environment: munificent and non-munificent, and three reactions posited: in munificent conditions organizations accumulate slack, or they may not, and in non-munificent conditions organizations "spend" slack. The second set of tests contains the alternatives: in munificent conditions organizations "spend" slack, and in non-munificent conditions organizations accumulate slack.

The alternatives are not designed to remove support from the original model but rather add dimension to a rather constrained view of an organization's ability to react to its environment. Note that the constrained view suggests environmental determinism, which, as mentioned earlier, seems opposite what one would expect to find in a "behavioral theory of the firm". Expanding the possibilities supports the type of managerial discretion you would expect in such a behavioral theory of the firm. The received and alternative views form a matrix of possibilities. Each of the five possibilities becomes a testable hypothesis that can be plotted in a depiction of the research space. This research space can be described and tested with graphical analysis by plotting organizational slack and environmental munificence. While I plot the full

range of organizational slack and environmental munificence outcomes I am not interested in removing support for the conventional wisdom of the received view. Rather, I only set up hypotheses to test for the alternatives to the received view. That is, I test whether organizations will "spend" slack during munificence and if they will accumulate slack during non-munificence. I make the assumption that the original model remains viable and that this research will add to the model.

The measure of slack most often used has been operational efficiency ratios in terms of various resources or costs compared to sales. While efficiency measures might be one way to approximate an absolute level of slack in a benchmarking exercise, more often, changes in these efficiency ratios signals an increase or a decrease in slack that becomes a useful operational and research tool. We generally do not know the equilibrium point marking the boundary of when resources take on the characteristic of slack. Using ratios to sales allows us to partially take into consideration differences among organizations in terms of size although different organizational characteristics might suggest slack for one organization may not be the same level or ratio that represents slack at another organization. Later I control for this latter difference by adding an industry control measure. The ratio has practical advantages for managers who try to "leverage" the ratio, with downward change signaling improvement. The ratio's practical advantage for researchers is replacing the disadvantage of not being able to determine absolute or equilibrium points for slack with the advantage of using the change in the ratio as an indication of organizational slack performance.

In the original Carnegie School model, munificence was only described as a binary condition. The environment was either munificent, or it was not. The default

proxy for munificence has been growth (Aldrich, 1979; Dess and Beard, 1984) in a variety of industry indicators. Growth signals munificence, while zero growth or decline signals lack of munificence. The assumption is that organizations and their industries could not grow unless there were ample resources in the environment to provide factor inputs to the organization, and ample capacity (resources) to absorb the output of the organization. Growth in the industry is used to signal a munificent environment for the organization. Because the munificence operationalization provides a continuous measure I plot both slack and munificence in terms of degree of growth or decline.

The original framers of the model said that organizations in munificent conditions either accumulate slack or leave it unchanged. The original conceptualization also spoke of "spending" slack when there was no munificence. The hypotheses for an alternative view and an expanded model of slack would suggest that organizations in munificent conditions may decrease their levels of slack and that organizations in non-munificent environments may not spend but rather increase their level of slack. These alternative hypotheses would be:

H1: When munificence is positive organizations will decrease slack.

H2: When munificence is negative organizations will increase slack.

A graphical view of the research space representing all five potential conditions is presented in Figure 3.2. This essentially becomes a matrix of munificence and slack possibilities. Munificence (defined as growth) is represented by the right side of the graph, or matrix, as quadrants I and IV, while non-munificence (non-growth) is represented by quadrants II and III. (Zero growth, $\Delta M = 0$, was also considered non-munificence indicating that the axis

belongs to the non-munificence side of the matrix, or graph). Slack growth is represented in the upper quadrants (I and II), with slack decline in quadrants III and IV. Quadrants I, III, as well as the line representing no change in slack under munificent conditions, are the only points in the research space posited in the original model. These represent, respectively, the research space where organizations are increasing slack in a munificent environment, the research space where organizations are spending slack when munificence does not exist, or that space where organizations are not increasing or decreasing slack under munificent conditions. We should see these portions of the research space, and only these portions, populated by organizations under the received view.

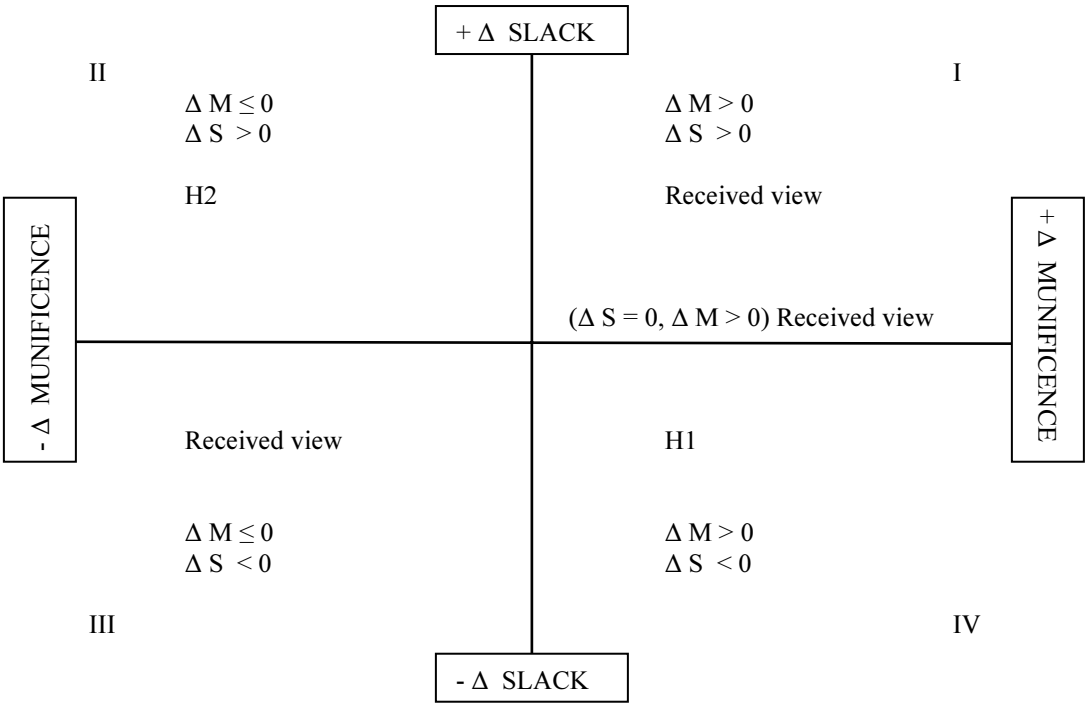


Figure 3.2 The slack – munificence research space

Outside the originally posited portions of the matrix space there should be no organizations present in the received view. For quadrant IV I might ask why would organizations reduce slack in munificent conditions when most of the literature suggests that slack is needed at some level in organizations and provides many benefits, not the least of which includes buffering the environment and the ability to take advantage of opportunities? Quadrant II seems even more unlikely in that organizations would be increasing slack during non-munificence. Here I might rightly ask where would the resources come from to increase slack?

I suspect one of two situations may influence the amount of slack being created or spent. On the one hand, the level of needed, or wanted, resources may remain relatively constant, irrespective of their location in some of the new organizational forms and relationships on the organizational landscape. This would explain why some organizations might exhibit decreasing slack under munificent conditions without discarding the benefits of slack posited in the literature. On the other hand, I also suspect that organizations have found efficiencies, allowing for a reduction in slack within the organization's own boundaries and perhaps even system wide in the organizational set. Curvilinear ∩ shaped slack behavior has been noted by several authors (Bourgeois, 1981; Sharfman, 1985; and Nohria and Gulati, 1996). To be sure, there may be many reasons why slack levels decrease irrespective of munificence. Over time, process improvements may change the level of resources needed. Organizations may find substitute resources that lower slack, such as knowledge or equipment that better utilize resources. Slack may be moved from one area to another in the organization, frustrating its measurement by researchers who may not be casting their nets wide enough to measure slack in its many

locations and guises. And of course there are poor management, desperation, and contrarian strategies.

If the needed resources are merely being allowed to remain outside the measurement boundaries of the organization we are seeing more than assets and costs shifting within the organization. The between organization shifts may be evidence of relationships evolving in terms of asset distributions between these organizations determining ownership and control of assets in the organizational set. Assets are often in motion, not only within organizations as they try to reach optimality in the form of return for assets employed, but also between organizations as organizations try to achieve optimality among themselves (e.g. alliances, partnerships, or even industries).

Changes in inter-organizational relationships may reflect organizations trying to achieve both intra- and inter-organizational optimality. It has been posited that optimality, at least in structural terms, may be a function of slack, with organizations having slack also having more latitude in deciding how to structure themselves (Child, 1972; Bourgeois and Astley, 1979). I suggest that the structure of a single organization may be a function of slack in the entire organizational set of which the organization is a part. Shifts in resources allow material changes to the organizational structure as it moves from traditional ownership of resources to management of resources. Ownership of resources within the boundaries of the organization is partially replaced by control of resources outside the boundaries of the organization.

It is important to understand conceptually why the organization might strategically want to place slack outside its boundaries. Bourgeois and Astley (1979), reflecting on earlier work by Thompson, noted that an "organization claims certain parts

of the environment as its own domain…they also create their own environments. This is particularly true with respect to an organization's relationships with other organizations" (p. 52). While organizations manipulate their environment to reduce uncertainty, I posit that part of this uncertainty is the control over slack resources that eased their operation, provided buffers, smoothed environmental cyclicality, and provided reserves for taking advantage of opportunities.

New organizational forms and relationships may be possible in part because organizations are willing to exchange control via ownership for control via relationship to achieve strategic optimality. These changes represent more than just an organization's relationships with other organizations. More importantly, this set of relationships creates the organization's environment. The organization does not solely operate under the constraints of an environment equivalent to an "unseeing hand" but rather helps to create that environmental constraint in such a way that it is benevolent for the organization. The environmental constraint of interest in this research is munificence. If the organization moves slack within the space of its inter-organizational relationships, it may very well create its own munificence.

This research is limited in its exhaustiveness in where slack may reside in the organization due to the limitations of its operationalizations of slack. It is difficult to uncover the breadth of possibilities in managing slack by moving resources around within or between organizations. If resources move out of the net cast by one measure of slack into an area unmeasured, the result will appear to be less slack. Slack as overpayments may be a little easier to track as expenses although there are times when expenses may be recharacterized, delayed, shifted, or in some manner made more difficult to measure in a

period. It is, however, possible to test whether slack has moved around to some degree within and across organizations. Recall research Problem Two:

> 2. Are slack predictors environmentally determined or are they based on managerial discretion?

If the level of resources needed by the organization is relatively constant within the curvilinear behavior noted but resources are being removed from the organization only to appear in the environment (including other organizations), then slack and munificence may represent the very same set of resources. The received view suggests that munificent environments have to be present before slack can be accumulated, and that organizations will accumulate slack or hold it constant under munificent conditions. Interestingly, the organization could also manage its level of munificence by increasing slack to the point where the organization became attractive to other organizations because it allowed those other organizations to reduce their slack. This would suggest that some organizations might be increasing slack in munificent conditions while other organizations would be decreasing slack under the same conditions, not dependent on munificence but rather on some other conditions. If the munificence condition remained positive, organizations plotted in the research space identified as Quadrant IV attest to the presence of decreasing slack in munificent (industry growth) conditions.

As part of the test for organizations in these alternative view portions of the matrix, I provide a comparison of the slack behavior between supplier organizations and their customers. In this study I view the presence of slack in both manufacturer and supplier organizations, asking whether organizations have moved slack out of their measurement boundaries and into the environment, specifically, in this case, to their suppliers or to their customers. The former would suggest a position of power in the

channel. The latter might seem unlikely at first glimpse but this is possible through incentives for customers to take delivery of product, particularly when the customer may have a strong business relationship with the organization (e.g. when automobile manufacturers push their output into the leased fleets of rental car companies owned by the automobile manufacturer). I only test the upstream relationships between supplier and manufacturer in the design of the hypotheses, leaving the downstream tests to future research.

I suggest that a possible reason to exist in the research space of Quadrant IV involves organizations moving resources from within the boundaries of the organization to the environment of the organization and back as needed. Or they leave the resources and processes in the environment to be managed outside the organization. Organizations (manufacturers in this case) may position slack resources in their supplier base. The manufacturer's slack resource base may decrease, stay the same, or increase, but the supplier's slack resource base increases in relation to that of the manufacturer's. Manufacturing firms push resources to their suppliers as well as related downstream organizations. Just-in-time manufacturing is an example of moving resources up stream rather than maintaining large inventories. Building-to-order, such as the Dell Computer business model, has often been used as an example of reducing inventories of potential slack. Forcing inventory of automobiles to rental fleets owned by the auto manufacturers or to dealers represents shifting of what might be slack resources. I am interested in the comparative degree of change in the slack conditions between manufacturers and suppliers. This leads to hypothesis

H3: The increase in slack for suppliers will be greater then the increase in slack for manufacturers.

3.3 Testing predictors in the slack-munificence model

This section more specifically addresses the question of environmentally versus managerially determined slack growth. A number of environmental and organizational predictors are posited. Using hierarchical regression I explore partial predictor effects to determine environmental versus managerial explained variance. Munificence is the primary environmental predictor as suggested in the received view. Other environmental predictors enter as controls based on industry membership. Relational variables represent a combination of organizational and environmental predictor as they describe a portion of the relationship of the organization with its environments.

Recall that original theory suggested that a set of inducements and contributions characterized slack accumulation and spending. Slack created to maintain the membership of the organizational coalition is what ties together the supplier-buyer relationship. While it might be possible to assert that various types of slack present in supplier organizations signal inducements or contributions to the relationship of various members in the organizational coalition, I measure the sustained membership of the coalition as the outcome of the slack strategies employed. This membership is measured in the relational variables of length of membership and concentration of membership. That allows the membership proxies to be predictors of the slack strategy employed.

These predictors are organizational variables yet describe a condition partially that of the environment. Concentration of sales is such a predictor. Change in supplier slack may be a function of whether the share of sales at a supplier organization is dominated by principal customers (manufacturers). An organization's principal customers affect its business decisions and outcomes. This effect is greater with a large

primary customer than with a secondary or tertiary customer. As a supplier moves to a situation in which sales to a principal customer increasingly represents a larger portion of the supplier's sales, its business will be more affected by that principal customer and the supplier's level of slack will increase. This presents us with hypothesis

> H4: The increase in slack for suppliers will increase with the proportion of their sales to principal customers.

Once the test of principal customer concentration has been accomplished, it makes sense to tease out differences among the customers and their effect on suppliers. Some customers may treat their suppliers differently. In this test of manufacturers I have chosen the "big three" (B3) auto manufacturers and the test for differences among them is written into the hypothesis for Daimler-Chrysler (DC), Ford Motors (FM), and General Motors (GM). The auto manufacturing industry provides a source for testing this supplier-customer relationship because it is a large industry with multiple vendors on a scale that allows the capture of specific relationship metrics such as concentration of sales and tenure. The database discussed in the next chapter outlines the availability of public information when firms achieve this scale, allowing the researcher to access larger samples and reliable information. There is also anecdotal information that suggests there are differences in relationship characteristics for the auto manufacturers specifically. While the popular business press might offer hints as to which relationships vary and in what ways, I make no prediction other than slack growth will not be the same for the suppliers of the various B3 giving us hypothesis

> H5: There will be significant differences by major customer (DC, FM, or GM) in terms of the suppliers' growth in slack.

Typically, size is entered into a model as a control variable. Size may also have an effect on the amount of slack an organization can support as well as an effect on the power (based on size) that an organization might have on its business channel strategies. As overall size grows, a supplier organization may become less susceptible to influences from its customer base (power in the distribution channel). As size grows, this same power in the channel may represent possibilities for easier resource shifting further upstream from one supplier to its own set of suppliers. There is also the possibility that slack resources represent a threshold level that does not need to increase with size, or at the same rate as size increases. This would partially explain the ∩ shaped slack change behavior as reported in the literature and mentioned previously. These possibilities would represent the idea of leveraging sales and the notion of economies of scale. Slack in these cases represents a smaller portion of the overall resource level as size increases. Determining a size effect is possible with hypothesis

H6: Slack growth has an inverse relationship with supplier size.

The cooperative strategy literature has suggested that a relational view can and does supplant a contractual view in some organizational partnerships, leading to competitive strategies where trustworthiness may replace other forms of contractual costs enabling economic efficiencies (e.g. Ring and Van de Ven, 1992; Barney and Hansen, 1994; Dyer and Singh, 1998). As the current trend toward longer-term relationships replaces annual contracting negotiation, tenure as a supplier may have some effect on slack levels. Large customers, in particular, often work closely with their suppliers to streamline their operations and become more of a long term "partner" than an adversarial price negotiator. While this effect may be visible in our test of differences among B3

members and supplier slack, it may also be visible if we test for the duration in which a supplier has had the same set of principal customers. Slack should decrease as a supplier either learns how to do business with a particular customer, or becomes a "partner" with that customer giving us hypothesis

> H7: Slack will decrease as the duration of the principal customer relationship increases.

Control variables help limit alternative explanations in model outcome. They also act as more thoughtful ways to partial out what would end up as residual error. One typical control variable having influence for organization decision-making was included in the predictors as size, measured in sales. External control variables are also important. Different industries have varying operational characteristics. Of those measured in this research, service industries may have much different characteristics than manufacturing industries in their slack formation. In addition, munificence is often studied in conjunction with other industry environmental characteristics such as complexity and dynamism (Dess and Beard, 1984). An industry variable may pick up other industry characteristics left unmeasured by munificence. Industry membership at the SIC level is broken into six categories and entered for each supplier.

Because previous slack measures may have an effect on current slack decisions, a lagged slack predictor is entered as a control variable as well. Organizations often seek to "manage" accounting indicators of performance and this takes on the characteristics of either a stable or an improving trend. Organization managers often manage with prior budgets as the starting place for future decisions. Wolf (1971) suggested that managers really determine slack, which was opposite the contention in the received view.

3.4 The slack-munificence model: A summary

As pointed out in the contribution statement of Chapter One, slack and munificence may be nothing more then two ways in which to characterize resources, and in fact, the same resources, dependent on their placement vis-à-vis some boundary arbitrarily created for our conceptualizations of organization and environment. The ability to reposition resources to improve performance measures while still maintaining their utility is a valuable tool for strategic management as well as an extension of the systems approach in organization theory. A model of slack and munificence also helps to explain a myriad of new organizational forms and relationships.

This thesis tests the received view that the accumulation of slack is conditioned on munificent environments. Organizations can be managed in a myriad of ways, both good and bad, largely because there is managerial discretion. The Carnegie School framers of the slack construct used the concept to explain observed phenomenon. Perhaps there were operational or environmental reasons for organizations to accumulate slack in munificent environments. Perhaps some of those reasons no longer exist, or, managers have improved practice in the search for competitiveness.

A revised model of slack and munificence does not propose that organizations will forego slack accumulation in munificent environments. It merely amends the received view. My thesis allows that organizations may increase or forego the accumulation of slack in munificent environments, or they may decrease slack in munificent conditions. There are also organizations that will accumulate slack in environments that lack munificence.

A primary purpose of this thesis is to suggest that organizations do not have to own resources to benefit by them. New organizational forms attest to this. Certain aspects of the way organizations have their performance evaluated are tied to legal and accounting descriptions of organizational boundaries. To the extent that organizations manage the inputs and outputs that affect those measures, they manage the observations of their environment. To the extent that organizations are able to manage resources with unique strategy and structure, they maintain control over their environment and improve the performance measures that govern them.

Chapter Four
Methodology

4.0 Overview of the chapter

In the methodology chapter I discuss various procedures and stages of this research as well as several overriding research issues. I open with a discussion of sample selection. Like many sampling selection and sample "cleaning" procedures in organizational research, this study makes compromises that have to do with the availability, or source, of data to test hypotheses and in making that data tractable to the hypothesis testing. More often than not, as in this research, the researcher is also confronted with the problem of preserving as much of the sample as possible. Sample preservation most often starts with how to solve missing data problems that threaten to lower sample size with the resultant loss of power to test effect sizes and the limitations

on generalizability. I discuss sampling and data preservation to a great extent, as it warrants considerable attention.

This discussion is also interwoven with the rationale for multiple research methods. While some of the hypotheses only require a cross sectional approach, others require longitudinal data. By definition, strategy is something that unfolds and has relevance over time. As it relates to strategy, decisions regarding slack are not tactical by and large, and while they may show up in cross sectional measures, the value of slack may be best recognized in how it is employed over time. Strategic intra- and inter-organizational effects also grow and are realized over time. Longitudinal studies bring richness to our understanding of phenomena but are not without their own methodological difficulties that also make a discussion of missing data techniques and alternative methods of measuring change over time pertinent.

The methodological discussion prepares the reader for a discussion of the variables measured as well as the form that they take in this research. Operationalizing the variables in advance of these notes would be preferable to some readers. However, I would rather have the reader conceptualize about the measurements and how they are used in the research as the foundation, and then fit the operationalization of variables into this schema.

4.1 Sample selection - Overview

To test the hypotheses, a sample of organizations is needed that might show a change in slack under potentially varying conditions of munificence. I begin with an overview of the population and the reasons for inclusion or exclusion in the sample. The

sampling procedure is especially detailed indicating when and why various groups of organizations are retained, or more importantly, why they are dropped from the sample. Dropping organizations means losing valuable information. The reluctance to do so led to an exploration of techniques for dealing with missing data in longitudinal research.

4.1.1 The population

The organizational population is all publicly owned firms in the COMPUSTAT database. I use the automotive manufacturing industry as the organizational arena in which to conduct this research. The automotive manufacturing "big three" (B3): Daimler-Chrysler (DC), Ford Motors (FM), and General Motors (GM) have a large and varied set of suppliers and the database has the level of detail needed to test various relationships between automobile manufacturers and their suppliers. Relationship specifics (e.g. sales percentages to certain customers and tenure information) are available to measure the "intensity" of the relationships. The supplier side of the sample is any organization that indicated one of the B3 as a principal customer. I do not restrict the sampling to industries whose concentration ratio signaled more typical automotive industry suppliers. Obtaining a more heterogeneous sample allows for more environmental variability and lessens potential range restriction on variables. This also increases the potential for generalizability.

4.1.2 Criteria for inclusion

The B3 were automatically included in the sample. The second task in assembling a sample is accessing a pool of organizations that indicate that they are

suppliers of one of the B3 during the time period. While there are other large auto manufacturers, the number of suppliers who claim to do business with them in this database is limited, providing potentially smaller samples of suppliers for these other manufacturers. While a true population of such organizations is impossible to isolate based on proprietary information, and lack of data on private organizations in particular, it is possible to access public organizations and a considerable amount of financial data from organizations who claim to be suppliers of the B3. This of course comes with the proviso to exercise caution in generalizing any findings of the research and confine those generalizations to how other public organizations with similar characteristics might interact with the B3.

4.1.3 Criteria for exclusion

If organizations were not primary suppliers, that is, if they did not supply one of the B3 directly rather than through an intermediary organization, they are excluded. Any relationship between a more remote supplier and the B3 member would be mediated and likely to confound the research. Organizations also have to have fairly complete levels of data for the variables under study. Missing data rates can be quite high in the COMPUSTAT database and, while rectifiable with several methodologies, pose challenges to various assumptions as noted in the sampling procedures.

4.1.4 Sampling procedures

To test the hypotheses, a sample of organizations was obtained from the 1999 COMPUSTAT database of over 10,300 publicly traded U.S. organizations. The database

contains a variety of organization level financial data over the prior twenty-year period. Data in the most current year tends to be "spotty" and underreported. Within this database, there exists "business segment" data that breaks down composite data to various business segments that the organization operates in. Business segment data is gathered from the notes of the organization's financial statements and is reported for the most recent seven years (1993-1999). Organization data may be reported in multiple business segments (up to ten per year) within or across SIC Codes. Organizations must report a customer's name if revenue exceeds 10% from that customer. At other levels, reporting is voluntary.

Data by company and by year is not uniformly reported over the period. Data is generally more complete in more current years, with the exception of under-reporting in the most current year. Overall completeness of data in various reporting areas ranges from 0.1% to 100% across variables and years. Completeness of data by year for the variables selected in this study averaged approximately 19%, 20%, 23%, 25%, 26%, 29%, and 16% respectively for 1993-1999. The year 1999 uniformly represented underreporting in all areas of interest and was dropped from the study reducing the panel years to 1993-1998.

In this multi-year sample the first pass through the data was to identify where a member of the B3 was mentioned as a principal customer for any organization. Of the organizations reporting business segment data, many do not uniformly report the specific names of primary customers. As noted above, there is no regulatory compliance requiring disclosure for customers representing less than 10% of sales. This, and much of the other business segment level information, represents voluntary disclosure. Within the

years covered by this study (1993-1998), only 0.7% to 12.2% of the four possible "primary customer name" fields included usable information in any given year. For the period 1993-1998 the principal (#1) customer line had information listed in 8.6-12.2% of the cases while the second principal customer line had information in 4.4-5.8% of the cases. Third and fourth principal customer lines had information in 0.7-2.7% of the cases. Generally, the fourth principal customer line held a reported customer name less than 1% of the time. The third and fourth principal customer lines were collapsed resulting in 3.1-3.6% usable data lines.

The "name scan" resulted in a potential sample of 167 supplier organizations of interest. Each of these 167 potential supplier organization's data was further checked before retention in the sample. This check resulted in some organizations being eliminated from the sample because: 1. suppliers identified a customer with a name similar to a member of the B3 that was in fact a separate organization, 2. suppliers identified a "class" of a B3 member's stock that was not in the automobile manufacturing industry (e.g. a customer listing of "GM class H" representing GM's Hughes division and not automobile manufacturing), and 3. suppliers who listed a related business division of the B3 jointly in the data field (e.g. "DelcoGM"). This latter would have represented redundant data as this division was already represented in the supplier sample (e.g. Delco Remy) although, as this example points out, divisions that existed as part of GM and then became separate organizations represent a dilemma when deciding what data to retain in the sample. Sample organization count was also reduced when data were "collapsed" for duplicate entries. Duplicate entries occur when COMPUSTAT reports the same

organization twice, pre and post major restructurings of accounting data, such as "pre FASB" listings.

The above inspection resulted in a reduction to 156 supplier organizations remaining in the sample reporting a relationship with a member of the B3 during the period 1993-1998. This business segment list of organizations and the data in the business segment portion of the COMPUSTAT database was then combined with data from the larger COMPUSTAT database to fill in the variables needed for hypotheses testing. While the business segment database captured information for the period 1993-1998, an additional lag year (1992) from the larger COMPUSTAT database for the other variables of interest was captured resulting in a panel study period of 1992-1998.

4.1.5 Characteristics of the sample – missing data

While the 156-organization sample met the requirements of isolating the customer-supplier relationship, it was necessary to make another pass through the sample of organizations after adding in the other variables of interest from the larger COMPUSTAT database. This was to make sure that observations for each of the final variables chosen for inclusion in hypothesis testing were complete enough to perform the required statistical analyses. The COMPUSTAT database has considerable amounts of missing data. Even in key fields, such as net profit or sales, approximately 7% of the data was missing and was filled in to the extent possible after a review of the U.S. Securities and Exchange Commission's EDGAR archives and organization websites listing historical financial data. In addition, the COMPUSTAT database frequently inserts the notations "@NA" and "@CF" in data cells representing, respectively, "not available" and

"combined figure". I had to determine the rationale for this missing data that may in fact have a value of "zero", or be salvageable in some fashion to retain for analysis, even as "no value". This required an additional inspection and an in-depth review of the COMPUSTAT database for each variable with a missing observation.

In the cases of "combined figures" the variable of interest was not reported because it was part of another variable that may or may not have been captured in the variables of interest to this study. Thus, the data existed, but in another portion of the database, combined with other figures. If the variable was not one captured, eliminating the possibility of data redundancy, it may be appropriate to impute missing values in some manner (a typical missing data solution). Clearly, zero or "no value", were inappropriate imputation candidates if the information was "combined" within a captured variable as imputation would have duplicated the information already present. Those entries not available (@NA) could in fact be zero or "no value". In both the case of "combined figure" and "not available" cases, missing data would be problematic in covariance methods of analyzing the data and a decision has to be made about missingness before analysis.

A non-covariance technique unaffected by these missing elements is growth curve analysis (GCA) (Rogosa, 1988). High degrees of missingness are tolerable, however, Rogosa suggests that more than two observations are needed to effectively describe growth curves else they are merely pre- post change scores. With Rogosa's caution in mind, I established a primary decision rule requiring a minimum of three observations in the seven time periods for inclusion in the final data set.

With a panel of organizations representing observations over a seven-year period that were tractable to analysis, several techniques were employed to insure that the data were as error free as possible. One source of error that was more readily verifiable was sales data reported "by principal customer" (sales to one of the B3 in this sample) as a rank in one of four positions. This data is used to help establish a "level of importance" or "intensity of relationship" for any supplier-B3 member relationship. Principal customer names sequenced in one of the four reporting columns available were not a reliable indication of their rank as principal customers. This was correctable by calculating the percent of sales to the listed customer. The percentage of sales calculation replaced rank with a continuous measure of relationship intensity.

This allowed an additional check of reporting accuracy by totaling percents of sales to make sure there was no over reporting (due to the ability of organizations to break down their sales by business category). There were several instances where organizations reported sales to multiple customers that when summed exceeded their total sales. Where there was obvious evidence of incorrect sales to principal customers (such as dual reporting in more than one business category), corrected data was determined and I recalculated the sales percentages. When over-reporting was evident but there was no clear manner in which to correct the error, the organization was eliminated from the sample. This pass at refining the sample of organizations (removing those with unresolvable errors, or those with less than three annual observations) resulted in 130 organizations remaining in the panel with seven years (1992-1998) of observations.

The related set of industry data used to operationalize the munificence construct was subjected to similar analyses with a munificence score calculated for all SIC codes.

Because munificence is operationalized as a growth construct, the same rule of needing three observations in the time period was applied. Several SIC codes did not have enough observations to use GCA and were dropped. When the 130 organizations in the supplier sample where matched with available munificence data from their respective SIC code industries there were 3 organizations in the supplier sample that had to be dropped due to no munificence data for their SIC code to test the hypotheses. This reduced the final sample to 127 organizations.

4.2 Design and methods

I use a panel or longitudinal design in this research that is essentially a repeated measures study within subjects over time and across environmental conditions. This research employs a multiple method of analysis using growth curve analysis (GCA), graphical analysis, and multiple regression techniques. A benefit of GCA is its tractability to missing data problems. The output from GCA becomes the input for later graphical analysis and regression models (a form of random coefficient regression). This section discusses the implications of GCA for the missing data problem and the longstanding debate on the use of ratios or proportions that are critical to this research on slack.

4.2.1 Methodological considerations of missing data

I expected a missing data problem after initial reviews of the COMPUSTAT database. I reviewed the missing data literature and came away with a technique (growth curve analysis) that provides a method to deal with the missing data problem. This is not

a methodological technique common in the management literature. What follows is a short review of the missing data problem.

Missing data can be a characteristic of the sample in its own right, providing information about the sample. Considering an empty cell as "no data" rather than "missing data" is essentially "an additional point in the sample space of the variable being measured" (Little and Rubin, 1987, p. 3). These points of valuable information may be "masked" and misinterpreted as missing data. Questioning "Why?" the data are missing can lead to the proper treatment of a sample with missing data.

When any set of organizations is assembled for study, it should be expected that the relationships among those organizations is going to vary over time. This variance allows the researcher to test various hypotheses about the relationships. Some organizations that are in a stable relationship, perhaps characterized by incremental changes in the variables measured, might coincidentally fall within the chosen time period of the study. Other organizations may be in a sharp growth period, or a sharp decline. Others still, may begin or end their inter-organizational relationship well within the timeframe in question. It should be expected that a large enough sample of organizations would exhibit a variety of these start/stop and/or growth/decline characteristics, and that these may be of benefit to the research (unless interested in organizations only at a particular stage in their relationship).

It is the possibility of relationships starting and ending within the period that provides most missing data problems. Samples are often screened for complete data matrices in the panel period. This screening for completeness raises the problem of screening out relationships that may be important during the life of the panel and between

the organizational members. It is unlikely that a sample with random characteristics would have complete data on all measurable relationships at all points within the time period, unless the sample was selected on this basis. Such a sample would be less representative of the population, and inherently biased. It is more likely that a sampling technique used to create a panel of organizations, by moving backward or forward in time, will encounter points where organizations lacked some metric of relationship within the study.

Including these beginning and end points of organizational relationship within the study has advantages. Organizations have asset and expense aspects of an impending relationship, or asset and expense effects after a relationship has ended. Screening on the relationship metric (in this case sales) is likely to eliminate some organizations from study that have important relationship affected asset and expense variables. Take, as examples, organizations that make relationship specific asset investments in advance of making a sale, or organizations that decide to take exit expenses after the sale relationship has ended. These costs in advance of, or after a sales relationship has ended, would not be completely reflected in any asset or expense relationship the organizations have if the sample were restricted to organizations with sales during all years of the study. To the extent organizations are eliminated in any sample, we bias the sample if unique effects of the pre or post relationship are measurable in additional years that the sample does not capture. This is similar to the bias when we study only surviving organizations. The methodological unpleasantries and statistical hurdles are eliminated by culling offending organizations, but only at the expense of understanding the entire population of organizations.

Characteristics of organizations and their relationships are non-zero in other ways as well. A supplier organization might sell only one product to a buyer in a single year and sell multiple products in an ensuing year. These changing relationships may be characterized and controlled for in terms of the intensity of the relationship (sales concentration), as in parts of this study, or must be reconciled when organizations in the sample show a zero sales relationship. Showing a relationship of "zero" only indicates that one aspect of the relationship has entered a range where "zero" is a possibility.

Zero sales are an important conceptual hurdle as they impact our handling of what would normally be sample retention and missing data issues. Zero sales relationships in any of several years should not constitute a rationale for omission in sampling criteria if another underlying relationship over time is affected in any of the zero sales time periods. Conventional missing data techniques should not be used to replace zero values. If a lack of sales (a zero value) were replaced with some imputed value, a valuable piece of information about the relationship (no sales in a particular period) would be lost and be replaced by artificially generated information that is intended to "create" the most likely piece of information for the gap based on surrounding information. Zero sales, in this case, is the best value that describes the set of observations.

The intent of this study is to describe a set of organizations that have a relationship over time that may include periods of vastly changing intensity even to the point of zero sales or zero values in other metrics of the relationship. Because a relationship among the organizations exists, in a developing or fading sense, it is important not to eliminate organizations from the sample merely on the basis of lack of a measurable variable in any one period. Just as we sum the activity of a organization over

a fiscal year rather than eliminate it on the basis of a zero in any week, month, or quarter, we need to "sum" the relationship and performance over the entire set of time periods without eliminating the organization for zero sales in any one year.

4.2.2 Cautions on the form of the data - ratios

The raw data collected and discussed to this point is used in calculations to describe slack, or munificence. Slack as an absolute value exists only conceptually. More often than not, it is measured as a change over time, as well as relative to some other standardizing variable, that is, as a ratio. Bourgeois and Singh (1983) are most often cited for their work on operationalizing slack and frequently used sales as the ratio denominator. Munificence is also a variable that works better in the absolute only from a conceptual point of view. It often is referred to in terms of growth. In pioneering empirical work on industry environmental factors, including munificence, Dess and Beard (1984) standardize this growth within industry by dividing by mean sales.

The use of ratios in analysis has been challenged in the literature and is generally unresolved and seen as problematic (Fuguitt and Lieberson, 1973-1974; Long, 1980; Cohen and Cohen, 1983; Dunlap, Dietz and Cortina, 1997). Ratios are most often criticized for having the potential to produce spurious correlations and provide non-normal data distributions. Ratios are common in management data, represented most often as proportions, percentages, or rates. For example, the ratio of expenses to sales represents a proportion or rate of some subset of sales that are used for expenses. Concentration of sales is a percentage, and growth, measured as the slope of the

regression line, is a proportion of the unit of measurement. The main variables of interest in this research are ratios. Slack is calculated as a ratio and growth is a ratio.

While the use of ratios as proportions raises the issue of spurious correlations, Cohen and Cohen (1983) advise that when the numerator is a subset of the denominator the potential correlation problem is much less serious. Subsets of numerator to denominator reduce the likelihood of zero correlations and equal intervals between numerator and denominator. The ratios used in this research are formed using numerators that are subsets of the denominator, such as expenses as a portion of sales, and with continuous measures of both it is unlikely that equal intervals characterize the difference between numerator and denominator in measures of these ratios.

Cohen and Cohen elaborate "[f]or division by the denominator to be an appropriate method for qualifying the numerator makes an implicit assumption that the correlation of [the two variables] is perfectly linear, or nearly so, and that the regression line goes through the origin" (p. 265). I would expect a highly linear relationship between many expense or asset categories and sales in organizational research, although economies of scale and the ability of an organization to "leverage" its sales in expense reductions as a percent of sales suggests that the linear relationship is not perfect. I would also reasonably expect to find variables going through the origin because zero sales should represent no available subset of funds to spend on expenses or assets. This lessens the possibility of correlation in the ratios, the most oft cited problem.

Another potential problem mentioned in using ratios is that they will not exhibit a normal distribution. A concern with ratio data is that it is often skewed to the ends of the ratio scale of 0 or 1. Can we expect these problems with organizational data? A sample

of organizations is likely to be at many different stages in their life cycle or may be managed in better or poorer ways compared to other organizations, both causing some tail producing pattern in the distribution of the data. In severe cases this might lead to skewed distributions. However, there is a mimetic influence brought about by benchmarking tendencies in which organizations strive to model themselves after other successful organizations. This is often further driven by industry, analyst, and investor expectations. This is more likely to produce a centered peak of "normal" behavior. The balance of managerial influences that create tails in the distribution and the mimetic influences that provide the central behavior will determine the shape of the ratio distributions. If this conceptualization is correct it will be verified in the descriptive statistics further suggesting that ratio data is not problematic in this sense (see the next paragraph for descriptive statistics).

If there is a "normal" mode for the ratio data, it is not likely to be near 1 for slack or munificence data, and the possibility of having decline can pull ratios into the negative range away from 0, a point not considered in the cautions on the skewed distribution of ratio data. In the two types of slack variables in this research the ranges are –1.331 to 0.735 with a mean of 0.002 (kurtosis 15.5; skewness –1.7; Kolmogorov-Smirnov statistic 2.09, sig. 0.000) and 0.050 to 1.367 with a mean of 0.327 (kurtosis 7.1; skewness 2.2; Kolmogorov-Smirnov statistic 1.45, sig. 0.030). These are not the characteristics warned against with ratio data. While there is a bunching of the data near 0 for the first slack measure, it is not a skewed bunching at 0 but rather a peaked bunching at 0 with values falling on either side of 0. Skew is not the primary distribution characteristic. Rather, kurtosis reflects the mimetic behavior of organizations. Note that the significance of the

K-S statistics indicates these are non-normal distributions. Qualitative review is important however to determine the potential effect on our regression tests. Other than the lack of shoulder density evidenced by the kurtosis value, the data shows an expected mimetic pattern in its distribution. Most of the methods used in this research will be robust to mild departures from normality. The mimetic responses of organizations in general, and within their own industries in particular, suggest a normal range of acceptable distributions for accounting ratios with both highs and lows existing for both tails based on life cycles and varying management capabilities. At worst, mimetic behavior will remove data densities from the shoulders of the distribution and put it in the peak of the distribution.

Yet another offense charged to the use of ratios is that the distribution is generally "flatter" exhibiting "bunched tails" (Cohen and Cohen, 1983) requiring some form of transformation. For organizational research at least, the kind of extremes suggested by bunched tails would seem less likely because of industry mimetic forces creating peakedness rather than the bunched tails phenomenon.

4.2.3 Research methodology

There are several approaches to methodology in this research. Because of the missing data issue, I perform the analysis in methodological stages using the outcomes of GCA for input to both the graphical analysis and later regressions. Using earlier stage model output in the form of intercepts or slopes as input at later stage models is a hierarchical linear modeling (HLM) or random coefficient approach. Measures of slack and munificence growth are first developed using GCA. In this case GCA provides slope

coefficients describing slack ratio growth (slack is standardized before growth is calculated). Munificence measures essentially use the same methodology but standardize after growth is calculated. In both cases sales is the standardizing metric. The next stage is a graphical analysis of the research space using GCA outcomes for slack and munificence growth to determine whether observations exist where they are hypothesized to exist. I also show slack patterns at customer and supplier organizations. The last stage is multiple regression to control and test for the predictive ability of several variables simultaneously, again using the GCA outcomes along with the other variables of interest.

4.2.3.1 Stage 1: Growth curve analysis

Growth curve analysis (GCA) is not a technique often seen in the management literature although it is subsumed under many studies that look at change in variables over time. The Dess and Beard (1984) operationalization of munificence is essentially a GCA model calculating growth over time represented as the slope of the best fitting regression line modeling that growth. They then standardize the slope for each industry's regression equation by dividing by mean sales for that industry. See another notable exception from the marketing literature by Lessne and Hanumara (1988). GCA does however have a significant amount of exposure in the psychoanalytic, educational, and human development literature (Rogosa and Willet, 1985; Figueredo, Brooks, Leff and Sechrest, 2000) and even more prominent coverage in the statistical methodology literature (Kleinbaum, 1973;Timm, 1980; Reinsel, 1982; Duncan, Duncan, Strycker and Alpert, 1999; Hox and de Leeuw, 1999; Li, Duncan, Duncan, McAuley, Chaumeton and

Harmer, 2001; Marcoulides and Schumacker, 2001; Duncan, Duncan, Okut, Strycker and Li, 2002).

For GCA, missing data is not the problem it is in many of the more typical methodologies employed in the management literature. While early growth curve modeling assumed researchers would want to replace missing data with the use of estimators or iterative techniques, it isn't necessary in GCA to have observations for all subjects/organizations for all time periods, although two-observation change scores are probably inappropriate (Rogosa, 1988). Work on random-coefficient growth curve models (Vonesh and Chinchilli, 1997) has the advantage of accommodating unbalanced and incomplete data by treating each subject as having its own regression model and its own slope coefficient. The individual regressions handle missing observations over time as long as time is modeled to retain the proper interval.

Not having to worry about replacing missing data frees the researcher from the concerns of missingness assumptions for data replacement techniques such as imputation. The most conservative missingness assumption is "missing completely at random" (MCAR). This would be an unlikely assumption for missing within-organization data. What appears as missing data in an organization's panel is often not random at all, such as when there are no sales, and no profits, in a time period. Across organizations, having missing data is a much more reasonable MCAR assumption. Missingness within organizations, and failure of the MCAR assumption does not affect GCA regression slopes, whereas failure of the MCAR assumption would make imputation techniques questionable.

Growth curve analysis preserves the sample size to the extent that more organizations stay in the sample even though they have some missing data. Eliminating subject organizations with fewer than three observations to calculate growth for a variable will result in considerably fewer organizations being deleted. Complete deletion where there are any missing observations creates the possibility of severely distorting the sample. Based on the missing data problem in the COMPUSTAT database, this is a non-trivial concern.

Ratios used in measuring change are not problematic in GCA. Here, the change in the variable can provide a direct measure of growth (or decline). In GCA, it would be uninformative to look only at the ratio's components. SG&A (an expense variable) or SALE alone would only show growth in the components but not in the interaction of the components. The answer does not lie in the parameter coefficients (slopes indicating growth) of the variable alone in a regression either because autocorrelation makes the coefficients suspect (Lessne and Hanumara, 1988). And, perhaps more importantly, the components do not represent, by themselves, the decision variable we need to measure. By themselves, SG&A, or SALE, are not measures of slack. Slack has more implied content to the practitioner and researcher in terms of the ratio of these variables, and, perhaps also in terms of the ratio's change over time.

For every organization in the sample, a GCA was performed resulting in a slope coefficient that represents the change in the slack ratio for that organization. For each organization's industry, a GCA was performed resulting in a slope coefficient that represents the change in the munificence for that organization's industry. These slope coefficients then become the slack and munificence variable inputs in the graphical

analysis and later regression models. GCA in simplest terms is within subject regression to determine velocity of change (slope) and anchor that value with a starting point (the intercept). While we could discuss the non-normality of within subject data with 3 to 6 observations, it would be unusual. We would more likely discuss extreme values. So, for GCA, normality would not be an issue in terms of practicality because I would envision NO sample showing growth ever to be "normal"…there would be no bell curve under which to fit the values if the initial assumption is that there is growth, because all values would be increasing.

Values from GCA are then used in further regression models (much like the HLM process). Here you could claim, and should, that all of the individual slope and intercepts of the within subject regressions should have normal distribution to satisfy one of the major assumptions of regression. The K-S tests were significant indicating non-normality. However, we still haven't solved the question of when the departure from normality is severe enough to cause problems since the techniques are robust to "mild departures". Skewness is often the culprit, whereas kurtosis is not often discussed in this regard. The K-S statistic indicates non-normality and then offers no interpretation for "mild departure". It is often recommended that this inadequacy be resolved through visual inspection of the data with histograms. The skew of all of the individual slopes does not appear to be a great departure from normality. While the kurtosis statistics indicate the potential for non-normality we have to remember that high kurtosis values only reflect lack of shoulder density. If that density were shifted to create "fat-tailed" kurtosis it would be like both positive and negative skew simultaneously with no way to enclose those fat tails under a normal curve. On the other hand, if the kurtosis was

peaked kurtosis where the shoulder density shifts to the peak we don't have much tailedness to the distribution, but rather much more similarity in the distribution causing the peak to be higher than the normal curve. Non normality will raise its ugly head in regression with heavy tails by pulling the regression line in one direction or the other unless the heavy tails are balanced and then the regression outcome will be determined by the highly kurtotic variable's joint distribution with the other regression variables. The worse case scenario in peakedness (which characterizes this data) is that the range of variation is limited, creating more difficulty finding effect sizes that are measurable.

4.2.3.2 Stage 2: Graphical analysis

A benefit of graphical analysis in this research is that it immediately shows the answers sought in the hypothesis testing. While inferential analysis may still be required, much can be learned and conclusions drawn from graphical analysis. In this research, for example, hypotheses describing all areas in the research space can be posited on a graph or matrix of the potential relationships between slack and munificence. The areas of the graph or matrix become the "home" for the hypotheses. A plot of organizational slack and munificence characteristics should fall into one of the hypothesized spaces on the graph. Theory often suggests that observations should be possible in portions of the research space while at the same time theorizing that they should not be possible in other areas. I use confidence intervals to test statistical significance for the plotted data. This is a very simple macro test of the hypotheses in question. I also provide graphical displays comparing customer and supplier slack growth characteristics and test inferences for their statistical significance.

4.2.3.3 Stage 3: Multiple regression analysis

GCA provided data for the graphical analysis and helps explain the research space. However, there are multivariate phenomena that remain to be tested. Growth curves have time embedded, which is convenient for certain aspects of the analyses by reducing change in slack and munificence over time to one measure. One measure will not suffice in a more intricate regression model where prior slack levels may determine slack growth. This requires the inclusion of a lagged measure of slack.

More importantly however, the regression stage of the analysis allows for partitioning incremental variance through hierarchical regression. In addition to gaining an understanding of the contribution to variance of variables and sets of variable, this technique will also allow an interesting view of two opposing models, that of environmental determinism and managerial discretion.

As Cohen and Cohen (1983) suggest, hierarchical regression is "[o]ne of the most useful tools for extracting information from a data set…" (p. 120) by sequentially adding variables singly or in blocks and running successive regression models, noting the change in *R-square* and its significance. The position of any predictor variable in the hierarchical sequence is critical. Because it is unlikely that my organizational or industry variables have zero correlations there will be at least some redundancy in their information content. The first variables in the sequencing will "take credit for" redundant information they share with variables entered later in the hierarchy. With increasing correlation, variables entered later will appear to contribute less explanation. Cohen and Cohen suggest that hierarchical regression presumes causal priority in its sequencing stating that "…ideally, no IV entering later should be a presumptive cause of an IV that

has been entered earlier" (p. 120). They also point out that any single sequence is not likely to be uncontroversial and that posited models should be considered together.

It is that controversy which I address the hierarchical procedure to. Typically, control variables are entered into hierarchical regression models first to later test the incremental variance partitioned to other variables of interest. This presumes a causal sequence. There is likely some correlation between industry conditions and the amount of slack an organization has. Entering an industry variable in the regression first would partition all of that redundant information content's incremental variance explained to industry. Likewise, entering slack first would partition the redundant information to slack. In this research I will alternately make the assumption that the control variables are environmental (by entering industry membership and munificence first to test the additional variance explained at later stages by organizational variables) or organizational (by entering size, relationship, and lagged slack variables first to test the additional variance explained at later stages by the environmental variables).

In a behavioral science such as management, using hierarchical regression presumes that the variable entered first sets the condition under which later variables exert their influence. In an environmental determinism model I could say that industry characteristics creates the conditions under which slack grows and then managers make decisions about the amount of slack growth. That would be represented by the first model where industry and, then slack, share explanatory power. On the other hand, I could posit a managerial discretion model in which managers determine the amount of slack growth, with industry playing a small part in the explanation. The amount of

change in *R-square* will determine which model seems to more accurately portray what is going on.

Using the hierarchical regression framework to incrementally partition variance I set up an "environmental determinism" model where I enter the environmental variables of munificence and industry membership first, followed by organizational variables such as lagged slack, size (sales), concentration, and tenure. This tests the notion that munificence conditions largely are the determining factor under which managers then exercise some level of managerial discretion in growing or declining levels of slack. I then set up another hierarchical regression sequence in which the organizational variables are entered first followed by the environmental variables. This "managerial discretion" model suggests that managers make decisions on organizational variables primarily and that in the decision-making process consider them first as the most important determinants, with environmental conditions playing a less important role in determining slack growth. Note that while the change in R^2 is likely to vary considerably as the variables are sequenced into the model, final model R^2 will be the same for both models.

4.3 Measures – the variables

Recall earlier that while many operationalizations of slack and munificence are possible and several reported in the literature, there is no theoretical support to suggest one operationalization is better or worse than the next. I chose the following based on their historical appearance and acceptance plus citation in the literature. While I use the Dess and Beard (1984) measure intact for munificence, I use portions of the several Bourgeois and Singh (1983) operationalizations of slack. Bourgeois and Singh used

accounting variables as the input for their calculation of slack variables. Dess and Beard used Census of Manufactures variables as the input for their calculation of munificence. Each is described in the following section along with the control variables.

4.3.1 Operationalizing slack

Slack growth is the criterion variable in this research. A lagged measure of the slack ratio is used as a predictor variable. Slack is defined as an underutilized resource, or as an overpayment. Slack can reside in organizations in a number of ways that are more or less tractable to measurement, leading to the need for multiple measures. Looking for slack in a variety of places is essential. I measure various types of slack although it is important to note that the measurement of slack is in no way exhaustive. Earlier research suggested that slack would be present differentially dependent on environmental characteristics (Sharfman, 1985). Other research suggests that these pressures, as well as the different performance levels of the organization, determine where an organization may invest in, or spend from, its pool of slack (Ward and Duray, 1995).

Slack is not available for measurement in absolute terms (Bourgeois and Singh, 1983). We cannot reasonably expect to know levels of zero slack. That is to say that we may not know the "real" amount of assets required to buffer, invest, and operate efficiently, or the real costs of things that might be overpaid for. Slack is therefore more tractable as a concept when discussed in relative terms. This may be a measure of the use of resources as compared to other organizations with similar operational characteristics measured through ratio analysis and benchmarking, or might be a comparison over time

to ascertain whether the organization is "leveraging" its performance, that is, to achieve a higher return on assets employed. Generally, slack is viewed as some level of resources or expense over those needed to achieve optimality. Optimality is often measured in terms of performance, and performance is often measured in accounting terms.

Bourgeois and Singh characterize slack in various types such as available, recoverable, and potential. Available slack describes assets that have not been absorbed yet by the organization. Recoverable are those absorbed currently yet they can be turned into other assets over different periods of time or reduced as future expenses. Potential slack describes resources available from the environment. Each is described as a ratio, to aid in comparisons from year to year and from organization to organization. As pointed out by Tan (2003, p. 744) there is no reason to suspect that all forms of slack have the same relationships with various organizational phenomena and that even "Bourgeois (1985) and Singh (1986) were able to support their hypothesized slack effects only after they controlled for differences in the degree of absorption." I measure several forms of slack to better represent and test possible slack growth phenomena, yet, as noted above, this is not an exhaustive search for slack in the organization. My interest is limited to measuring several forms of slack that might be affected by the supplier-customer relationship. These forms might have different characteristics in terms of recoverability, adsorption, or availability dimensions.

One type of available slack measure is the liquidity or working capital measure. Bourgeois and Singh created a measure of "excess" liquidity over and above that needed to support a given level of sales (Bourgeois, 1981; Bourgeois and Singh, 1983). They later make a refinement to working capital slack to separate its components on the basis

of recoverability. It is fairly clear they were suggesting that cash rich organizations had underused resources. The working capital measure of cash and equivalents, plus receivables, minus current liabilities is conceptually intended to show positive slack conditions. In reality, the measure can go negative in sign when current liabilities are in excess of cash and equivalents plus receivables.

The idea of "negative slack" is not provided for in the Carnegie School model as an underutilized asset or as an overpayment. There is no construct equivalent to over utilization or underpayment to create something termed "negative slack". Perhaps Bourgeois and Singh did not anticipate the overwhelming financial strategy of organizations for short term financing that would create a negative value in slack liquidity. The effect of the potentially negative available slack measure is a sizable offsetting balance to the other measures of slack that would in turn downplay their significance. For this reason, I do not sum slack over the various measures but rather use them independently as variables, creating two slack models for the graphical analysis and regression models.

I use two forms of recoverable slack in this research that show more of the adsorption dimension. These are inventory and selling and general administrative expenses (SGA), both as a ratio to sales. The five different components measured (cash and equivalents, receivables, liabilities, inventory, and SGA) have a wide range of adsorption, availability, and recoverability dimensions to more accurately reflect the also wide range of slack types that may be affected by the relationships being tested. Working capital slack is referred to as "unabsorbed slack" while inventory and SGA are referred to as "absorbed slack" from this point on. I make no use of potential slack, the measure of

"the capacity of the organization to generate extra resources from the environment" (Bourgeois and Singh, 1983, p. 43). Potential slack is a hypothetical amount of assets not under the legal or accounting control of the organization but rather available to the organization. Potential slack is essentially a measure of munificence, or those input factors that the environment could make available to the organization.

All raw data is from COMPUSTAT and is annual fiscal data in millions of dollars. Slack was calculated for each slack area by summing its components and then dividing by sales to create a slack ratio. Growth variables are calculated from the slack ratios as slopes of the regression line over the panel measurement period. I squared slack growth as a criterion variable to reflect the ∩ shaped behavior noted earlier (Bourgeois, 1981; Nohria and Gulati, 1996; Sharfman, Wolf et al., 1988; and Tan, 2003) and entered the lagged slack term as both first order and squared predictors (per convention) to reflect that same ∩ shaped behavior.

4.3.2 Operationalizing munificence

Aldrich (1979, p. 63) described munificence as "*Environment capacity (rich/lean*): the relative level of resources available to an organization within its environment" and Starbuck (1976) conceptualized "environmental munificence as the extent to which the environment can support sustained growth" (Dess & Beard, 1984, p. 55). Dess & Beard's munificence operationalizations are based on U.S. Census Bureau data. Dess and Beard used the individual variables below to create a factor score coefficient, a "munificence factor score," for each industry.

V1. Growth in total sales (Value of shipments; regression slope divided by industry mean; 1968-1977. U.S. Bureau of the Census, 1977 Census of Manufactures, Preliminary Reports MC 771 (20A to 39A)

V2. Growth in price-cost margin (Value added by manufacture minus total wages; same measurement procedure and source as V1)

V3. Growth in total employment (Total employment; same measurement procedure and source as V1)

V4. Growth in value added by manufacture (Value added by manufacture; same measurement procedure and source as V1)

V5. Growth in number of manufacturing establishments (Number of manufacturing establishments, average annual percentage change, 1967-1977; same source as V1)

Dess and Beard's standardized factor scores were replicated and cross validated in 60 industries over a 16-year period by Rasheed and Prescott (1987, 1992). I use the original operationalizations and calculate the five variables from Census Bureau reports from 1992 and 1997 with interim reports where available from the Annual Survey of Manufacturers. Instead of a "munificence factor score" the five "growth" variables were averaged to form a munificence score for each industry in the study. They first measure the growth in the variable over the panel period as the slope of the best fitting line through the data and then "standardize" the data by dividing by the mean of each six-year series of data within an industry. Using the mean of the panel period centers the data. Their ratios (slopes) for the five munificence measures are then averaged to determine an overall munificence score for each industry. The munificence score is used to plot the munificence characteristic for each organization's industry environment and later is used as a predictor/control for slack growth in the regression models.

Note also that the Dess and Beard measure for growth in establishments is a simple growth calculation using the pre- post- difference divided by the pre- score rather than a best fitting line over all the measures divided by the mean. This simpler growth calculation has the effect of "left centering" the data because it uses the first observed value in the series to determine growth whereas the slope divided by means method uses a calculated mean, or centered, position. Growth calculations anchor the intercept at the first observation in the time series whereas slope calculations create an intercept based on the best fitting line that goes through the mean of all variables during the panel period.

4.3.3 Supplier-customer relationship: concentration

The argument that changes in supplier slack will be a function of whether share of sales at a supplier organization are dominated by principal customers (manufacturers) measures one portion of the intensity of the relationship between supplier and customer. Customer relationships affect the business decisions of, and outcomes for, an organization. I suggest this effect is greater with a large primary customer than with a secondary or tertiary customer. As a supplier moves to a situation in which sales to a principal customer increasingly represents a larger portion of the supplier's sales, its business will be more affected by that principal customer and the supplier's level of slack will increase. This portion of the supplier-customer relationship is measured by the percent of sales to the B3, both in composite (to test H4) and individually (to test H5). As proportions, I take the arcsine transform to improve distributional characteristics for all concentration measures (Cohen and Cohen, 1983). Business segment level data is

available from the COMPUSTAT database and as previously described provides supplier sales to each of the B3 as a continuous measure of the intensity of the relationship.

4.3.4 Supplier-customer relationship: tenure

"Partnering" rather than adversarial price negotiating has become of dominant theme in the relational contracting literature (Gulati, 1995; Anderson, Glenn and Sedatole, 2000; Jeffries and Reed, 2000). There are also popular business press descriptions of changes in the way B3 members view their supplier relationships (Carbone, 1999; Dyer, 2000). While some of this effect will likely be represented in the relationship variable of sales concentration to the B3 above, a further test of this effect may be visible while looking at the experience level of a supplier measured by the duration in which a supplier has serviced principal customers as large as the B3. I suggest that learning how to do business and becoming a "partner" with suppliers or customers will lessen the amount of slack needed to sustain the partnerships.

Tenure may be measured in several ways. The most straightforward measure would be to count the number of years at any point in time that a relationship exists. This of course necessitates a panel size of n-1 additional years (n = number of years in the existing panel) that precede the panel period to accurately reflect the value of tenure for the organization in the first year of the panel. The data often showed that a supplier's sales to a B3 member was on and off over the period. This would suggest that an important aspect of the relationship would not be measured through a simple counting procedure. Contractual arrangements mean organizations might exhibit pre- and post-relationship effects. To the extent that relationships also have pre- effects, n years must

be added to the most current year of the panel and years without sales may still be reflective of slack creating effects. It was not possible to collect the additional years from the currently available data, not did I want to ignore the off year effects for slack. Another method to measure tenure is needed.

It is important to measure more than just the single year when ascertaining customer relationship effects on organizational indicators. Preceding the evidence of a relationship, signaled by revenue, there are likely to be significant effects on the supplier's expenses and assets. These come from relationship building expenses during negotiation and contracting as well as expenses that will allow creation of the revenue stream. These may include hiring sales, shipping, and customer service employees, engineers, production workers, and back office clerks. There are associated employee expenses in hiring, training, and providing benefits. There is also a likely increase in terms of capital outlays in physical plant costs, equipment purchase, and related expenses for retooling, retraining, and ramping up inventory in raw materials, work-in-progress, and finished goods. While these effects occur prior to the period in which we measure revenue, there are also post relationship effects that should be monitored after revenue tapers off or even stops. These may include lay-off expenses, retraining, continuing sunk costs, salvage write-downs, and so on. This essentially suggests that any relationship studied in terms of revenue should be associated with costs of that revenue pre- and post-revenue period.

I calculate a tenure value for each supplier for each year in the panel by counting the number of reported relationships with B3 members (possible values 0 to 3) each year for a three-year span (total possible value is then 0 to 9 for a time period). Every year in

the sample thus has a tenure value associated with it that measures both historical and anticipated relationship effects of tenure for one year in either direction. The tenure variable combines the effect then of a three-year span along with the B3 experience level under the assumption that members of the B3 have similar kinds of effects on suppliers due to their size and some mimetic behavior. The tenure measure is not designed to measure anything other than the composite effect. Individual effects of B3 members will be picked up with the use of the concentration measure in the prior section. There is likely some overlap with the tenure and concentration measurements.

4.3.5 Size

While size is most often in a model as a control variable, I suggest that size offers several other predictor influences (Kimberly, 1976). Size is a proxy for power in the channel as well as a proxy for immunity to power in the channel. In the former, supplier organizations may become large enough to have their own power enhanced in relationships further upstream. In the latter, supplier organizations may grow large enough and/or become less dependent on individual customers giving them a level of immunity from channel power by large customers. Size may also reflect that threshold levels of resources have been reached where further accumulation of or the velocity of change in resource levels tapers off. Size is measured in terms of total sales of the supplier. The untransformed variable is used to form the slack ratio variables. The log of mean sales (to transform typical non-linearity of the sales variable) (Cohen and Cohen, 1983) over the panel period is used for the regression control variable.

As I am interested in differentiating environmental variables from organizational variables in testing the hierarchical regression models, I enter size with other organizational variables after the environmental variables.

4.3.6 Lagged slack

Business decisions are most often made with some reference to prior performance outcomes and target or benchmarking guidelines. Prior slack measures, as they evidence themselves in resource performance, may have an effect on current slack decisions. There were two conceptual possibilities for determining lagged slack. Note that often it is recommended to perform a sensitivity analysis to determine the best lagged model but in this case I narrowed the choice down to the most current lagged period versus the earliest lagged period.

Management decisions are often based on the most current conditions as representative of the environment. That is, managers will make decisions on financial parameters on the basis of recent data and their anticipations of the future. This suggests that in a seven-year panel the best lag variable might be from t_6. Often, in time dependent organizational data, a lag of one time period is the best determinant.

On the other hand, I am using a growth curve to represent the response variable and this growth curve has an origin that is likely far from t_6. A simple growth line would specifically contain all $t_{1\text{-}7}$ with points between being estimated in the growth calculation. The slope growth curve variable (the best fitting regression line in this case) contains the mean time period, that is t_4, because the regression line always go through a point described by the mean of the variables. This slope line potentially contains none of the

actual measured points but would provide an intercept. Both the intercept and the mean time point reflect slope characteristics but are not actual points on the line. Because I am using the slope method to calculate growth, the time period t_6 no longer seems appropriate as a lag with all other available time periods being averaged into the curve. It also does not seem as appropriate to use the calculated intercept when I have a very real first time period value available.

The time period t_1 was not always available when missing time periods in the slope calculations (because of left truncation) meant a later time period was the first in the curve. I elected to use the earliest available t_e as it represented an approximation of the intercept for each curve yet had the additional properties of being a real value for the organization. Note that in slope calculations for growth (versus simple growth calculations) the actual intercept approaches t_e but does not necessarily go through it. That is, the best fitting line whose slope characteristics are used does not necessarily go through the point described as the lag variable. In practice, this meant that about three fourths of the lags were based on t_1 and the others were from t_2 to t_5 depending on the severity of the left truncation. I use the slack ratio variable operationalized as above for both absorbed and unabsorbed slack for the lagged slack variable. I use both first and second order variables for lagged slack to model the curvature suggested by authors as noted above.

4.3.7 Industry

Industry is used as a control variable. Industry is entered into the regression equation via SIC code groupings. Industries were grouped by similarities and entered

with dummy coding (Pedhazur, 1997; Tihanyi, Johnson, Hoskisson and Hitt, 2003). Recent research (Ward and Duray, 1995) has suggested that environmental characteristics act as industry controls because they define the overall characteristics that exist within industries. It is not uncommon when discussing munificence to include in the discussion industry environmental characteristics such as complexity and dynamism. The three concepts are often used in conjunction when describing environmental characteristics. Here industry code acts as a proxy for any remaining environmental characteristics after munificence is separated out.

Six industry groupings were conceptualized on the basis of potentially sharing various characteristics (in a manner consistent with Tihanyi, et al., 2003), not the least of which was perhaps slack strategies of their members. As categorical variables, it would not be practical to have 66 different SIC code variables at the 4-digit SIC level or even as few as 19 different categorical variables at the 2-digit level. Reducing the set of industries to a more manageable level while still trying to discern if industry characteristics provided explanatory power in the model suggested a smaller group of coded industry groups. While many conceptualizations are possible when arbitrarily assigning industry SIC codes to a smaller set of groups, I chose similarity in products under the assumption that these groups would share industry characteristics in terms of resource issues, capital structure, financing decisions, and industry relationships with the automobile manufacturing companies. Those SIC groupings were: component parts for the manufacture of automobiles, electrical components, machinery producers, primary metal and metal forging, business service organizations, and miscellaneous suppliers of products not related to components parts. Dummy codes were set up for each SIC

industry grouping. One less group than created carries all membership information needed in a regression. For sake of continuity I did not enter the last group in the regression models versus letting the regression program pick the group to delete each time.

Chapter Five
Results

5.0 Overview of the chapter

This chapter begins with the characteristics of the sample and the input data used in the various stages of the hypothesis testing. Recall that the raw input accounting data is used to calculate slack measures and the growth of slack. As input data is transformed into the measures of interest, the data characteristics of those measures are provided. A restatement of the hypotheses in terms of what each is designed to test appears as I move through the various stages. Graphical analysis results are shown and statistical support for the visual representation is noted. Noteworthy conclusions from the tests are highlighted but their discussion is reserved for the next chapter. Results of statistical tests are presented along with any relevant details about the tests used and their statistical or practical significance.

5.1 Characteristics of the sample

The final sample of 127 organizations represents 66 different 4-digit, 55 different 3-digit, and 19 different 2-digit SIC industry codes. This is noteworthy because only 8 of

the 2-digit industries are in "typical" manufacturing industries (SIC 2-digit codes 30-39). Further, only 28 of the 127 retained supplier organizations in the sample were from SIC code 3714, the industry sector with the highest "specialization ratio" for "motor vehicle parts and accessories". Coding by SIC membership is used to control for industry effects in this research. Having many sectors represented may extend the generalizability of any findings from the research. Additionally, three "customer" organizations, the "Big 3" (B3) automobile manufacturers Daimler-Chrysler, Ford Motors, and General Motors, were selected because they were identified as being principal customers of the 127-organization supplier group. Identifying a group of suppliers with this commonality is important to some of the hypotheses being tested. The total number of organizations for which data was accumulated was 130 and covered 67 4-digit SIC codes (adding SIC code 3711 for the B3). (See Appendices 5.1A and 5.1B respectively for a list of organizations and a list of SIC codes and their descriptions used in the sample.)

Seven financial accounting measures were collected for each organization from the COMPUSTAT database over a seven-year span (1992–1998). The accounting variables in this research are: sales (SALE), cash and equivalents (CHE), receivables (RECT), current liabilities (LCT), inventory (INVT), and general and administrative expense (XSGA). Descriptive statistics and correlations by year of the panel are provided in Appendices 5.1C-1 to C-3. Descriptive statistics for the means of these variables are reported in Appendix 5.1C-7 for comparisons. These variables are used to form slack variables and I am not concerned with their distributional characteristics in their raw form. Additionally, I extracted data from the COMPUSTAT database to compile a concentration of sales variable (CON) for each supplier organization as a total

for the B3 and individually by B3 member (CONFM, CONGM, CONDC). I also compiled a tenure (TEN) variable from the database. Descriptive characteristics and correlations appear in Appendices 5.1C-7 and C-8. A review of the data shows non-normal distribution characteristics for most of the variables. Much of the raw organizational data is not likely to exhibit normal distributions because no range restriction was used for organizational size allowing for considerable skew and kurtosis. While normality statistics are provided for variables used in the analysis, they are not as informative as graphical representations (note that a significant Kolmogorov-Smirnov Z statistic represents data from a non-normal distribution). Histogram and distributional characteristics suggest some outlying data or the presence of sub-samples. There is a somewhat positive skew throughout the accounting data due to a small group of high revenue organizations and considerable kurtosis due to peakedness in the distributions. Correlations year to year show typical accounting data relationships that are highly correlated and waning as the period widens. Time series trending is apparent. Intensity of relationship variables CON and TEN show departure from normality although the concentration variable CON is improved using the arcsin transformation per Cohen and Cohen (1983). Tenure shows no improvement with transformation. Concentration and tenure show high levels of correlation suggesting concern for redundancy in later regressions. Histograms of the major variables are provided in Appendices 5.1C-9 and C-10.

Additionally, Census of Manufactures industry data for five variables was collected for each 4-digit SIC code represented in the sample to determine growth in the industries represented by the sample for the same relative period. Those variables are:

value of shipments (V1), value added by the manufacturer (V4), total employment (V3), number of establishments (V5), and total wages (TW). Another variable of value added minus wages was calculated (V2). The Census of Manufactures is taken every five years and I use data from 1992 – 1997 in this study supplemented by Annual Survey of Manufactures (ASM) data in the off years 1993-1996, when reported. Descriptive statistics and correlations appear in Appendices 5.1C-4 to C-6. A similar review of the industry data used as inputs for calculating munificence shows departure from normality in the majority of variables by year and a very high degree of correlation for variables by year. Both were expected patterns based on stable influences (lack of major industry disturbances) and time dependence being represented in industry data over the period of measurement. Standardization and regression slopes are calculated and averaged from these input variables to create the munificence (MUN) variable. The descriptive statistics, correlation, and histogram for munificence are reported in Appendices 5.1C-7,8, and 11 respectively.

5.1.1 Missingness characteristics of sample

As in most archival research of this nature, there was a degree of missingness in the data. For many of the reasons mentioned in the description of the COMPUSTAT database there was missing data in the matrix of possible accounting data observations. The rate of missing data within any one variable was 0.0 - 27.6%, within a single organization the range was 0.0 - 57.1%, and within a single year 0.0 – 44.1%. The B3 database matrix was complete for the panel period. The level of missing data was reduced from almost 10% of the total supplier data matrix to 7.7% by filling in, and in

some cases correcting to the extent possible, using the SEC's EDGAR database supplemented by on-line archives of individual organizations.

An evaluation of the missing data resulted in the observation that only 37 organizations had missing data. I retained all organizations in the sample. Missingness rates by variable, year, and organization can be found in Appendices 5.1D1-2. Organizations with the highest missingness also contributed most of this missingness in the earlier years. All available data can be characterized as having some useful content. Losing the information content of available data in an effort to make the complete data matrix more amenable to analysis was not an acceptable alternative. The table below (Table 5.1.1) illustrates the "cost in information" that is incurred to lessen one type of missing data problem by reducing the data matrix one the year 1992 where 44.1% of the missing data is accounted for.

Table 5.1.1 "Cost in information" with data reduction

Years	**Cells w/missing**	**Cells w/data**	**Total cells in matrix**	**% missing**
92-98 (7 yrs)	410	4,924	5,334	7.7%
93-98 (6 yrs)	229	4,343	4,572	5.0%
Reductions: (1 yr)	181	581	762	2.7%

Reducing the number of years in the sample "costs" the researcher 581 observations (those with useful information content) to resolve 181 missing observations. In this scenario, the researcher has to give up three times more information content to reduce missingness and in the process potentially introduces more bias due to manipulation of the sample, versus less bias by maintaining missingness and imputing

missing cells or using techniques where missing data is not problematic. I do not reduce the useful data to resolve missingness.

Note that the Census of Manufactures data is only collected every five years, which is why the panel period for this portion of the data runs from 1992 to 1997. Intervening years are not really "missing" although both the original work by Dess and Beard (1984), as well as this research, used the ASM to supplement the data in the Census where reported. This allows a more accurate calculation for munificence growth using six observations in most cases versus just two.

5.2 Slack and munificence variables

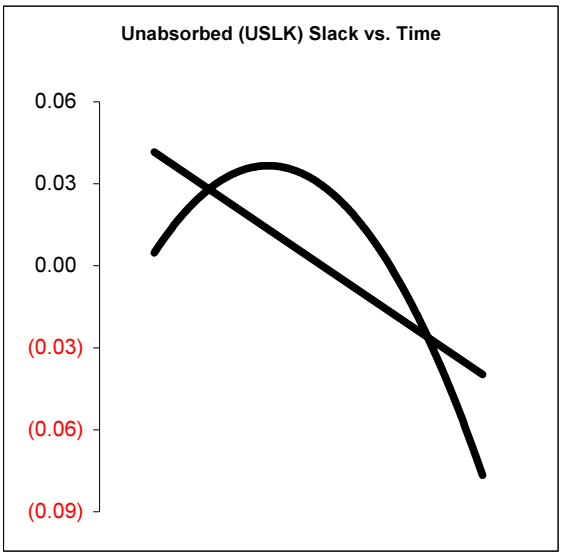
Both Bourgeois and Singh (1983) and Dess and Beard (1984) use the input variables described above to construct measures of slack and munificence respectively as outlined in Chapter four. In this section I report the descriptive characteristics of these variables created from the input data discussed in section 5.1. Slack growth and munificence (growth) data are created first by standardizing input measures (CHE, RECT, LCT, INVT, and XSGA) by SALE by year for each organization. These ratios are regressed on time to form slopes describing the growth in the slack or munificence variable. Two major composites of slack are formed. Working capital slack is unabsorbed slack and is referred to as USLK while absorbed slack appears as ASLK. Munificence is MUN.

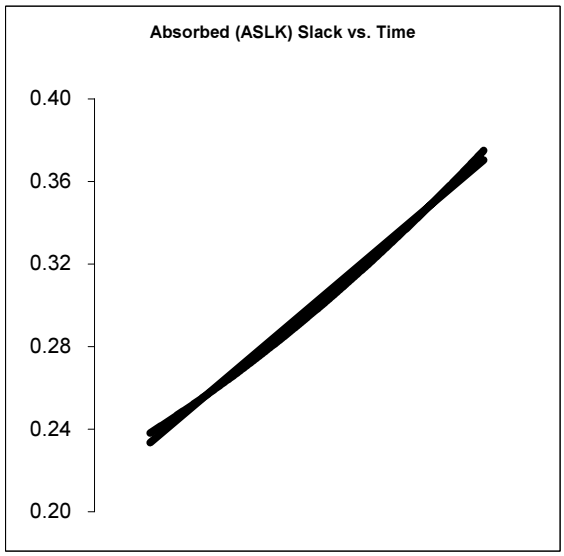
The slack and munificence ratios serve the useful function of removing the effect of varying organizational size. That does not mean however that they improve normality in the distribution. Appendices 5.2A1-6 show descriptive statistics and correlations for

the slack variables by year. Appendices 5.2B1-3 show descriptive statistics and correlations for the munificence variables by year. I also show the growth calculation for slack in each case using the slope of the regression line. Slack and munificence growth variables still exhibit non-normal distribution patterns. The lack of normality is not problematic with the first graphical analysis and its tests. Later regression tests assume normality but regression is robust to mild departures. Descriptive statistics, correlations, and histograms appear in Appendices 5.2A1-6 and 5.2B1-3.

An important note is the significant (p = 0.000) negative correlation (-0.43) between the two composite slack variables ASLK and USLK. As noted earlier this should require separate modeling as they act in opposite directions. This behavior is noted below in Figures 5.2a-b where ASLK displays growth and USLK decline. The theoretical curvilinear behavior that has been supported in the literature suggests that a quadratic curve can be fitted to the slopes. While I present quadratic slack variable behavior later in terms of the regression findings, the figures hint that USLK squared will add to the model but the quadratic fitted curve adds almost no additional fit to the slope for ASLK suggesting that not all forms of slack follow this curvilinear behavior. The tight overlap for the linear and curvilinear lines for absorbed slack indicate redundancy of information and are likely to add to collinearity in a regression model.

Figure 5.2a **Figure 5.2b**





5.3 Graphical analysis: The research space hypotheses

The "hypotheses grid" created to provide a graphical view of the nexus of slack and munificence (Figure 3.2a) is reproduced again below (Figures 5.3a and 5.3b) showing a scatter plot of organizations and their slack and munificence growth characteristics. Recall that quadrants I, III, and the zero slack growth corridor under munificent conditions, are the received view's hypothesized locations, while the alternatives in the research space are quadrants II and IV. Hypotheses H1 and H2 were

H1: When munificence is positive organizations will decrease slack.

H2: When munificence is negative organizations will increase slack.

Note that I have indicated that the two types of slack may have different characteristics and are thus plotted separately. Figure 5.3a and 5.3b show the unabsorbed and absorbed slack and munificence relationships respectively.

Figure 5.3a

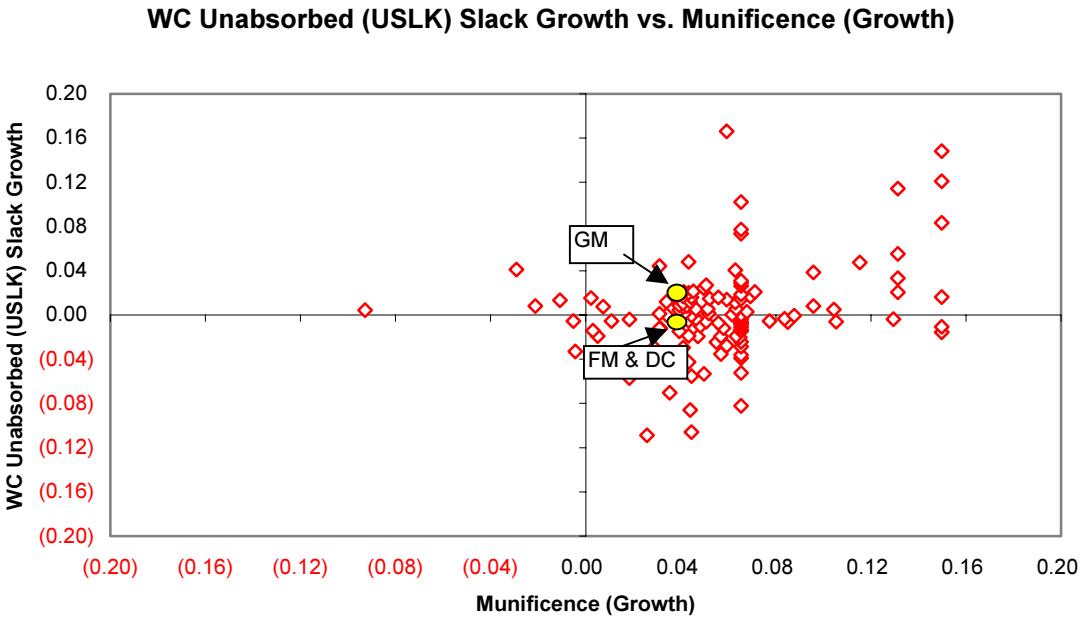
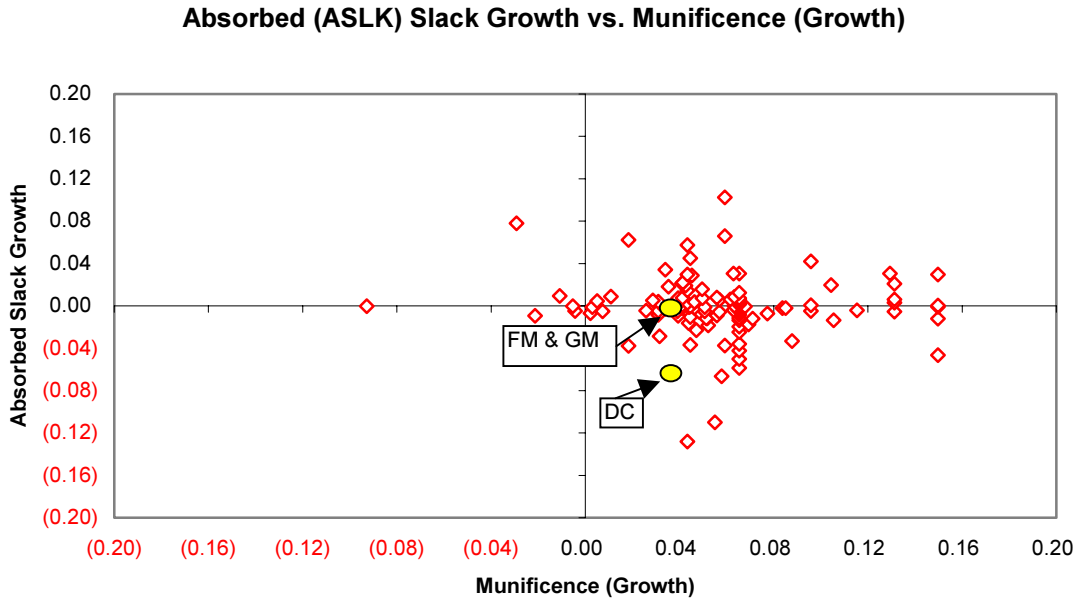


Figure 5.3b



Note that in both cases quadrant IV seems to be supported with the presence of organizations in munificent conditions decreasing slack while quadrant II has few organizations present. It is worth noting that quadrant I is represented as expected and quadrant III is not. The zero line under munificent conditions also seems to have organizations near it. I also plotted the members of the B3 for both types of slack.

To more accurately determine the differences suggested in the graphical view I created a set of conservative tests looking for mean differences in the groupings of organizations. Confidence intervals (95%) were created around the zero slack line because no organizations had exactly zero growth in slack. This formed maximum sets of organizations for each quadrant rather than the nominal sets pictured in the figures. Each quadrant thus comprised organizations to the far side of each confidence interval. This resulted in multiply counting organizations in the overlaps of the newly configured quadrants. The mean slack and munificence growth scores for each of these sets of organizations was a more conservative way to test for differences.

The Games-Howell (G-H) multiple comparison procedure (Toothaker, 1993) for unequal variances and unequal sample sizes was used to confirm that the means of each calculated and potential maximum (max) set of organizations were different. For quadrant II to "exist" I required a significant mean difference be found for munificence scores in quadrant II versus quadrant I. The G-H procedure confirmed a mean difference with t stat of 5.41, t crit of 4.67, $a = 0.05$ for USLK and a mean difference with t stat of 5.26, t crit of 4.67, $a = 0.05$ for ASLK. For quadrant IV to "exist" I required a significant mean difference be found for slack scores not only between quadrants I and IV (t stat of 3.68, t crit of 3.33, $a = 0.01$ for ASLK and no mean difference for USLK) but also a

significant mean difference between quadrant IV and the zero confidence interval (*t* stat of -3.69, *t* crit of 3.34, $a = 0.01$ for ASLK and no mean difference for USLK). Hypothesis H1 (quadrant IV's presence) was supported for absorbed (ASLK) but not supported for unabsorbed (USLK) slack. This means organizations exist that will decrease absorbed slack in munificent conditions. Hypothesis H2 (quadrant II's presence) was supported for both types of slack meaning organizations will increase ASLK and USLK slack even when environmental conditions are not munificent. Interestingly there was support for the existence of quadrant II even though the number of organizations was very low ($n = 4$).

The stratified data for both nominal and maximum sets have mixed results for normal distribution. Most variations of the *t*-test are robust to non-normality, especially when *n* is rather large. That would suggest that caution is necessary in interpreting results for quadrant II where *n* is small. I took the number of comparisons into account to control for family wise error rate by reporting critical statistics adjusted for the number of comparisons. Degrees of freedom were recalculated as indicated in the GP procedure to adjust for the variance weighted by sample size. Statistics of interest for the calculated sets using the Games-Howell procedure are represented in Appendix 5.3A1-2.

5.4 Comparison of effect in slack variables: supplier vs. B3

One suggestion for why organizations exist in different quadrants of the research space was that supplier slack would increase faster than customer slack. Potentially there were two reasons put forward for this, one of power in the dyad with large customers setting the parameters for the relationship, or two, that suppliers were making themselves

more attractive to enhance the munificence of their environment. We see some of the B3 positioned in quadrant IV for example where they might be reducing slack at the expense of their suppliers. It was also suggested earlier that even these suppliers might use similar power in their channel relationships to push this behavior further back in the channel. While this hypothesis does not address the rationale, it is positioned to test that differences exist, specifically between our supplier group and the B3. Hypothesis H3 suggested:

> H3: The increase in slack for suppliers will be greater then the increase in slack for manufacturers.

A slope (growth or decline) value for each created slack variable was determined by using the variable's mean values each year for the panel. The growth or decline for the supplier group was compared to the B3 group (see Appendix 5.4A1-2). The slopes can be best understood recalling that the slack measures are ratios or proportions of sales. Therefore each slope indicates the percentage units of change in the slack ratio per year on average over the panel period. Tables 5.4a and b show the slope calculations (coeff.) for USLK and ASLK respectively. Both compare suppliers (SU) and the B3.

Table 5.4a Unabsorbed (USLK) growth supplier vs. B3

SU-USLK	*Coeff.*	*S.E.*	*t Stat*	*P*	*low 95%*	*up 95%*
Intercept $t = 0$	0.046	0.031	1.490	0.196	(0.033)	0.124
YEAR	(0.013)	0.008	(1.547)	0.182	(0.035)	0.009

B3-USLK	*Coeff.*	*S.E.*	*t Stat*	*P*	*low 95%*	*up 95%*
Intercept $t = 0$	0.310	0.027	11.529	0.000	0.241	0.379
YEAR	0.002	0.007	0.313	0.767	(0.017)	0.021

Table 5.4b Absorbed (ASLK) growth supplier vs. B3

SU-ASLK	*Coeff.*	*S.E.*	*t Stat*	*P*	*low 95%*	*up 95%*
Intercept $t = 0$	0.315	0.014	23.083	0.000	0.280	0.350
YEAR	0.006	0.004	1.574	0.176	(0.004)	0.016

B3-ASLK	*Coeff.*	*S.E.*	*t Stat*	*P*	*low 95%*	*up 95%*
Intercept $t = 0$	0.281	0.027	10.485	0.000	0.212	0.350
YEAR	(0.021)	0.007	(2.889)	0.034	(0.041)	(0.002)

Slope measurements for slack are only significant in one case but it is important to recall that non-significance in this case is only a test of the null hypothesis. A more informative picture of the data can be viewed in the plots in the appendices. The plots show the entire confidence interval space for slack growth for suppliers and the B3. For USLK it is apparent that the confidence intervals of the two groups only overlap in a small space suggesting that during the panel period suppliers were generally reducing working capital slack while the B3 was increasing it. This is not a very favorable position for suppliers to be in. In a more detailed review I decomposed USLK finding that suppliers are increasing receivables (slope = 0.005, $p = 0.000$) and current liabilities (slope = 0.026. $p = 0.009$). B3 slopes were not significant but the direction was flat or negative in both instances. While USLK appears to be declining for suppliers while it remains relatively flat for the B3 we should consider this support for H3 because of the nature of the type of slack.

For ASLK, there is much more overlap in the confidence intervals. Absorbed slack for the B3 is significant and trending downward, while supplier absorbed slack is trending upward, although non-significant. Decomposing ASLK also suggests that while inventories and expenses are flat or on the rise at suppliers (slope = 0.006, p = 0.176) they are decreasing for the B3 (slope = -0.021, $p = 0.034$). Correlations between

suppliers and the B3 slack means are inversely related in each case, further suggesting the differences in slack levels and direction during the panel period adding to the suggested support for H3.

5.5 Multivariate tests of relationships

Regression offers a tool for testing the effects of many variables simultaneously as well as the potential for an interesting glimpse into whether environmental conditions or organizational variables offer more predictive power in determining slack growth. Cohen and Cohen (1983) suggested the hierarchical modeling approach to incremental variance partitioning in regression. It is well known that the order of entering variables in hierarchical regression is critical. If variables were totally uncorrelated this would not be the case. However, in most organizational research, variables will share correlation and thereby carry redundant information. When variables are entered sequentially (singly or in blocks) the first variable or block in a correlated set that enters the regression will be credited with all of the redundant information content of those entered after it. While no formal hypothesis was entertained suggesting a test of an environmentally constrained versus an organizationally dominant predictive model, the hierarchical regression technique requires some theory to be advanced to support the entry sequence. The typical procedure of entering control variables first presumes a temporal sequence. In this case, entering environmental variables first presupposes that they constrain decision-making and set up the condition for managerial discretion. Mindful of Cohen and Cohen's admonitions about the use of hierarchical regression, the presumed causal

sequencing of variables allows the creation of two models to help depict the positions of environmental determinism versus managerial discretion.

In the environmental determinism (ED) model I entered the environmental variables first (munificence and industry membership) followed by organizational variables. In the managerial discretion (MD) model, that suggests that environment is not the predominant constraining factor, I entered the organizational variables first and then environmental variables. This modeling sequence was done for both absorbed slack (ASLK) and unabsorbed slack (USLK). Appendix 5.5A1-2 recaps order entry by variables or groups of variables in blocks along with the amount of R^2 change and its significance. For descriptive statistics and correlations of all variables used in the models see Appendices 5.5A3-4. Complete model characteristics showing change in *R*2, overall model results, and coefficient significance appear in Appendices 5.5 A5-12 and will be discussed with the individual hypothesis tests.

For absorbed slack neither the environmental variable munificence nor the industry SIC grouping provided a significant model. When the log of SALE was entered as the first organizational variable the model became significant with logSALE providing some significant change in R2. Neither the tenure nor the concentration variable provided significant change. Breaking out the concentration variable by B3 member did not improve model characteristics. The absorbed slack model improved with the entry of the lagged slack variables. The second order unabsorbed lagged second order variable also improved the model which is what was expected from the curvilinear behavior noted earlier. The second order lagged absorbed slack did not add significantly to the model predicting absorbed slack growth, as expected and as noted earlier when the second order

curve generally fit the linear regression line when absorbed slack was regressed over time.

Reversing the hierarchical sequence for absorbed slack growth I confirmed that both types of lagged slack and only second order unabsorbed slack added significantly to the model when entered first. In this case logSALE, arcCON, and TEN provided no significant changes upon entry although MUN provided a small but significant change to the model. The SIC groupings provided no significant change to the model. The models for predicting absorbed slack showed R2 of 0.463, adjusted R2 of 0.401, with model significance of 0.000.

For the models predicting unabsorbed (USLK) slack growth, the hierarchical sequence with environmental variables entered first showed similar results. This model showed no significant models changes with logSALE, arcCON (or breaking out CON by B3 member), or TEN. All forms of lagged slack both first and second order added significantly to the model. Reversing the order entry confirmed all forms of lagged first and second order slack were significant additions to the model. No other organizational or environmental variables added significantly to the model. The models for predicting unabsorbed slack showed R2 of 0.868, adjusted R2 of 0.853, with model significance of 0.000.

While noting that the environmental variables were non significant, I wanted also to be able to determine if a stronger statement could be made with reference to having no effect on slack strategies. I ran post hoc power tests (Cohen, 1988) on the models to determine if the sample sizes would allow a test of the null hypothesis with the effects sizes of the variables in question. Note that due to constrained availability of the sample,

a priori power determinations were not practical. In those models where environmental variables were entered first (ED models) I was particularly interested in the strength of statement that could be made regarding the munificence (MUN) variable. In the ASLK model the effect size f^2 for MUN was 0.011 and for USLK model $f^2 = 0.003$. Using Cohen as a guide where small effect sizes are in the range of 0.02 these are very small effect sizes that often require large sample sizes to test the null hypothesis "proving" that probabilistically there is no effect versus a finding of simply "no significance". In this case the post hoc power analysis indicated power of 0.21 in the ASLK model and 0.05 in the USLK model with alpha set at 0.05. Both are inadequate to test the null hypothesis affording a stronger statement than "no significance".

In the managerial discretion (MD) models where organizational variables were entered first, followed by munificence (MUN) the effect size in the ASLK model is $f^2 = 0.035$ and in the USLK model $f^2 = 0.002$. These are small effect sizes. Power in the ASLK model was 0.65 and for the USLK model power was 0.01. Power is not sufficient to make stronger statements than "no significance".

5.5.1 Customer relationship effects: Sales concentration

The proposition that suppliers whose sales were dominated by principle customers might have different pressures on the creation of slack gave us the hypotheses:

H4: The increase in slack for suppliers will increase with the proportion of their sales to principal customers.

H5: The growth in slack will vary depending on whether organizations principally supply DC, FM, or GM.

We saw from a previous test comparing slack growth or decline that some critical operating areas for suppliers were being adversely affected by slack growth while they were not for the B3. That phenomenon could be independent of relationships of suppliers and the B3. On the other hand, there may be some connection, and one way to get closer to that possibility is to see if more intense relationships, as measured by percent of supplier sales concentration to the B3, are associated with the adverse slack conditions.

Of the 127 supplier organizations that could list up to four principle customer relationship in each of the six years in this study (3,048 possible relationships), there were 839 relationships (27.5%) noted in the business segment portion of the COMPUSTAT database. Table 5.5 provides the recap of supplier relationships for each of the B3 and Appendix 5.5.1 provides further detail. Recall that listings in principle customer positions 3 and 4 were collapsed due to low counts in position 4. This is a sizable set of relationships for which we have sales data to determine the level of each supplier's dependency on the B3 and whether there is a corresponding difference in the level of slack growth.

Table 5.5 Reported principle customer relationships for suppliers

B3 Member	Principle customer position			Totals / %
	#1	#2	#3&4	
Total with Ford Motor	181	107	21	309 / 37%
Total with General Motors	211	80	31	322 / 38%
Total with Daimler-Chrysler	57	66	85	208 / 25%
	449	253	137	839
	54%	30%	16%	100%

In multivariate testing the models for both absorbed and unabsorbed slack showed no significant improvement with the addition of either the omnibus measure of sales

concentration to the B3 nor the individual measures by member of the B3 (refer to Appendix 5.5A5-12). Thus there was no support for either hypothesis that sales concentration predicted slack growth.

5.5.2 Supplier size effects

It was hypothesized that size (SALE) would not only be appropriate as a control variable but that size might also be indicative of some relationship in the way in which organizations accumulated or "spent" slack. This could either be due to power in the relationship suggesting that larger suppliers might not be affected as much by the demands of the customer-supplier relationship, or that there was some economy of scale or threshold effect that would reduce the need for slack at some point. In either case, slack growth would be inversely related to size.

H6: Slack growth has an inverse relationship with supplier size.

As noted above SALE only provided some explanatory power in the case of absorbed slack and then only when entered before other organizational variables. Lagged forms of slack offer redundant information content (see Appendix 5.5A5-12). Hypothesis H6 receives only weak support based on the redundant information content that size as measured in sales has with amount of lagged slack in the organization, and then for only absorbed slack.

5.5.3 Customer relationship effects: Tenure

I posited that in addition to the concentration effects in a supplier-customer relationship, there would also be tenure effects as noted in the hypothesis:

H7: Slack growth will decrease as the duration of the principal customer relationship increases.

Tenure provided no significant changes to any model tested. Thus there is no support for the hypothesis that tenure affects slack growth (refer to Appendix 5.5A5-12).

5.5.4 Environment/industry controls

Munificence was a primary variable of interest in determining effect on slack growth. An SIC coded variable was entered to control for any industry effects other than munificence. As noted above, munificence provided some explanatory power in only one of the four models tested offering a significant addition to R2 change in the absorbed slack model after organizational variables were entered. Yet, surprisingly it did not offer any significant change when the order entry was reversed. This suggests there may be another unexplored relationship present. The block of SIC coded variables offered no explanatory power in any modeling sequence. See Appendices 5.5A5-12 for specifics.

5.5.5 Recap of hypotheses support and non-support

Recall that my hypotheses were:

H1: When munificence is positive organizations will decrease slack.
H2: When munificence is negative organizations will increase slack.
H3: The increase in slack for suppliers will be greater then the increase in slack for manufacturers.
H4: The increase in slack for suppliers will increase with the proportion of their sales to principal customers.
H5: There will be significant differences by major customer (DC, FM, or GM) in terms of the suppliers' growth in slack.
H6: Slack growth has an inverse relationship with supplier size.
H7: Slack will decrease as the duration of the principal customer relationship increases.

H1: supported for ASLK (absorbed) but not supported for USLK (working capital) using the graphical analysis and G-H procedure to compare means.
H2: supported for both ASLK and USLK using the graphical analysis and G-H procedure to compare means
H3: supported; note that tests were non-significant but that confidence intervals did not overlap for USLK and partially overlap for ASLK and that further, slack growth and decline were generally favorable in terms of slack growth of decline for the B3 but not for suppliers and were negatively correlated showing opposite directions
H4: no support for measures of sales concentration affecting slack growth or decline
H5: no support for differences in slack growth or decline by B3 member
H6: weak support only in the case of ASLK for size predicting slack growth or decline and largely redundant with the information content of lagged slack
H7: no support for measures of relationship tenure affecting slack growth or decline

Chapter Six
Discussion and conclusions

6.0 Restatement of research purpose

There were two primary questions of interest in the presentation of the theoretical model representing the research problems. Those were:

1. Is slack conditioned on environmental munificence as outlined in the behavioral theory of the firm?
2. To what extent are slack predictors environmentally determined, or are they based on managerial discretion?

The rationale for the first question was a seemingly narrow received view of how organizations manage slack under certain environmental conditions, particularly munificence. Quite simply, the received view, widely cited over five decades, was one in which organizations accumulated slack in munificent conditions and spent slack in non-munificent conditions. From a "managerial" perspective guided by multiple theories that tout the importance of strategic management, uniqueness of strategy, and perhaps an almost contrarian set of management practices designed to find advantages over competition, the received view supported a narrower model that, in essence, was largely environmentally constrained.

An interim question arose wondering if organizations were moving slack outside their boundaries where they would not be penalized for having underutilized resources

but yet still maintain some level of control over those resources. Slack would lessen for some organizations but control over these resources in the environment would amount to a form of munificence. Alternatively, other organizations might accept slack and appear more attractive to customers, thereby improving their munificence. An answer to this question might explain behavior that would position organizations in other quadrants of the research matrix than those long accepted.

Finally, I was interested in the extent to which environmental and organizational variables predicted slack growth to further answer the environmental constraint question. The anecdotal reports noted seemed to suggest that managers were employing slack creation or decline strategies without being constrained by environmental munificence. This would provide an expansion of the possibilities listed in the behavioral theory of the firm as well as provide additional rationale for newer theories on organizational forms and cooperative strategies.

6.1 The slack – munificence relationship: The research space hypotheses

The use of the matrix research space grid graphically portrayed the environmental conditions along with organizational outcomes for slack growth. It was readily apparent that organizations inhabited one portion of the matrix often suggested where organizations accumulate slack in munificent conditions. Another early posited space along the zero corridor was also supported saying organizations could neither accumulate or spend slack during munificent periods. One point of interesting note was that the often posited space where organizations spend slack under non-munificent conditions was not well populated although this could easily be due to the sample period being characterized

more by munificence than not. That is to say that the sample period was characterized by munificence for most organizations in the sample. Had the time period been different or larger, there may have been more examples of non-munificence and therefore potentially a greater potential for organizations falling in to the non-munificent space. The cross section of industry types was probably not the factor that the time period was in this case because even though they were all suppliers to the B3, they represented 66 different SIC industry codes.

Regarding new spaces in the matrix not mentioned in the literature it was also readily apparent that many organizations fell into the area defined as munificent but yet they were spending slack. While less populated, some organizations were also accumulating slack in non-munificent conditions. Both of these alternatives to the oft-cited expectations of the slack-munificence nexus were statistically supported. This suggests that organizations have a full range of slack strategies they can execute without being constrained by the environment's munificence, at least completely. I explore that point further below.

Different slack characteristics surfaced early in this research when it was noted that the two major forms of slack measured had an inverse relationship and exhibited different linear-curvilinear behavior. This was not expected, as most of the research suggests the more typical ∩ shaped behavior for slack, although controlling for the amount of absorption has been noted. As seen in the absorbed slack model, the second order lagged absorbed slack provided no additional explanation of slack growth over that of the first order lagged behavior. This was not the case for unabsorbed slack that exhibited curvilinear predictive power.

While I started the research hoping to use an omnibus measure of slack, it is important to note that slack may have to be studied by its component types. This was also clear for unabsorbed slack in this research, which was working capital slack. The behavior of cash and equivalents, receivables, and current liabilities may all reflect different strategies that may or may not be evident when using the combined measure. Because slack can exist in a myriad of forms this points to either much narrower research or less parsimonious models as we take multiple forms of slack into account.

6.2 Do organizations move slack and create munificence?

Slack growth and decline portrayed the situation where generally the B3 was improving its slack position by either increasing the more beneficial or flexible slack types while the supplier group was increasing more absorbed slack types. This is a change of slack strategies within the organizational set. In this research suppliers were generally in munificent conditions and there was no attempt to determine longitudinal patterns of munificence determined by changes in slack. Whether organizations created that munificence through the described slack changes is a conceptual possibility but would require additional analysis.

Characteristics revealed in this study show a decided trend in reducing slack at bigger customers and increasing it in the smaller supplier. Here it is important to note the different types of slack however. Some forms of slack such as inventory and expenses seem to be increasing in suppliers as was noted in Appendix 5.4A2. This would seem to decrease supplier financial flexibility. Other forms of slack, such as cash and equivalents, were increasing in the B3 as was noted in Appendix 5.4A1. This however

also reduces supplier financial flexibility. It is necessary not to paint all forms of slack with the same brush as they have different characteristics and provide different limitations and advantages to the organization holding them.

The graphical tests depicted these differences and it is important to note that they are a benefit over purely statistical significance measures that don't convey the complete picture of the slack behavior. This behavior was only evident when the ranges of behavior were studied with confidence intervals plotted to review the areas of supplier and customer slack overlap. This suggests that researchers could look further than their statistical tests in understanding organizational behavior. Those plots showed that suppliers of the B3 seemed to have either increasing or rather steady levels of slack while the B3 themselves (the customers) were reducing slack. This observation also has to take into consideration the "good" versus "bad" characteristics of various types of slack in term of financial structure flexibility. There was also no test of the reasons behind this shift although they might also be governed by some logic regarding power in the channel and a shift to relationship styles of inter-organizational behavior.

Within the limitations of the panel period, perhaps not representing enough non-munificence, the breadth of the organizational types and industry types seems to suggest that managers will pursue different, and perhaps contrarian or novel resource strategies. That is to say, most observers would assume firms to have slack strategies of growth in resources when there is munificence but this did not explain the noted examples of firms increasing resources when their environment was not munificent, or positioning valuable resources outside the organization's boundaries. Much has been written about new organizational forms, alternatives to more typical integration strategies, and cooperative

strategies. While I do not address these forms in this research, they may represent some of the novel resource strategies with regard to slack accumulation and spending. Some of these seem to include new organizational relationships that shift the form or structure of organizations to allow resource control versus resource ownership. This latter seems to be a common theme in organizational research as of late. While references abound, the moving away from "centralized control versus dispersed access to resources" as noted by Lampel and Shamsie (2003) seems to be indicative of the way organizations might position what was once slack for them outside their boundaries, resulting in shifts of what might have been considered more typical slack behavior under munificence. As firms improve their financial structures in these new organization forms, the question remains if they somehow contribute to their own munificence. It seems likely that better run firms would be rewarded with growth and that if enough mimetic behavior existed for improved operations throughout an industry that munificence as measured in industry growth would improve. This requires a larger panel period where we might be able to view the slack-munificence nexus over a larger range of values, particularly munificence. If there were more variation in the munificence measured, or more organizations in non-munificent conditions I might have seen other slack strategies unfold. It might also be possible to test whether organizations create munificence with their slack strategies. This would require a panel period of shifting munificence and characterizing slack behavior as the predictor variable in an attempt to test its affect on munificence as a criterion. This I leave to future research.

I am unable to determine causality and direction. Do the members of the B3 improve their own munificence as measured in the growth of their industry by shifting

slack out of their organization and into their supplier organizations? The circumstantial evidence is strong that they do. The test of the hypothesis questioning whether suppliers or the B3 increased levels of slack was prefaced with the proposition that powerful members of the B3 would force suppliers to increase slack, or that suppliers would do so voluntarily to make themselves more attractive to the B3, thereby creating munificence in their environment. This analysis also points out that different organizations place slack in different areas for whatever strategies they are trying to execute. This means the researcher has to be careful to decompose overall measures to find out how the organizations are storing slack. There are interesting trends in the ratio of slack resources that could signal strategic direction. Further testing needs to be done to refine these measures.

6.3 Customer relationship effects: Sales concentration and tenure

Sales concentration and tenure surprisingly offered no significant changes to *R*2 explained. This was the case even when they were no swamping effects from the predominant slack variables. There is overlap in information content between concentration and tenure, as noted in the high correlations, that would suggest one or the other would be sufficient in future research. The correlation matrix gave the first hints that concentration and tenure may carry the same information, as they showed significant, strong correlations.

Research may require more refined measures to get at strategies that may be dependent on relationships between suppliers. Relationship as a topic is frequent in the literature and certainly has been mentioned in the changing styles of interaction in the

auto industry. While this research did not show relationship effects on slack creation, the area seems to require more study.

6.4 Size and industry effects

Size as measured by sales only showed significance in determining slack growth in the case of absorbed slack where it had a negative effect on slack growth. Size offers clues to three potential explanations including immunity from power in the supply channel, power in the channel to push slack to one's own suppliers, or economies of scale that affect the need for specific levels of slack. Further research may want to test which of these propositions can be credited with sale's effects on absorbed slack creation.

The munificence measure showed a significant positive effect on absorbed slack growth only after other organizational measures were entered. An effect would have been suggested on earlier order entry in the regression model. This suggests some yet unexplored relationship in the model. Other industry effects designed to capture whatever was missing from the munificence measure added no explanation for slack growth. Industry characteristics often include other factors than munificence, such as dynamism and complexity. The suggestion here is that environmental effects are not constraints that outweigh managerial discretion, at least in slack creation. In particular, it would seem apparent that organizational theorists should not limit themselves to the conception that organizations create or spend slack in specific types of environmental conditions, especially munificence. There could of course be other more complex relationships between environmental factors such as munificence, dynamism, and complexity that are only explained in interaction. Sharfman, et al (1991) made similar

suggestions standardizing munificence by competitive threat. While industry membership was hoped to pick up other types of environmental influence it is very possible that that membership alone does not tap into munificence interactions. Those were not tested here and might be of interest in future research.

It is important to note the outcomes of the power tests with regard to munificence. There is often the implication with reports of no significance that there is no relationship. This implication is strictly invalid unless there is sufficient power to test the null hypothesis. As noted in the results section, the constrained sample size and the small (to very small) effect sizes, did not provide sufficient power to test the null hypothesis. From a probabilistic standpoint I can only attest to non-significance for this finding but cannot say that munificence has no effect on slack creation. However, there is "practical" significance to consider, especially from a managerial application perspective. Small effect sizes essentially say that the variable in question may be negligible or trivial (Cohen, 1988). In this case, if the effect sizes are in the range of 0.003 – 0.011 for the model in which munificence was entered first (thereby "taking credit" for redundant information content with organizational variables), then it is appropriate to say that, regardless of statistical significance, there is no practical significance for the effect of munificence on slack creation or spending. It should be noted that in the MD model where munificence was entered after organizational variables there was (after organizational variables took credit for redundant information content) an effect size that moved up to 0.035. While still small, and perhaps of somewhat limited practical significance, this is, as noted earlier, a hint of some as yet unexplored relationship between munificence and the organizational variables.

6.5 Parsimony Models

The full models can of course be streamlined into more parsimonious models of benefit to research and practitioner alike (see Appendices 6.5A-B). When the intensity of relationship indicator concentration is removed the eight possible models are reduced to four. Tenure and the SIC variable were also eliminated in all models due to no improvement in *R*2. The completely redundant second order lagged absorbed slack variable was also removed from each model which had the secondary effect of stabilizing the coefficients as the collinearity was reduced in the model.

The two parsimony models for absorbed slack growth both contained the lagged slack variables and the unabsorbed lagged second order variable. The only other difference is one model reduction left the logSALE in place while the other model reduction left the MUN variable. The logSALE variable turned out to be non-significant and the MUN model actually performed slightly better with an adjusted *R*2 of 0.391 versus 0.380. Both were significant to *p* 0.000. The MUN model also had all coefficients including the intercept significant to $p < 0.05$ or better. While considerable predictive ability for absorbed slack lies with the lagged slack variables and a small amount from the environmental munificence variable, there is still a large amount of variance to be explained suggesting that the model is lacking important variables.

The parsimony model for unabsorbed slack reduced completely to the lagged slack variables and the second order lagged unabsorbed variable. Even though the model showed significant *R*2 change with ASLKlag, the coefficient was not significant. When dropped from the model there was no loss of adjusted *R*2 for the model that 0.857. It

appears unabsorbed slack can be predicted very accurately without using any other organizational variables then its lagged value and with no environmental variables.

6.6 Limitations of the research

The two most important potential problems in this research are the operationalizations of the key variables slack and munificence. The problem is that they may be too narrow in their scope for capturing slack. Slack has the potential to exist in any number of asset and expense categories and this research used slack measures that tap into only a few of these. The organization has no incentive to make it easy to identify slack. In fact the opposite is the case because underutilized assets and high expenses are penalized. This forces the researcher to use a seemingly inexhaustible number of slack measures to ferret out all the places managers might "hide" slack. Hiding slack begins at the lowest levels of padding budgets and reaches to the scandal ridden cases of recharacterizing assets to the point of the major bankruptcy cases we have seen as of late.

While there may be no hope of a practical number of slack measures that have more specificity and give us the ability to look more carefully at the data, this same specificity may give the researcher more power to test effects when the focus of the research is much narrower. An example might be to study slack only in inventories where we can track the flow of materials and finished goods with more accuracy from a cost accounting perspective. On the other hand, doing macro level research like that contained in this research may need a larger and more omnibus measure of asset and cost productivity. After all, slack is a measure of productivity and classic organizational productivity measures such as ROA, ROE, and ROI may capture the utilization of assets

much better. Of course, the mischaracterization of assets and expenses will be problematic no matter what measures the researcher uses.

Munificence also poses a problem in that it is an environmental condition measure at the industry level. If growth is the proxy of choice, it would seem sound to see what strategies of the organization affected its own growth. The argument that the data is from the same source seems a little hollow in that all accounting data we use to measure actions and performance are essentially from the same source. When the researcher wants to determine whether the organization is affecting its immediate environment, the measure of that environment needs to be more immediate as well.

For other more specific research into micro munificence phenomenon I also suggest that other measures of munificence aside from growth be used. The assumption that growth could only have occurred if the environment munificently provided the resources needed for growth seems a bit more than just obvious and doesn't take into account differences in managerial ability, better strategies, serendipity, being in the right place at the right time, and a host of other possibilities. If the researcher was measuring the munificence of the software engineer market, it might be better to look at employment rates, graduation rates at technical schools, wages, etc. than at some larger growth proxy.

There are also some shortcomings that might have allowed better testing of the hypotheses. The first of these was the limited number of organizations in the sample that operated in non-munificent conditions during the panel period. Using extant measures of both munificence and slack, it would be rather easy to extend the current research to new industries and additional time periods. It would be particularly helpful to expand this

scope to include economic cyclicality and study the phenomena over a wider range of munificence. This would allow organizational or industry testing of slack management in differing munificence conditions rather than characterizing each industry and organization only once on the munificence measure used. This "within subject" approach would control for managerial or organizational characteristics and allow the researcher to see how slack management varies as environmental conditions vary.

Additionally, widening the time period would allow a better potential for increasing the number of organizations in each area of the research space. In the current research, there was a paucity of sample size in a key area representing the received view (organizations that spend slack in non-munificent conditions – Q III). More organizations in the area where organizations add slack in non-munificence because of either contrarian strategies, or poor management (Q II) would also be of help. It would be possible to determine industry cyclicality and position organizations on the basis of where they are in their munificence cycle, should one exist for their industry. Slicing panels out of cycles rather than arbitrary chronological time periods such as a group of years would allow better testing.

6.7 Recommendations for future research

While this research is not intended to be about organizational boundaries they are a measurement constraint in essentially all management and organizational research. Studying firms outside the context of their environment is somewhat useless. The literature is replete with discussions of boundaries and new organizational forms and this thesis is not an attempt to do that area justice. While there is much new ground being

covered in the literature on organizational boundary conditions, this is a phenomenon that is much about concept and little about empirics. Most of our measurement conventions constrain progress in this area, as does the concern with mixed level of analysis. I address the boundary issue from a conceptual point of view only to frame the reader's perspective for this research. I further the notion that organizations employ strategy well outside the measurement boundaries of the organization and that the researcher will only inform old and new theory to the extent that they can find ways to measure across boundaries.

Longitudinal studies continue to be problematic and new methods for studying change need to be explored. I use growth curve analysis, driven largely by a missing data problem in this research, but this technique needs to be explored more fully in the management literature to test its benefits not only in that regard but as a way of removing some of the ill-effects of longitudinal data. Autocorrelation for example may be moderated. I found in this research that while panel data showed typical serial trending, growth calculations for the same data were uncorrelated.

I only test the upstream relationships between supplier and manufacturer in the design of the hypotheses, leaving the downstream tests of yet another way in which organizations manage slack to future research. Control of slack may indeed be a factor of organizations reaching their own limits and then pushing slack further upstream. Do firms with increasing slack let off some of this building pressure by forcing it on their own suppliers? If they are large enough, do they force it on their customers? If an organization is in the position of declining slack, can they share the good fortune with their partner organizations, or are they in a declining slack for the opposite reason of not

sharing with their partners? This research provides many new questions as to why the received view and the alternative are both possible.

6.8 Implications and contribution

The most significant contribution is the expansion of the Carnegie School model of the slack-munificence nexus. That model in essence suggested an environmentally constrained picture of slack creation and use. At the same time, other theorists were widely discussing the benefits of slack. All of the actions possible in the original model still hold and this research shows that managerial discretion in its choice of strategies is not constrained by the environment in the ways that the original model suggested, or in how it has been interpreted.

The lack of support for munificence as an environmental variable to explain slack growth and decline seconds McArthur and Nystrom's (1991) finding of no connection between slack and munificence although, as they pointed out, munificence may still have some relationship with other measures of organizational performance. The concept of munificence calls for more research. This research suggests that strategic action may have a much wider range, free from environmental constraints by managers finding creative ways in which they restructure organizations and manage outside the boundaries of the organization. Juxtaposed to munificence's lack of support as a significant predictor of slack growth and decline, this research suggests that the existing slack position is the important predictor. Prior research suggesting that slack is often characterized by curvilinear ∩-shaped behavior was also supported here by using the squared lagged slack position as the primary predictor of slack growth and decline.

The other contributions and implications of this research are largely methodological. The operationalizations of slack and munificence need to be revisited to remain, or perhaps even become, useful measures in organizational research. Measuring slack seems to have lagged behind organizational creativity in how to "account" for it.

I believe the discussion on missing data should alert many organizational researchers that what we see in most published research is largely convenience sampling of highly cleaned data. The missing data issue is rarely discussed in empirical studies in the management literature, or, at best, casually mentioned as being handled with one of the techniques available. I suggest that for conceptual as well as methodological reasons, this downplaying of the missing data issue is problematic and requires much more attention. Any manipulation of the sample requires the same level of detail as sample selection or downstream hypothesis testing methodologies to insure that other researchers can replicate findings and that future meta-analytic reviews of the literature can compare and consolidate the research findings of management scholars.

There are also numerous admonitions against the various forms our measures take. Change scores are warned against. Ratios, rates, and proportions seem problematic. Yet all of these are essential to measuring and testing organizational data. Managers operate on the basis of change and ratio measurements. Those measurements hold much more information content than their components alone and, as decision variables, take on latent characteristics over and above their antecedent input data. We need much more research on the characteristics of these forms of data and methodologies to use them. Is growth curve analysis a way to not only deal with missing data but also to remove correlation patterns in change scores and panel data? Are accounting data and

ratio forms immune to some of the touted problems from other fields because of the inherent characteristics of the data such as whether the ratios are formed with subsets of their denominator, whether they go through the origin, or whether they congregate at the polar extremes? Answers to these questions may free up researchers to use measures with confidence or find new measures tractable to other data and methodology problems.

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Appendix 5.1A-1 Alphabetical List of 127 Supplier Organizations in the Sample

SIC	Company Name	CUSIP
3460	AETNA INDUSTRIES INC	8121931
3714	AFTERMARKET TECHNOLOGY CORP	8318107
3312	AK STEEL HOLDING CORP	1547108
2870	ALCIDE CORP	13742507
3663	ALLEN TELECOM INC	18091108
3523	ALLIED PRODUCTS	19411107
3714	AMCAST INDL CORP	23395106
3714	AMERICAN AXLE & MFG HLDGS	24061103
3576	ANCOR COMMUNICATIONS INC	03332K108
1731	ARGUSS COMMUNICATIONS INC	40282105
3714	ARVIN INDUSTRIES INC	43339100
3714	ARVINMERITOR INC	43353101
3320	ATCHISON CASTING CORP	46613105
7389	AUDIO VISUAL SERVICES CORP	50727106
7372	BASE TEN SYSTEMS -CL A	69779304
3714	BORG WARNER INC	99724106
3714	BREED TECHNOLOGIES INC	106702103
7363	CDI CORP	125071100
3714	CHAMPION PARTS INC	158609107
3640	CHERRY CORP	164541401
7370	CIBER INC	17163B102
3669	CODE-ALARM INC	191893106
2273	COLLINS & AIKMAN CORP	194830105
3530	COLUMBUS MCKINNON CORP	199333105
7372	COMPUWARE CORP	205638109
3670	CTS CORP	126501105
3510	CUMMINS ENGINE	231021106
3714	DANA CORP	235811106
3714	DECOMA INTL INC -CL A	24359C100
3510	DETROIT DIESEL CORP	250837101
3231	DONNELLY CORP	257870105
3559	DT INDUSTRIES INC	23333J108
3714	DURA AUTOMOTIVE SYS -CL B	265903104
3714	EATON CORP	278058102
7370	ELECTRONIC DATA SYSTEMS CORP	285661104
5094	ENGELHARD CORP	292845104
4822	E-SYNC NETWORKS INC	269156105
3452	FEDERAL SCREW WORKS	313819104
3714	FEDERAL-MOGUL CORP	313549107
3086	FOAMEX INTERNATIONAL INC	344123104
3760	GENCORP INC	368682100
3825	GENRAD INC	372447102
2810	GENTEK INC	37245X104
3714	GENTEX CORP	371901109

SIC	Company Name	CUSIP
3310	GIBRALTAR STEEL CORP	37476F103
3714	GLAS-AIRE INDS GROUP LTD	376796108
3826	GLOBAL TECHNOVATIONS INC	37939M109
8200	GP STRATEGIES CP	36225V104
5000	GRAINGER (W W) INC	384802104
2250	GUILFORD MILLS INC	401794102
3651	HARMAN INTERNATIONAL INDS	413086109
3060	HARVARD INDS INC	417434503
3590	HASTINGS MFG CO	418398103
3714	HAYES LEMMERZ INTL INC	420781106
3825	HICKOK INC -CL A	428839104
3630	HMI INDUSTRIES INC	404238107
3728	HONEYWELL INTERNATIONAL INC	438516106
3341	IMCO RECYCLING INC	449681105
3714	IMPCO TECHNOLOGIES INC	45255W106
3823	INTEGRALVISION INC	45811H106
7389	INTEGRATED PACK ASSEMBLY CP	457989101
3320	INTERMET CORP	45881K104
3312	ISPAT INLAND INC	46499Y007
2531	JOHNSON CONTROLS INC	478366107
3460	JPE INC	466230109
2211	JPS INDUSTRIES INC	46624E405
3714	KNUSAGA CORP	499846103
3812	KVH INDUSTRIES INC	482738101
2030	LANCASTER COLONY CORP	513847103
7389	LASON INC	51808R107
2531	LEAR CORP	521865105
3060	LEXINGTON PRECISION CORP	529529109
3390	LINDBERG CORP	535171102
3613	LITTELFUSE INC	537008104
3312	LTV CORP	501921100
2670	LYDALL INC	550819106
3714	MAGNA INTERNATIONAL -CL A	559222401
3470	MARGATE INDUSTRIES INC	566902409
3714	MASCOTECH INC	574670105
3470	MATERIAL SCIENCES CORP	576674105
7372	MECHANICAL DYNAMICS	583521109
3678	METHODE ELECTRONICS -CL A	591520200
3452	MICHIGAN RIVET CORP	594572208
3714	MODINE MFG CO	607828100
7340	MPW INDL SVCS GROUP INC	553444100
3312	NATIONAL STEEL CORP -CL B	637844309
7370	NATIONAL TECHTEAM INC	638108100
3714	NEWCOR INC	651186108
1700	NOBLE INTERNATIONAL LTD	655053106

SIC	Company Name	CUSIP
8700	OPINION RESEARCH CORP	683755102
5072	PARK OHIO HOLDINGS CORP	700666100
3827	PERCEPTRON INC	71361F100
3060	PLYMOUTH RUBBER -CL A	730026101
3540	PRODUCTIVITY TECHNOLOGIES CP	743088106
3540	QUALITY PRODUCTS INC	747578409
3490	RAYTECH CORP/DE	755103108
7372	REMEDY CORP	759548100
3540	RIVIERA TOOL CO	769648106
3690	ROBOMATIX TECH LTD -ORD	M8216J107
3312	ROUGE INDUSTRIES INC	779088103
5051	RYERSON TULL INC	78375P107
3679	SATCON TECHNOLOGY CORP	803893106
3672	SHELDAHL INC	822440103
3460	SHILOH INDUSTRIES INC	824543102
3714	SIMPSON INDUSTRIES	829060102
3640	SLI INC	78442T108
3621	SMITH (A O) CORP	831865209
3679	SPARTON CORP	847235108
3310	STEEL TECHNOLOGIES	858147101
3679	STONERIDGE INC	86183P102
3714	STRATTEC SECURITY CORP	863111100
7372	STRUCTURAL DYNAMICS RESEARCH	863555108
7372	SUPERIOR INDUSTRIES INTL	868168105
7370	SYNTEL INC	87162H103
8711	THERMO TERRATECH INC	883598104
8742	THOMAS GROUP INC	884402108
3460	TOWER AUTOMOTIVE INC	891707101
3714	TRANSPRO INC	893885103
3714	TRW INC	872649108
3630	U S INDUSTRIES INC	912080108
3679	UNIQUE MOBILITY INC	909154106
3080	UNIROYAL TECHNOLOGY CORP	909163107
3724	UNITED TECHNOLOGIES CORP	913017109
8700	VSI HOLDINGS INC	918322108
3714	WESCAST INDUSTRIES -CL A	950813105
3310	WORTHINGTON INDUSTRIES	981811102
3050	WYNN'S INTERNATIONAL INC	983195108

Appendix 5.1B-167 SIC Codes Represented in the 127 Supplier Sample

4-Digit SIC Code	4-Digit SIC Code Description	# Of Suppliers	3-Digit SIC Code	2-Digit SIC Code
1700	Construction-Special Trade	1	170	17
1731	Electrical Work & Special Trade Contractors	1	173	17
2030	Preserved Fruits & Vegetables	1	203	20
2211	Weaving Mills, Cotton	1	221	22
2250	Knitting Mills	1	225	
2273	Carpets And Rugs	1	227	
2531	Public Building & Related Furniture	2	253	25
2670	Misc. Converted Paper Products	1	267	26
2810	Industrial Inorganic Chemicals	1	281	28
2870	Agricultural Chemicals	1	287	
3050	Hose, Belting, Gaskets & Packing	1	305	30
3060	Fabricated Rubber Products, n.e.c.	3	306	
3080	Misc. Plastics Products, n.e.c.	1	308	
3086	Plastics Foam Products	1		
3231	Products Of Purchased Glass	1	323	32
3310	Blast Furnace & Basic Steel Products	3	331	33
3312	Blast Furnaces & Steel Mills	5		
3320	Iron And Steel Foundries	2	332	
3341	Secondary Nonferrous Metals	1	334	
3390	Misc. Primary Metal Products	1	339	
3452	Bolts, Nuts, Rivets, & Washers	2	345	34
3460	Metal Forgings & Stampings	4	346	
3470	Metal Services, n.e.c.	2	347	
3490	Misc. Fabricated Metal Products	1	349	
3510	Engines And Turbines	2	351	35
3523	Farm Machinery & Equipment	1	352	
3530	Construction & Related Machinery	1	353	
3540	Metalworking Machinery	3	354	
3559	Special Industry Machinery, n.e.c.	1	355	
3576	Computer Communication Equipment	1	357	
3590	Industrial Machinery, n.e.c.	1	359	
3613	Switchgear & Switchboard Apparatus	1	361	36
3621	Motors & Generators	1	362	
3630	Household Appliances	2	363	
3640	Electric Lighting & Wiring Equipment	2	364	
3651	Household Audio & Video Equipment	1	365	
3663	Radio & TV Communications Equipment	1	366	
3669	Communications Equipment, n.e.c.	1		
3670	Electronic Components & Accessories	1	367	
3672	Printed Circuit Boards	1		
3678	Electronic Connectors	1		

4-Digit SIC Code	4-Digit SIC Code Description	# Of Suppliers	3-Digit SIC Code	2-Digit SIC Code
3679	Electronic Components, n.e.c.	4		
3690	Misc. Electrical Equipment & Supplies	1	369	
3714	Motor Vehicle Parts & Accessories	28	371	37
3724	Aircraft Engines & Engine Parts	1	372	
3728	Aircraft Parts & Equipment, n.e.c.	1		
3760	Guided Missiles, Space Vehicles, Parts	1	376	
3812	Search & Navigation Equipment	1	381	38
3823	Process Control Instruments	1	382	
3825	Instruments To Measure Electricity	2		
3826	Analytical Instruments	1		
3827	Optical Instruments & Lenses	1		
4822	Telegraph Communications	1	482	48
5000	Wholesale Trade - Durable Goods	1	500	50
5051	Metals Service Centers & Offices	1	505	
5072	Hardware	1	507	
5094	Jewelry & Watches - Wholesale	1	509	
7340	Services To Dwellings And Other Buildings	1	734	
7363	Help Supply Services	1	736	
7370	Computer Programming, Data Processing	4	737	
7372	Software Publishers	5		
7389	Business Services, n.e.c.	3	738	
8200	Educational Services	1	820	82
8700	Engineering, Accounting, Research, Mgmt Services	2	870	87
8711	Engineering Services	1	871	
8742	Management Consulting Services	1	874	
Totals		127 suppliers		
66	4-digit SIC codes			
	3-digit SIC codes		55	
	2-digit SIC codes			19

n.e.c. = not elsewhere classified
SIC code descriptions from: U.S. Census Bureau 1997 Economic Census: Bridge Between NAICS and SIC (Available at http://www.census.gov/epcd/ec97brdg/)

3-Digit SIC Code	3-Digit SIC Code Description	# Of Suppliers	2-Digit SIC Code
173	Electrical Work Special Trade Contractors	1	17
203	Preserved Fruits & Vegetables	1	20
221	Broadwoven Fabric Mills, Cotton	1	22
225	Knitting Mills	1	
227	Carpets And Rugs	1	
253	Public Building & Related Furniture	2	25
267	Misc. Converted Paper Products	1	26
281	Industrial Inorganic Chemicals	1	28
287	Agricultural Chemicals	1	
305	Hose, Belting, Gaskets & Packing	1	30
306	Fabricated Rubber Products, n.e.c.	3	
308	Misc. Plastics Products, n.e.c.	2	
323	Products Of Purchased Glass	1	32
331	Blast Furnace & Basic Steel Products	8	33
332	Iron And Steel Foundries	2	
334	Secondary Nonferrous Metals	1	
339	Misc. Primary Metal Products	1	
345	Screw Machine Products, Bolts, Etc	2	34
346	Metal Forgings & Stampings	4	
347	Metal Services, n.e.c.	2	
349	Misc. Fabricated Metal Products	1	
351	Engines And Turbines	2	35
352	Farm And Garden Machinery	1	
353	Construction & Related Machinery	1	
354	Metalworking Machinery	3	
355	Special Industry Machinery	1	
357	Computer And Office Equipment	1	
359	Industrial Machinery, n.e.c.	1	
361	Electric Distribution Equipment	1	36
362	Electrical Industrial Apparatus	1	
363	Household Appliances	2	
364	Electric Lighting & Wiring Equipment	2	
365	Household Audio & Video Equipment	1	
366	Communications Equipment	2	
367	Electronic Components & Accessories	7	
369	Misc. Electrical Equipment & Supplies	1	
371	Motor Vehicle & Equipment	28	37
372	Aircraft & Parts	2	
376	Guided Missiles, Space Vehicles, Parts	1	
381	Search & Navigation Equipment	1	38
382	Measuring & Controlling Devices	5	
482	Telegraph Communications	1	48
500	Wholesale Trade - Durable Goods	1	50

3-Digit SIC Code	3-Digit SIC Code Description	# Of Suppliers	2-Digit SIC Code
505	Metals & Minerals Except Petroleum	1	
507	Hardware, Plumbing, Heating Equip & Supp	1	
509	Misc. Durable Goods	1	
733	Mailing, Reproduction, Comm Art, Photo & Steno Services	1	73
734	Services To Dwellings And Other Buildings	1	
736	Personnel Supply Services	1	
737	Computer Programming, Data Processing, & Comp Servs	9	
738	Misc. Business Services	3	
820	Educational Services	1	82
870	Engineering, Accounting, Research, Management Services	2	87
871	Engineering, Architectural, & Surveying Services	1	
874	Management & Public Relations Services	1	
Totals 55		127	19

2-Digit SIC Code	2-Digit SIC Code Description	# Of Suppliers
17	Construction - Special Trade Contractors	1
20	Food & Kindred Products	1
22	Textile Mills Products	3
25	Furniture & Fixtures	2
26	Paper & Allied Products	1
28	Chemicals & Allied Products	2
30	Rubber & Misc. Plastics Products	6
32	Stone, Clay & Glass Products	1
33	Primary Metal Industries	12
34	Fabricated Metal Products	9
35	Industrial Machinery & Equipment	10
36	Electronic & Other Electric Equipment	17
37	Transportation Equipment	31
38	Instruments & Related Products	6
48	Communications	1
50	Wholesale Trade - Durable Goods	4
73	Business Services	15
82	Educational Services	1
87	Engineering, Accounting, Research, Management & Related Services	4
Totals 19		127

n.e.c. = not elsewhere classified
SIC code descriptions from: U.S. Census Bureau 1997 Economic Census: Bridge Between NAICS and SIC (Available at http://www.census.gov/epcd/ec97brdg/)

Appendix 5.1C-1 Slack Input COMPUSTAT Variables Descriptive Statistics
(Original data in $millions; Panel dates 1992-1998)

SALES REVENUE

	SALE92	*SALE93*	*SALE94*	*SALE95*	*SALE96*	*SALE97*	*SALE98*	*SALEmean*	*logSALEmean*
Mean	1,077.2	1067.1	1176.5	1300.2	1358.1	1496.5	1664.8	1285.016	5.542
Standard Error	263.5	243.5	250.3	269.7	279.6	298.5	323.6	263.409	0.172
Median	152.8	161.8	197.5	218.5	272.9	339.4	389.2	257.266	5.550
Standard Deviation	2,738.9	2622.3	2753.8	3026.8	3150.8	3364.4	3647.2	2968.469	1.939
Sample Variance	7,501,411.4	6,876,273.6	7,583,194.1	9,161,713.9	9,927,353.0	11,319,044.4	13,301,814.1	8811810.5	3.761
Kurtosis	34.4	31.9	26.0	23.9	22.9	21.4	18.8	25.8	(0.4)
Skewness	5.3	5.0	4.6	4.4	4.3	4.2	4.0	4.6	(0.0)
Range	22,030.9	21079.8	21159.5	22797.8	23432.0	24711.3	25714.6	22986.3	8.465
Minimum	1.1	1.2	1.5	4.2	2.0	1.7	0.4	4.844	1.578
Maximum	22,032.0	21081.0	21161.0	22802.0	23434.0	24713.0	25715.0	22991.1	10.0
Sum	116,341.1	123778.6	142356.1	163828.2	172483.2	190061.0	211435.3	163197.0	703.8
Count	108	116	121	126	127	127	127	127	127

GENERAL AND ADMINISTRATIVE EXPENSE

	XSGA92	*XSGA93*	*XSGA94*	*XSGA95*	*XSGA96*	*XSGA97*	*XSGA98*	*XSGAmean*
Mean	157.4	140.9	147.9	151.1	159.8	175.3	203.1	157.059
Standard Error	50.2	39.5	36.9	36.4	38.8	40.8	43.9	38.105
Median	25.3	24.0	27.1	30.9	31.9	41.8	49.8	33.878
Standard Deviation	502.4	412.8	402.4	408.5	437.7	460.1	494.8	429.425
Sample Variance	252,367.9	170,440.3	161,952.6	166,912.8	191,546.1	211,646.2	244,872.8	184406.1
Kurtosis	60.3	51.3	42.6	42.7	48.0	43.4	37.5	50.1
Skewness	7.2	6.5	5.8	5.8	6.2	5.8	5.4	6.3
Range	4549.8	3683.6	3513.7	3613.2	3993.3	4101.0	4271.2	3960.8
Minimum	0.2	0.4	0.3	0.8	0.7	1.0	0.8	0.618
Maximum	4550.0	3684.0	3514.0	3614.0	3994.0	4102.0	4272.0	3961.4
Sum	15740.8	15357.5	17595.7	19033.9	20289.3	22268.7	25795.4	19946.5
Count	100	109	119	126	127	127	127	127

INVENTORY

	INVT92	*INVT93*	*INVT94*	*INVT95*	*INVT96*	*INVT97*	*INVT98*	*INVTmean*
Mean	140.3	131.6	140.9	136.1	141.5	150.3	179.4	138.029
Standard Error	44.4	37.0	34.6	31.7	33.2	33.0	37.8	32.110
Median	20.6	20.5	25.7	26.4	30.9	34.6	38.1	31.309
Standard Deviation	425.7	373.3	357.8	351.3	373.8	371.9	425.4	361.866
Sample Variance	181,255.4	139,345.1	128,001.3	123,412.7	139,728.6	138,345.3	181,006.8	130947.3
Kurtosis	46.1	45.9	39.5	39.7	46.6	39.9	30.3	45.7
Skewness	6.4	6.3	5.7	5.7	6.2	5.7	5.0	6.1
Range	3508.0	3153.0	2955.0	2954.0	3342.0	3173.0	3362.0	3206.7
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Maximum	3508.0	3153.0	2955.0	2954.0	3342.0	3173.0	3362.0	3206.7
Sum	12903.7	13418.6	15074.0	16746.1	17972.6	19083.2	22781.6	17529.7
Count	92	102	107	123	127	127	127	127

Appendix 5.1C-2 Slack Input COMPUSTAT Variables Descriptive Statistics
(Original data in $millions; Panel dates 1992-1998)

CURRENT LIABILITIES

	LCT92	*LCT93*	*LCT94*	*LCT95*	*LCT96*	*LCT97*	*LCT98*	*LCTmean*
Mean	281.2	276.8	293.0	287.4	312.3	349.8	437.5	304.159
Standard Error	90.3	80.4	77.1	71.8	75.6	80.3	95.5	73.179
Median	35.9	35.1	42.8	43.6	50.1	65.4	76.5	53.622
Standard Deviation	866.4	819.5	801.2	799.8	848.3	904.8	1076.7	824.684
Sample Variance	750,566.2	671,504.4	641,955.7	639,714.5	719,586.9	818,746.2	1,159,341.9	680103.2
Kurtosis	42.9	44.3	37.3	36.6	41.3	31.6	21.1	39.6
Skewness	6.1	6.1	5.6	5.5	5.8	5.1	4.3	5.7
Range	7036.5	6919.5	6552.5	6658.5	7389.4	7310.4	7734.1	7085.7
Minimum	0.5	0.5	0.5	0.5	0.6	0.6	0.9	0.745
Maximum	7037.0	6920.0	6553.0	6659.0	7390.0	7311.0	7735.0	7086.4
Sum	25872.3	28787.2	31647.9	35637.9	39350.8	44428.7	55559.3	38628.1
Count	92	104	108	124	126	127	127	127

CASH AND SECURITIES

	CHE92	*CHE93*	*CHE94*	*CHE95*	*CHE96*	*CHE97*	*CHE98*	*CHEmean*
Mean	53.5	43.3	43.3	43.7	74.9	65.1	55.4	51.548
Standard Error	20.6	12.0	11.2	11.9	20.4	15.5	14.1	12.676
Median	3.5	4.4	4.4	5.3	7.5	9.6	7.5	8.184
Standard Deviation	201.6	122.7	117.9	132.2	229.7	175.0	159.0	142.855
Sample Variance	40,631.6	15,045.5	13,895.8	17,480.1	52,780.3	30,636.6	25,268.4	20407.6
Kurtosis	43.7	26.8	22.1	23.4	28.7	17.1	35.1	22.2
Skewness	6.3	4.9	4.5	4.7	5.0	4.1	5.5	4.6
Range	1632.2	892.0	757.8	900.0	1766.0	1041.0	1311.7	912.9
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.002
Maximum	1632.2	892.0	757.8	900.0	1766.0	1041.0	1311.7	912.9
Sum	5137.0	4547.3	4764.7	5415.2	9511.6	8268.2	7032.4	6546.7
Count	96	105	110	124	127	127	127	127

ACCOUNTS RECEIVABLE

	RECT92	*RECT93*	*RECT94*	*RECT95*	*RECT96*	*RECT97*	*RECT98*	*RECTmean*
Mean	175.4	171.0	207.3	204.5	215.7	237.7	261.0	200.366
Standard Error	45.7	41.0	49.1	47.5	49.3	51.5	53.5	43.597
Median	29.5	30.8	34.5	35.7	40.1	56.4	68.8	44.042
Standard Deviation	437.9	414.1	507.9	529.4	555.4	580.2	603.4	491.308
Sample Variance	191,747.0	171,504.5	257,970.3	280,266.4	308,458.7	336,640.0	364,052.8	241383.5
Kurtosis	24.9	23.9	25.2	24.1	23.6	22.7	21.4	24.5
Skewness	4.6	4.5	4.6	4.7	4.6	4.5	4.3	4.6
Range	3134.7	2980.8	3744.8	3682.0	3717.0	3788.3	3992.6	3576.6
Minimum	0.3	0.2	0.2	0.0	0.0	0.7	0.4	0.820
Maximum	3135.0	2981.0	3745.0	3682.0	3717.0	3789.0	3993.0	3577.4
Sum	16135.6	17440.1	22183.7	25360.5	27398.5	30188.4	33142.4	25446.5
Count	92	102	107	124	127	127	127	127

Appendix 5.1C-3 Slack Input COMPUSTAT Variables Correlations

	SALE92	*SALE93*	*SALE94*	*SALE95*	*SALE96*	*SALE97*	*SALE98*
SALE92	1.00						
SALE93	1.00	1.00					
SALE94	0.99	1.00	1.00				
SALE95	0.98	0.99	1.00	1.00			
SALE96	0.97	0.98	0.99	1.00	1.00		
SALE97	0.96	0.97	0.98	0.99	1.00	1.00	
SALE98	0.94	0.95	0.97	0.98	0.99	0.99	1.00

	LCT92	*LCT93*	*LCT94*	*LCT95*	*LCT96*	*LCT97*	*LCT98*
LCT92	1.00						
LCT93	1.00	1.00					
LCT94	0.98	0.99	1.00				
LCT95	0.97	0.98	1.00	1.00			
LCT96	0.97	0.98	0.99	0.99	1.00		
LCT97	0.96	0.96	0.98	0.99	0.99	1.00	
LCT98	0.90	0.91	0.94	0.95	0.95	0.97	1.00

	XSGA92	*XSGA93*	*XSGA94*	*XSGA95*	*XSGA96*	*XSGA97*	*XSGA98*
XSGA92	1.00						
XSGA93	0.99	1.00					
XSGA94	0.98	0.99	1.00				
XSGA95	0.97	0.99	1.00	1.00			
XSGA96	0.97	0.99	0.99	1.00	1.00		
XSGA97	0.96	0.98	0.99	1.00	1.00	1.00	
XSGA98	0.95	0.98	0.99	0.99	0.99	0.99	1.00

	CHE92	*CHE93*	*CHE94*	*CHE95*	*CHE96*	*CHE97*	*CHE98*
CHE92	1.00						
CHE93	0.79	1.00					
CHE94	0.86	0.86	1.00				
CHE95	0.78	0.84	0.91	1.00			
CHE96	0.68	0.90	0.84	0.88	1.00		
CHE97	0.64	0.84	0.86	0.86	0.91	1.00	
CHE98	0.57	0.79	0.83	0.78	0.80	0.87	1.00

	INVT92	*INVT93*	*INVT94*	*INVT95*	*INVT96*	*INVT97*	*INVT98*
INVT92	1.00						
INVT93	1.00	1.00					
INVT94	0.99	0.99	1.00				
INVT95	0.98	0.99	1.00	1.00			
INVT96	0.99	0.99	1.00	1.00	1.00		
INVT97	0.98	0.98	0.99	0.99	0.99	1.00	
INVT98	0.94	0.95	0.96	0.97	0.97	0.97	1.00

	RECT92	*RECT93*	*RECT94*	*RECT95*	*RECT96*	*RECT97*	*RECT98*
RECT92	1.00						
RECT93	0.99	1.00					
RECT94	0.98	0.99	1.00				
RECT95	0.95	0.97	0.98	1.00			
RECT96	0.93	0.96	0.97	1.00	1.00		
RECT97	0.92	0.95	0.97	0.99	1.00	1.00	
RECT98	0.90	0.92	0.95	0.97	0.98	0.98	1.00

Appendix 5.1C-4 Munificence Input Census of Manufactures Variables Descriptive Statistics

V1	**Value of Shipments ($billion)**					
	V1 - 1992	*V1 - 1993*	*V1 - 1994*	*V1 - 1995*	*V1 - 1996*	*V1 - 1997*
Mean	56.286	61.059	66.948	72.657	77.454	83.314
Standard Error	23.845	25.987	28.143	30.275	32.405	34.551
Median	19.844	20.408	22.204	23.102	24.468	25.835
Standard Deviation	195	213	230	248	265	283
Sample Variance	38095	45245	53065	61410	70357	79980
Kurtosis	60.8	60.5	60.0	59.8	59.7	59.5
Skewness	7.6	7.6	7.6	7.6	7.6	7.5
Range	1593	1734	1875	2017	2158	2299
Minimum	0.988	0.826	0.664	0.502	0.340	0.178
Maximum	1594	1735	1876	2017	2158	2299
Sum	3771	4091	4486	4868	5189	5582
Count	67	67	67	67	67	67

V2	**Value added by manufacture - total wages ($billion) [V4-TW]**					
	V2 - 1992	*V2 - 1993*	*V2 - 1994*	*V2 - 1995*	*V2 - 1996*	*V2 - 1997*
Mean	7.205	7.707	8.801	9.656	9.993	11.020
Standard Error	1.035	1.106	1.308	1.552	1.637	1.834
Median	4.648	5.291	5.660	5.773	5.793	7.210
Standard Deviation	7.394	7.895	9.340	11.080	11.688	13.098
Sample Variance	54.673	62.331	87.232	122.777	136.604	171.554
Kurtosis	4.0	3.7	4.1	7.6	8.8	9.7
Skewness	1.9	1.9	2.1	2.5	2.7	2.8
Range	34.132	35.281	39.512	56.895	62.318	71.316
Minimum	0.696	0.837	0.968	0.960	0.910	1.130
Maximum	34.828	36.118	40.480	57.855	63.229	72.446
Sum	367.439	393.068	448.864	492.461	509.663	562.039
Count	51	51	51	51	51	51

V3	**Total employment (million)**					
	V3 - 1992	*V3 - 1993*	*V3 - 1994*	*V3 - 1995*	*V3 - 1996*	*V3 - 1997*
Mean	0.323	0.338	0.355	0.374	0.389	0.406
Standard Error	0.075	0.080	0.085	0.090	0.095	0.100
Median	0.131	0.128	0.120	0.127	0.129	0.133
Standard Deviation	0.613	0.652	0.692	0.733	0.774	0.817
Sample Variance	0.376	0.425	0.479	0.537	0.600	0.667
Kurtosis	13.2	12.3	11.6	11.0	10.7	10.5
Skewness	3.6	3.5	3.4	3.4	3.3	3.3
Range	3.344	3.452	3.560	3.669	3.777	3.886
Minimum	0.006	0.005	0.004	0.003	0.002	0.001
Maximum	3.349	3.457	3.564	3.672	3.780	3.887
Sum	21.664	22.659	23.804	25.057	26.076	27.223
Count	67	67	67	67	67	67

Appendix 5.1C-5 Munificence Input Census of Manufactures Variables Descriptive Statistics

V4	**Value added by manufacture ($billion)**					
	V4 - 1992	*V4 - 1993*	*V4 - 1994*	*V4 - 1995*	*V4 - 1996*	*V4 - 1997*
Mean	11.768	12.360	13.676	14.782	15.243	16.571
Standard Error	1.550	1.647	1.896	2.170	2.265	2.514
Median	7.819	8.745	9.238	9.442	9.466	11.060
Standard Deviation	11.070	11.764	13.538	15.494	16.173	17.951
Sample Variance	122.536	138.383	183.266	240.062	261.553	322.247
Kurtosis	2.4	2.6	3.2	5.6	6.5	7.3
Skewness	1.6	1.7	1.8	2.2	2.3	2.4
Range	43.990	46.413	56.653	76.610	82.649	93.807
Minimum	1.273	1.420	1.704	1.460	1.410	1.598
Maximum	45.262	47.833	58.357	78.070	84.059	95.404
Sum	600.191	630.378	697.458	753.895	777.385	845.121
Count	51	51	51	51	51	51

V5	**Number of manufacturing establishments (000)**		
	V5 - 1992		*V5 - 1997*
Mean	20.947		24.839
Standard Error	7.890		9.049
Median	1.633	Data is not collected in	1.654
Standard Deviation	64.585	intervening years.	74.068
Sample Variance	4171.208		5486.010
Kurtosis	19.5		17.8
Skewness	4.4		4.2
Range	367.126		415.324
Minimum	0.137		0.099
Maximum	367.263		415.423
Sum	1403.478		1664.215
Count	67		67

TW	**Total Wages ($billion)**					
	TW - 1992	*TW - 1993*	*TW - 1994*	*TW - 1995*	*TW - 1996*	*TW - 1997*
Mean	9.422	4.653	4.874	5.126	5.249	13.873
Standard Error	2.174	0.591	0.632	0.681	0.694	3.340
Median	4.214	3.103	3.473	3.511	3.454	4.542
Standard Deviation	17.794	4.220	4.515	4.860	4.954	27.337
Sample Variance	316.620	17.811	20.382	23.623	24.546	747.293
Kurtosis	16.7	2.0	2.3	2.6	2.6	12.8
Skewness	3.9	1.5	1.6	1.7	1.7	3.5
Range	104.937	17.022	18.150	19.715	20.331	147.686
Minimum	0.218	0.415	0.466	0.500	0.500	0.051
Maximum	105.155	17.436	18.616	20.215	20.830	147.737
Sum	631.290	237.310	248.594	261.434	267.723	929.515
Count	67	51	51	51	51	67

Appendix 5.1C-6 Munificence Input Variables Correlations

V1 **Value of Shipments ($billion)**

	V1 - 1992	*V1 - 1993*	*V1 - 1994*	*V1 - 1995*	*V1 - 1996*	*V1 - 1997*
V1 - 1992	1					
V1 - 1993	1.00	1				
V1 - 1994	1.00	1.00	1			
V1 - 1995	1.00	1.00	1.00	1		
V1 - 1996	1.00	1.00	1.00	1.00	1	
V1 - 1997	1.00	1.00	1.00	1.00	1.00	1

V2 **Value added by manufacture - total wages ($billion) [V4-TW]**

	V2 - 1992	*V2 - 1993*	*V2 - 1994*	*V2 - 1995*	*V2 - 1996*	*V2 - 1997*
V2 - 1992	1					
V2 - 1993	1.00	1				
V2 - 1994	0.98	0.99	1			
V2 - 1995	0.95	0.96	0.98	1		
V2 - 1996	0.93	0.94	0.97	1.00	1	
V2 - 1997	0.92	0.93	0.97	1.00	1.00	1

V3 **Total employment (million)**

	V3 - 1992	*V3 - 1993*	*V3 - 1994*	*V3 - 1995*	*V3 - 1996*	*V3 - 1997*
V3 - 1992	1					
V3 - 1993	1.00	1				
V3 - 1994	1.00	1.00	1			
V3 - 1995	0.99	1.00	1.00	1		
V3 - 1996	0.99	0.99	1.00	1.00	1	
V3 - 1997	0.98	0.99	0.99	1.00	1.00	1

V4 **Value added by manufacture ($billion)**

	V4 - 1992	*V4 - 1993*	*V4 - 1994*	*V4 - 1995*	*V4 - 1996*	*V4 - 1997*
V4 - 1992	1					
V4 - 1993	0.997	1				
V4 - 1994	0.987	0.994	1			
V4 - 1995	0.969	0.975	0.988	1		
V4 - 1996	0.958	0.966	0.982	0.999	1	
V4 - 1997	0.952	0.960	0.978	0.997	0.999	1

V5 **Number of manufacturing establishments (000)**

	V5 - 1992	*V5 - 1997*
V5 - 1992	1	
V5 - 1997	1.00	1

TW **Total Wages ($billion)**

	TW - 1992	*TW - 1993*	*TW - 1994*	*TW - 1995*	*TW - 1996*	*TW - 1997*
TW - 1992	1					
TW - 1993	1.00	1				
TW - 1994	0.99	1.00	1			
TW - 1995	0.98	0.99	1.00	1		
TW - 1996	0.98	0.99	1.00	1.00	1	
TW - 1997	0.98	0.99	0.99	1.00	1.00	1

Appendix 5.1C-7 Descriptive Statistics for Supplier Variables

	SALEmean	*logSALEmean*	*XSGAmean*	*INVTmean*	*LCTmean*	*CHEmean*	*RECTmean*	*MUN*
Mean	1285.016	5.542	157.059	138.029	304.159	51.548	200.366	0.056
Standard Error	263.409	0.172	38.105	32.110	73.179	12.676	43.597	0.004
Median	257.266	5.550	33.878	31.309	53.622	8.184	44.042	0.057
Standard Deviation	2968.469	1.939	429.425	361.866	824.684	142.855	491.308	0.044
Sample Variance	8811810.5	3.761	184406.1	130947.3	680103.2	20407.6	241383.5	0.002
Kurtosis	25.8	(0.4)	50.1	45.7	39.6	22.2	24.5	10.9
Skewness	4.6	(0.0)	6.3	6.1	5.7	4.6	4.6	(1.6)
Range	22986.3	8.465	3960.8	3206.7	7085.7	912.9	3576.6	0.361
Minimum	4.844	1.578	0.618	0.000	0.745	0.002	0.820	(0.211)
Maximum	22991.1	10.0	3961.4	3206.7	7086.4	912.9	3577.4	0.150
Sum	163197.0	703.8	19946.5	17529.7	38628.1	6546.7	25446.5	7.059
Kolmogorov-Smirnov Z	3.754	0.627	These variables are used to create slack variables. Their					2.516
K-S sig.*	0.000	0.827	descriptive characterisitics as slack variables are reported later.					0.000
Count	127	127	127	127	127	127	127	127

* Significant K-S statistics suggest non-normal distributions of the date.

	CON	*arcCON*	*CONDC*	*arcCONDC*	*CONFM*	*arcCONFM*	*CONGM*	*arcCONGM*	*TEN*
Mean	0.247	0.940	0.047	0.252	0.100	0.447	0.103	0.477	3.313
Standard Error	0.021	0.054	0.009	0.034	0.013	0.045	0.013	0.044	0.225
Median	0.142	0.772	0.000	0.000	0.020	0.284	0.044	0.423	2.625
Standard Deviation	0.242	0.613	0.101	0.389	0.149	0.509	0.144	0.493	2.540
Sample Variance	0.058	0.375	0.010	0.151	0.022	0.259	0.021	0.243	6.454
Kurtosis	0.1	(0.4)	30.4	5.5	2.3	(0.3)	2.2	(0.4)	(0.2)
Skewness	1.0	0.6	4.6	1.9	1.7	0.9	1.7	0.8	0.9
Range	0.918	2.562	0.840	2.319	0.613	1.799	0.605	1.782	8.542
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.458
Maximum	0.918	2.562	0.840	2.319	0.613	1.799	0.605	1.782	9.000
Sum	31.432	119.343	5.942	32.028	12.705	56.712	13.127	60.523	420.792
Kolmogorov-Smirnov Z	1.953	1.261	3.630	4.011	2.823	2.826	2.664	2.469	2.195
K-S sig.*	0.001	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Count	127	127	127	127	127	127	127	127	127

* Significant K-S statistics suggest non-normal distributions of the date.

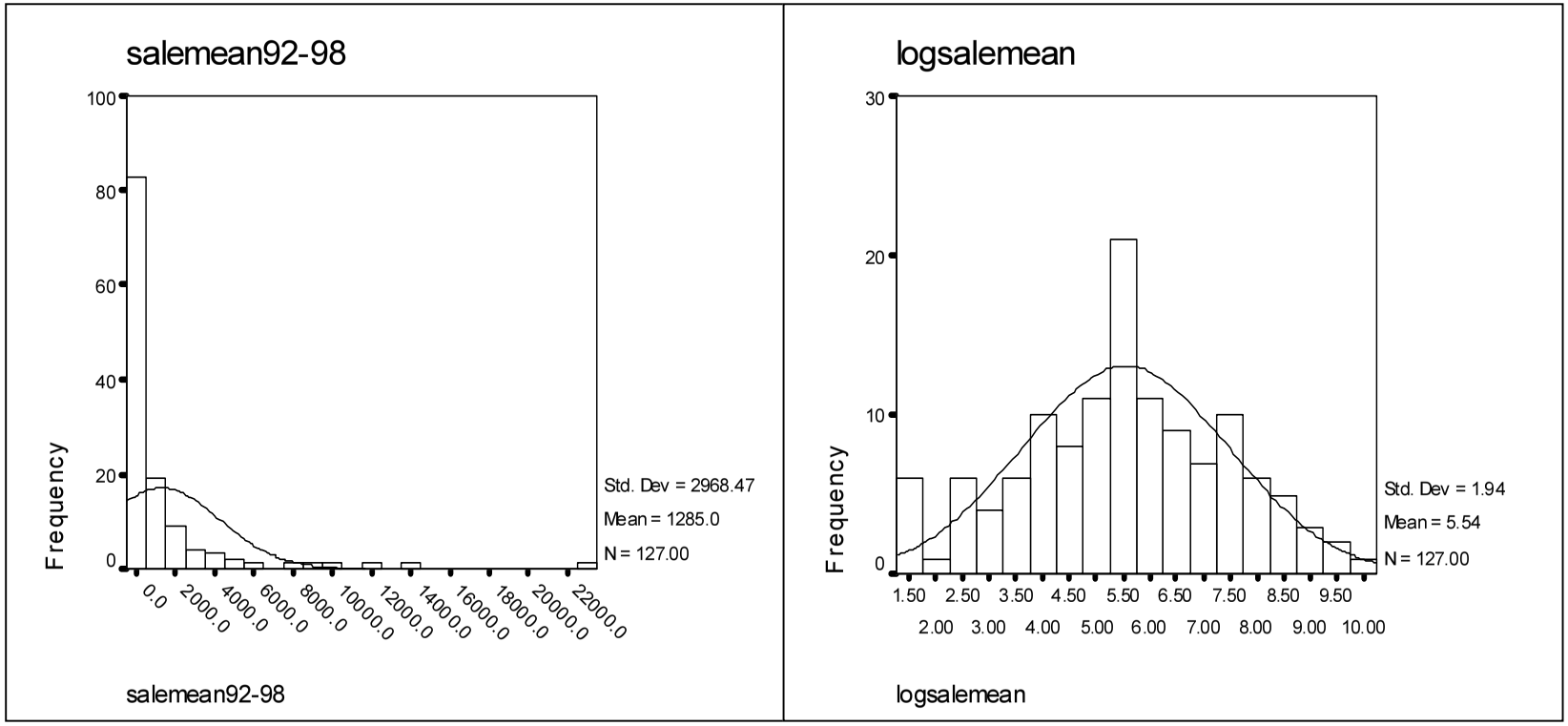
Appendix 5.1C-8 Correlations for Supplier Variables

	SALEmean	*logSALEmean*	*XSGAmean*	*INVTmean*	*LCTmean*	*CHEmean*	*RECTmean*	*MUN*
SALEmean	1.00							
logSALEmean	0.65	1.00						
XSGAmean	0.94	0.54	1.00					
INVTmean	0.89	0.55	0.91	1.00				
LCTmean	0.99	0.58	0.95	0.92	1.00			
CHEmean	0.77	0.50	0.66	0.69	0.76	1.00		
RECTmean	0.97	0.61	0.90	0.81	0.95	0.74	1.00	
MUN	(0.12)	(0.05)	(0.13)	(0.23)	(0.14)	(0.02)	(0.06)	1.00
CON	0.06	0.07	(0.00)	(0.03)	0.06	(0.02)	0.08	0.03
arcCON	0.07	0.08	0.01	(0.01)	0.08	(0.00)	0.09	0.03
CONDC	(0.06)	(0.15)	(0.07)	(0.07)	(0.06)	(0.09)	(0.04)	0.04
arcCONDC	(0.04)	(0.07)	(0.06)	(0.06)	(0.04)	(0.11)	(0.01)	0.06
CONFM	0.11	0.06	0.10	0.10	0.13	(0.02)	0.11	0.02
arcCONFM	0.14	0.11	0.13	0.12	0.15	0.01	0.13	0.02
CONGM	0.02	0.14	(0.06)	(0.11)	0.00	0.04	0.04	0.00
arcCONGM	(0.01)	0.13	(0.10)	(0.13)	(0.03)	0.02	(0.00)	(0.01)
TEN	0.09	0.22	0.03	0.02	0.07	(0.02)	0.10	0.01

	CON	*arcCON*	*CONDC*	*arcCONDC*	*CONFM*	*arcCONFM*	*CONGM*	*arcCONGM*	*TEN*
CON	1.00								
arcCON	0.99	1.00							
CONDC	0.46	0.45	1.00						
arcCONDC	0.52	0.52	0.93	1.00					
CONFM	0.70	0.68	0.07	0.17	1.00				
arcCONFM	0.66	0.66	0.05	0.17	0.96	1.00			
CONGM	0.65	0.64	0.02	0.07	0.10	0.08	1.00		
arcCONGM	0.62	0.63	(0.00)	0.05	0.10	0.08	0.96	1.00	
TEN	0.79	0.79	0.25	0.39	0.57	0.59	0.57	0.60	1.00

Highlighted area have significant correlations to the 0.05 level

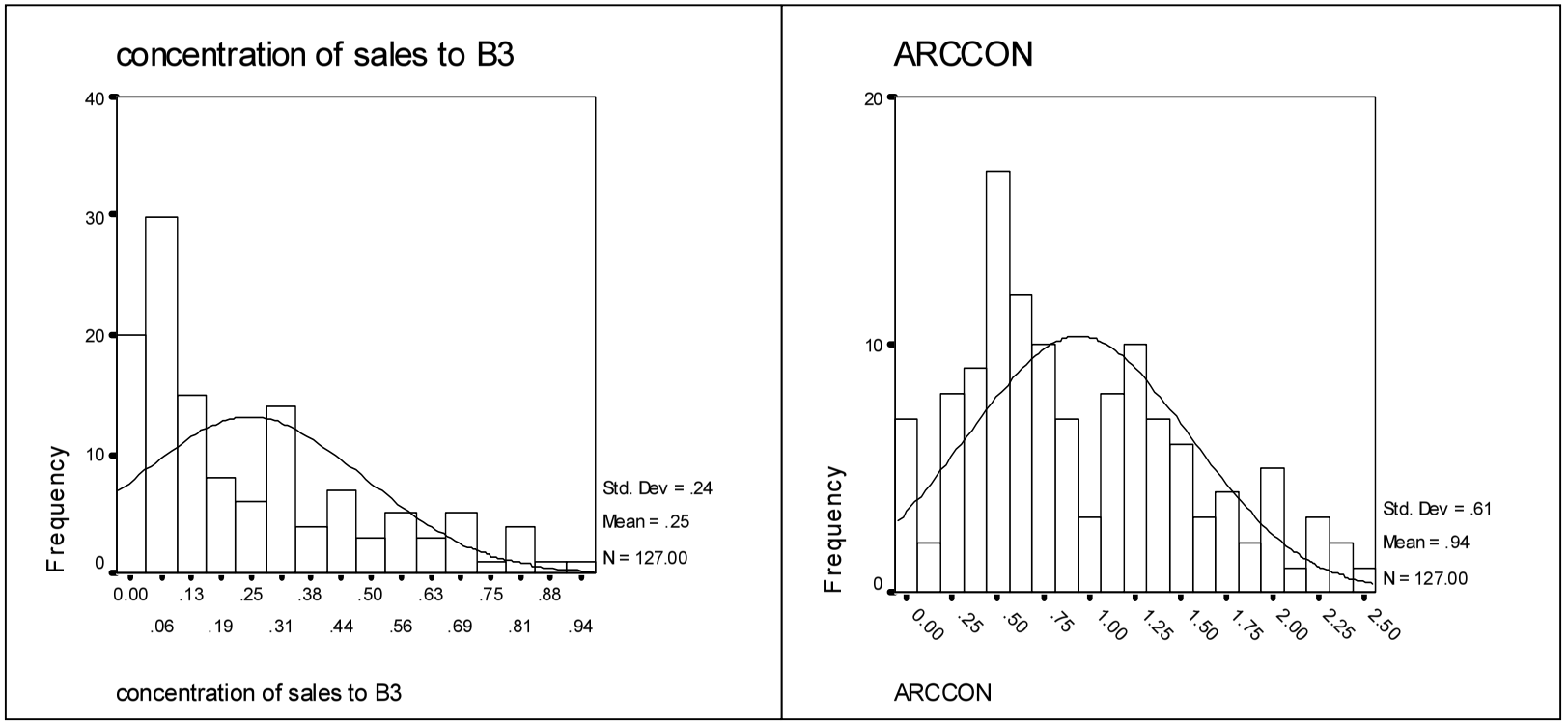
Appendix 5.1C-9 Histograms of organizational data



Kurtosis	25.8	Kurtosis	(0.4)
Skewness	4.6	Skewness	(0.0)
Kolmogorov-Smirnov Z	3.754	Kolmogorov-Smirnov Z	0.627
K-S sig.*	0.000	K-S sig.*	0.827

* Significant K-S statistics suggest non-normal distributions of the data.

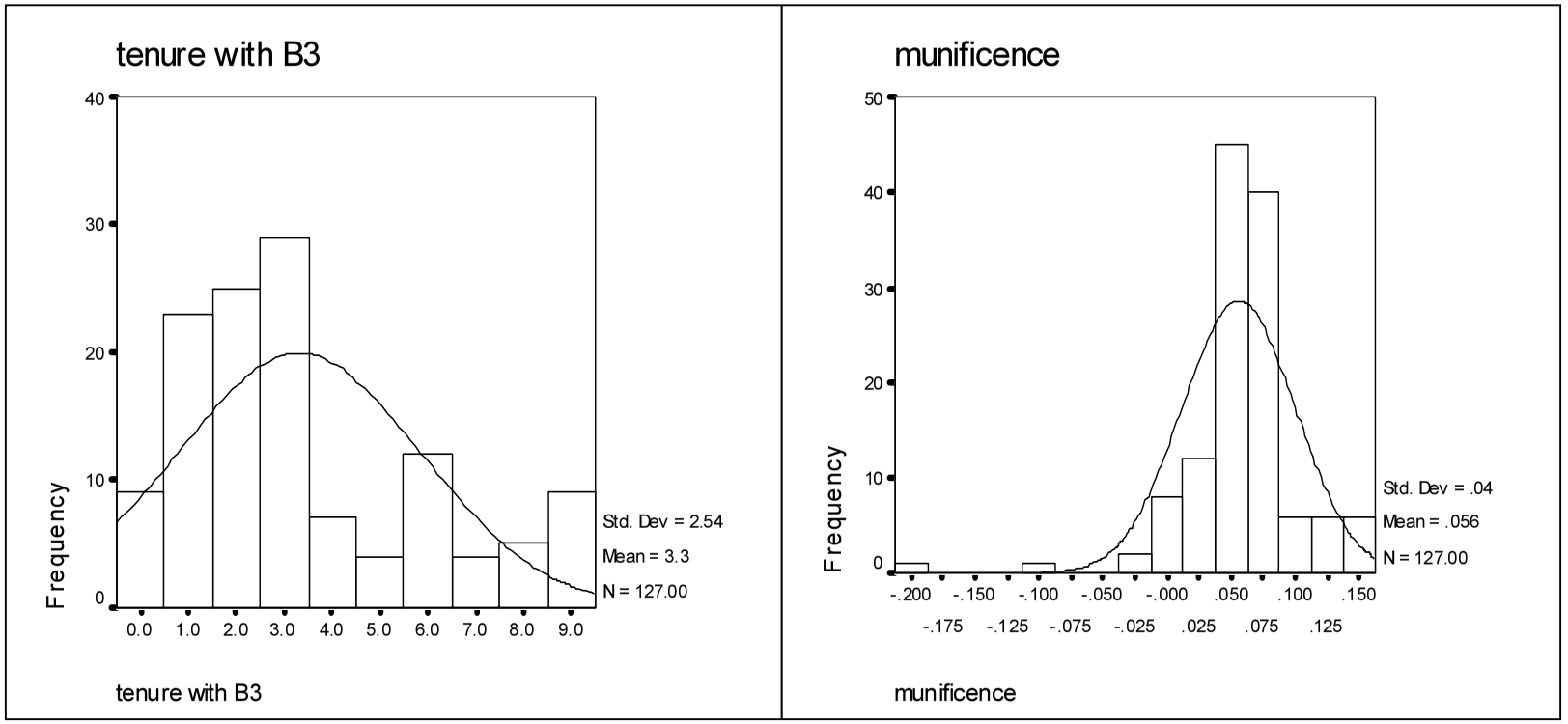
Appendix 5.1C-10 Histograms of organizational data



Kurtosis	0.1	Kurtosis	(0.4)
Skewness	1.0	Skewness	0.6
Kolmogorov-Smirnov Z	1.953	Kolmogorov-Smirnov Z	1.261
K-S sig.*	0.001	K-S sig.*	0.083

* Significant K-S statistics suggest non-normal distributions of the data.

Appendix 5.1C-11 Histograms of organizational data and environmental munificence



Kurtosis	(0.2)	Kurtosis	10.9
Skewness	0.9	Skewness	(1.6)
Kolmogorov-Smirnov Z	2.195	Kolmogorov-Smirnov Z	2.516
K-S sig.*	0.000	K-S sig.*	0.000

* Significant K-S statistics suggest non-normal distributions of the data.

Appendix 5.1D-1 Missing COMPUSTAT Accounting Data Characteristics

Missing data counts by year by variable

matrix 6x7x127 = 5,334

Variable	1992	1993	1994	1995	1996	1997	1998	Total
SALE	18	11	6	1	0	0	0	36
RECT	35	25	20	3	0	0	0	83
INVT	35	25	20	4	0	0	0	84
LCT	35	23	19	3	0	0	0	80
CHE	31	22	17	3	0	0	0	73
XSGA	27	18	8	1	0	0	0	54
Sum	181	124	90	15	0	0	0	410
% of missing	44.1%	30.2%	22.0%	3.7%	0.0%	0.0%	0.0%	100.0%

Missing data percentages by year by variable

matrix 6x7x127 = 5,334

Variable	1992	1993	1994	1995	1996	1997	1998	Total
SALE	14.2%	8.7%	4.7%	0.8%	0.0%	0.0%	0.0%	4.0%
RECT	27.6%	19.7%	15.7%	2.4%	0.0%	0.0%	0.0%	9.3%
INVT	27.6%	19.7%	15.7%	3.1%	0.0%	0.0%	0.0%	9.4%
LCT	27.6%	18.1%	15.0%	2.4%	0.0%	0.0%	0.0%	9.0%
CHE	24.4%	17.3%	13.4%	2.4%	0.0%	0.0%	0.0%	8.2%
XSGA	21.3%	14.2%	6.3%	0.8%	0.0%	0.0%	0.0%	6.1%
% of total matrix	23.8%	16.3%	11.8%	2.0%	0.0%	0.0%	0.0%	7.7% of 5,334

Appendix 5.1D-2 Missing Data Characteristics

Company Name	Missing data Count	Percentage	Company Name	Missing data Count	Percentage
AETNA INDUSTRIES INC	8	19.0%	JPE INC	0	0.0%
AFTERMARKET TECHNOLOGY CORP	14	33.3%	JPS INDUSTRIES INC	0	0.0%
AK STEEL HOLDING CORP	3	7.1%	KNUSAGA CORP	0	0.0%
ALCIDE CORP	0	0.0%	KVH INDUSTRIES INC	11	26.2%
ALLEN TELECOM INC	1	2.4%	LANCASTER COLONY CORP	0	0.0%
ALLIED PRODUCTS	0	0.0%	LASON INC	12	28.6%
AMCAST INDL CORP	0	0.0%	LEAR CORP	0	0.0%
AMERICAN AXLE & MFG HLDGS	20	47.6%	LEXINGTON PRECISION CORP	0	0.0%
ANCOR COMMUNICATIONS INC	4	9.5%	LINDBERG CORP	0	0.0%
ARGUSS COMMUNICATIONS INC	0	0.0%	LITTELFUSE INC	0	0.0%
ARVIN INDUSTRIES INC	0	0.0%	LTV CORP	0	0.0%
ARVINMERITOR INC	18	42.9%	LYDALL INC	0	0.0%
ATCHISON CASTING CORP	4	9.5%	MAGNA INTERNATIONAL -CL A	0	0.0%
AUDIO VISUAL SERVICES CORP	18	42.9%	MARGATE INDUSTRIES INC	0	0.0%
BASE TEN SYSTEMS -CL A	0	0.0%	MASCOTECH INC	0	0.0%
BORG WARNER INC	0	0.0%	MATERIAL SCIENCES CORP	0	0.0%
BREED TECHNOLOGIES INC	0	0.0%	MECHANICAL DYNAMICS	11	26.2%
CDI CORP	0	0.0%	METHODE ELECTRONICS -CL A	0	0.0%
CHAMPION PARTS INC	0	0.0%	MICHIGAN RIVET CORP	0	0.0%
CHERRY CORP	0	0.0%	MODINE MFG CO	0	0.0%
CIBER INC	5	11.9%	MPW INDL SVCS GROUP INC	20	47.6%
CODE-ALARM INC	0	0.0%	NATIONAL STEEL CORP -CL B	0	0.0%
COLLINS & AIKMAN CORP	4	9.5%	NATIONAL TECHTEAM INC	0	0.0%
COLUMBUS MCKINNON CORP	8	19.0%	NEWCOR INC	0	0.0%
COMPUWARE CORP	0	0.0%	NOBLE INTERNATIONAL LTD	16	38.1%
CTS CORP	0	0.0%	OPINION RESEARCH CORP	0	0.0%
CUMMINS ENGINE	0	0.0%	PARK OHIO HOLDINGS CORP	0	0.0%
DANA CORP	0	0.0%	PERCEPTRON INC	0	0.0%
DECOMA INTL INC -CL A	24	57.1%	PLYMOUTH RUBBER -CL A	0	0.0%
DETROIT DIESEL CORP	0	0.0%	PRODUCTIVITY TECHNOLOGIES CP	12	28.6%
DONNELLY CORP	0	0.0%	QUALITY PRODUCTS INC	0	0.0%
DT INDUSTRIES INC	4	9.5%	RAYTECH CORP/DE	0	0.0%
DURA AUTOMOTIVE SYS -CL B	12	28.6%	REMEDY CORP	8	19.0%
EATON CORP	0	0.0%	RIVIERA TOOL CO	16	38.1%
ELECTRONIC DATA SYSTEMS CORP	0	0.0%	ROBOMATIX TECH LTD -ORD	0	0.0%
ENGELHARD CORP	0	0.0%	ROUGE INDUSTRIES INC	6	14.3%
E-SYNC NETWORKS INC	0	0.0%	RYERSON TULL INC	0	0.0%
FEDERAL SCREW WORKS	0	0.0%	SATCON TECHNOLOGY CORP	0	0.0%
FEDERAL-MOGUL CORP	0	0.0%	SHELDAHL INC	0	0.0%
FOAMEX INTERNATIONAL INC	5	11.9%	SHILOH INDUSTRIES INC	0	0.0%
GENCORP INC	0	0.0%	SIMPSON INDUSTRIES	0	0.0%
GENRAD INC	0	0.0%	SLI INC	12	28.6%
GENTEK INC	18	42.9%	SMITH (A O) CORP	0	0.0%
GENTEX CORP	0	0.0%	SPARTON CORP	0	0.0%
GIBRALTAR STEEL CORP	0	0.0%	STEEL TECHNOLOGIES	0	0.0%
GLAS-AIRE INDS GROUP LTD	18	42.9%	STONERIDGE INC	16	38.1%
GLOBAL TECHNOVATIONS INC	0	0.0%	STRATTEC SECURITY CORP	18	42.9%
GP STRATEGIES CP	0	0.0%	STRUCTURAL DYNAMICS RESEARCH	0	0.0%
GRAINGER (W W) INC	0	0.0%	SUPERIOR INDUSTRIES INTL	0	0.0%
GUILFORD MILLS INC	0	0.0%	SYNTEL INC	14	33.3%
HARMAN INTERNATIONAL INDS	0	0.0%	THERMO TERRATECH INC	0	0.0%
HARVARD INDS INC	0	0.0%	THOMAS GROUP INC	1	2.4%
HASTINGS MFG CO	0	0.0%	TOWER AUTOMOTIVE INC	6	14.3%
HAYES LEMMERZ INTL INC	0	0.0%	TRANSPRO INC	14	33.3%
HICKOK INC -CL A	0	0.0%	TRW INC	0	0.0%
HMI INDUSTRIES INC	0	0.0%	U S INDUSTRIES INC	8	19.0%
HONEYWELL INTERNATIONAL INC	0	0.0%	UNIQUE MOBILITY INC	0	0.0%
IMCO RECYCLING INC	0	0.0%	UNIROYAL TECHNOLOGY CORP	0	0.0%
IMPCO TECHNOLOGIES INC	0	0.0%	UNITED TECHNOLOGIES CORP	0	0.0%
INTEGRALVISION INC	0	0.0%	VSI HOLDINGS INC	0	0.0%
INTEGRATED PACK ASSEMBLY CP	15	35.7%	WESCAST INDUSTRIES -CL A	6	14.3%
INTERMET CORP	0	0.0%	WORTHINGTON INDUSTRIES	0	0.0%
ISPAT INLAND INC	0	0.0%	WYNN'S INTERNATIONAL INC	0	0.0%
JOHNSON CONTROLS INC	0	0.0%			
			Total/Average	410	7.7%

Appendix 5.2A-1 Slack Calculations Descriptive Statistics

SLKCHE = CHE/SALE (Slack as measured in cash and equivalents)

	SLKCHE92	*SLKCHE93*	*SLKCHE94*	*SLKCHE95*	*SLKCHE96*	*SLKCHE97*	*SLKCHE98*	*SLKCHESLOPE*
Mean	0.070	0.090	0.063	0.079	0.126	0.110	0.099	0.007
Standard Error	0.014	0.020	0.010	0.016	0.023	0.021	0.025	0.004
Median	0.016	0.024	0.019	0.015	0.026	0.024	0.022	0.000
Standard Deviation	0.134	0.206	0.105	0.183	0.257	0.232	0.277	0.042
Sample Variance	0.018	0.043	0.011	0.033	0.066	0.054	0.077	0.002
Kurtosis	11.0	39.8	13.2	29.5	12.1	21.5	40.6	19.7
Skewness	3.2	5.7	3.2	5.0	3.3	4.2	5.9	3.5
Range	0.746	1.713	0.689	1.401	1.577	1.723	2.310	0.403
Minimum	0	0	0	0	0	0	0	(0.115)
Maximum	0.746	1.713	0.689	1.401	1.577	1.723	2.310	0.287
Sum	6.608	9.434	6.912	9.735	16.017	13.994	12.558	0.891
Count	95	105	110	124	127	127	127	127

SLKRECT = RECT/SALE (Slack as measured in account recievables)

	SLKRECT92	*SLKRECT93*	*SLKRECT94*	*SLKRECT95*	*SLKRECT96*	*SLKRECT97*	*SLKRECT98*	*SLKRECT SLOPE*
Mean	0.167	0.169	0.180	0.180	0.180	0.193	0.196	0.004
Standard Error	0.007	0.008	0.009	0.011	0.008	0.010	0.024	0.003
Median	0.148	0.148	0.154	0.155	0.158	0.168	0.159	0.001
Standard Deviation	0.071	0.085	0.089	0.117	0.086	0.111	0.275	0.035
Sample Variance	0.005	0.007	0.008	0.014	0.007	0.012	0.076	0.001
Kurtosis	1.1	5.3	12.3	49.9	8.8	20.2	109.9	76.3
Skewness	1.2	2.1	2.7	5.9	2.4	3.8	10.2	7.7
Range	0.362	0.509	0.700	1.219	0.642	0.868	3.105	0.408
Minimum	0.032	0.020	0.010	0	0.000	0.078	0.058	(0.060)
Maximum	0.393	0.530	0.710	1.219	0.642	0.946	3.163	0.348
Sum	15.170	17.256	19.209	22.303	22.910	24.481	24.889	0.546
Count	91	102	107	124	127	127	127	127

Appendix 5.2A-2 Slack Calculations Descriptive Statistics

SLKLCT = LCT/SALE (Slack as measured in current liabilities) Note this is a debit to unabsorbed slack

	SLKLCT92	*SLKLCT93*	*SLKLCT94*	*SLKLCT95*	*SLKLCT96*	*SLKLCT97*	*SLKLCT98*	*SLKLCT SLOPE*
Mean	0.223	0.228	0.220	0.230	0.264	0.349	0.369	0.025
Standard Error	0.018	0.017	0.018	0.019	0.031	0.104	0.127	0.020
Median	0.192	0.179	0.187	0.190	0.202	0.199	0.207	0.003
Standard Deviation	0.176	0.176	0.191	0.210	0.351	1.176	1.434	0.224
Sample Variance	0.031	0.031	0.036	0.044	0.123	1.383	2.056	0.050
Kurtosis	42.0	21.3	68.5	40.1	82.8	114.4	124.3	117.1
Skewness	5.8	4.2	7.5	5.8	8.4	10.5	11.1	10.6
Range	1.525	1.318	1.942	1.865	3.774	13.120	16.249	2.711
Minimum	0.066	0.057	0.039	0.029	0.029	0.043	0.067	(0.226)
Maximum	1.592	1.375	1.981	1.893	3.803	13.163	16.316	2.485
Sum	20.323	23.693	23.773	28.572	33.578	44.380	46.913	3.219
Count	91	104	108	124	127	127	127	127

USLK = Working capital slack (unabsorbed slack) as the summed composite of SLKCHE + SLKRECT - SLKLCT)

	USLK92	*USLK93*	*USLK94*	*USLK95*	*USLK96*	*USLK97*	*USLK98*	*USLK SLOPE*
Mean	0.014	0.034	0.024	0.028	0.042	(0.047)	(0.075)	(0.015)
Standard Error	0.024	0.028	0.022	0.024	0.039	0.094	0.101	0.017
Median	0.001	0.010	0.004	0.008	0.013	0.009	(0.022)	(0.001)
Standard Deviation	0.231	0.280	0.223	0.264	0.438	1.060	1.143	0.187
Sample Variance	0.053	0.079	0.050	0.070	0.192	1.123	1.306	0.035
Kurtosis	14.0	16.0	23.6	21.0	36.8	106.7	112.1	106.4
Skewness	(1.8)	2.5	(1.9)	0.7	(3.9)	(9.9)	(10.2)	(9.9)
Range	2.066	2.557	2.496	3.025	4.882	13.042	14.431	2.221
Minimum	(1.331)	(0.858)	(1.502)	(1.550)	(3.558)	(11.399)	(12.465)	(2.019)
Maximum	0.735	1.700	0.994	1.475	1.324	1.644	1.966	0.202
Sum	1.292	3.461	2.611	3.466	5.348	(5.906)	(9.467)	(1.844)
Kolmogorov-Smirnov Z								4.001
K-S sig.*								0.000
Count	90	102	107	124	127	127	127	127

* Significant K-S statistics suggest non-normal distributions of the data.

Appendix 5.2A-3 Slack Calculations Descriptive Statistics

SLKXSGA = XSGA/SALE (Slack as measured in general and administrative expenses)

	SLKXSGA92	*SLKXSGA93*	*SLKXSGA94*	*SLKXSGA95*	*SLKXSGA96*	*SLKXSGA97*	*SLKXSGA98*	*SLKXSGA SLOPE*
Mean	0.218	0.197	0.205	0.191	0.203	0.229	0.250	0.006
Standard Error	0.021	0.018	0.019	0.015	0.019	0.037	0.047	0.006
Median	0.167	0.152	0.157	0.144	0.142	0.137	0.134	(0.002)
Standard Deviation	0.210	0.186	0.211	0.165	0.217	0.414	0.533	0.069
Sample Variance	0.044	0.034	0.045	0.027	0.047	0.172	0.284	0.005
Kurtosis	9.3	11.2	16.1	9.0	12.8	70.6	56.2	41.5
Skewness	2.8	3.0	3.6	2.4	3.3	7.7	7.0	6.1
Range	1.215	1.173	1.439	1.117	1.342	4.214	5.002	0.616
Minimum	0.033	0.023	0.020	0.023	0.019	0.016	0.018	(0.115)
Maximum	1.249	1.195	1.459	1.140	1.360	4.230	5.020	0.501
Sum	21.617	21.286	24.358	24.058	25.791	29.051	31.790	0.747
Count	99	108	119	126	127	127	127	127

SLKINVT = INVT/SALE (Slack as measured in inventories)

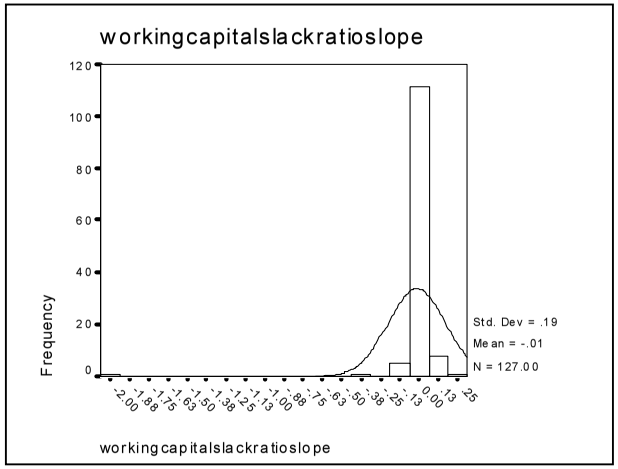
	SLKINVT92	*SLKINVT93*	*SLKINVT94*	*SLKINVT95*	*SLKINVT96*	*SLKINVT97*	*SLKINVT98*	*SLKINVT SLOPE*
Mean	0.122	0.122	0.126	0.114	0.119	0.121	0.123	0.001
Standard Error	0.008	0.008	0.008	0.007	0.008	0.007	0.008	0.001
Median	0.120	0.115	0.124	0.113	0.112	0.114	0.113	0.000
Standard Deviation	0.074	0.083	0.088	0.073	0.085	0.083	0.087	0.017
Sample Variance	0.006	0.007	0.008	0.005	0.007	0.007	0.008	0.000
Kurtosis	0.7	0.9	4.8	0.3	1.6	1.0	2.4	13.9
Skewness	0.5	0.8	1.4	0.4	0.9	0.9	1.0	2.2
Range	0.369	0.357	0.555	0.348	0.431	0.414	0.518	0.159
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	(0.053)
Maximum	0.369	0.357	0.555	0.348	0.431	0.414	0.518	0.106
Sum	11.059	12.422	13.463	14.136	15.171	15.395	15.600	0.160
Count	91	102	107	124	127	127	127	127

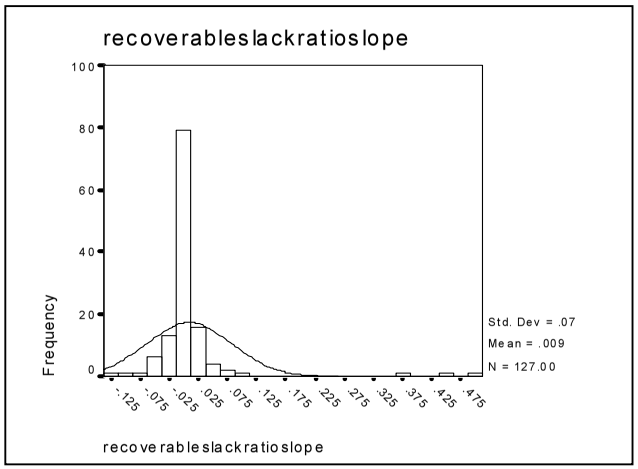
Appendix 5.2A-4 Slack Calculations Descriptive Statistics and Histograms

ASLK = Absorbed (recoverable) slack as the summed composite of SLKXSGA and SLKINVT

	ASLK92	*ASLK93*	*ASLK94*	*ASLK95*	*ASLK96*	*ASLK97*	*ASLK98*	*ASLK SLOPE*
Mean	0.337	0.320	0.324	0.306	0.323	0.350	0.373	0.009
Standard Error	0.023	0.021	0.025	0.016	0.022	0.038	0.048	0.006
Median	0.291	0.270	0.284	0.259	0.258	0.263	0.263	(0.001)
Standard Deviation	0.215	0.215	0.260	0.182	0.244	0.432	0.536	0.073
Sample Variance	0.046	0.046	0.067	0.033	0.059	0.187	0.287	0.005
Kurtosis	7.8	11.1	19.9	7.1	15.2	63.9	52.0	29.2
Skewness	2.3	2.7	3.9	2.0	3.3	7.2	6.7	5.0
Range	1.318	1.501	1.778	1.277	1.666	4.350	4.978	0.617
Minimum	0.050	0.051	0.046	0.038	0.066	0.071	0.073	(0.128)
Maximum	1.367	1.553	1.824	1.315	1.732	4.420	5.051	0.489
Sum	30.358	32.594	34.660	37.977	40.962	44.446	47.390	1.145
Kolmogorov-Smirnov Z								3.354
K-S sig.*								0.000
Count	90	102	107	124	127	127	127	127

* Significant K-S statistics suggest non-normal distributions of the data.





USLK SLOPE	
Kurtosis	106.4
Skewness	(9.9)
Kolmogorov-Smirnov Z	4.001
K-S sig.*	0.000
ASLK SLOPE	
Kurtosis	29.2
Skewness	5.0
Kolmogorov-Smirnov Z	3.354
K-S sig.*	0.000

Appendix 5.2A-5 Slack Calculations Correlations

SLKCHE = CHE/SALE (Slack as measured in cash and equivalents)

	1	2	3	4	5	6	7	8
1. CHE/SALE92	1.00							
2. CHE/SALE93	0.58	1.00						
3. CHE/SALE94	0.71	0.89	1.00					
4. CHE/SALE95	0.31	0.57	0.64	1.00				
5. CHE/SALE96	0.42	0.70	0.68	0.63	1.00			
6. CHE/SALE97	0.42	0.72	0.71	0.64	0.82	1.00		
7. CHE/SALE98	0.15	0.19	0.31	0.46	0.34	0.48	1.00	
8. SLOPE	(0.24)	(0.01)	0.06	0.26	0.25	0.43	0.85	1.00

SLKRECT = RECT/SALE (Slack as measured in account recievables)

	1	2	3	4	5	6	7	8
1. RECT/SALE92	1.00							
2. RECT/SALE93	0.71	1.00						
3. RECT/SALE94	0.78	0.73	1.00					
4. RECT/SALE95	0.35	0.63	0.36	1.00				
5. RECT/SALE96	0.62	0.65	0.66	0.44	1.00			
6. RECT/SALE97	0.43	0.50	0.53	0.24	0.53	1.00		
7. RECT/SALE98	0.23	0.33	0.36	0.09	0.15	0.73	1.00	
8. SLOPE	(0.03)	0.09	0.12	(0.09)	0.00	0.71	0.90	1.00

SLKLCT = LCT/SALE (Slack as measured in current liabilities)

	1	2	3	4	5	6	7	8
1. LCT/SALE92	1.00							
2. LCT/SALE93	0.81	1.00						
3. LCT/SALE94	0.88	0.80	1.00					
4. LCT/SALE95	0.73	0.67	0.82	1.00				
5. LCT/SALE96	0.79	0.64	0.91	0.82	1.00			
6. LCT/SALE97	0.83	0.64	0.89	0.72	0.90	1.00		
7. LCT/SALE98	0.84	0.67	0.91	0.73	0.91	0.98	1.00	
8. SLOPE	0.80	0.60	0.88	0.69	0.89	0.98	0.99	1.00

USLK = Working capital slack or unabsorbed slack

	1	2	3	4	5	6	7	8
1. USLK92	1.00							
2. USLK93	0.57	1.00						
3. USLK94	0.74	0.74	1.00					
4. USLK95	0.65	0.66	0.84	1.00				
5. USLK96	0.69	0.58	0.84	0.80	1.00			
6. USLK97	0.70	0.45	0.76	0.62	0.81	1.00		
7. USLK98	0.65	0.35	0.73	0.64	0.80	0.94	1.00	
8. SLOPE	0.58	0.27	0.67	0.55	0.75	0.94	0.98	1.00

Appendix 5.2A-6 Slack Calculations Correlations

SLKINVT = INVT/SALE (Slack as measured in inventories)

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. INVT/SALE92	1.00							
2. INVT/SALE93	0.87	1.00						
3. INVT/SALE94	0.85	0.88	1.00					
4. INVT/SALE95	0.88	0.76	0.78	1.00				
5. INVT/SALE96	0.78	0.68	0.67	0.83	1.00			
6. INVT/SALE97	0.81	0.70	0.71	0.78	0.86	1.00		
7. INVT/SALE98	0.63	0.53	0.48	0.66	0.76	0.83	1.00	
8. SLOPE	(0.31)	(0.41)	(0.38)	(0.11)	0.23	0.33	0.53	1.00

SLKXSGA = XSGA/SALE (Slack as measured in general and administrative expenses)

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. XSGA/SALE92	1.00							
2. XSGA/SALE93	0.95	1.00						
3. XSGA/SALE94	0.82	0.87	1.00					
4. XSGA/SALE95	0.86	0.82	0.82	1.00				
5. XSGA/SALE96	0.85	0.85	0.90	0.91	1.00			
6. XSGA/SALE97	0.42	0.39	0.46	0.56	0.63	1.00		
7. XSGA/SALE98	0.56	0.43	0.67	0.66	0.68	0.65	1.00	
8. SLOPE	0.19	0.07	0.32	0.38	0.43	0.78	0.86	1.00

ASLK = Absorbed slack SLKINVT plus SLKXSGA

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. ASLK92	1.00							
2. ASLK93	0.91	1.00						
3. ASLK94	0.79	0.86	1.00					
4. ASLK95	0.82	0.78	0.79	1.00				
5. ASLK96	0.80	0.84	0.86	0.89	1.00			
6. ASLK97	0.36	0.39	0.46	0.59	0.66	1.00		
7. ASLK98	0.53	0.47	0.71	0.68	0.68	0.67	1.00	
8. SLOPE	0.09	0.10	0.36	0.42	0.46	0.79	0.84	1.00

Correlations between the various SLACK SLOPES

	CHE/SALE	RECT/SALE	LCT/SALE	USLK	INVT/SALE	XSGA/SALE	ASLK
CHE/SALE	1						
RECT/SALE	0.29	1					
LCT/SALE	0.26	0.91	1				
USLK	(0.03)	(0.84)	(0.97)	1			
INVT/SALE	0.00	(0.29)	(0.35)	0.36	1		
XSGA/SALE	0.70	0.65	0.68	(0.54)	(0.08)	1	
ASLK	0.68	0.53	0.57	(0.43)	0.19	0.95	1

Appendix 5.2B-1 Munificence descriptive statistics and correlations

V1 - Value of Shipments (regression slope/mean value 1992-1997)

	slope	*mean*	*slope/mean*
Mean	5.430	69.348	0.065
Standard Error	2.160	29.192	0.008
Median	1.114	22.419	0.070
Standard Deviation	17.683	238.947	0.062
Sample Variance	312.691	57,095.558	0.004
Kurtosis	54.5	60.1	13.6
Skewness	7.1	7.6	(2.6)
Range	142.787	1,946.101	0.451
Minimum	(1.663)	0.583	(0.278)
Maximum	141.124	1,946.684	0.173
Sum	363.777	4,646.337	4.357
Count	67	67	67

V1 Correlations

	slope	*mean*	*slope/mean*
slope	1		
mean	0.99	1	
slope/mean	0.14	0.06	1

V2 - Value added by manufacture - total wages

	slope	*mean*	*slope/mean*
Mean	0.765	9.064	0.072
Standard Error	0.206	1.394	0.008
Median	0.321	6.204	0.077
Standard Deviation	1.474	9.955	0.055
Sample Variance	2.172	99.107	0.003
Kurtosis	27.7	5.8	1.8
Skewness	4.8	2.3	(0.3)
Range	10.438	47.660	0.308
Minimum	(0.722)	0.958	(0.099)
Maximum	9.715	48.617	0.210
Sum	39.039	462.256	3.697
Count	51	51	51

V2 Correlations

	slope	*mean*	*slope/mean*
slope	1		
mean	0.82	1	
slope/mean	0.52	0.20	1

Appendix 5.2B-2 Munificence descriptive statistics and correlations

V3 - Total employment # million

	slope	*mean*	*slope/mean*
Mean	0.017	0.364	0.015
Standard Error	0.006	0.087	0.007
Median	0.002	0.130	0.019
Standard Deviation	0.050	0.712	0.054
Sample Variance	0.002	0.507	0.003
Kurtosis	26.0	11.3	6.8
Skewness	4.7	3.4	(1.6)
Range	0.348	3.615	0.367
Minimum	(0.015)	0.004	(0.231)
Maximum	0.333	3.618	0.136
Sum	1.123	24.414	0.977
Count	67	67	67

V3 Correlations

	slope	*mean*	*slope/mean*
slope	1		
mean	0.83	1	
slope/mear	0.45	0.30	1

V4 - Value added by manufacture $billion

	slope	*mean*	*slope/mean*
Mean	0.965	14.067	0.059
Standard Error	0.241	1.991	0.006
Median	0.428	9.672	0.066
Standard Deviation	1.724	14.218	0.044
Sample Variance	2.972	202.138	0.002
Kurtosis	22.6	4.4	2.6
Skewness	4.2	2.0	(0.7)
Range	12.132	66.503	0.258
Minimum	(1.180)	1.519	(0.093)
Maximum	10.953	68.023	0.165
Sum	49.203	717.405	3.029
Count	51	51	51

V4 Correlations

	slope	*mean*	*slope/mean*
slope	1		
mean	0.830	1	
slope/mear	0.560	0.212	1

Appendix 5.2B-3 Munificence descriptive statistics and correlations

V5 - Number of manufacturing establishments (avg annual % change 1992-1997)

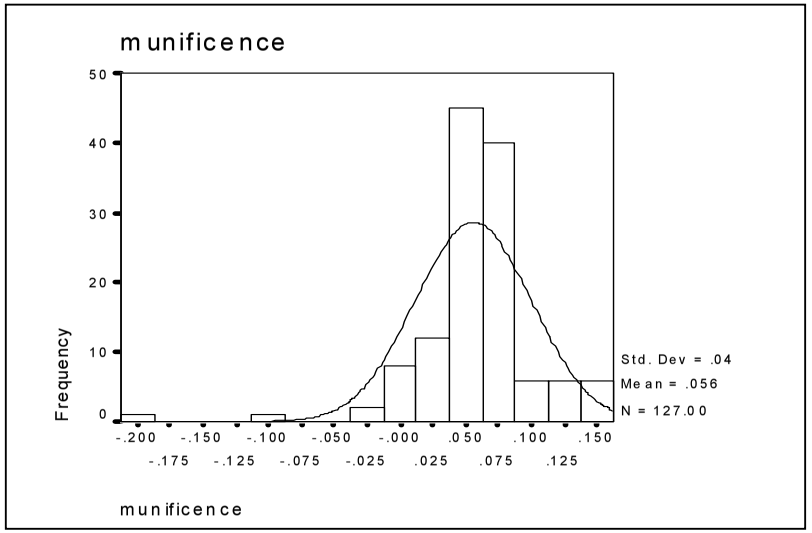
	slope	*mean*	*slope/mean*	*growth*
Mean	0.778	22.893	0.008	0.013
Standard Error	0.274	8.462	0.005	0.005
Median	0.011	1.611	0.011	0.011
Standard Deviation	2.240	69.262	0.041	0.042
Sample Variance	5.017	4,797.252	0.002	0.002
Kurtosis	13.9	18.6	6.7	3.3
Skewness	3.7	4.3	(1.2)	0.5
Range	11.928	391.225	0.291	0.275
Minimum	(0.073)	0.118	(0.182)	(0.125)
Maximum	11.855	391.343	0.109	0.150
Sum	52.147	1,533.847	0.561	0.857
Count	67	67	67	67

V5 Correlations

	slope	*mean*	*slope/mean*	*growth*
slope	1			
mean	0.85	1		
slope/mean	0.39	0.21	1	
growth	0.45	0.21	0.97	1

Note that the Dess and Beard methodology uses the "growth" measure. The "slope" measure is shown for comparison of properties.

Munificence	*MUN*
Mean	0.056
Standard Error	0.004
Median	0.057
Standard Deviation	0.044
Sample Variance	0.002
Kurtosis	10.9
Skewness	(1.6)
Range	0.361
Minimum	(0.211)
Maximum	0.150
Sum	7.059
Kolmogorov-Smirnov Z	2.516
K-S sig.*	0.000
Count	127



* Significant K-S statistics suggest non-normal distributions of the data.

Appendix 5.3A-1 GH Procedure for Multiple Comparisons Slack-Munificence plot

USLK unabsorbed slack

	munificence MAX sets				**4 comparisons**					0.01 **		0.05 *	
j vs *k*	mean *j*	mean *k*	variance *j*	variance *k*	n *j*	n *k*	t stat	sig	df	t crit	*q*	t crit	*q*
Q1 vs Q2	0.0630	(0.0385)	0.0011	0.0014	106	4	5.41	*	3.2	8.44	11.93	4.67	6.61
Q1 vs Q3													
Q1 vs Q4													
Q1 vs 0													
Q2 vs Q3													
Q2 vs Q4	(0.0385)	0.0499	0.0014	0.0004	4	15	-4.61	*	3.5	7.54	10.67	4.45	6.29
Q2 vs 0	(0.0385)	0.0574	0.0014	0.0008	4	90	-5.12	*	3.2	8.44	11.93	4.67	6.61
Q3 vs Q4	(0.1079)	0.0499	0.0214	0.0004	2	15	-1.52		1.0	116.15	164.26	23.21	32.82
Q3 vs 0													
Q4 vs 0													

	slack MAX sets				**5 comparisons**					0.01 **		0.05 *	
j vs *k*	mean *j*	mean *k*	variance *j*	variance *k*	n *j*	n *k*	t stat	sig	df	t crit	*q*	t crit	*q*
Q1 vs Q2													
Q1 vs Q3													
Q1 vs Q4	0.0128	(0.2130)	0.0015	0.2558	106	15	1.73		14.0	3.98	5.63	3.12	4.41
Q1 vs 0													
Q2 vs Q3	0.0167	(0.0348)	0.0003	0.00001	4	2	6.01	*	3.3	8.70	12.31	5.05	7.14
Q2 vs Q4	0.0167	(0.2130)	0.0003	0.2558	4	15	1.76		14.1	3.98	5.63	3.12	4.41
Q2 vs 0	0.0167	(0.0005)	0.0003	0.0002	4	90	2.02		3.2	8.94	12.65	5.13	7.26
Q3 vs Q4													
Q3 vs 0													
Q4 vs 0	(0.2130)	(0.0005)	0.2558	0.0002	15	90	-1.63		14.0	3.98	5.63	3.12	4.41

q is the Studentized range distribution for either $_{\alpha = 0.01**, \text{ or } 0.05*}$

q values interpolated from standard tables

test statistic t_{jk}; reject the H_0 if $|t \text{ stat}|$ is greater than or equal to t crit

Appendix 5.3A-2 GH Procedure for Multiple Comparisons Slack-Munificence plot

ASLK absorbed slack

	munificence MAX sets				**4 comparisons**					0.01 **		0.05 *	
j vs *k*	mean *j*	mean *k*	variance *j*	variance *k*	n *j*	n *k*	t stat	sig	df	t crit	*q*	t crit	*q*
Q1 vs Q2	0.0604	(0.0385)	0.0012	0.0014	101	4	5.26	*	3.2	8.18	11.57	4.67	6.61
Q1 vs Q3													
Q1 vs Q4													
Q1 vs 0													
Q2 vs Q3													
Q2 vs Q4	(0.0385)	0.0596	0.0014	0.0010	4	98	-5.23	*	3.2	8.18	11.57	4.67	6.61
Q2 vs 0	(0.0385)	0.0587	0.0014	0.0011	4	77	-5.16	*	3.2	8.18	11.57	4.67	6.61
Q3 vs Q4	(0.0841)	0.0596	0.0085	0.0010	4	98	-3.10		3.0	8.61	12.17	4.83	6.83
Q3 vs 0													
Q4 vs 0													

	slack MAX sets				**5 comparisons**					0.01 **		0.05 *	
j vs *k*	mean *j*	mean *k*	variance *j*	variance *k*	n *j*	n *k*	t stat	sig	df	t crit	*q*	t crit	*q*
Q1 vs Q2													
Q1 vs Q3													
Q1 vs Q4	0.0193	(0.0098)	0.0058	0.0005	101	98	3.68	**	116.6	3.33	4.71	2.77	3.92
Q1 vs 0													
Q2 vs Q3	0.0194	(0.0059)	0.0016	0.0002	4	4	1.20		3.7	9.25	13.08	4.70	6.65
Q2 vs Q4	0.0194	(0.0098)	0.0016	0.0005	4	98	1.46		3.1	9.19	12.99	5.22	7.38
Q2 vs 0	0.0194	(0.0014)	0.0016	0.00003	4	77	1.04		3.0	9.42	13.32	5.30	7.50
Q3 vs Q4													
Q3 vs 0													
Q4 vs 0	(0.0098)	(0.0014)	0.0005	0.00003	98	77	-3.69	**	113.1	3.34	4.72	2.77	3.92

q is the Studentized range distribution for either $_{\alpha = 0.01**, \text{ or } 0.05*}$

q values interpolated from standard tables

test statistic t_{jk}; reject the H_0 if $|t \text{ stat}|$ is greater than or equal to t crit

Appendix 5.4A-1 USLK (unabsorbed working capital slack) slope line with confidence intervals
SU = Suppliers Mean Slack by Year; B3 = B3 Mean Slack by Year

YEAR	SU-USLK	B3-USLK
1992 *t0*	0.014	0.306
1993 *t1*	0.034	0.337
1994 *t2*	0.024	0.303
1995 *t3*	0.028	0.291
1996 *t4*	0.042	0.291
1997 *t5*	(0.047)	0.391
1998 *t6*	(0.075)	0.297

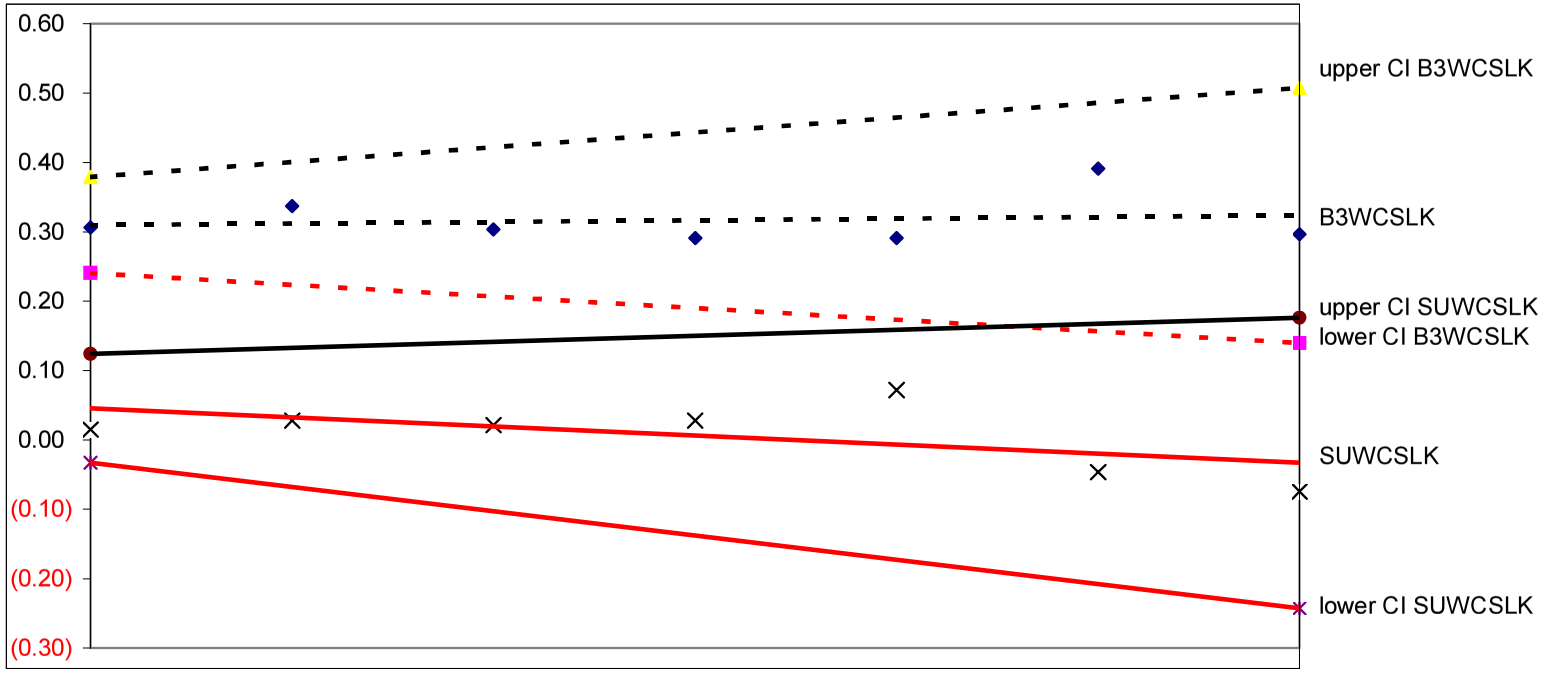
SU-USLK	*Coeff.*	*S.E.*	*t Stat*	*P*	*low 95%*	*up 95%*
Intercept *t* = 0	0.046	0.031	1.490	0.196	(0.033)	0.124
YEAR	(0.013)	0.008	(1.547)	0.182	(0.035)	0.009

B3-USLK	*Coeff.*	*S.E.*	*t Stat*	*P*	*low 95%*	*up 95%*
Intercept *t* = 0	0.310	0.027	11.529	0.000	0.241	0.379
YEAR	0.002	0.007	0.313	0.767	(0.017)	0.021

Correlations

	SU-USLK	*B3-USLK*
SU-USLK	1	
B3-USLK	(0.36)	1

B3 = dotted lines; SU = solid lines



Appendix 5.4A-2 ASLK (Absorbed Inventory and SGA Expense slack) slope line with confidence intervals
SU = Suppliers Mean Slack by Year; B3 = B3 Mean Slack by Year

YEAR	SU-ASLK	B3-ASLK
1992 *t0*	0.337	0.306
1993 *t1*	0.320	0.298
1994 *t2*	0.324	0.177
1995 *t3*	0.306	0.182
1996 *t4*	0.323	0.195
1997 *t5*	0.350	0.181
1998 *t6*	0.373	0.178

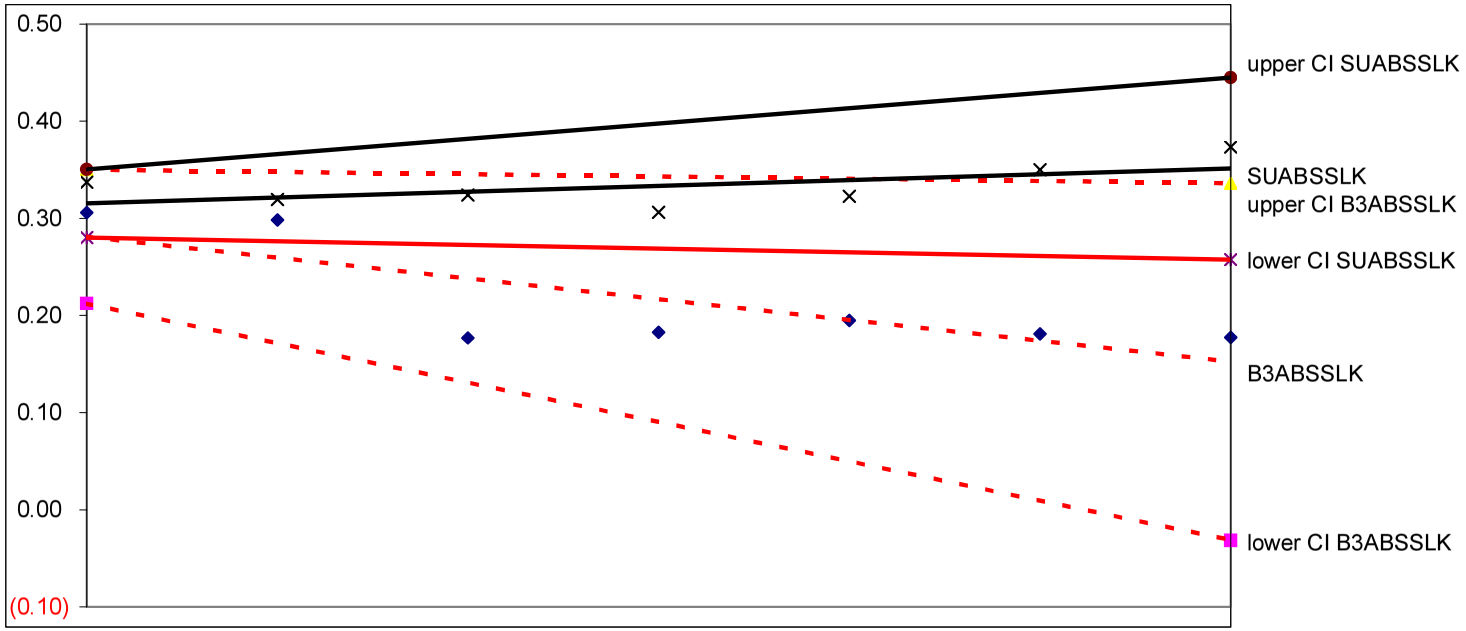
SU-ASLK	*Coeff.*	*S.E.*	*t Stat*	*P*	*low 95%*	*up 95%*
Intercept *t* = 0	0.315	0.014	23.083	0.000	0.280	0.350
YEAR	0.006	0.004	1.574	0.176	(0.004)	0.016

B3-ASLK	*Coeff.*	*S.E.*	*t Stat*	*P*	*low 95%*	*up 95%*
Intercept *t* = 0	0.281	0.027	10.485	0.000	0.212	0.350
YEAR	(0.021)	0.007	(2.889)	0.034	(0.041)	(0.002)

Correlations

	SU-ASLK	*B3-ASLK*
SU-ASLK	1	
B3-ASLK	(0.18)	1

B3 = dotted lines; SU = solid lines



Appendix 5.5.1 Reported Principle Customer Relationships of B3 for 1993-1998

		Principle Customer				
		#1	#2	#3 & #4		
1993	FM	34	13	2		
	GM	30	18	2		
	DC	7	7	15		
1994	FM	34	14	4		
	GM	33	17	5		
	DC	9	10	15		
1995	FM	34	18	4		
	GM	41	14	5		
	DC	8	14	15		
1996	FM	28	22	5		
	GM	38	11	7		
	DC	14	12	12		
1997	FM	30	20	3		
	GM	36	11	6		
	DC	11	12	13		
1998	FM	21	20	3		
	GM	33	9	6		
	DC	8	11	15	**grand total**	
	FM total	181	107	21	**309**	37%
	GM total	211	80	31	**322**	38%
	DC total	57	66	85	**208**	25%
	grand total	**449**	**253**	**137**	**839**	
		54%	30%	16%		100%

Appendix 5.5A-1 Hierarchical regression models for environmental determinsim versus managerial discretion sequencing

Absorbed Slack

Environmental Determinism proposition - Hierarchical sequencing for regression models

Criterion variable - **ASLK** growth squared overall model significance appears in the first row as *R2/adj R2/**sig.***

Model ED 1	**Model ED 2**	**Model ED 3**	**Model ED 4**	**Model ED 5**	**Model ED 6**	**Model ED 7**	**Model ED 8**	**Model ED 9**
industry	industry	organization	organization	organization	organization	organization	organization	organization
munificence	control	size control	concentration	tenure	ASLKlag 1st order	USLKlag 1st order	ASLKlag 2nd order	USLKlag 2nd order
.011/.003/.237	.061/.014/.263	**.131/.080/.017**	**.131/.073/.030**	**.137/.071/.038**	**.191/.121/.005**	**.387/.329/.000**	**.403/.340/.000**	**.463/.401/.000**
MUN			**arcCON by B3**	**arcCON by B3**	**arcCON by B3**	**arcCON by B3**	**arcCON by B3**	**arcCON by B3**
R2 change/sig.	SIC1 thru SIC5		**.148/.075/.037**	.150/.069/.054	**.196/.112/.011**	**.393/.323/.000**	**.407/.333/.000**	**.474/.403/.000**
.011/.237	*R2* change/sig.	logSAL						
	.050/.280	*R2* change/sig.	arcCON					
		.070/.003	*R2* change/sig.	TEN				
			.001/.752	*R2* change/sig.	ASLKlag			
				.005/.390	*R2* change/sig.	USLKlag		
					.054/.006	*R2* change/sig.	ASLKlag2	
						.197/.000	*R2* change/sig.	USLKlag2
							.016/.086	*R2* change/sig.
								.060/.001
			arcCON by B3	arcCON by B3	arcCON by B3	arcCON by B3	arcCON by B3	arcCON by B3
			.018/.493	.002/.652	**.046/.012**	**.197/.000**	.015/.099	**.067/.000**

Managerial Discretion proposition - Hierarchical sequencing for regression models

Criterion variable - **ASLK** growth squared overall model significance appears in the first row as *R2/adj R2/**sig.***

Model MD 1	**Model MD 2**	**Model MD 3**	**Model MD 4**	**Model MD 5**	**Model MD 6**	**Model MD 7**	**Model MD 8**	**Model MD 9**
organization	organization	organization	organization	organization	organization	organization	industry	industry
ASLKlag 1st order	USLKlag 1st order	ASLKlag 2nd order	USLKlag 2nd order	size control	concentration	tenure	munificence	control
.141/.134/.000	**.301/.290/.000**	**.313/.296/.000**	**.390/.370/.000**	**.404/.379/.000**	**.404/.374/.000**	**.404/.369/.000**	**.424/.385/.000**	**.463/.401/.000**
ASLKlag					**arcCON by B3**	**arcCON by B3**	**arcCON by B3**	**arcCON by B3**
R2 change/sig.	USLKlag				**.412/.373/.000**	**.414/.369/.000**	**.433/.384/.000**	**.474/.403/.000**
.141/.000	*R2* change/sig.	ASLKlag2						
	.160/.000	*R2* change/sig.	USLKlag2					
		.012/.146	*R2* change/sig.	logSAL				
			.077/.000	*R2* change/sig.	arcCON			
				.014/.095	*R2* change/sig.	TEN		
					.000/.969	*R2* change/sig.	MUN	
						.000/.969	*R2* change/sig.	SIC1 thru SIC5
							.020/.044	*R2* change/sig.
								.039/.155
					arcCON by B3	arcCON by B3	arcCON by B3	arcCON by B3
					.009/.622	.001/.628	**.019/.048**	.041/.130

Appendix 5.5A-2 Hierarchical regression models for environmental determinsim versus managerial discretion sequencing

Unabsorbed Slack

Environmental Determinism proposition - Hierarchical sequencing for regression models

Criterion variable - **USLK** growth squared overall model significance appears in the first row as *R2/adj R2/**sig.***

Model ED 1	**Model ED 2**	**Model ED 3**	**Model ED 4**	**Model ED 5**	**Model ED 6**	**Model ED 7**	**Model ED 8**	**Model ED 9**
industry	industry	organization	organization	organization	organization	organization	organization	organization
munificence	control	size control	concentration	tenure	ASLKlag 1st order	USLKlag 1st order	ASLKlag 2nd order	USLKlag 2nd order
.003/-.005/.570	.067/.020/.209	.080/.026/.183	.083/.021/.229	.084/.014/.306	.140/.065/.055	**.458/.406/.000**	**.498/.445/.000**	**.868/.853/.000**
MUN			**arcCON by B3**	**arcCON by B3**	**arcCON by B3**	**arcCON by B3**	**arcCON by B3**	**arcCON by B3**
R2 change/sig.	SIC1 thru SIC5		.093/.015/.306	.095/.009/.368	**.177/.091/.026**	**.473/.412/.000**	**.518/.458/.000**	**.868/.850/.000**
.003/.570	*R2* change/sig.	logSAL						
	.064/.152	*R2* change/sig.	arcCON					
		.013/.198	*R2* change/sig.	TEN				
			.004/.488	*R2* change/sig.	ASLKlag			
				.001/.779	*R2* change/sig.	USLKlag		
					.055/.007	*R2* change/sig.	ASLKlag2	
						.319/.000	*R2* change/sig.	USLKlag2
							.040/.003	*R2* change/sig.
								.370/.000
			arcCON by B3	arcCON by B3	arcCON by B3	arcCON by B3	arcCON by B3	arcCON by B3
			.013/.640	.002/.600	**.082/.001**	**.295/.000**	**.045/.002**	**.350/.000**

Managerial Discretion proposition - Hierarchical sequencing for regression models

Criterion variable - **USLK** growth squared overall model significance appears in the first row as *R2/adj R2/**sig.***

Model MD 1	**Model MD 2**	**Model MD 3**	**Model MD 4**	**Model MD 5**	**Model MD 6**	**Model MD 7**	**Model MD 8**	**Model MD 9**
organization	organization	organization	organization	organization	organization	organization	industry	industry
ASLKlag 1st order	USLKlag 1st order	ASLKlag 2nd order	USLKlag 2nd order	size control	concentration	tenure	munificence	control
.110/.102/.000	**.423/.414/.000**	**.452/.439/.000**	**.862/.857/.000**	**.862/.857/.000**	**.864/.857/.000**	**.865/.857/.000**	**.865/.856/.000**	**.868/.853/.000**
ASLKlag					**arcCON by B3**	**arcCON by B3**	**arcCON by B3**	**arcCON by B3**
R2 change/sig.	USLKlag				**.865/.855/.000**	**.865/.855/.000**	**.866/.854/.000**	**.868/.850/.000**
.110/.000	*R2* change/sig.	ASLKlag2						
	.314/.000	*R2* change/sig.	USLKlag2					
		.029/.012	*R2* change/sig.	logSAL				
			.410/.000	*R2* change/sig.	arcCON			
				.001/.353	*R2* change/sig.	TEN		
					.001/.275	*R2* change/sig.	MUN	
						.001/.332	*R2* change/sig.	SIC1 thru SIC5
							.000/.641	*R2* change/sig.
								.003/.822
					arcCON by B3	arcCON by B3	arcCON by B3	arcCON by B3
					.002/.598	.001/.432	.000/.625	.003/.827

Appendix 5.5A-3 Descriptive statistics

Descriptive Statistics

	Minimum	Maximum	Mean	Std. Dev	Variance	Skewness	Kurtosis
ASLKGR2	0.000	0.239	0.005	0.0	0.0	6.7	44.8
USLKGR2	0.000	4.078	0.035	0.4	0.1	11.3	126.7
ASLKlag	0.050	1.367	0.327	0.2	0.0	2.2	7.1
USLKlag	-1.331	0.735	0.002	0.2	0.0	-1.7	15.5
ASLKlag2	0.002	1.869	0.149	0.2	0.1	4.6	25.9
USLKlag2	0.000	1.771	0.042	0.2	0.0	8.5	81.5
SALE	4.844	22,991	1,285	2,968	8,811,811	4.6	25.8
logSALE	1.578	10.043	5.542	1.9	3.8	0.0	-0.4
CON	0.000	0.918	0.247	0.2	0.1	1.0	0.1
CONDC	0.000	0.840	0.047	0.1	0.0	4.6	30.4
CONFM	0.000	0.613	0.100	0.1	0.0	1.7	2.3
CONGM	0.000	0.605	0.103	0.1	0.0	1.7	2.2
arcCON	0.000	2.562	0.940	0.6	0.4	0.6	-0.4
arcCONDC	0.000	2.319	0.252	0.4	0.2	1.9	5.5
arcCONFM	0.000	1.799	0.447	0.5	0.3	0.9	-0.3
arcCONGM	0.000	1.782	0.477	0.5	0.2	0.8	-0.4
TEN	0.458	9.000	3.313	2.5	6.5	0.9	-0.2
MUN	-0.211	0.150	0.056	0.0	0.0	-1.6	10.9
SIC1	0.000	1.000	0.362	0.5	0.2	0.6	-1.7
SIC2	0.000	1.000	0.102	0.3	0.1	2.7	5.1
SIC3	0.000	1.000	0.110	0.3	0.1	2.5	4.4
SIC4	0.000	1.000	0.150	0.4	0.1	2.0	2.0
SIC5	0.000	1.000	0.142	0.4	0.1	2.1	2.4

Variables that were transformed are shown before and after

Appendix 5.5A-4 Correlations

Correlations in bottom triangle; *p-values in upper triangle*; **bold** is significant at 0.05

N = 127	ASLKGR2	USLKGR2	ASLKlag	USLKlag	ASLKlag2	USLKlag2	SALE	logSALE	CON	CONDC	CONFM	CONGM
ASLKGR2	1	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.400*	*0.001*	*0.481*	*0.199*	*0.278*	*0.322*
USLKGR2	**0.584**	1	*0.000*	*0.000*	*0.000*	*0.000*	*0.643*	*0.036*	*0.481*	*0.641*	*0.484*	*0.885*
ASLKlag	**0.375**	**0.331**	1	*0.465*	*0.000*	*0.000*	*0.056*	*0.000*	*0.044*	*0.002*	*0.044*	*0.001*
USLKlag	**(0.424)**	**(0.580)**	(0.065)	1	*0.350*	*0.000*	*0.399*	*0.997*	*0.841*	*0.801*	*0.874*	*0.529*
ASLKlag2	**0.398**	**0.382**	**0.933**	(0.084)	1	*0.000*	*0.120*	*0.000*	*0.585*	*0.000*	*0.098*	*0.017*
USLKlag2	**0.540**	**0.896**	**0.370**	**(0.404)**	**0.416**	1	*0.416*	*0.003*	*0.149*	*0.457*	*0.269*	*0.430*
SALE	(0.075)	(0.042)	(0.170)	(0.076)	(0.139)	(0.073)	1	*0.000*	*0.536*	*0.494*	*0.220*	*0.847*
logSALE	**(0.302)**	**(0.186)**	**(0.501)**	0.000	**(0.447)**	**(0.261)**	**0.645**	1	*0.440*	*0.100*	*0.479*	*0.110*
CON	(0.063)	(0.063)	**(0.179)**	(0.018)	(0.049)	(0.129)	0.055	0.069	1	*0.000*	*0.000*	*0.000*
CONDC	0.115	(0.042)	**0.270**	0.023	**0.407**	(0.067)	(0.061)	(0.147)	**0.457**	1	*0.466*	*0.820*
CONFM	(0.097)	(0.063)	**(0.179)**	0.014	(0.147)	(0.099)	0.110	0.063	**0.698**	0.065	1	*0.279*
CONGM	(0.089)	(0.013)	**(0.293)**	(0.056)	(0.211)	(0.071)	0.017	0.142	**0.649**	0.020	0.097	1
arcCON	(0.049)	(0.054)	(0.195)	(0.066)	(0.075)	(0.140)	0.073	0.080	**0.985**	**0.454**	**0.683**	**0.644**
arcCONDC	0.090	(0.059)	0.104	(0.033)	**0.215**	(0.106)	(0.040)	(0.071)	**0.519**	**0.932**	0.165	0.074
arcCONFM	(0.109)	(0.080)	**(0.201)**	0.027	(0.168)	(0.126)	0.136	0.111	**0.662**	0.050	**0.960**	0.082
arcCONGM	(0.096)	0.018	(0.330)	(0.105)	(0.246)	(0.050)	(0.013)	0.134	0.618	(0.003)	0.101	0.956
TEN	(0.125)	(0.086)	**(0.245)**	0.056	**(0.186)**	(0.154)	0.087	**0.220**	**0.789**	**0.252**	**0.566**	**0.575**
MUN	0.106	(0.051)	(0.023)	0.083	(0.006)	(0.056)	(0.123)	(0.051)	0.030	0.037	0.016	0.002
SIC1	(0.127)	(0.071)	(0.221)	(0.129)	**(0.206)**	(0.105)	**0.207**	**0.283**	**0.302**	0.078	**0.185**	**0.258**
SIC2	0.083	(0.030)	**0.260**	0.002	**0.223**	(0.027)	(0.125)	(0.170)	(0.075)	(0.035)	(0.023)	(0.078)
SIC3	0.136	**0.253**	**0.409**	**(0.195)**	**0.380**	**0.238**	(0.143)	**(0.333)**	0.037	0.166	0.001	(0.063)
SIC4	(0.071)	(0.040)	**(0.252)**	0.026	(0.180)	(0.053)	(0.022)	0.134	(0.094)	(0.017)	(0.104)	(0.029)
SIC5	(0.065)	(0.030)	(0.093)	0.164	(0.084)	(0.004)	(0.054)	(0.155)	**(0.198)**	(0.111)	(0.145)	(0.096)

N = 127	arcCON	arcCONDC	arcCONFM	arcCONGM	TEN	MUN	SIC1	SIC2	SIC3	SIC4	SIC5
ASLKGR2	*0.587*	*0.314*	*0.223*	*0.285*	*0.160*	*0.237*	*0.155*	*0.354*	*0.128*	*0.427*	*0.471*
USLKGR2	*0.549*	*0.511*	*0.371*	*0.838*	*0.336*	*0.570*	*0.430*	*0.741*	*0.004*	*0.658*	*0.739*
ASLKlag	*0.028*	*0.246*	*0.024*	*0.000*	*0.005*	*0.793*	*0.013*	*0.003*	*0.000*	*0.004*	*0.300*
USLKlag	*0.460*	*0.711*	*0.763*	*0.238*	*0.532*	*0.352*	*0.148*	*0.979*	*0.028*	*0.768*	*0.065*
ASLKlag2	*0.403*	*0.015*	*0.059*	*0.005*	*0.037*	*0.947*	*0.020*	*0.012*	*0.000*	*0.043*	*0.349*
USLKlag2	*0.115*	*0.237*	*0.160*	*0.573*	*0.084*	*0.534*	*0.240*	*0.766*	*0.007*	*0.556*	*0.962*
SALE	*0.416*	*0.659*	*0.127*	*0.884*	*0.328*	*0.168*	*0.020*	*0.162*	*0.110*	*0.803*	*0.546*
logSALE	*0.374*	*0.430*	*0.216*	*0.134*	*0.013*	*0.571*	*0.001*	*0.056*	*0.000*	*0.132*	*0.082*
CON	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.736*	*0.001*	*0.400*	*0.683*	*0.294*	*0.026*
CONDC	*0.000*	*0.000*	*0.574*	*0.971*	*0.004*	*0.683*	*0.382*	*0.696*	*0.062*	*0.849*	*0.212*
CONFM	*0.000*	*0.064*	*0.000*	*0.258*	*0.000*	*0.861*	*0.037*	*0.801*	*0.992*	*0.245*	*0.103*
CONGM	*0.000*	*0.411*	*0.358*	*0.000*	*0.000*	*0.982*	*0.003*	*0.383*	*0.480*	*0.746*	*0.282*
arcCON	1	*0.000*	*0.000*	*0.000*	*0.000*	*0.746*	*0.000*	*0.434*	*0.597*	*0.365*	*0.031*
arcCONDC	**0.524**	1	*0.063*	*0.574*	*0.000*	*0.519*	*0.019*	*0.303*	*0.203*	*0.573*	*0.172*
arcCONFM	**0.662**	0.165	1	*0.401*	*0.000*	*0.785*	*0.022*	*0.857*	*0.601*	*0.073*	*0.194*
arcCONGM	0.628	0.050	0.075	1	*0.000*	*0.934*	*0.012*	*0.439*	*0.786*	*0.543*	*0.238*
TEN	**0.788**	**0.387**	**0.594**	**0.597**	1	*0.918*	*0.002*	*0.498*	*0.863*	*0.601*	*0.035*
MUN	0.029	0.058	0.024	(0.007)	0.009	1	*0.247*	*0.973*	*0.889*	*0.245*	*0.157*
SIC1	**0.314**	**0.209**	**0.203**	**0.222**	**0.274**	(0.103)	1	*0.004*	*0.003*	*0.000*	*0.000*
SIC2	(0.070)	(0.092)	0.016	(0.069)	(0.061)	(0.003)	**(0.254)**	1	*0.183*	*0.112*	*0.124*
SIC3	0.047	0.114	(0.047)	(0.024)	(0.015)	(0.012)	**(0.265)**	(0.119)	1	*0.098*	*0.109*
SIC4	(0.081)	(0.051)	(0.160)	0.055	(0.047)	(0.104)	**(0.316)**	(0.142)	(0.148)	1	*0.055*
SIC5	**(0.192)**	(0.122)	(0.116)	(0.105)	**(0.187)**	0.126	**(0.306)**	(0.137)	(0.143)	(0.170)	1

Appendix 5.5A-5 Model Summary: Absorbed Slack Growth Environmental Determinism; Criterion: ASLKGR2

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
MUN	0.106	0.011	0.003	0.030	0.011	1.415	1	125	0.237	Regression	0.001	1	0.001	1.415	0.237
										Residual	0.114	125	0.001		
										Total	0.115	126			
SIC1, SIC2, SIC3, SIC4, SIC5	0.247	0.061	0.014	0.030	0.050	1.274	5	120	0.280	Regression	0.007	6	0.001	1.300	0.263
										Residual	0.108	120	0.001		
										Total	0.115	126			
logSALE	0.361	0.131	0.080	0.029	0.070	9.535	1	119	0.003	Regression	0.015	7	0.002	2.555	0.017
									***	Residual	0.100	119	0.001		**
										Total	0.115	126			
arcCON	0.363	0.131	0.073	0.029	0.001	0.101	1	118	0.752	Regression	0.015	8	0.002	2.232	0.030
										Residual	0.100	118	0.001		**
										Total	0.115	126			
TEN	0.370	0.137	0.071	0.029	0.005	0.743	1	117	0.390	Regression	0.016	9	0.002	2.062	0.038
										Residual	0.099	117	0.001		**
										Total	0.115	126			
ASLKlag	0.437	0.191	0.121	0.028	0.054	7.727	1	116	0.006	Regression	0.022	10	0.002	2.735	0.005
									***	Residual	0.093	116	0.001		***
										Total	0.115	126			
USLKlag	0.622	0.387	0.329	0.025	0.197	36.897	1	115	0.000	Regression	0.045	11	0.004	6.610	0.000
									***	Residual	0.070	115	0.001		***
										Total	0.115	126			
ASLKlag2	0.635	0.403	0.340	0.025	0.016	2.994	1	114	0.086	Regression	0.046	12	0.004	6.414	0.000
									*	Residual	0.069	114	0.001		***
										Total	0.115	126			
USLKlag2	0.680	0.463	0.401	0.023	0.060	12.594	1	113	0.001	Regression	0.053	13	0.004	7.492	0.000
									***	Residual	0.062	113	0.001		***
										Total	0.115	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	0.019	0.017		1.114	0.268		
MUN	0.085	0.049	0.125	1.749	0.083	*	1.1
SIC1	(0.015)	0.007	(0.234)	(2.052)	0.043	**	2.7
SIC2	(0.011)	0.009	(0.115)	(1.260)	0.210		1.7
SIC3	(0.025)	0.009	(0.263)	(2.673)	0.009	***	2.0
SIC4	(0.010)	0.008	(0.122)	(1.227)	0.222		2.1
SIC5	(0.015)	0.008	(0.169)	(1.761)	0.081	*	1.9
logSALE	(0.003)	0.001	(0.172)	(1.932)	0.056	*	1.7
arcCON	0.001	0.006	0.030	0.228	0.820		3.6
TEN	0.000	0.001	0.013	0.108	0.914		3.1
ASLKlag	0.008	0.035	0.051	0.215	0.830		12.1
USLKlag	(0.050)	0.012	(0.340)	(4.127)	0.000	***	1.4
ASLKlag2	0.020	0.028	0.161	0.717	0.475		10.6
USLKlag2	0.055	0.015	0.313	3.549	0.001	***	1.6

Appendix 5.5A-6 Model Summary: Absorbed Slack Growth Managerial Discretion; Criterion: ASLKGR2

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
ASLKlag	0.375	0.141	0.134	0.028	0.141	20.462	1	125	0.000	Regression	0.016	1	0.016	20.462	0.000
									***	Residual	0.099	125	0.001		***
										Total	0.115	126			
USLKlag	0.549	0.301	0.290	0.025	0.160	28.440	1	124	0.000	Regression	0.035	2	0.017	26.697	0.000
									***	Residual	0.080	124	0.001		***
										Total	0.115	126			
ASLKlag2	0.559	0.313	0.296	0.025	0.012	2.144	1	123	0.146	Regression	0.036	3	0.012	18.677	0.000
										Residual	0.079	123	0.001		***
										Total	0.115	126			
USLKlag2	0.624	0.390	0.370	0.024	0.077	15.336	1	122	0.000	Regression	0.045	4	0.011	19.474	0.000
									***	Residual	0.070	122	0.001		***
										Total	0.115	126			
logSALE	0.635	0.404	0.379	0.024	0.014	2.832	1	121	0.095	Regression	0.046	5	0.009	16.380	0.000
									*	Residual	0.069	121	0.001		***
										Total	0.115	126			
arcCON	0.635	0.404	0.374	0.024	0.000	0.002	1	120	0.969	Regression	0.046	6	0.008	13.538	0.000
										Residual	0.069	120	0.001		***
										Total	0.115	126			
TEN	0.635	0.404	0.369	0.024	0.000	0.001	1	119	0.969	Regression	0.046	7	0.007	11.507	0.000
										Residual	0.069	119	0.001		***
										Total	0.115	126			
MUN	0.651	0.424	0.385	0.024	0.020	4.143	1	118	0.044	Regression	0.049	8	0.006	10.853	0.000
									**	Residual	0.066	118	0.001		***
										Total	0.115	126			
SIC1, SIC2, SIC3, SIC4, SIC5	0.680	0.463	0.401	0.023	0.039	1.642	5	113	0.155	Regression	0.053	13	0.004	7.492	0.000
										Residual	0.062	113	0.001		***
										Total	0.115	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	0.019	0.017		1.114	0.268		
ASLKlag	0.008	0.035	0.051	0.215	0.830		12.1
USLKlag	(0.050)	0.012	(0.340)	(4.127)	0.000	***	1.4
ASLKlag2	0.020	0.028	0.161	0.717	0.475		10.6
USLKlag2	0.055	0.015	0.313	3.549	0.001	***	1.6
logSALE	(0.003)	0.001	(0.172)	(1.932)	0.056	*	1.7
arcCON	0.001	0.006	0.030	0.228	0.820		3.6
TEN	0.000	0.001	0.013	0.108	0.914		3.1
MUN	0.085	0.049	0.125	1.749	0.083	*	1.1
SIC1	(0.015)	0.007	(0.234)	(2.052)	0.043	**	2.7
SIC2	(0.011)	0.009	(0.115)	(1.260)	0.210		1.7
SIC3	(0.025)	0.009	(0.263)	(2.673)	0.009	***	2.0
SIC4	(0.010)	0.008	(0.122)	(1.227)	0.222		2.1
SIC5	(0.015)	0.008	(0.169)	(1.761)	0.081	*	1.9

Appendix 5.5A-7 Model Summary: Uabsorbed Slack Growth Environmental Determinism; Criterion: USLKGR2

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
MUN	0.051	0.003	(0.005)	0.363	0.003	0.325	1	125	0.570	Regression	0.043	1	0.043	0.325	0.570
										Residual	16.450	125	0.132		
										Total	16.493	126			
SIC1, SIC2, SIC3, SIC4, SIC5	0.258	0.067	0.020	0.358	0.064	1.650	5	120	0.152	Regression	1.101	6	0.183	1.430	0.209
										Residual	15.392	120	0.128		
										Total	16.493	126			
logSALE	0.282	0.080	0.026	0.357	0.013	1.679	1	119	0.198	Regression	1.315	7	0.188	1.473	0.183
										Residual	15.178	119	0.128		
										Total	16.493	126			
arcCON	0.289	0.083	0.021	0.358	0.004	0.484	1	118	0.488	Regression	1.377	8	0.172	1.344	0.229
										Residual	15.116	118	0.128		
										Total	16.493	126			
TEN	0.290	0.084	0.014	0.359	0.001	0.079	1	117	0.779	Regression	1.387	9	0.154	1.194	0.306
										Residual	15.106	117	0.129		
										Total	16.493	126			
ASLKlag	0.374	0.140	0.065	0.350	0.055	7.472	1	116	0.007	Regression	2.301	10	0.230	1.881	0.055
									***	Residual	14.191	116	0.122		*
										Total	16.493	126			
USLKlag	0.677	0.458	0.406	0.279	0.319	67.611	1	115	0.000	Regression	7.556	11	0.687	8.838	0.000
									***	Residual	8.937	115	0.078		***
										Total	16.493	126			
ASLKlag2	0.705	0.498	0.445	0.270	0.040	8.974	1	114	0.003	Regression	8.208	12	0.684	9.411	0.000
									***	Residual	8.285	114	0.073		***
										Total	16.493	126			
USLKlag2	0.932	0.868	0.853	0.139	0.370	316.194	1	113	0.000	Regression	14.311	13	1.101	57.030	0.000
									***	Residual	2.181	113	0.019		***
										Total	16.493	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	(0.146)	0.100		(1.451)	0.150		
MUN	0.100	0.290	0.012	0.346	0.730		1.1
SIC1	(0.018)	0.042	(0.025)	(0.435)	0.664		2.7
SIC2	(0.013)	0.054	(0.011)	(0.246)	0.806		1.7
SIC3	0.003	0.056	0.003	0.057	0.954		2.0
SIC4	0.020	0.050	0.020	0.399	0.691		2.1
SIC5	0.039	0.049	0.038	0.800	0.425		1.9
logSALE	0.009	0.008	0.047	1.051	0.296		1.7
arcCON	0.006	0.038	0.011	0.162	0.871		3.6
TEN	0.008	0.009	0.059	0.981	0.329		3.1
ASLKlag	0.042	0.208	0.024	0.203	0.840		12.1
USLKlag	(0.481)	0.072	(0.274)	(6.690)	0.000	***	1.4
ASLKlag2	0.074	0.167	0.049	0.443	0.659		10.6
USLKlag2	1.628	0.092	0.777	17.782	0.000	***	1.6

Appendix 5.5A-8 Model Summary: Unabsorbed Slack Growth Managerial Discretion; Criterion: USLKGR2

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
ASLKlag	0.331	0.110	0.102	0.343	0.110	15.371	1	125	0.000	Regression	1.806	1	1.806	15.371	0.000
									***	Residual	14.687	125	0.117		***
										Total	16.493	126			
USLKlag	0.650	0.423	0.414	0.277	0.314	67.379	1	124	0.000	Regression	6.977	2	3.488	45.456	0.000
									***	Residual	9.516	124	0.077		***
										Total	16.493	126			
ASLKlag2	0.672	0.452	0.439	0.271	0.029	6.482	1	123	0.012	Regression	7.453	3	2.484	33.804	0.000
									**	Residual	9.040	123	0.073		***
										Total	16.493	126			
USLKlag2	0.928	0.862	0.857	0.137	0.410	360.826	1	122	0.000	Regression	14.209	4	3.552	189.729	0.000
									***	Residual	2.284	122	0.019		***
										Total	16.493	126			
logSALE	0.929	0.862	0.857	0.137	0.001	0.868	1	121	0.353	Regression	14.225	5	2.845	151.793	0.000
										Residual	2.268	121	0.019		***
										Total	16.493	126			
arcCON	0.929	0.864	0.857	0.137	0.001	1.204	1	120	0.275	Regression	14.247	6	2.375	126.909	0.000
										Residual	2.245	120	0.019		***
										Total	16.493	126			
TEN	0.930	0.865	0.857	0.137	0.001	0.949	1	119	0.332	Regression	14.265	7	2.038	108.869	0.000
										Residual	2.228	119	0.019		***
										Total	16.493	126			
MUN	0.930	0.865	0.856	0.137	0.000	0.219	1	118	0.641	Regression	14.269	8	1.784	94.662	0.000
										Residual	2.223	118	0.019		***
										Total	16.493	126			
SIC1, SIC2, SIC3, SIC4, SIC5	0.932	0.868	0.853	0.139	0.003	0.436	5	113	0.822	Regression	14.311	13	1.101	57.030	0.000
										Residual	2.181	113	0.019		***
										Total	16.493	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	(0.146)	0.100		(1.451)	0.150		
ASLKlag	0.042	0.208	0.024	0.203	0.840		12.1
USLKlag	(0.481)	0.072	(0.274)	(6.690)	0.000	***	1.4
ASLKlag2	0.074	0.167	0.049	0.443	0.659		10.6
USLKlag2	1.628	0.092	0.777	17.782	0.000	***	1.6
logSALE	0.009	0.008	0.047	1.051	0.296		1.7
arcCON	0.006	0.038	0.011	0.162	0.871		3.6
TEN	0.008	0.009	0.059	0.981	0.329		3.1
MUN	0.100	0.290	0.012	0.346	0.730		1.1
SIC1	(0.018)	0.042	(0.025)	(0.435)	0.664		2.7
SIC2	(0.013)	0.054	(0.011)	(0.246)	0.806		1.7
SIC3	0.003	0.056	0.003	0.057	0.954		2.0
SIC4	0.020	0.050	0.020	0.399	0.691		2.1
SIC5	0.039	0.049	0.038	0.800	0.425		1.9

Appendix 5.5A-9 Model Summary: Absorbed Slack Growth Environmental Determinism; Criterion: ASLKGR2

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
MUN	0.106	0.011	0.003	0.030	0.011	1.415	1	125	0.237	Regression	0.001	1	0.001	1.415	0.237
										Residual	0.114	125	0.001		
										Total	0.115	126			
SIC1, SIC2, SIC3, SIC4, SIC5	0.247	0.061	0.014	0.030	0.050	1.274	5	120	0.280	Regression	0.007	6	0.001	1.300	0.263
										Residual	0.108	120	0.001		
										Total	0.115	126			
logSALE	0.361	0.131	0.080	0.029	0.070	9.535	1	119	0.003	Regression	0.015	7	0.002	2.555	0.017
									***	Residual	0.100	119	0.001		**
										Total	0.115	126			
arcCONFM, arcCONGM, arcCONDC	0.385	0.148	0.075	0.029	0.018	0.806	3	116	0.493	Regression	0.017	10	0.002	2.022	0.037
										Residual	0.098	116	0.001		**
										Total	0.115	126			
TEN	0.387	0.150	0.069	0.029	0.002	0.204	1	115	0.652	Regression	0.017	11	0.002	1.844	0.054
										Residual	0.098	115	0.001		*
										Total	0.115	126			
ASLKlag	0.443	0.196	0.112	0.028	0.046	6.577	1	114	0.012	Regression	0.023	12	0.002	2.320	0.011
									**	Residual	0.092	114	0.001		**
										Total	0.115	126			
USLKlag	0.627	0.393	0.323	0.025	0.197	36.582	1	113	0.000	Regression	0.045	13	0.003	5.624	0.000
									***	Residual	0.070	113	0.001		***
										Total	0.115	126			
ASLKlag2	0.638	0.407	0.333	0.025	0.015	2.761	1	112	0.099	Regression	0.047	14	0.003	5.501	0.000
									*	Residual	0.068	112	0.001		***
										Total	0.115	126			
USLKlag2	0.689	0.474	0.403	0.023	0.067	14.143	1	111	0.000	Regression	0.055	15	0.004	6.680	0.000
									***	Residual	0.060	111	0.001		***
										Total	0.115	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	0.022	0.017		1.321	0.189		
MUN	0.081	0.049	0.119	1.669	0.098	*	1.1
SIC1	(0.016)	0.007	(0.249)	(2.153)	0.033	**	2.8
SIC2	(0.010)	0.009	(0.101)	(1.107)	0.271		1.8
SIC3	(0.026)	0.009	(0.266)	(2.703)	0.008	***	2.1
SIC4	(0.012)	0.009	(0.142)	(1.395)	0.166		2.2
SIC5	(0.015)	0.008	(0.178)	(1.850)	0.067	*	2.0
logSALE	(0.003)	0.001	(0.176)	(1.945)	0.054	*	1.7
arcCONDC	0.007	0.007	0.096	1.005	0.317		1.9
arcCONFM	(0.004)	0.006	(0.075)	(0.707)	0.481		2.4
arcCONGM	(0.004)	0.007	(0.065)	(0.559)	0.577		2.9
TEN	0.001	0.002	0.078	0.529	0.598		4.6
ASLKlag	0.005	0.036	0.034	0.138	0.891		12.8
USLKlag	(0.050)	0.012	(0.343)	(4.125)	0.000	***	1.5
ASLKlag2	0.015	0.029	0.117	0.508	0.613		11.2
USLKlag2	0.059	0.016	0.337	3.761	0.000	***	1.7

Appendix 5.5A-10 Model Summary: Absorbed Slack Growth Managerial Discretion; Criterion: ASLKGR2

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
ASLKlag	0.375	0.141	0.134	0.028	0.141	20.462	1	125	0.000	Regression	0.016	1	0.016	20.462	0.000
									***	Residual	0.099	125	0.001		***
										Total	0.115	126			
USLKlag	0.549	0.301	0.290	0.025	0.160	28.440	1	124	0.000	Regression	0.035	2	0.017	26.697	0.000
									***	Residual	0.080	124	0.001		***
										Total	0.115	126			
ASLKlag2	0.559	0.313	0.296	0.025	0.012	2.144	1	123	0.146	Regression	0.036	3	0.012	18.677	0.000
										Residual	0.079	123	0.001		***
										Total	0.115	126			
USLKlag2	0.624	0.390	0.370	0.024	0.077	15.336	1	122	0.000	Regression	0.045	4	0.011	19.474	0.000
									***	Residual	0.070	122	0.001		***
										Total	0.115	126			
logSALE	0.635	0.404	0.379	0.024	0.014	2.832	1	121	0.095	Regression	0.046	5	0.009	16.380	0.000
									*	Residual	0.069	121	0.001		***
										Total	0.115	126			
arcCONFM, arcCONGM, arcCONDC	0.642	0.412	0.373	0.024	0.009	0.591	3	118	0.622	Regression	0.047	8	0.006	10.356	0.000
										Residual	0.068	118	0.001		***
										Total	0.115	126			
TEN	0.643	0.414	0.369	0.024	0.001	0.237	1	117	0.628	Regression	0.048	9	0.005	9.172	0.000
										Residual	0.067	117	0.001		***
										Total	0.115	126			
MUN	0.658	0.433	0.384	0.024	0.019	3.985	1	116	0.048	Regression	0.050	10	0.005	8.864	0.000
										Residual	0.065	116	0.001		***
										Total	0.115	126			
SIC1, SIC2, SIC3, SIC4, SIC5	0.689	0.474	0.403	0.023	0.041	1.744	5	111	0.130	Regression	0.055	15	0.004	6.680	0.000
										Residual	0.060	111	0.001		***
										Total	0.115	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	0.022	0.017		1.321	0.189		
ASLKlag	0.005	0.036	0.034	0.138	0.891		12.8
USLKlag	(0.050)	0.012	(0.343)	(4.125)	0.000	***	1.5
ASLKlag2	0.015	0.029	0.117	0.508	0.613		11.2
USLKlag2	0.059	0.016	0.337	3.761	0.000	***	1.7
logSALE	(0.003)	0.001	(0.176)	(1.945)	0.054	*	1.7
arcCONDC	0.007	0.007	0.096	1.005	0.317		1.9
arcCONFM	(0.004)	0.006	(0.075)	(0.707)	0.481		2.4
arcCONGM	(0.004)	0.007	(0.065)	(0.559)	0.577		2.9
TEN	0.001	0.002	0.078	0.529	0.598		4.6
MUN	0.081	0.049	0.119	1.669	0.098	*	1.1
SIC1	(0.016)	0.007	(0.249)	(2.153)	0.033	**	2.8
SIC2	(0.010)	0.009	(0.101)	(1.107)	0.271		1.8
SIC3	(0.026)	0.009	(0.266)	(2.703)	0.008	***	2.1
SIC4	(0.012)	0.009	(0.142)	(1.395)	0.166		2.2
SIC5	(0.015)	0.008	(0.178)	(1.850)	0.067	*	2.0

Appendix 5.5A-11 Model Summary: Unabsorbed Slack Growth Environmental Determinism; Criterion: USLKGR2

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
MUN	0.051	0.003	(0.005)	0.363	0.003	0.325	1	125	0.570	Regression	0.043	1	0.043	0.325	0.570
										Residual	16.450	125	0.132		
										Total	16.493	126			
SIC1, SIC2, SIC3, SIC4, SIC5	0.258	0.067	0.020	0.358	0.064	1.650	5	120	0.152	Regression	1.101	6	0.183	1.430	0.209
										Residual	15.392	120	0.128		
										Total	16.493	126			
logSALE	0.282	0.080	0.026	0.357	0.013	1.679	1	119	0.198	Regression	1.315	7	0.188	1.473	0.183
										Residual	15.178	119	0.128		
										Total	16.493	126			
arcCONFM, arcCONGM, arcCONDC	0.305	0.093	0.015	0.359	0.013	0.564	3	116	0.640	Regression	1.533	10	0.153	1.189	0.306
										Residual	14.960	116	0.129		
										Total	16.493	126			
TEN	0.308	0.095	0.009	0.360	0.002	0.276	1	115	0.600	Regression	1.569	11	0.143	1.099	0.368
										Residual	14.924	115	0.130		
										Total	16.493	126			
ASLKlag	0.421	0.177	0.091	0.345	0.082	11.381	1	114	0.001	Regression	2.924	12	0.244	2.047	0.026
									***	Residual	13.569	114	0.119		**
										Total	16.493	126			
USLKlag	0.687	0.473	0.412	0.277	0.295	63.285	1	113	0.000	Regression	7.795	13	0.600	7.790	0.000
									***	Residual	8.698	113	0.077		***
										Total	16.493	126			
ASLKlag2	0.720	0.518	0.458	0.266	0.045	10.511	1	112	0.002	Regression	8.541	14	0.610	8.593	0.000
									***	Residual	7.952	112	0.071		***
										Total	16.493	126			
USLKlag2	0.932	0.868	0.850	0.140	0.350	295.051	1	111	0.000	Regression	14.319	15	0.955	48.747	0.000
									***	Residual	2.174	111	0.020		***
										Total	16.493	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	(0.147)	0.101		(1.455)	0.148		
MUN	0.110	0.293	0.013	0.376	0.708		1.1
SIC1	(0.016)	0.043	(0.021)	(0.370)	0.712		2.8
SIC2	(0.017)	0.055	(0.014)	(0.312)	0.756		1.8
SIC3	0.004	0.057	0.004	0.074	0.941		2.1
SIC4	0.022	0.051	0.022	0.436	0.664		2.2
SIC5	0.040	0.050	0.039	0.806	0.422		2.0
logSALE	0.009	0.008	0.046	1.009	0.315		1.7
arcCONDC	(0.014)	0.045	(0.016)	(0.325)	0.746		1.9
arcCONFM	0.012	0.038	0.016	0.309	0.758		2.4
arcCONGM	0.015	0.043	0.020	0.346	0.730		2.9
TEN	0.007	0.010	0.053	0.713	0.478		4.6
ASLKlag	0.038	0.216	0.022	0.175	0.861		12.8
USLKlag	(0.482)	0.073	(0.274)	(6.587)	0.000	***	1.5
ASLKlag2	0.097	0.173	0.065	0.560	0.576		11.2
USLKlag2	1.614	0.094	0.770	17.177	0.000	***	1.7

Appendix 5.5A-12 Model Summary: Unabsorbed Slack Growth Managerial Discretion; Criterion: USLKGR2

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
ASLKlag	0.331	0.110	0.102	0.343	0.110	15.371	1	125	0.000	Regression	1.806	1	1.806	15.371	0.000
									***	Residual	14.687	125	0.117		***
										Total	16.493	126			
USLKlag	0.650	0.423	0.414	0.277	0.314	67.379	1	124	0.000	Regression	6.977	2	3.488	45.456	0.000
									***	Residual	9.516	124	0.077		***
										Total	16.493	126			
ASLKlag2	0.672	0.452	0.439	0.271	0.029	6.482	1	123	0.012	Regression	7.453	3	2.484	33.804	0.000
									***	Residual	9.040	123	0.073		***
										Total	16.493	126			
USLKlag2	0.928	0.862	0.857	0.137	0.410	360.826	1	122	0.000	Regression	14.209	4	3.552	189.729	0.000
									***	Residual	2.284	122	0.019		***
										Total	16.493	126			
logSALE	0.929	0.862	0.857	0.137	0.001	0.868	1	121	0.353	Regression	14.225	5	2.845	151.793	0.000
										Residual	2.268	121	0.019		***
										Total	16.493	126			
arcCONFM, arcCONGM, arcCONDC	0.930	0.865	0.855	0.138	0.002	0.629	3	118	0.598	Regression	14.261	8	1.783	94.233	0.000
										Residual	2.232	118	0.019		***
										Total	16.493	126			
TEN	0.930	0.865	0.855	0.138	0.001	0.621	1	117	0.432	Regression	14.272	9	1.586	83.563	0.000
										Residual	2.220	117	0.019		***
										Total	16.493	126			
MUN	0.930	0.866	0.854	0.138	0.000	0.240	1	116	0.625	Regression	14.277	10	1.428	74.742	0.000
										Residual	2.216	116	0.019		***
										Total	16.493	126			
SIC1, SIC2, SIC3, SIC4, SIC5	0.932	0.868	0.850	0.140	0.003	0.430	5	111	0.827	Regression	14.319	15	0.955	48.747	0.000
										Residual	2.174	111	0.020		***
										Total	16.493	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	(0.147)	0.101		(1.455)	0.148		
ASLKlag	0.038	0.216	0.022	0.175	0.861		12.8
USLKlag	(0.482)	0.073	(0.274)	(6.587)	0.000	***	1.5
ASLKlag2	0.097	0.173	0.065	0.560	0.576		11.2
USLKlag2	1.614	0.094	0.770	17.177	0.000	***	1.7
logSALE	0.009	0.008	0.046	1.009	0.315		1.7
arcCONDC	(0.014)	0.045	(0.016)	(0.325)	0.746		1.9
arcCONFM	0.012	0.038	0.016	0.309	0.758		2.4
arcCONGM	0.015	0.043	0.020	0.346	0.730		2.9
TEN	0.007	0.010	0.053	0.713	0.478		4.6
MUN	0.110	0.293	0.013	0.376	0.708		1.1
SIC1	(0.016)	0.043	(0.021)	(0.370)	0.712		2.8
SIC2	(0.017)	0.055	(0.014)	(0.312)	0.756		1.8
SIC3	0.004	0.057	0.004	0.074	0.941		2.1
SIC4	0.022	0.051	0.022	0.436	0.664		2.2
SIC5	0.040	0.050	0.039	0.806	0.422		2.0

Appendix 6.5A Absorbed Slack Parsimony Models

ASLKGR2 ED Model

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
logSALE	0.302	0.091	0.084	0.029	0.091	12.569	1	125	0.001	Regression	0.011	1	0.011	12.569	0.001
									***	Residual	0.105	125	0.001		***
										Total	0.115	126			
ASLKlag	0.398	0.158	0.145	0.028	0.067	9.841	1	124	0.002	Regression	0.018	2	0.009	11.649	0.000
									***	Residual	0.097	124	0.001		***
										Total	0.115	126			
USLKlag	0.568	0.323	0.306	0.025	0.165	29.883	1	123	0.000	Regression	0.037	3	0.012	19.536	0.000
									***	Residual	0.078	123	0.001		***
										Total	0.115	126			
USLKlag2	0.632	0.400	0.380	0.024	0.077	15.697	1	122	0.000	Regression	0.046	4	0.012	20.327	0.000
									***	Residual	0.069	122	0.001		***
										Total	0.115	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	0.006	0.010		0.646	0.520		
logSALE	(0.002)	0.001	(0.132)	(1.613)	0.109		1.4
ASLKlag	0.025	0.012	0.168	1.989	0.049	**	1.5
USLKlag	(0.041)	0.011	(0.279)	(3.613)	0.000	***	1.2
USLKlag2	0.058	0.015	0.330	3.962	0.000	***	1.4

ASLKGR2 MD Model

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
ASLKlag	0.375	0.141	0.134	0.028	0.141	20.462	1	125	0.000	Regression	0.016	1	0.016	20.462	0.000
									***	Residual	0.099	125	0.001		***
										Total	0.115	126			
USLKlag	0.549	0.301	0.290	0.025	0.160	28.440	1	124	0.000	Regression	0.035	2	0.017	26.697	0.000
									***	Residual	0.080	124	0.001		***
										Total	0.115	126			
USLKlag2	0.622	0.387	0.372	0.024	0.086	17.285	1	123	0.000	Regression	0.045	3	0.015	25.897	0.000
									***	Residual	0.071	123	0.001		***
										Total	0.115	126			
MUN	0.641	0.411	0.391	0.024	0.024	4.877	1	122	0.029	Regression	0.047	4	0.012	21.254	0.000
									**	Residual	0.068	122	0.001		***
										Total	0.115	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	(0.014)	0.005		(2.904)	0.004	***	
ASLKlag	0.034	0.011	0.231	3.068	0.003	***	1.2
USLKlag	(0.041)	0.011	(0.280)	(3.663)	0.000	***	1.2
USLKlag2	0.061	0.014	0.350	4.263	0.000	***	1.4
MUN	0.105	0.048	0.154	2.208	0.029	**	1.0

Appendix 6.5B Unabsorbed Slack Parsimony Models

USLKGR2 ED and MD Models

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
ASLKlag	0.331	0.110	0.102	0.343	0.110	15.371	1	125	0.000	Regression	1.806	1	1.806	15.371	0.000
									***	Residual	14.687	125	0.117		***
										Total	16.493	126			
USLKlag	0.650	0.423	0.414	0.277	0.314	67.379	1	124	0.000	Regression	6.977	2	3.488	45.456	0.000
									***	Residual	9.516	124	0.077		***
										Total	16.493	126			
USLKlag2	0.927	0.860	0.857	0.137	0.437	384.714	1	123	0.000	Regression	14.187	3	4.729	252.317	0.000
									***	Residual	2.305	123	0.019		***
										Total	16.493	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	(0.047)	0.023		(2.008)	0.047	**	
ASLKlag	0.043	0.064	0.025	0.672	0.503		1.2
USLKlag	(0.463)	0.065	(0.263)	(7.104)	0.000	***	1.2
USLKlag2	1.635	0.083	0.781	19.614	0.000	***	1.4

USLKGR2 ED and MD Models

Predictor Entry Sequence	R	R2	Adj R2	SE	R2 Chg	F Chg	df1	df2	Sig F Chg		SS	df	MS	F	Sig
USLKlag	0.580	0.337	0.332	0.296	0.337	63.485	1	125	0.000	Regression	5.555	1	5.555	63.485	0.000
									***	Residual	10.938	125	0.088		***
										Total	16.493	126			
USLKlag2	0.927	0.860	0.857	0.137	0.523	462.160	1	124	0.000	Regression	14.179	2	7.089	379.929	0.000
									***	Residual	2.314	124	0.019		***
										Total	16.493	126			

Final Model	B	SE	Beta	t	Sig		VIF
(Constant)	(0.034)	0.013		(2.674)	0.009	***	
USLKlag	(0.459)	0.065	(0.261)	(7.088)	0.000	***	1.2
USLKlag2	1.656	0.077	0.791	21.498	0.000	***	1.2