THE COMPETITIVE DYNAMICS OF A FIRM'S CAPACITY POSITION AND INVENTORY LEANNESS ACTIVITIES: EVIDENCE FROM US MANUFACTURING INDUSTRIES

by

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Abstract

The competitive dynamics of a firm's capacity position and inventory leanness activities: evidence from US manufacturing industries

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The notion of 'perennial gale of creative destruction' by Schumpeter and Austrian economics has been researched in the field of strategic management to study the competitive dynamics among firms' rivalrous activities. However, its application is sparse in operations management. With the advancement of the field and the increasing pressure on the firms, the strategies regarding operations planning and control are argued to be not just internal according to the conventional norms of operations management, but these strategic moves will be impacted by the moves of their immediate rivals. This competitive imitation is studied in the areas of inventory management and capacity management as these are the two main operations strategies. A two way relationship is examined to see how the leader firm's past inventory management and capacity management will affect the challenger firm's current inventory management and capacity management and how the challenger firm's past inventory management and capacity management will affect the leader firm's current inventory management and capacity management. The relationships of the leader and challenger firms are then investigated through two one sided tests as how the lagged inventory management and capacity management of a leader firm affects the challenger firm's

current inventory management and capacity management and vice versa as two separate regressions. The leader and the challenger firms in an industry are respectively the firms holding the highest and second highest market share (Hofer, Cantor and Dai, 2012). Since, the concepts are clearly established at the enterprise level and since enterprise strategy is linked to operations strategy, the competitive actions and reactions that take place at the operations level appeared important to investigate. The variables like market share gap, industry growth and industry concentration will be examined to see if they have any moderating effects on this dynamic relationship. The study controls for the barriers to entry, diversification of firms and firm size. Apart from the Schumpeterian perspective and competitive dynamics theory, supports are drawn from theoretical frameworks such as Resource Based View, Transaction Cost Theory and also from signaling theory and from institutional theory. A 10 years Compustat data from 2001 to 2010 is used to examine the hypotheses. Data are analyzed using the econometrics panel data analysis where with the help of multiple OLS regressions the hypotheses are tested for top two firms of multiple industries across the years from 2001 through 2010. The results are significant to conclude that the main effects of the inventory management and the capacity management of the rival firms have a positive impact on the focal firm. This dynamic relationship triggered as a result of competitive imitation in inventory management is found to be significantly moderated by industry growth and sparsely by market share difference but industry concentration is found to be a non-significant moderator. On the contrary, in context to capacity management, the moderators industry concentration and market share difference has showed weak significance (significant at higher levels of significance) but industry growth has turned out to be insignificant.

Table of Contents

List of Illustrations

List of Tables

Chapter 1

Introduction

The strategies associated with operations planning and control for a manufacturing firm are not only a decision that is entirely dependent on the firm's own stand but it is an outcome of the contingencies which it is exposed to by its competitors. With the extension of the research paradigm and the advancement of the field of operations management (OM), the boundary of the firm and the decisions pertaining to its operations planning and control need to be re analyzed and ultimately extended to accommodate the growing competition among firms in all industries. In most industries, it is possible to identify a leader and a challenger. Hofer, Cantor and Dai (2012) defined market leader as the firm with the highest market share in an industry and the market challenger as the firm with the second highest market share. Since, I am analyzing a dyadic relationship where the dynamic effects of a leader firm's past inventory leanness and capacity position to the challenger firm's current inventory leanness and capacity position and vice versa for a period of ten years, I define the firm which is a response at a point as 'focal firm' and the firm which is a lagged predictor as 'rival firm'. It means if we are examining the impacts of a leader firm's past strategies on the challenger firm, the leader firm is a rival firm and the challenger firm is a focal firm and similarly when examining the impacts of a challenger firm's past strategies on the leader firm, the leader firm is a focal firm and the challenger firm is a rival firm. This two way relationship is examined across various industries where I am interested in studying the dynamic effects of competition and not a particular leader or challenger firm's specific attributes.

The competition and the thirst to supersede its rivals are justified as there are distinctive advantages to being a market leader. Market leaders exploit economies of scale and market power, as well as first-mover and reputational advantages (Armstrong

& Collopy, 1996; Buzzell, Gale, & Sultan, 1975; Ferrier, Smith& Grimm, 1999; Lieberman & Montgomery, 1988; Zeithaml & Fry, 1984). While it is believed that every firm focuses on some rivalrous behaviors against its immediate rival or few numbers of rival firms, this research is focused on the rivalrous behaviors of the leader firm and the challenger firm across various industries. The reason why this dissertation focuses primarily on top two firms' competitive behavior in every industry is because the competition is believed to be maximum among these two top firms (Ferrier et al., 1999; Hofer, Cantor and Dai, 2011).

Researches in the field of operations management (OM) and related disciplines like industrial engineering that covers the basic premises of operations planning and control decisions mostly regard these as strictly internal decisions. However, with the advancement of the field and growing competition among firms, it is important to analyze these strategies under the viewpoint of rivalrous actions and the reactions that follow among these firms.

Some of the key constructs of this research are described as follows.

1.1 Inventory Management

Inventory management is a major strategic decision in operations management. Firms realize that holding inventory deteriorates financial performance. Chen et al. (2005, 2007) found that inventories are decreasing in industries in modern times. Excess inventory is a waste (Womack, Jones & Roos, 1990). Lean inventory management is interchangeably used with good inventory management which implies holding fewer inventories as much as possible (Eroglu and Hofer, 2011; Hall, 1983; Zipkin, 1991; Chen et al., 2005; Cooper and Maskell, 2008). Thus, inventories should be kept minimum or the firm should be as lean as possible in inventory management to have improved firm performance but realistically that's not the case. Firms vary their inventory position depending on rival firms and not just by their aggregate planning within their own

boundary. This research has introduced and analyzed the inventory leanness strategic viewpoints under dynamic competitive scenarios where the action of the leader will trigger a reaction from the challenger followed by the reaction again from the leader and so on regarding the issues related to inventory leanness. Fundamentally, this dissertation defines the term inventory leanness as follows:

"*the extent to which the minimum inventory is held*"

1.2 Capacity Management

Similarly, capacity management is another integral strategic decision in OM. Managing capacity by considering the capacity cushion needs in future is vital. The addition or the reduction in capacities may not be just a stand- alone function of a firm's forecast of the future demands but also a function of the rival firm's capacity position. Firms decide to expand its capacity of facilities and equipments, among others, by getting a signal from its rivals. Cagle (2011) and Lieberman (1987) opined that expanding one's capacity without considering other firms' capacity position initiates a huge financial risk for the firm. This is because the capacity addition may remain underutilized or even unutilized causing the performance to go down. Similarly, not having adequate capacity may jeopardize a firm's competitive position within an industry resulting in failure to meet the fluctuating demands (Cagle, 2011) and lack of resources when actually demand requirements will arise. Thus, this research focuses on the counter moves by a leader firm as a result of a particular move by the challenger firm and vice versa over a period of time.

1.3 Competitive Behavior

A firm's leadership position within an industry is never secure or sustainable (Hofer, Cantor and Dai, 2011). Market Leaders seek to retain their position as a leader because of the business and economic stakes involved in it. Market leaders exploit

economies of scale and market power, as well as first-mover and reputational advantages (Armstrong & Collopy, 1996; Buzzell, Gale, & Sultan, 1975; Ferrier, Smith& Grimm, 1999; Lieberman & Montgomery, 1988; Zeithaml & Fry, 1984). However, there is a constant competition going on to overthrow the leader by the market challenger of an industry. “Leader's decline may be caused either by its own complacency and feelings of invincibility or by the aggressive behavior of challengers” (Ferrier, Smith& Grimm, 1999). Nothing is constant and a series of creative destruction that takes place in the industry disturbs the basic statics of the market share hierarchy in a regular continuity. This is often referred to as “Competitive dynamics”; it was highlighted by Schumpter (1942). Weiss and Pascoe (1983) realized that only 39% of leaders in industry segments continued to be leader from the span of 1950 to 1975. Likewise, Mueller (1986) had 44% of industries retaining market leadership in the observed industries. It is because of this competitive dynamics that exist in industries that there is a huge sense of rivalry and competition prevailing among firms to sustain or overthrow the rival firm. The competitive behaviors have the potential to cause disequilibrium (equilibrium is defined as the static state of affairs brought about by the absence of rivalry (Kirzner; 1997, Ferrier, Smith & Grimm; 1999). Strategies are followed, and duplicated, sometimes even sub optimally just to meet the levels of the rival. The support of this claim is the Schumpeterian economics which points out that “a firm’s competitive activity instigates a rival’s competitive response, ultimately leading to cycles of “creative destruction” of competitive advantage” (Grimm and Smith, 1997; Hofer, Cantor & Dai, 2012). The competitive actions cause competitive reactions by rivals (Schumpeter, 1934, 1942). Firms and markets evolve through patterns of competitive actions and reactions that create and erode competitive advantage (Grimm and Smith, 1997; Hofer, Cantor & Dai, 2012). Thus, a leader firm, in most cases, enjoys the central dominance in an industry and so the

leadership position is always challenged and attempted to be taken away by the challenger firm. This was the motivation of this research as to understand how this basic concept of competition and creative destruction works in the operations strategy related to managing capacity position and inventory leanness.

1.4 Market Share Gap

Market Share gap is believed to have a significant effect on this research. There is a limitation on the imitation of the rivals depending upon the difference in market share. The leader firm in an industry attempts to resist the reduction of the erosion of the market share gap. On the other hand, the challenger firm attempts to reduce the gap (Caves & Ghemawat, 1992; Davies & Geroski, 1997). The reason why market share gap is thought to be useful in this research is because the mimic or the competitive approach and rivalry strategies implemented by firms will be contingent upon the relative market share of those firms. A huge difference in the market share would lead to a tendency to be complacent on the part of the market leader because the firm would think that it can never be overtaken by the challenger with drastically lower resource levels and a sense of desperation on the part of the market challenger because it would think that it can never touch the leader's strategies with its limited resources. However, if the market share gap is low, the competitive rivalry is argued to be fierce.

1.5 Industry Growth

Industry growth will have a significant effect on the imitation of leader and challenger mimetic relationship dynamics. The industry which is growing is lucrative for firms to risk on trying novel approaches to supersede the rival firm. The whole notion of 'creative destruction' as coined by Schumpeter will be highly dynamic and existent when the growth of the industry is higher. The rivalry will be profitable and so will be prominent. "Studies examining the stability of market shares have suggested that high-growth

industries experience less market share stability and greater turnover in industry leadership than low-growth industries (Caves & Porter, 1978; Gort, 1963; Mueller, 1986; Weiss & Pascoe, 1983)" (Ferrier, Smith& Grimm, 1999). Thus, this construct is expected to play a vital role in this research to analyze the rivalrous activities triggered as a result of competition among the leader and challenger firms across various industries.

1.6 Industry Concentration

The higher the concentration means there is fewer numbers of firms in the industry. As the concentration in an industry increases, the market is more stable (Caves & Porter, 1978; Gort, 1963). Higher concentration results in fewer rivalrous moves among the firms (Ferrier Smith, & Grimm, 1999; Young and colleagues, 1996). It may, thus, be important to investigate the effect of industry concentration on the rivalrous moves and counter moves by the leader and challenger firms pertaining to decisions on inventory management and capacity management.

1.7 Summary

The study aims to develop and test an analytical framework on capacity and inventory leanness with the moves and counter moves of the leader and challenger firms as a result of each other's strategies over a period of ten years. The variables like market share gap, industry growth and industry concentration are thought of as moderators, which will moderate the effect of the lagged inventory leanness and lagged capacity position of the rival firm on the strategies of the focal firm. The data will contain the US firms with sales exceeding $500 million.

The study will add to the stream of research by examining the capacity position and inventory leanness activities in market leaders and challengers of various industries and how the leader firm's past inventory leanness and capacity position affect the challenger's inventory leanness and capacity position, and vice versa. Thus, this

research will rely on Austrian economics (Kirzner, 1989, 1997; O'Driscoll & Rizzo, 1985) *("Austrian economics is a school of thought that originated in Vienna in which competition is viewed as a dynamic process stemming from entrepreneurial alertness and purposeful action" (Ferrier, Smith& Grimm; 1999))*, theories of organizational decline (Cameron, Sutton, & Whetten, 1988; McKinley, 1993), research on competitive dynamics (Grimm & Smith, 1997) and hyper competition theory (D'Aveni, 1994) to examine the following research questions.

- how the past inventory leanness of a leader firm affects the inventory leanness of the challenger firm and vice versa.
- how the past capacity position of a leader firm affects the capacity position of the challenger firm and vice versa.

Additional questions that this research focuses on are.

- how does market share gap affect the relationship mentioned in research questions

  1 and 2?
- how does industry growth affect the relationship mentioned in research questions 1 and 2?
- how does industry concentration affect the relationship mentioned in research questions 1 and 2?

Financial performance of any business firm is probably the single aspect practitioners are concerned about in the real world. Although, the financial performance has been tested before in literature, it was thought of as an integral aspect in suggesting a framework on inventory leanness and capacity position of a firm and thus, the following two adjunct questions also seem important to the researchers.

- how does the inventory leanness affect the financial performance?

- how does the capacity position of a firm affect its financial performance?

A more detaled literature survey is provided in the following section that analyzes these research questions and then builds the hypotheses with the help of the support drawn from the literature.

The remainder of this dissertation is structured as follows. Chapter 2 discusses the literature review and hypotheses. Chapter 3 and chapter 4 talks about methodology and analysis. Section 5 presents concluding remarks, limitations and future extensions.

Chapter 2

Literature Overview

2.1 Hypotheses development

The literature survey presented in this chapter is organized as follows. This chapter starts with the summary of the relevant literature dealing with competitive dynamics and attempts to connect the links between inventory management and competitive dynamics followed by the discussion of the articles that are relevant to the association of the capacity position of a firm and competitive dynamics. Finally, it presents a gap analysis which this research aims to address.

The decisions related to operations planning and control has to be carefully undertaken to ensure higher operational performance. Operations strategy, thus, is an important aspect of an enterprise today. The reason why the performance in operations is so important to strategize is because the strategic process development is argued to be positively associated with firm performance (Hart and Banbury, 2006). It is evident that enterprises imitate the successful strategies practiced across rival firms or the firms across other industries. For example, early 90's saw some extensive research work done in airlines industries where firms imitate the successful actions or steps taken by other firms in the industry (Chen, Smith & Grimm 1992; Chen & MacMillan, 1992; Chen & Miller, 1994; Chen & Hambrick, 1995; Chen & Miller, 1994; Smith, Ferrier and Ndofer, 2001; Smith, Grimm, Gannon & Chen, 1991; Smith, Grimm, & Gannon, 1992). In the context of competition, the actions taken by the first firm is referred to as 'moves' and the reaction by other firms is referred to as 'counter moves' (Smith, Ferrier and Ndofer, 2001). It was not always a win win situation, there were cases where firms involved in this competitive rivalry ended up hurting each other's revenues by compromising and targeting the same market niche. Schumpeter (1942) referred to this competitive rivalry

as a “perennial gale of creative destruction”. Austrian economics support the argument that market is not static, rather they are dynamic. It means when the opportunities arise, firms make their initiatives to exploit those opportunities. This is followed by the rival firms imitating the similar strategic moves. The prime motivation of such reactions from the rival firm is huge financial benefits enjoyed by the focal firm (Smith, Ferrier and Ndofer, 2001). Often the benefits get shared and the market move to equilibrium soon. Another opportunity is identified and the market soon becomes dynamic again where a firm wants to exploit the opportunities arisen followed by the cycle of imitation attempts by the rivals. This cycle continues and thus, these market opportunities create disequilibrium. This interaction of the focal and rival firm makes the industry non-stable. Depending upon which firm has been successfully able to exploit a particular opportunity and to what extent, the market share of the firms changes and thus changes the leader and challenger firms across every industry in different time periods. Smith, Ferrier and Ndofer (2001) pointed out that although this imitation gives firms benefits but also sometimes these firms are willing to compromise on their own revenues as well and they still imitate. This reflects Schumpeter’s concept of creative destruction.

Having understood that the firms tend to imitate at the enterprise level, it is worthwhile to investigate the imitation and its extent at the operations level too. It is already established in the operations management literature that enterprise strategy should be linked to manufacturing and operations strategy (Boyer and Lewis, 2002; Minor et al., 1994). Since, the moves are copied with counter moves at the enterprise level, it seems important to investigate this interplay at the operations level too. Schumpeterian economics perspective is adopted to investigate competitive interactions among leader and challenger firms. The main theme of Schumpeterian perspective is why firms engage in competitive behaviors. While the Schumpeterian perspective has received support in

prior research (e.g., Ferrier, Smith & Grimm, 1999; Smith, Grimm, Gannon & Chen, 1991; Smith, Grimm, & Gannon, 1992), its application to the study of competitive dynamics in OM research, in general is rare (Eroglu & Hofer, 2012). Thus, this interaction or competitive interplay that takes place in the realm of operations planning and control is investigated in this research.

Two of the main strategic inputs that an operations manager has to provide are inventory management and capacity management. This dissertation is focused on the competitive actions and reactions that take place among the leader and challenger firms pertaining to the decisions related to these two strategic viewpoints. Apart from the Schumpeterian perspective and the competitive dynamics theory as discussed above, few more theories are used in this research. Mimetic Isomorphism concepts of institutional theory proposed by DiMaggio and Powell (1983) focuses on the theme of "monkey see monkey do" which is relevant to argue that the focal firm imitates the action of the rival firm's past inventory leanness and capacity position. This does not always have to yield positive results for the two firms; they imitate at times even sacrificing their own economic gains and competitive edge. Porter (1980) proposed signaling theory where the activity of a firm sends a signal to its rivals. This theory is used in this research to justify the action and the reaction that takes place within an industry. Resource Based View (Barney, 1986; Conner, 1991) is thought to be a useful theory to explain that efficient strategies on the inventory management and capacity management would lead a firm to gain a competitive advantage.

Without a doubt, inventory management is definitely a major aspect of aggregate planning which has been established by various researchers. Inventory management is vital as there needs to be a tradeoff between holding less inventories and be more lean and holding more inventories and avoid stock outs. While holding too little

can be the reason to lose customers forever in case of continuous stockouts, holding too much is considered bad because it will increase the holding costs and reduce operational efficiency. Hence, this is an important decision to be made strategically by the operations manager. Womack et al., 1990 pointed out that the philosophy of lean manufacturing considers inventory as a form of waste. Thus, ideally a firm would like to have as minimum inventory as possible that can satisfy the demand with no need to hold any. This basically points the usefulness of Just In Time (JIT) strategy emerged from Toyota manufacturing principles. Thus, introducing the term inventory leanness would mean holding minimum inventory to reduce the associated costs and risks. Lean inventory management is often known as an effective and efficient way of managing inventories (Hall, 1983; Zipkin, 1991; Chen et al., 2005; Cooper and Maskell, 2008; Eroglu and Hofer, 2011). Firms are in consensus to a larger extent that reducing inventories enhances financial performance. Nevertheless, inventory is considered as an important aspect of aggregate planning in the traditional operations management literature. Conceptually, anecdotically and empirically, it has been shown that holding extra inventories is bad for the financial aspects of the firm. Thus, the concept of lean production occupied the central stage with a motive to reduce the inventory and ultimately improve the performance (Womack, Jones & Roos, 1990). Implementing lean production principles enhances the operational benefits for a firm (Eroglu and Hofer, 2011). Since inventory leanness is seen as something which gives better performance for the firm (Chen et al, 2005; Chen et al, 2007; Swamidass, 2007; Capkun, Hameri, Weiss, 2009; Eroglu & Hofer, 2011), and since firm performance would in turn raise the market share of the firm (Chen et al; 2005, Chen et al; 2007), firms can outplay their rivals by maintaining a strategy of lean inventory. Thus, it might seem very intuitive to imagine that every firm would intend to be as lean as it can to foster its financial performance, but this

research argues that there are deeper layers to analyze strategically than this. What happens outside the boundary of the firm also holds a significant importance in the strategy of inventory management. Traditionally, the OM literature is limited to the decisions on inventory management within the firm. Now, since it is established that the market in the modern business world is dynamic and the competitive rivalry plays a big role, it is important to analyze the impacts of the rival firm on the focal firm's inventory leanness. It is, therefore, argued that the rival firm's inventory leanness will work as a stimulus for the focal firm to act accordingly. Smith, Grimm & Gannon (1992) identified the impulse as a response to a competitive activity of rivals very crucial. What a firm does is not just a pure strategic decision based on the forecasts and/or its capacity availability but also is hugely impacted by the competitive behaviors of the rival firms. In modern day, the customers have a lot of options, and backorders and stock outs might not go to well with them. This might result not just in the form of lost sales but also lost customers or rather more adversely a group of customers which belong to a similar cluster and network. Inventory position of a firm may indicate its aggressive strategy and also its perception of the way the industry is going to perform and thus, if a firm believes that the industry is going to perform better, it may increase its level of inventory to avoid the stock out. Thus, it goes against the notion that extra inventory is bad. This step of the rival firm would signal the focal firm about "a direct or indirect indication of its intentions, motives, goals, or internal situation" (Porter, 1980). This is supported by researchers like Fombrun and Shanley (1990); Heil and Robertson (1991) who advocate that signals convey information about the competitive intentions of rivals. Now since a firm wants to secure or attain a better position in the industry, firms must undertake a series of actions to ensure long-term viability and market leadership (D'Aveni, 1994). Hofer, Cantor & Dai (2012) argued that these actions by the rival firm signal a message to the focal firm about the

market as they perceive the future regarding sales and revenues. Accordingly the inventories that they think would be optimum to satisfy the customer's expectation would be readjusted. The inventory position also hints towards the rival firm's strategy regarding whether they are aggressively targeting the demand expected, by keeping higher inventories at the cost of having non optimal operational performance, whether they are being not so attacking and just targeting the absolute inventory leanness or whether they are somewhere in the middle of this continuum. Following Schumpeter's (1942) theory of creative destruction, it is even argued that firms would be willing to even be generating non optimal financial revenues in order to destroy the rival firm's market share.

For the desire that every firm has to acquire and develop resources, as per resource based view, in a way so as to attain a position of having valuable, rare, inimitable and non-substitutable resources so that they can gain a sustained competitive advantage over its rivals, every firm not just attempts to develop its own resources but also makes an attempt to follow the rival firm to destroy their competitive advantage. Thus, it is argued that the focal firm would not just make the inventory management strategies limiting itself within the scenarios of its own firm but also would consider the rival firm's inventory management strategies. This would lead to cycles of competitive interactions between focal and rival firms. There is, however, inertia in the action and reaction of the firms; firms may be skeptical to react immediately and also at times the current year data may not be available. Thus, this research is seeing the impact of *lagged* inventory leanness of a rival firm on the inventory leanness of the focal firm.

Hypothesis 1: The rival firm's past inventory leanness positively impacts the focal firm's inventory leanness.

Hypothesis 1a: The challenger firm's past inventory leanness positively impacts the leader firm's inventory leanness.

Hypothesis 1b: The leader firm's past inventory leanness positively impacts the challenger firm's inventory leanness.

Another strategic variable in OM which seems important to analyze under the spectrum of moves and counter moves of the focal and rival firms is the capacity position of the firm. There seems an ongoing debate about whether an under capacity position or an over capacity position is worse. Greenley and Oktemgil (1998) argued that firms keep capacity more than they need, to maneuver the needs of the firm depending upon the possible changes in the environment and/or industry in which the firm functions. Conversely, Lieberman (1987) argued that keeping excess capacity often puts the firms at higher risk. The aspiration to have that optimum level of capacity position to not miss the opportunities and at the same time not be extremely underutilized is a constant pursuit for the firms. Bradley, Shepherd & Wiklund (2011) and Hayes and Wheelwright (1984) argued that when capacity position is less, it might result in lost sales while researchers like Lieberman (1987) opined that organizations may be "plagued" by over capacity. Thus, it seems worthwhile for firms to investigate what their immediate rival's capacity position is. Similar to inventory management, the strategists should look for the rival firm's capacity position because the environment in which today's business runs is not uniform and steady rather there is a signal that is given with a firm's moves leading to a potential reaction from the focal firm to maintain or surpass the competitive edge of the rival firm. Cagle (2011) opined that a firm should expand its capacity when other firms in the industry are expanding it, otherwise it may be missing the opportunities to gain the competitive edge over its competitors in the industry.

Cyert and March (1992), Anand and Ward (2004), Dess and Beard (1984), and Cagle (2011) advocated that excess capacity position are the buffers and can act as useful resources in emergency situations. Capacity position cannot at most cases be built

overnight. This may take long term planning (Cagle, 2011). This capacity position sends a signal to the focal firm about the way the rival firm is expecting the market opportunities and threats. Porter (1980) describes "a signal is any action by a competitor that provides a direct or indirect indication of its intentions, motives, goals, or internal situation". As described above, the actions trigger a reaction from the rival firm. Clark and Montgomery (1998), Chen, Smith & Grimm (1992) and Chen & MacMilan (1992) opined that competitive moves by a firm signal its competitive aggressiveness. Similarly, Grimm and Smith (1997) claimed that competitive actions signal firm's capabilities and Ferrier, Smith & Grimm (1999) and Grimm, Lee & Smith (2005) argued that a firm's move signals market position. A capacity position of a firm is built over the years and is generally a part of long term strategic plan. The capacity position, therefore, indicates the way the market and the opportunities are perceived by the rival firm. It also indicates the rival firm's strategic moves for future. Since, the capacity position may not be easy to be created in the short term, the focal firm in the case of overlooking the rival firm's capacity position would end up losing opportunities and/or competitive edge to its rivals. This may be because the focal firm is not able to view certain aspects of business that the rivals are focusing on. Also, since a capacity position indicates the aggressiveness of a rival firm and also its operations strategy or the overall enterprise strategy, focal firms tend to imitate the capacity position of the rival firms. Similar to inventory management, there are cases when firms imitate the rival firm's capacity position even at the cost of their own benefits. Cagle (2011) cited Hayes and Wheelwright and (1984), Olhager, Rudberg & Wikner (2001) to explain lead, track and lagged strategies related to capacity position as follows. The lead strategy means being aggressive and having enough capacity resources to accommodate the demand fluctuations, the track strategy targets to be as close as demand to balance having resources either too much or too little, the lag

strategy focuses on high capacity utilization and stresses on avoiding keeping excess capacities to respond to the demand fluctuations. A focal firm is, therefore, argued to imitate the capacity position strategy that is implemented by the rival firm in the immediate past because it will give the focal firm a signal of the understanding of the rival firm about the market and anticipated demand in the future period of time and also their strategy and aggressiveness, and their preparation to deal with the unanticipated shock in the forthcoming demand.

A firm may choose to outsource tasks keeping lesser capacities or may opt for in house activities keeping higher capacities to reduce the cost of transactions (transaction cost theory (Williamson, 1975)) and this strategy of the rival firm might lead them to build valuable, rare, inimitable and non-substitutable resources to gain a competitive advantage (Barney, 1986). It would, therefore, be worthwhile to keep a track of the rival firm's capacity position by the focal firm with an aim to follow and destruct the competitive advantage that the rival firm might gain. This again follows from the concept of "perennial gale of creative destruction" originated from Schumpeter (1934, 1942) and Austrian economics. Firms that expand their capacities simultaneously with other firms in an industry put themselves and competitors at a higher level of risk (Cagle, 2011; Lieberman, 1987). Thus, firms in regard to their capacity position strategies is argued to follow and mimic the strategies of its rival's past capacity position which sometimes can be even at the cost of their own revenues.

Hypothesis 2: The rival firm's past capacity position positively impacts the focal firm's capacity position

Hypothesis 2a: The challenger firm's past capacity position positively impacts the leader firm's capacity position.

Hypothesis 2b: The leader firm's past capacity position positively impacts the challenger firm's capacity position.

Because of differences in industry structure, across industries there is considerable variance in terms of returns. Those industries where the returns are higher seem attractive to firms for initiating unique attempts and strategies to surpass the rival. Schumpeterian perspective of creative destruction will be very prominent in such industries as the business returns will be very lucrative. According to the studies by Caves & Porter (1978), Gort (1963), Mueller (1986), Weiss & Pascoe, (1983), "high-growth industries experience less market share stability and greater turnover in industry leadership than low-growth industries" (Ferrier, Smith& Grimm, 1999). Since the stability is lower, there is greater likelihood that the decisions taken by the firms pertaining to their inventory management are arguably affected by the inventory management of the rivals. Smith, Grimm & Gannon (1992) established that, firms in high-growth industries engage in more rivalrous actions than do firms in low-growth industries with specific regard to the level of competitive activity. The sense of complacency and security, thus, is proposed to be lower which is argued to drive the inventory decisions beyond the internal boundary of a firm towards a closer scrutiny of the rivals. This leads to the following hypothesis with a basic underlying theme that the rivalry activity in inventory leanness in high growth industries between leader and challenger firms is higher.

Hypothesis 3: The focal firm's reaction to the rival firm's past inventory leanness will be moderated by the industry growth such that the higher the industry growth the higher would be the focal firm's reaction to the rival firm's past inventory leanness.

Hypothesis 3a: The leader's reaction to the challenger's past inventory leanness will be moderated by the industry growth such that the higher the industry growth the higher would be the leader's reaction to the challenger's past inventory leanness.

Hypothesis 3b: The challenger's reaction to the leader's past inventory leanness will be moderated by the industry growth such that the higher the industry growth the higher would be the challenger's reaction to the leader's past inventory leanness.

The argument presented above is thought to be true for the capacity position strategies in the leader and the challenger firms for an industry too. If the industry is growing and the returns are huge for the players, market is not stable and the firms will imitate more leading to a high competitive rivalry among firms. In such a case, the capacity planning is thought to be done by keeping a close eye on the actions of the immediate rivals. This again follows from the basic concept that the actions of rival give a signal for a potential change in the market, the rival's aggressiveness or any implicit strategy which triggers a reaction by the focal firm. Since, the industry is growing, firms would not spare any opportunity to its rivals and would plan the capacity accordingly as them. However, if the industry is growing less or if the industry is mature, then since the returns are less, the firms tend to make capacity decisions more on the basis of its internal resource availability and would not stretch beyond certain extent to imitating the rival's capacity position.

Hypothesis 4: The focal firm's reaction to the rival firm's past capacity position will be moderated by the industry growth such that the higher the industry growth the higher would be the focal firm's reaction to the rival firm's past capacity position.

Hypothesis 4a: The leader's reaction to the challenger's past capacity position will be moderated by the industry growth such that the higher the industry growth the higher would be the leader's reaction to the challenger's past capacity position.

Hypothesis 4b: The challenger's reaction to the leader's past capacity position will be moderated by the industry growth such that the higher the industry growth the higher would be the challenger's reaction to the leader's past capacity position.

The unique attributes of a firm shape the competitive offerings it provides to its customers. Caves and Ghemawat (1992) and Gimeno (1999) found that the strategic heterogeneity of firms leads to the market share gain or loss in an industry. Thus, the firm specific attributes that lead to the generation of a competitive advantage for a firm is found to be attractive to its rivals to imitate with a goal of similar economic gains. However, it really depends on the position of the firm in terms of its market share as to what level they can practically mimic the activities of the rival firm. For instance, practically a local retailer might not be able to mimic the proactive steps taken by Wal-Mart. There seems to be, thus, some clear advantages of having high market share. Hence, the market leaders with the highest market share have a competitive edge in the business over the market challenger with the second highest market share. According to Armstrong & Collopy (1996), Buzzell, Gale, & Sultan (1975), Ferrier, Smith& Grimm (1999), Lieberman & Montgomery (1988) and Zeithaml & Fry (1984) market leaders exploit economies of scale and market power, as well as first-mover and reputational advantages. It, therefore, makes sense that a constant competition is always going on attempting to overthrow the leader by the market challenger of an industry. “Leader's decline may be caused either by its own complacency and feelings of invincibility or by the aggressive behavior of challengers” (Ferrier, Smith& Grimm, 1999). Since, there is enough motivation to maintain the position of having the highest share in an industry or to be a market leader or acquiring the leadership position by market challenger, attempts are made by a market leader of an industry to restrain the reduction of market share erosion while at the same time all attempts are made by the market challenger of an industry to enhance the market share erosion (Caves & Ghemawat, 1992; Davies & Geroski, 1997). *The industries where the difference in market share between the leader and challenger is higher might result in competitive inertia and lack of competitive*

aggressiveness among firms. The leader firms, just because of the fact that their rival is far below their margin, would be complacent and would repeat the historical inventory management processes without considering much about their inconsequential competitors. They would be reluctant with the marginal benefits gained by their rivals as a result of their inventory leanness because they will be satisfactorily practicing their own methods. Challengers, on the other hand, might not recognize that bigger opportunity to improve their market position by competing aggressively so they feel a sense of despair when it comes to competing with leaders who will be prominent which lead them to show slow impulse with the changing inventory leanness of the leader firm. Partly, it can also be the case that the challengers due to a huge difference with the leaders do not have the process, manpower, technological and managerial expertise to be able to mimic the change in the inventory leanness policies implemented by the market leader.

Hypothesis 5: The focal firm's reaction to the rival's past inventory leanness will be moderated by the market share gap such that the higher the market share gap the lower would be the focal firm's reaction to the rival firm's past inventory leanness.

Hypothesis 5a: The leader's reaction to the challenger's past inventory leanness will be moderated by the market share gap such that the higher the market share gap the lower would be the leader's reaction to the challenger's past inventory leanness.

Hypothesis 5b: The challenger's reaction to the leader's past inventory leanness will be moderated by the market share gap such that the higher the market share gap the lower would be the challenger's reaction to the leader's past inventory leanness.

Following with the arguments presented above that the rivalry in an industry would be less if the market share gap is more means that industries where the market share of the leader and the challenger is closer, there is a higher apprehension for a leader for being overtaken and a higher thrust for a challenger to overtake because the

difference is so small as there is clearly huge motivation to become a market leader. The capacity management strategies, thus, in an industry where the market share gap is higher is more internal strategy than external giving stress on the firm's own strategic resources and performance outcome targets. However, in an industry where the market share gap is lower, all attempts are done to make sure that the focal firm has taken into consideration all the moves of the rival firm and so since this competitive rivalry is higher, the capacity management strategies will be imitated to a greater extent. This is hypothesized as under.

Hypothesis 6: The focal firm's reaction to the rival firm's past capacity position will be moderated by the market share gap such that the higher the market share gap the lower would be the focal firm's reaction to the rival firm's past capacity position.

Hypothesis 6a: The leader's reaction to the challenger's past capacity position will be moderated by the market share gap such that the higher the market share gap the lower would be the leader's reaction to the challenger's past capacity position.

Hypothesis 6b: The challenger's reaction to the leader's past capacity position will be moderated by the market share gap such that the higher the market share gap the lower would be the challenger's reaction to the leader's past capacity position.

As the concentration in the industries increase, it means that the industry constitute of fewer number of firms. Fewer firms in an industry would mean there would be less competitive actions and reactions. Ferrier, Smith & Grimm (1999) inferenced Young and colleagues (1996) who found that higher concentration results in fewer rivalrous moves among the firms. Since, the competitive actions and reactions will be lesser when the concentration is higher, it means the risk of losing the market leadership is going to be low and therefore the dynamic nature of the competitive rivalry and its consequences would be lower. Therefore, the market stability is higher when the industry

concentration is higher. As the concentration in the industry increase, the market is stable (Caves & Porter, 1978; Gort, 1963). Thus, the dynamic effects of concentration among the leader and challenger firms in an industry are claimed to be associated as follows.

Hypothesis 7: The focal firm's reaction to the rival firm's past inventory leanness will be moderated by the industry concentration such that the higher the industry concentration the lower would be the focal firm's reaction to the rival firm's past inventory leanness.

Hypothesis 7a: The leader's reaction to the challenger's past inventory leanness will be moderated by the industry concentration such that the higher the industry concentration the lower would be the leader's reaction to the challenger's past inventory leanness.

Hypothesis 7b: The challenger's reaction to the leader's past inventory leanness will be moderated by the industry concentration such that the higher the industry concentration the lower would be the challenger's reaction to the leader's past inventory leanness.

Building the argument with the support of the findings of Young and colleagues (1996), which was further cited by Ferrier, Smith & Grimm (1999), that higher concentration results in lesser degrees of rivalrous activities among firms. This means that if an industry has fewer firms, the chances of *collusion* is higher. For instance, a destination which is targeted by fewer number of airlines companies will have the price higher than even a destination which is far but is targeted by more number of airlines. The reason for this is with the fewer number of airlines companies, it is easier for them to coordinate among themselves and have an agreement on price and they can mutually raise it higher. The case where the firms will be more, collusion may not be possible to the same extent. This hints that the market is more stable when there is less number of

firms in an industry. Caves & Porter (1978) and Gort (1963) have argued that the more the industry concentration, the more is the stability. Since in high concentrated industries, the stability and the rivalry is low which means the capacity planning is more a function of a firm's internal decision unlike low concentrated industries where the capacity planning strategies will be a resource for the firm to gain competitive advantage over its rivals in long run and therefore, these strategies have to encompass the actions taken by the immediate rivals and thus, the imitation will be higher. This is hypothesized as under.

Hypothesis 8: The focal firm's reaction to the rival firm's past capacity position will be moderated by the industry concentration such that the higher the industry concentration the lower would be the focal firm's reaction to the rival firm's past capacity position.

Hypothesis 8a: The leader's reaction to the challenger's past capacity position will be moderated by the industry concentration such that the higher the industry concentration the lower would be the leader's reaction to the challenger's past capacity position.

Hypothesis 8b: The challenger's reaction to the leader's past capacity position will be moderated by the industry concentration such that the higher the industry concentration the lower would be the challenger's reaction to the leader's past capacity position.

Lean inventory management is often referred as effective management system((Hall, 1983; Zipkin, 1991; Chen, Frank & Woo, 2005; Cooper and Maskell, 2008; Eroglu and Hofer, 2011). Inventories are decreasing in industries as claimed by Chen, Frank & Woo (2005, 2007) which may be as a result of the growing belief and realization that the inventories adversely affect financial performance. Researchers have shown both conceptually and empirically that holding extra inventories is bad for the financial

aspects of the firm. Excess inventory is identified as a form of waste (Womack, Jones & Roos, 1990). Chen, Frank & Woo (2005) by using data from manufacturing firms between 1981 and 2000 found that the reduction in inventory investment increases the stock market price of the firms. There is also an opinion and stream of work done to show that inventories are associated with huge risk of loss, theft, deformation and many others. Hence, a middle of the road concept of inventory management that balances the cost to order and the cost to hold is being implemented using the economic order quantity rule among others with an underlying desire to hold inventory optimally to its lowest possible level. Swamidass (2007) using regression analysis established that top performers have lower inventory to sales ratios than lower performing companies. Capkun, Hameri & Weiss (2009) used regression analysis again to show that inventory management positively affects firm performance. However there are many who found minimal or varied impacts (Cannon, 2008; Koumanakos, 2008). It seems important to investigate this relationship with inventory leanness and firm performance. The hypothesis presented below claims that regardless of whether the firm is a leader or a challenger, in general inventory leanness will impact the firm performance positively.

Hypothesis 9: The greater the Inventory Leanness of a firm, the greater is the financial performance of the firm.

It seems worthwhile to investigate the effects of capacity position of a firm to its financial performance. Since, the main motive of a business firm and any strategies undertaken by it is to investigate whether financial gains are achieved or not, financial performance of a firm is thought to be integral and hence included in the research model In prior research, researchers found mixed results of the relation between capacity position and financial performance. While Cyert and March (1963) and Daniel et al. (2004) found positive relationship of excess capacity with organizational performance,

Davis and Stout (1992) and Jensen (1986) found inverse relationship between the two. Bourgeois (1982) and Greenley and Oktemgil (1998) found curvilinear relationship between excess capacity and organizational performance. Cagle (2011) interpreted the result as capacity improves performance but after a level, the capacity position acts as an overhead which reduces organizational performance. Cagle (2011) used accounting data for manufacturing firms from year 2003 to 2007 and found a positive relationship between a firm's relative capacity position and its performance over time. In its basic essence, the arguments as presented in hypothesis 2 above, there are unanticipated changes in the business which is unforeseen ahead of its time. The capacity buffers act as a resource to be able to exploit any market or business opportunities that appear suddenly. Since capacity position cannot be built or attained overnight, the lack of required capacity would result in a potential loss of opportunities. This forms the basis of the following hypothesis which is argued to be the same for both the leader and challenger firms.

Hypothesis 10: The greater the relative capacity position of a firm, the greater is the financial performance of the firm.

2.2 Gap Analysis

The competitive drivers of a firm's inventory strategy resulting from the rivalrous behaviors of the market leader (firm with highest market share) and challenger (firm with second highest market share) is thought to an area which is unexplored, yet quite relevant in the real world.

Capacity position is linked and tested with firm performance multiple times in the OM literature but the action and reaction of market leader and challenger firms in the context of their capacity position is clearly seen as a gap.

The strategic management moderators like market share gap, industry growth and industry concentration have never been linked and researched before with the basic operational strategic variables inventory management and capacity management. However, these have been extensively researched in the realm of strategic management.

2.3 Summary of the literature review

Schumpeterian perspectives and Austrian economics are the basic support literature for this research. The concept of mutual destruction led by the firms competing in an industry is theoretical basis for this study. Literature of competitive dynamics and signaling theory are used to demonstrate, establish and justify the actions and the reactions of the firms. Resource based view, transaction cost theory and institutional theory with mimetic isomorphism is some of the theoretical supports. Operations strategies linked to inventory management and capacity management have been discussed in detail with the light of the above mentioned theories and the behavior of the leader and challenger firms.

2.4 Theoretical Frameworks

The following frameworks in figures 2-1 and 2-2 represent the inventory leanness strategy and the capacity management strategy analyzed under the perspectives of competitive dynamics and Schumpeterian economics. This is the theoretical construct that is going to be tested which represents the hypotheses, as mentioned above.

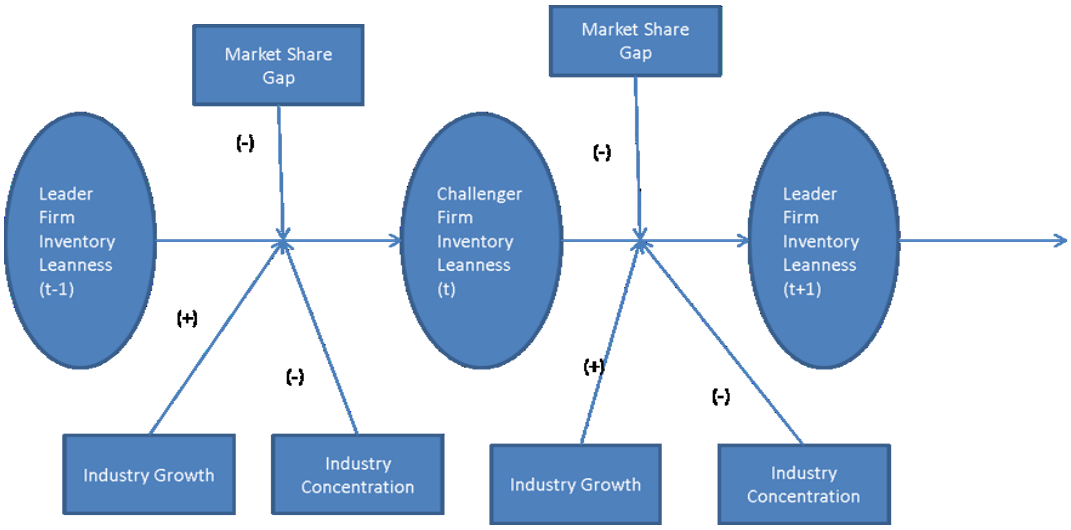

Figure 2-1 Inventory Management

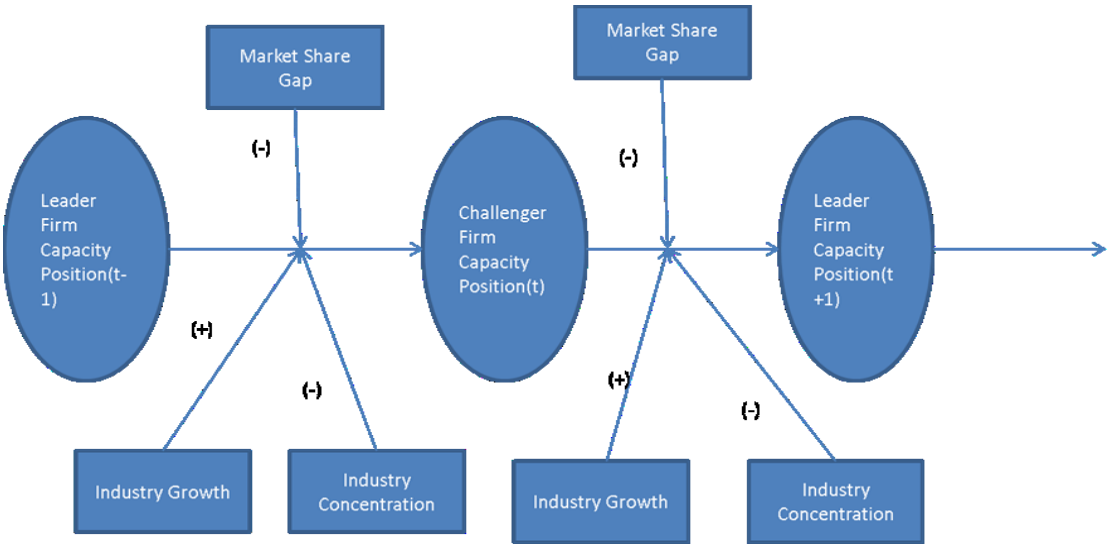

Figure 2-2 Capacity Management

Chapter 3

Methodology

Focusing on the appropriate method and analyzing the results carefully are the next steps after setting up the hypothesis and are extremely important to establish the nomological validity of the hypotheses presented in chapter 2. This chapter is focused on the description of data, explanation of variables and the approach of methods and in the following chapter an in-depth analysis of the hypotheses is presented. The methodological overview, thus as given below, explains the various steps undertaken in this research.

3.1 Methodology Overview

The sequence of steps in this section includes the following.

- Coming up with the operationalization of all the variables which includes the independent variables, the dependent variables and the control variables.
- Locating the source of data for the analysis. Justification of the data used.
- Data cleaning.
- Description of the operationalized variables used in the research.
- Detailed description and justification for the methodology employed.
- Setting the grounds for analyzing the results in the following chapter.

The original constructs are measured with the help of proxies which are called the operationalization of the constructs. An ongoing problem in the areas of operations management or strategic management is undermining the importance of construct validity where the constructs should be represented and measured, with minimum error, with the help of some measurable (operationalized) variables which reflect the construct in context. This clearly is the problem related to the operationalization of the constructs. The proxy or the operationalization for the variables, thus, is very crucial for any

research. Therefore, an attempt to summarize these operationalizations and then test the variables with multiple measures is planned. The operationalization and prior measures of the constructs are listed as follows.

3.2 Operationalization

The operationalization of the independent variables (IV), dependent variables (DV), moderator variables (MV) and control variables are discussed as follows

3.2.1 Operationalization of the IV, DV and MV

Inventory Leanness- It will be measured in this study by change in Inventory Turnover (Eroglu & Hofer, 2011). Eroglu and Hofer (2011) listed the following ways by which inventory leanness has been measured

"Absolute measures, including average inventory levels and maximum inventory levels (King and Lenox, 2001)

Standardized measures, such as inventory turnover (Schonberger, 2007; Gaur et al., 2005), inventory-to-sales ratios (Swamidass, 2007) and days of supply (Koumanakos, 2008)

Complex measures such as those based on fuzzy set theory (e.g. Bayou and de Korvin, 2008) and data envelopment analysis (e.g. Wan and Chen, 2008)".

Absolute measures of inventory leanness are not accurate as they do not capture the existing position of the inventory of firms (Cannon, 2008). Complex measures are in rare use in the field of operations and strategic management. Thus, in this research inventory leanness will be measured as the change in inventory turnover. The change in inventory turnover is thought to be useful unlike the original scale of inventory turnover because the inventory turnover of the previous period can make a difference (Cannon 2008).

Capacity Position- The capacity position of a firm at a point in time will be measured by taking the difference of the PPE variable from this period and its lagged period of time. PPE is generated below by taking the difference of Property, Plant and Equipment of the firm, with the average PPENT of that industry divided by the standard deviation of PPENT across those industries. Hence, PPENT of a firm is standardized over the average PPENT of the industry to calculate PPE, which is represented as follows.

PPE= (% PPENT- Avg %PPENT)/S%PPENT (Cagle, 2011).

Again, the capacity position is operationalized with the difference in PPE and not the absolute PPE for the similar reasons as explained above for the inventory.

Financial Performance- Financial performance of the firms are calculated using returns on investment, ROI, returns on equity, ROE, and Tobin's Q, which uses the market value of the firm and the book value of the firm. These are widely used operationalizations for financial performance by various researchers like Cagle (2011), Cannon (2008) among others.

Tobin's Q is measured as the ratio of market value of a firm to the book value of the firm. Market value of the firm is the sum of market value of equity (MVE) and book value of the firm (at) minus total common/ordinary equity (ceq) minus deferred taxes (txdb). Market value of the equity is the product of common shares outstanding (csho) and closing annual price (prcc_f). Hence, Tobin's Q= ((prcc_f* csho)+ at- ceq- txdb)/at.

Similarly, roe= ni/(ceq+txditc-pstkl) where, ceq is the total common/ordinary stock, ni is net income, txditc is deferred taxes and investment tax credit and pstkl is liquidating value of preferred stock.

Roa= ni/at where ni is net income and at is assets.

Market Share Gap: Market share gap is theoretically argued to be an important player in this research and hence is included. Following the paths of Ferrier, Smith & Grimm (1999), the market shares for the top two firms (leader and challenger) are calculated using sales as reported in the business and geographic segment files (for four-digit SICs) of COMPUSTAT. "The measure of relative market share is derived from the logarithm of the ratio of leader's market share to challenger's market share, which reduces to a market share difference score for each time period:

Gap ln(MSleader) - ln(MSchallenger),

where MSleader represents the leader's market share and MSchallenger represents that of the challenger" (Ferrier, Smith& Grimm, 1999).

Industry Growth: Literature suggests that industry growth impacts the relationship between the top two firms as hypothesized in the previous chapter. The following statement discusses about its operationalization. "A simple growth rate for each industry year (year t) as the percentage change in industry gross sales from the sales of the previous year (year t - 1), again using data for each four-digit SIC industry collected from COMPUSTAT" (Ferrier, Smith& Grimm, 1999).

Industry concentration: In a study similar to this, Ferrier, Smith& Grimm (1999) noted that "Young and colleagues (1996) found that higher levels of concentration resulted in fewer rivalrous moves among incumbent firms. Also, in terms of the dynamic effects of concentration on changes in market share, concentration has been positively related to market share stability among leading firms (Caves & Porter, 1978; Gort, 1963)". They used "Herfindahl index calculated from COMPUSTAT data for each four-digit SIC industry represented in the sample". Hence, Herfindahl index is thought of to be the proper operationalization of the construct 'industry concentration' as is suggested by these dyadic studies done in the past.

3.2.2 Operationalization of the Control Variables

Firm Size- Schumpeter (1934) noted that large firms are in a better position to design and implement competitive actions due to greater financial and human resource availability. Ferrier, Smith& Grimm (1999) have identified that “prior research addressing the effects of firm size on rivalry has suggested that large firms have simpler competitive repertoires than small firms (Miller & Chen, 1996) and are slower in terms of action timing (Chen & Hambrick, 1995)”. Therefore, following Ferrier, Smith& Grimm (1999), we used each firm's total number of employees as a measure of firm size. “Prior researches in competitive dynamics have used this measure” (Miller & Chen, 1996; Ferrier, Smith& Grimm, 1999). Thus, firm size will be controlled in this study by the Number of Employees (Ferrier, Smith& Grimm, 1999)

Barriers to entry: Ferrier, Smith& Grimm, (1999) opined “high (low) barriers have been found to dampen (accelerate) the loss of large firms' market shares (Caves, Fortunato, & Ghemawat, 1984; Mueller, 1986). Thus, we controlled for the influence of barriers to entry. Caves and colleagues (1984) and Ferrier, Smith& Grimm (1999) used a “composite entry barrier measure for each industry-year computed as the sum of industry means for investments in re-search and development, selling activities, and total assets, taking industry-level data from the business segment files of COMPUSTAT”. The use of research and development data was highly troublesome as 38 out of 204 final reduced samples was negative which does not yield any meaning as expense cannot be negative. Furthermore, there were missing values which would reduce the sample size greatly since a component (research and development expenses) missing in calculation of the composite entry barrier would result in the loss of the values of all the variables of that particular year and industry causing a high reduction in the sample size. Its inclusion also did not make any changes in the results.

Diversification: “Generalized Entropy Index” (GEI) (Cowell and Kuga, 1977, 1981) is used as a proxy for measuring the construct ‘diversification’. Diversification should be controlled as a highly diversified firm’s competitive strategy or the tendency to imitate the rival firm’s operations’ strategic behavior will be different than that of a lower diversified firm primarily because a high diversified company has income from various segments and thus, is not as focused in the competitive behavior of the rival firm. It should be controlled so we could be certain that the competitive actions of leaders and challengers were taken to improve their respective competitive positions in their primary industries. Ferrier, Smith & Grimm (1999) controlled for diversification. They argue the need to control for diversification “because firms confined to a particular industry are more likely to be keenly aware of competitors in the markets in which they are highly dependent (Chen, 1996)” (Ferrier, Smith& Grimm, 1999).

GEI is computed as summation from i 1 to n [Pi* ln (1/Pi)] where Pi is the proportion of sales in segment i, and the segment is an industry (four-digit standard industry classification (SIC) code. The proportions of a given firm across all segments will be equal to one. A couple of examples of this is shown in the appendix.

Alternatively, the number of product segments a firm has also been used as an operationalization for diversification. Although both are used as a proxy for the diversification, the generalized entropy index seems to be preferred in the literature as it is more sophisticated and uses weighted average.

Ferrier, Smith& Grimm (1999) controlled for diversification however, they used Rumelt’s (1974) specialization ratios of 0.7 as a benchmark. Hofer, Cantor & Dai (2012) also used Rumelt’s ratio to avoid the possible bias due to diversification. They selected their sample after the observations qualify the Rumelt (1974) specialization ratio criteria of having its value higher than 0.7. The firms whose specialization ratios were lesser than

0.7 was considered diversified enough to be excluded from the sample. The reasons this research is using GEI to control for the diversification instead of Rumelt's ratio is as follows.

Rumelt's ratio is a plane ratio of the income generated by a company from its chief product (the product or the industry segment yielding maximum income) to the overall income of that company. This seems erring as there may be the case this is a simple ratio and it does not have any inclusion of the other segments. GEI, on the other hand, gives higher weightage to the segment which gives the firm higher sales but still considers the other segments with lower weightage. GEI is a weighted average method widely used in econometrics indisputably.

Rumelt's ratio uses a cut point of .7 which is troublesome as the chance of diversification bias can still exist over .7 or under .7 a firm may have values which might be very close to qualify it as a specialized firm. Also rejecting a firm say if this ratio is .699 will be not accurate.

3.3 Data

Standard and Poor's Compustat is used as the secondary data base source to collect data. The freedom to use a reliable pool of data for a wide variety of years and industries has been the major reason of using Compustat. Boyd et al. (1983) and Cagle (2011) claimed that archival data does a better job of "measuring external constraints". Reliability of Compustat is highly acknowledged in the research community. Hofer, Cantor & Dai (2012) found Compustat a reliable source of getting publicly listed firms in US to be confident that the firms were truly the leader and challenger firms in their respective industries. The downside of survey research is the lack of accuracy and several biases. Hofer, Cantor & Dai (2012) cited Roth (2007) and Gattiker and Parente (2007) arguing that secondary data eliminates the issues of common method bias and

informant bias, unlike survey research. This provided the researcher with the confidence of proceeding forward in this research with the data from Compustat.

The years 2001 through 2010 is taken for analysis as they are recent and allow the analysis to look more comprehensive. The year 2000 is used to create the lagged values of the variables. Firms are grouped according to their respective four-digit SIC industries and ranked in descending order of their sales in these industries. Manufacturing industries with four digit SIC code ranging from 2000 to 4000 have been chosen. Following Ferrier, Smith& Grimm, (1999), “Industry groups that did not contain at least two large, non-diversified U.S. firms- a leader and a second place challenger-for each of the ten years from 2001 to 2010 are eliminated from further consideration”. Thus, the sample will include non-diversified U.S. manufacturing firms. The year 2001 to 2010 was considered because the recent years will have higher data availability or the missing data will be greatly low.

Data in Compustat was very generic and needed a very high degree of refinement to accommodate to the needs of this research. To start with grossly, there were 219 industries resulting in 36,174 observations from the years 2000-2011. The sic codes representing the first two digits, the frequency of firms within those, the percentage and the cumulative percentage are shown in table 3-1 below. Similarly, the mean value, the maximum and the minimum of the four digit sic codes are shown in table 3-2 below.

Table 3-1 Gross Frequency of the firms within the SIC codes

sic4	Freq	Percent	Cum.
20	1934	5.35	5.35
22	241	0.67	6.02
23	689	1.9	7.92
24	310	0.86	8.78
25	372	1.03	9.81
26	739	2.04	11.85
27	889	2.46	14.31
28	8240	22.78	37.09
29	618	1.71	38.8
30	758	2.1	40.9
31	249	0.69	41.59
32	440	1.22	42.81
33	1114	3.08	45.89
34	908	2.51	48.4
35	4395	12.15	60.55
36	6782	18.75	79.3
37	1726	4.77	84.07
38	5055	13.97	98.04
39	715	1.98	100
Total	36,174	100	

Table 3-2 Descriptive Statistics

Variable	OBS	Mean	Std. Dev.	Min	Max
sich	36174	3259.969	592.7049	2000	3990

Next, for these 219 industries, dropping the firms if they are not the top two firms in an industry, the observations for the years 2000 through 2011 dropped to 4877. The frequency of the firms within the first two digits of the sic codes, the percentage and the cumulative percentage are shown in table 3-3 below.

Table 3-3 Gross Frequency of the top two firms within the SIC codes

sic4	Freq	Percent	Cum.
20	495	10.15	10.15
22	131	2.69	12.84
23	113	2.32	15.16
24	119	2.44	17.6
25	150	3.08	20.68
26	147	3.01	23.69
27	219	4.49	28.18
28	384	7.87	36.05
29	64	1.31	37.36
30	174	3.57	40.93
31	48	0.98	41.91
32	190	3.9	45.81
33	257	5.27	51.08
34	290	5.95	57.03
35	689	14.13	71.16
36	504	10.33	81.49
37	316	6.48	87.97
38	397	8.14	96.11
39	190	3.9	100
Total	4,877	100	

Similarly, the minimum, maximum and mean values are shown in table 3-4 below.

Table 3-4 Descriptive Statistics

Variable	OBS	Mean	Std. Dev.	Min	Max
sich	4877	3160.065	592.0406	2000	3990

Table: 4

Finally, with the above obtained observation, when we run the regressions, the number of observations reduced to 218 from 40 industries. The frequency of the firms within the first two digits of sic codes, the percentage and the cumulative percentage are shown in table 3-5 below.

Table 3-5 Frequency of the top two firms within the SIC eliminating the missing values

sic4	Freq	Percent	Cum.
20	26	11.93	11.93
22	8	3.67	15.6
24	6	2.75	18.35
25	22	10.09	28.44
26	6	2.75	31.19
27	10	4.59	35.78
28	4	1.83	37.61
32	12	5.5	43.11
33	8	3.67	46.78
34	38	17.43	64.21
35	40	18.35	82.56
36	16	7.34	89.9
37	6	2.75	92.65
38	6	2.75	95.4
39	10	4.59	100
Total	218	100	

The minimum, maximum and standard deviation of the sic codes are given below in table 3-6.

Table 3-6 Descriptive Statistics

Variable	OBS	Mean	Std. Dev.	Min	Max
sich	218	3111.404	605.4123	2013	3960

From the number of industries dropping down from 219 to 40 and the observations dropping from 4877 to 218 is as a result of missing values of one or more variables of any regressions. Since, the capacity and the inventory both are operationalized as the differences and not the absolute value at any time period, the observations would have to drop by half anyways and moreover, if one value is missing since the difference is used, two observations would be lost. Also, Compustat had some

values listed as negative which were count data and cannot be negative so eliminating those also causes this reduction in the sample. This is not unusual in the econometric panel data analysis especially when a variable is operationalized as a difference of a value in two periods and in this research, many variables are operationalized this way as explained above.

Under 40 industries, ideally, with two firms and 11 years (year 2000 is used to create the lag; data for analysis is from 2001 through 2010) of data the number of observations should be 40*2*11=880 but it only 218, is again because of the missing values in one or the other operationalized variables across regressions.

3.4 Methodology:

Since this is a dyadic analysis where tests are done two ways as it is argued that both a leader firm and a challenger firm will mimic its rivals, and so to test this dynamic state of competition, we will use econometric methods using empirical analysis of panel data from US manufacturing industries. A regression representing the dyadic relationship is run to test the two sided relationship. Furthermore, two one sided relationship is also run to see whether a leader firm is making an impact on the respective challenger firm and whether a challenger firm is making an impact on the respective leader firm

Dependent Variable: The dependent variables are the inventory leanness and capacity management of the *focal* firm. The *focal* firm can be leader firm or challenger firm depending upon the direction of analysis.

Independent Variable: The independent variables are the past inventory leanness and past capacity management of the *rival* firm. Again, the *rival* firm can be leader firm or challenger firm depending upon the direction of analysis.

Moderator Variable: Moderator variables are market share gap, industry growth and industry concentration.

Control Variable: Control variables are firm size, barriers to entry and diversification of firms.

The unexplained variation in the model is represented by ε which is the error term.

These are represented in the form of following four equations.

Inventory Leanness of the Leader Firm= β0 + β1 Inventory Leanness of the Challenger Firm in the previous year + β2 Market Share Gap + β3 Industry Growth + β4 Industry Concentration + β5 Inventory Leanness of the Challenger Firm in the previous year * Market Share Gap + β6 Inventory Leanness of the Challenger Firm in the previous year * Industry Growth + β7 Inventory Leanness of the Challenger Firm in the previous year * Industry Concentration + β8Firm Size + β9 Barriers to entry +Diversification+ ε

Inventory Leanness of the Challenger Firm= β0 + β1 Inventory Leanness of the Leader Firm in the previous year + β2 Market Share Gap + β3 Industry Growth + β4 Industry Concentration + β5 Inventory Leanness of the Leader Firm in the previous year * Market Share Gap + β6 Inventory Leanness of the Leader Firm in the previous year * Industry Growth + β7 Inventory Leanness of the Leader Firm in the previous year * Industry Concentration + β8 Firm Size + β9 Barriers to entry + Diversification+ ε

Capacity Position of the Leader Firm= β0 + β1 Capacity Position of the Challenger Firm in the previous year + β2 Market Share Gap + β3 Industry Growth + β4 Industry Concentration + β5 Capacity Position of the Challenger Firm in the previous year * Market Share Gap + β6 Capacity Position of the Challenger Firm in the previous year * Industry Growth + β7 Capacity Position of the Challenger Firm in the previous year * Industry Concentration + β8 Firm Size + β9 Barriers to entry + Diversification+ ε

Capacity Position of the Challenger Firm= β0 + β1 Capacity Position of the Leader Firm in the previous year + β2 Market Share Gap + β3 Industry Growth + β4 Industry Concentration

+ β5 Capacity Position of the Leader Firm in the previous year * Market Share Gap + β6 Capacity Position of the Leader Firm in the previous year * Industry Growth + β7 Capacity Position of the Leader Firm in the previous year * Industry Concentration + β8 Firm Size + β9 Barriers to entry + Diversification+ ε

The above is a representation of the full model. Breaking it down into smaller chunks to represent the hypotheses mentioned in chapter 2, the regressions will appear as follows.

Hypothesis 1: Inventory Leanness of the *focal* Firm= β0 + β1 Inventory Leanness of the rival Firm in the previous year + β2Firm Size + β3 Barriers to entry + β4Diversification+ ε

Hypothesis 1a: Inventory Leanness of the Leader Firm= β0 + β1 Inventory Leanness of the Challenger Firm in the previous year + β2Firm Size + β3 Barriers to entry + β4 Diversification+ ε

Hypothesis 1b: Inventory Leanness of the Challenger Firm= β0 + β1 Inventory Leanness of the Leader Firm in the previous year + β2 Firm Size + β3 Barriers to entry + β4 Diversification+ ε

Hypothesis 2 : Capacity Position of the *focal* Firm= β0 + β1 Capacity Position of the *rival* Firm in the previous year + β2 Firm Size + β3 Barriers to entry + β4 Diversification+ ε

Hypothesis 2a: Capacity Position of the Leader Firm= β0 + β1 Capacity Position of the Challenger Firm in the previous year + β2 Firm Size + β3 Barriers to entry + β4 Diversification+ ε

Hypothesis 2b: Capacity Position of the Challenger Firm= β0 + β1 Capacity Position of the Leader Firm in the previous year + β2 Firm Size + β3 Barriers to entry + β4 Diversification+ ε

Hypothesis 3: Inventory Leanness of the *focal* Firm= β0 + β1 Inventory Leanness of the *rival* Firm in the previous year + β2 Industry Growth + β3 Inventory Leanness of the *rival* Firm in the previous year * Industry Growth + β4Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 3a: Inventory Leanness of the Leader Firm= β0 + β1 Inventory Leanness of the Challenger Firm in the previous year + β2 Industry Growth + β3 Inventory Leanness of the Challenger Firm in the previous year * Industry Growth + β4Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 3b: Inventory Leanness of the Challenger Firm= β0 + β1 Inventory Leanness of the Leader Firm in the previous year + β2 Industry Growth + β3 Inventory Leanness of the Leader Firm in the previous year * Industry Growth + β4Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 4: Capacity Position of the *focal* Firm= β0 + β1 Capacity Position of the *rival* Firm in the previous year + β2 Industry Growth + β3 Capacity Position of the *rival* Firm in the previous year * Industry Growth + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 4a: Capacity Position of the Leader Firm= β0 + β1 Capacity Position of the Challenger Firm in the previous year + β2 Industry Growth + β3 Capacity Position of the challenger Firm in the previous year * Industry Growth + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 4b: Capacity Position of the Challenger Firm= β0 + β1 Capacity Position of the Leader Firm in the previous year + β2 Industry Growth + β3 Capacity Position of the Leader Firm in the previous year * Industry Growth + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 5: Inventory Leanness of the *focal* Firm= β0 + β1 Inventory Leanness of the *rival* Firm in the previous year + β2 Market Share Gap + β3 Inventory Leanness of the *rival* Firm in the previous year * Market Share Gap + β4Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 5a: Inventory Leanness of the Leader Firm= β0 + β1 Inventory Leanness of the Challenger Firm in the previous year + β2 Market Share Gap + β3 Inventory Leanness of the

Challenger Firm in the previous year * Market Share Gap + β4Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 5b: Inventory Leanness of the Challenger Firm= β0 + β1 Inventory Leanness of the Leader Firm in the previous year + β2 Market Share Gap + β3 Inventory Leanness of the Leader Firm in the previous year * Market Share Gap + β4Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 6: Capacity Position of the *focal* Firm= β0 + β1 Capacity Position of the *rival* Firm in the previous year + β2 Market Share Gap + β3 Capacity Position of the *rival* Firm in the previous year * Market Share Gap + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 6a: Capacity Position of the Leader Firm= β0 + β1 Capacity Position of the Challenger Firm in the previous year + β2 Market Share Gap + β3 Capacity Position of the Challenger Firm in the previous year * Market Share Gap + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 6b: Capacity Position of the Challenger Firm= β0 + β1 Capacity Position of the Leader Firm in the previous year + β2 Market Share Gap + β3 Capacity Position of the Leader Firm in the previous year * Market Share Gap + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 7: Inventory Leanness of the *focal* Firm= β0 + β1 Inventory Leanness of the *rival* Firm in the previous year + β2 Industry Concentration + β3 Inventory Leanness of the *rival* Firm in the previous year * Industry Concentration + β4Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 7a: Inventory Leanness of the Leader Firm= β0 + β1 Inventory Leanness of the Challenger Firm in the previous year + β2 Industry Concentration + β3 Inventory Leanness

of the Challenger Firm in the previous year * Industry Concentration + β4Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 7b: Inventory Leanness of the Challenger Firm= β0 + β1 Inventory Leanness of the Leader Firm in the previous year + β2 Industry Concentration + β3 Inventory Leanness of the Leader Firm in the previous year * Industry Concentration + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 8: Capacity Position of the *focal* Firm= β0 + β1 Capacity Position of the *rival* Firm in the previous year + β2 Industry Concentration + β3 Capacity Position of the *rival* Firm in the previous year * Industry Concentration + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 8a: Capacity Position of the Leader Firm= β0 + β1 Capacity Position of the Challenger Firm in the previous year + β2 Industry Concentration + β3 Capacity Position of the Challenger Firm in the previous year * Industry Concentration + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 8b: Capacity Position of the Challenger Firm= β0 + β1 Capacity Position of the Leader Firm in the previous year + β2 Industry Concentration + β3 Capacity Position of the Leader Firm in the previous year * Industry Concentration + β4 Firm Size + β5 Barriers to entry + β6 Diversification+ ε

Hypothesis 9: Financial position of the firm= β0 + β1 Inventory position of the firm+ β2 Industry+ ε

Hypothesis 10: Financial position of the firm= β0 + β1 Capacity position of the firm+ β2 Industry+ ε

The models containing the independent variables, moderators and control variables and the dependent variable are tested. The bivariate correlations are seen among the independent variables, moderators and control variables to see if there is any problem of severe multi collinearity. The OLS regressions are run to test the significance of the variables at 1%, 5% and 10% significance levels. The value of the coefficient of determination (R-squared) are analyzed for all the equations to see if sufficient variability is explained by the model to establish results. The moderation effects are seen and analyzed. All the hypotheses are tested to see which one among those hold true. Stata is the statistical package that is used to run the tests primarily because stata is more users friendly and accurate with higher flexibility to run multiple tests when analyzing panel data in econometrics.

Chapter 4

Analysis

4.1 Analysis Overview

While, in general, an econometric analysis is highly important to investigate and establish the hypothesized relationships where the two way relationship should be examined with multiple years (t) and multiple number of companies (i), very few researches in the past seem to have taken steps in that direction. Longitudinal studies with the use of panel data should be done to see how over several industries and with multiple years of timeline, the operationalized constructs work. Hofer, Cantor and Dai (2012) is one of the recent papers where they looked at this competitive rivalry among the top two firms (leader and challenger) in context to the environmental management investments. This dyadic research where the impact of two firms involved in a competitive rivalry, even at the cost of their own profit, is tested using years from 2000 through 2010 and for 40 industries ending in a total sample size of 218. The other observations are lost due to the missing values while running the regressions for different hypotheses. This is explained in greater detail in the data section in chapter 3. Thus, the two main effects hypotheses related to the two-way imitation and competitive behaviors in context to inventory management and capacity management are tested. This is followed by the testing of the three moderator hypotheses with the moderators industry growth, market share difference and industry concentration for both the inventory management and capacity management of the top two firms across these 40 industries. Finally, whether, the firms are a leader or a challenger, their impact on financial performance is examined. Careful consideration has been provided to ensure the use of appropriate operationalization for these constructs and to properly represent those relationships in the form of multiple hypotheses to yield a high reliability in construct validity. It has been

indicated that the extraneous factors not caught in the hypothesis but which are the part of the construct can give biased results. To establish the nomological validity and see if the hypothesized relationships hold true, this chapter is laid out here presenting the results of the tests and analyzing it for all hypotheses on an individual basis.

The remaining of this chapter is presented as follows. The next section deals with the detailed analysis of results to see if the hypotheses presented hold and are supported along with a detailed discussion of the reasons and the explanations and then finally a concluding summary of analysis followed by the tabulated summary chart of the hypotheses results.

4.2 Results

This section deals with the discussion and analysis of the results of all the hypotheses.

4.2.1: Hypothesis 1

In hypothesis 1, I am looking at the impact of the rival firm's past inventory leanness (mean_inv_o~3) on the focal firm's inventory leanness (dintof). The control variables in this regression are firm size operationalized by number of employees (lnemp), barriers to entry (barrier) and diversification operationalized by GEI (sdiv) and number of segments a firm possesses (Nseg). Two separate regressions were run, one with GEI (sdiv) as an operationalization for diversification, and another with number of segments a firm has (Nseg) as the operationalization for diversification. As we can see from the following two tables 4-1 and 4-2, there is not much difference using one or the another as the proxy. The number of observations in both the cases is 200; the loss of 18 observations is as a result of missing value in any of the variables. The F-value is 2.72 and the p-value of the F test is 0.0000 indicating a strong significance of the model. The coefficient of determination, R-squared, is 50.30% indicating that 50.30% of the variability

in the inventory performance of the focal firm is explained by the inventory performance of the rival firm from the previous year after controlling for firm size, barriers to entry and diversification and this is indicated with strong significance (pvalue = 0.0000). The pvalue of the t-test for the rival firm's lagged inventory performance, as shown below, is 0.0000 showing that the variable is strongly significant. The coefficients are different with very closer margins from using Nseg with sdiv as measures for diversification, so representing the above hypothesis with sdiv, we can present the predicted value of dintoof as under examination as follows.

Dintof hat= .5050043 mean_inv_o~3 - .0927769 lnemp + .0000453 barrier +.0466133 sdiv

Interpreting the coefficient, it can be said that keeping other factors constant a unit change in the inventory performance of the rival firm in the previous year changes the inventory performance of the focal firm by .5050043 units.

Table 4-1 Hypothesis 1 with sdiv

dintof	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_inv_o~3	.5050043	.1267881	3.98	0.000	.2544128	.7555958
lnemp	-.0927769	.0384746	-2.41	0.017	-.1688204	-.0167334
barrier	.0000453	.0000822	0.55	0.583	-.0001172	.0002078
sdiv	.0466133	.160191	0.29	0.771	-.2699978	.3632245

Table 4-2 Hypothesis 1 with Nseg

dintof	Coef.&	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_inv_o~3	.507096	.1264294	4.01	0.000	.2572134	.7569787
lnemp	-.0932975	.0378915	-2.46	0.015	-.1681886	-.0184064
barrier	.0000453	.0000821	0.55	0.582	-.0001171	.0002077
NSeg	.0153709	.0446901	0.34	0.731	-.0729573	.1036992

It was also found interesting to see the effects of competitive rivalry of the firms as two one sided relationship and thus hypothesis 1a and 1b are created; the results of whose are presented and analyzed below.

4.2.1.1: Hypothesis 1a

Here, the challenger firm's lagged inventory performance's impact (intd2) is tested on the leader firm's inventory performance (intd0). This is a one sided test. The control variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yield results with almost no difference as shown below in table 4-3 and 4-4 so the researcher thought interpreting anyone would suffice the purpose. The model is highly insignificant, the R-squared is 0.2681 and the t test is insignificant, as shown below. The sign of the coefficient is negative but since it is insignificant to such a higher level, it yields no practical meaning.

Table 4-3 Hypothesis 1a with sdiv

intd0	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd2	-.0516863	.090285	-0.57	0.568	-.2301308	.1267583
lnemp	.0018005	.0063989	0.28	0.779	-.0108466	.0144476
barrier	-.0000183	.0000137	-1.34	0.182	-.0000454	8.68e-06
sdiv	.0180444	.0265261	0.68	0.497	-.0343834	.0704721

Table 4-4 Hypothesis 1a with Nseg

intd0	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd2	-.0487267	.0902612	-0.54	0.590	-.2271242	.1296709
lnemp	.002932	.0062921	0.47	0.642	-.0095042	.0153681
barrier	-.0000179	.0000137	-1.31	0.192	-.000045	9.10e-06
NSeg	.002503	.0074193	0.34	0.736	-.0121609	.017167

4.2.1.2: Hypothesis 1b

Here, the leader firm's lagged inventory performance's impact (intd) is tested on the challenger firm's inventory performance (intd01). This is a one sided test. The control variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using the number of segments (Nseg) and both of them yield results with almost no difference as shown in table 4-5 and 4-6 so the researcher thought interpreting anyone would suffice the purpose. The model is highly significant with F-value of 2.93 and the p-value of the F test as 0.0000, the R-squared is 52.14%. The t-test is highly significant with a pvalue of 0.0000, as shown below. The R-squared of 52.14% indicates that 52.14% of the variability in the challenger firm's inventory performance is explained by the lagged inventory performance of the leader firm controlling for firm size, diversification and barriers to entry.

Hence, hypothesis 1 b can be summarized as follows where the predicted value of challenger firm's inventory performance is the response variable.

Intd01 hat= .4725728 intd -.0978536 lnemp+ .0000562 barrier+ .0426117 sdiv

Table 4-5 Hypothesis 1b with sdiv

intd01	Coef.&	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd	.4725728	.128672	3.67	0.000	.2182578	.7268879
lnemp	-.0978536	.0374993	-2.61	0.010	-.1719695	-.0237377
barrier	.0000562	.00008	0.70	0.484	-.0001019	.0002143
sdiv	.0426117	.1557528	0.27	0.785	-.2652274	.3504507

Table 4-6 Hypothesis 1b with Nseg

intd01	Coef.&	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd	.4744993	.128412	3.70	0.000	.2206981	.7283004
lnemp	-.0987119	.0369522	-2.67	0.008	-.1717464	-.0256773
barrier	.000056	.0000799	0.70	0.484	-.0001019	.000214
NSeg	.0150407	.0434872	0.35	0.730	-.0709099	.1009913

4.2.2: Hypothesis 2

In hypothesis 2, I am looking at the impact of the rival firm's past capacity position (mean_cap_o~3) on the focal firm's inventory leanness (dppe). The control variables in this regression are firm size operationalized by number of employees (lnemp), barriers to entry (barrier) and diversification operationalized by GEI (sdiv) and number of segments a firm has (Nseg). Two separate regressions were run one with GEI (sdiv) as an operationalization for diversification and another with number of segments a firm has (Nseg) as the operationalization for diversification. As we can see in tables 4-7 and 4-8, there are not much difference using one or the another as the proxy. The number of observations in both the cases is 205; the loss of 13 observations is as a result of missing value in any of the variables. The coefficient of determination, R-squared, is 15.54% indicating that 15.54% of the variability in the capacity position of the focal firm is explained by the inventory performance of the rival firm from the previous year after controlling for firm size, barriers to entry and diversification. The p-value of the t-test for the rival firm's lagged capacity position, as shown below, is 0.003 showing that the variable is strongly significant. The coefficients are different with very closer margins from using Nseg with sdiv as measures for diversification, so representing the above hypothesis with say sdiv, we can present the predicted value of dppe as under.

Dppe hat= .2469084 mean_cap_o~3+ .0241487 lnemp + 6.63e-07 barrier - .1778276 sdiv

Interpreting the coefficient, it can be said that keeping other factors constant a unit change in the capacity of the rival firm in the previous year changes the inventory performance of the focal firm by .2469084 units.

Table 4-7 Hypothesis 2 with sdiv

dppe	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_cap_o~3	.2469084	.0832056	2.97	0.003	.0825109	.411306
lnemp	.0241487	.0190618	1.27	0.207	-.0135136	.061811
barrier	6.63e-07	.0000433	0.02	0.988	-.0000849	.0000862
sdiv	-.1778276	.0848678	-2.10	0.038	-.3455093	-.0101458

Table 4-8 Hypothesis 2 with Nseg

dppe	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_cap_o~3	.2515104	.0826439	3.04	0.003	.0882226	.4147981
lnemp	.0264234	.0185179	1.43	0.156	-.0101642	.0630109
barrier	1.39e-06	.0000429	0.03	0.974	-.0000835	.0000863
NSeg	-.0611415	.0235857	-2.59	0.010	-.1077421	-.014541

It was also found interesting to see the effects of competitive rivalry of the firms in the capacity management strategic decision making as two one sided relationships and thus hypothesis 2a and 2b are created; the results of whose are presented and analyzed below.

4.2.2.1: Hypothesis 2a

Here, the challenger firm's lagged capacity position's impact (cap2) is tested on the leader firm's capacity position (cap0). This is a one sided test. The control variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yield results with almost no difference as shown in the tables 4-9 and 4-10 below so the researcher thought interpreting anyone would suffice the purpose. The model is highly insignificant, the R-squared is 0.2318 and the t-test is highly insignificant as well as shown below. The sign of the coefficient is negative but since it is insignificant to such a higher level, it yields no practical meaning.

Table 4-9 Hypothesis 2a with sdiv

cap0	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap2	-.0486796	.0722232	-0.67	0.501	-.1913781	.0940189
lnemp	.0161561	.0131586	1.23	0.221	-.0098427	.042155
barrier	-.0000169	.0000301	-0.56	0.574	-.0000763	.0000425
sdiv	-.1083861	.0588867	-1.84	0.068	-.2247343	.0079622

Table 4-10 Hypothesis 2a with Nseg

cap0	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap2	-.0434627	.0714635	-0.61	0.544	-.1846602	.0977347
lnemp	.0192389	.0127461	1.51	0.133	-.0059449	.0444227
barrier	-.0000158	.0000297	-0.53	0.596	-.0000745	.0000429
NSeg	-.0420299	.0163032	-2.58	0.011	-.0742417	-.0098182

4.2.2.2: Hypothesis 2b

Next, the leader firm's lagged capacity position's impact (cap) is tested on the challenger firm's capacity position (cap01). This is a one sided test. The control variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yield results with almost no difference as shown in the tables 4-11 and 4-12 below so the researcher thought interpreting anyone would suffice the purpose. The model is highly insignificant, the R-squared is 0.1918 and the t-test is highly insignificant as well, as shown below. The sign of the coefficient is negative but since it is insignificant to such a higher level, it yields no practical meaning.

Table 4-11 Hypothesis 2b with sdiv

cap01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap	-.010279	.095597	-0.11	0.915	-.1991594	.1786014
lnemp	.0097702	.0127325	0.77	0.444	-.0153866	.034927
barrier	.0000104	.000029	0.36	0.720	-.0000469	.0000676
sdiv	-.0558589	.0567604	-0.98	0.327	-.168006	.0562882

Table 4-12 Hypothesis 2b with Nseg

cap01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap	-.007075	.0955294	-0.07	0.941	-.1958219	.1816719
lnemp	.0083188	.0124674	0.67	0.506	-.0163143	.0329519
barrier	9.89e-06	.000029	0.34	0.733	-.0000474	.0000672
NSeg	-.0131614	.0158703	-0.83	0.408	-.0445179	.0181952

4.2.3. Hypothesis 3

The relationships of the focal and rival firms are next introduced with the moderator industry growth (ind_growth). The moderator which is the interaction term of the lagged inventory position and industry growth is abbreviated as inv_riv_in~h. A positive coefficient is expected of the variable inv_riv_in~h. The regression is run where the inventory position of the focal firm (dintof) is regressed against the inventory position of the rival firm (mean_inv_o~3), industry growth (ind_growth) and the moderator term inv_riv_in~hNext, with the control variables firm size (lnemp), barrier and diversification. This is a two sided moderated test. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yield results with almost no difference as shown in the tables below 2-13 and 2-14 so the researcher thought interpreting either one would suffice the purpose. The model is highly significant with the value of F as 3.06 and the p-value of the F-test as 0.0000. The p-value of the t-test of the moderator term is 0.001 which is significant with respect to the traditionally used 5% level of significance. The coefficient of determination, R-squared, is .5449. The sign of the coefficient is positive and hence this hypothesis is fully supported. R-squared of 54.49% indicates that 54.49% of the variability of the inventory position of the focal firm is explained by this model, which is significant at the p-value of 0.0000. The coefficient of the moderator term is 4.33 meaning if the industry growth is 1 unit and the inventory performance of the rival firm increases by 1 units in the previous year, then the

inventory performance of the focal firm increases by 4.33 units keeping other factors constant. The regression equation is represented as follows on the basis of the results given in the following table.

Dintof= .1938566 mean_inv_o~3 + .6600579 ind_growth+ 4.330166 inv_riv_in~h- .0949656 lnemp -.0000126 barrier + .0696627 sdiv

Table 4-13 Hypothesis 3 with sdiv

dintof	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_inv_o~3	.1938566	.152511	1.27	0.206	-.1076106	.4953239
ind_growth	.6600579	.4182915	1.58	0.117	-.1667757	1.486891
inv_riv_in~h	4.330166	1.248923	3.47	0.001	1.861429	6.798902
lnemp	-.0949656	.0371118	-2.56	0.012	-.1683243	-.0216069
barrier	-.0000126	.0000819	-0.15	0.878	-.0001745	.0001492
sdiv	.0696627	.154651	0.45	0.653	-.2360347	.3753601

Table 4-14 Hypothesis 3 with Nseg

dintof	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_inv_o~3	.1962993	.1521203	1.29	0.199	-.1043957	.4969944
ind_growth	.6639831	.4183363	1.59	0.115	-.1629391	1.490905
inv_riv_in~h	4.339796	1.248882	3.47	0.001	1.871141	6.808451
lnemp	-.0959576	.0365444	-2.63	0.010	-.1681947	-.0237205
barrier	-.0000129	.0000818	-0.16	0.875	-.0001746	.0001487
NSeg	.0235322	.0431623	0.55	0.586	-.0617863	.1088508

4.2.3.1 Hypothesis 3a

After looking at the two way relationships, it was thought interesting to investigate how the moderator 'industry growth' affects the two one way relationships meaning the impact on challenger by leader and vice versa. Hence, the interaction of industry growth (ind_growth) and challenger firm's lagged inventory position (ind2) is created abbreviated as intd2_ind_~h whose impact is investigated on the leader firm's inventory leanness (intd0). This is a one sided test. The control variables stay the same. Again this is tested

with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yield results with almost no difference as shown in the tables 4-15 and 4-16 so the researcher thought interpreting either one would suffice the purpose. The model is highly insignificant, the R-squared is 0.2762 and the t-test of the interaction term is highly insignificant as well, as shown below. The sign of the coefficient is positive but since it is insignificant to such a higher level, this hypothesis is not supported.

Table 4-15 Hypothesis 3a with sdiv

intd0	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd2	-.0556491	.1008381	-0.55	0.582	-.254975	.1436769
ind_growth	.0894959	.0714597	1.25	0.212	-.051758	.2307497
intd2_ind_~h	.1688507	.6014211	0.28	0.779	-1.019974	1.357675
lnemp	.0013599	.0064357	0.21	0.833	-.0113614	.0140813
barrier	-.0000225	.0000141	-1.59	0.114	-.0000504	5.46e-06
sdiv	.0198083	.0265996	0.74	0.458	-.0327709	.0723875

Table 4-16 Hypothesis 3a with Nseg

intd0	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd2	-.0531343	.1009065	-0.53	0.599	-.2525954	.1463269
ind_growth	.0884387	.0715819	1.24	0.219	-.0530566	.229934
intd2_ind_~h	.1747328	.6024212	0.29	0.772	-1.016068	1.365534
lnemp	.002468	.0063367	0.39	0.697	-.0100577	.0149937
barrier	-.000022	.0000141	-1.56	0.122	-.00005	5.92e-0
NSeg	.003089	.0074454	0.41	0.679	-.0116283	.0178063

4.2.3.2 Hypothesis 3b

The industry growth (ind_growth) and leader firm's lagged inventory position (intd) are interacted to create a moderator which is abbreviated as intd_ind_g~h whose impact is investigated on the challenger firm's inventory leanness (intd01). A positive coefficient is expected of the variable intd01. This is a one sided test. The control

variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yield results with almost no difference as shown in tables 4-17 and 4-18 so the researcher thought interpreting either one would suffice the purpose. The model is significant with the F-value of 3.15 and the p-value of the F-test is 0.0000. The R-squared value is 55.21% meaning 55.21% of the variability of the inventory position of the challenger firm is explained by this model, which is significant at the p-value of 0.0000. The p-value of the t test of the moderator term is 0.003 which is significant with respect to the traditionally used 5% level of significance. The sign of the coefficient is positive. The coefficient of the moderator term is 3.93 meaning if the industry growth is 1 unit and the inventory performance of the leader firm increases by 1 units in the previous year then the inventory performance of the challenger firm increases by 3.93 units keeping other factors constant. This hypothesis is fully supported. The regression equation is represented as follows on the basis of the results given in the following table

Intd01= .1944411 intd + .4892277 ind_growth+ 3.938464 intd_ind_g~h -.0960169 lnemp +..0000196 barrier + .0613216 sdiv

Table 4-17 Hypothesis 3b with sdiv

intd01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd	.1944411	.1560462	1.25	0.215	-.1140143	.5028964
ind_growth	.4892277	.4106901	1.19	0.236	-.3225803	1.301036
intd_ind_g~h	3.938464	1.305175	3.02	0.003	1.358534	6.518394
lnemp	-.0960169	.0365907	-2.62	0.010	-.1683454	-.0236884
barrier	.0000196	.0000802	0.24	0.807	-.0001388	.000178
sdiv	.0613216	.1520661	0.40	0.687	-.2392664	.3619095

Table 4-18 Hypothesis 3b with Nseg

intd01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd	.1969563	.1557194	1.26	0.208	-.1108531	.5047657
ind_growth	.4922574	.4107051	1.20	0.233	-.3195802	1.304095
intd_ind_g~h	3.942597	1.304905	3.02	0.003	1.3632	6.5219
lnemp	-.0968947	.0360547	-2.69	0.008	-.1681637	-.0256257
barrier	.0000194	.0000801	0.24	0.809	-.0001389	.0001776
NSeg	.0206962	.042467	0.49	0.627	-.0632479	.1046404

4.2.4. Hypothesis 4

The impact of industry growth is investigated next in the relationship of leader and challenger firm's capacity position. The moderator which is the interaction term of the lagged capacity position of the rival firm and industry growth is abbreviated as cap_riv_in~h. A positive coefficient is expected of the variable cap_riv_in~h. The regression is run where the capacity position of the focal firm (dppe) is regressed against the capacity position of the rival firm (mean_cap_o~3), industry growth (ind_growth) and the moderator term cap_riv_in~h with the control variables firm size (lnemp), barrier and diversification. This is a two sided moderated test with number of observations is 205. Again this is tested with two regressions one using GEI as a proxy for diversification, the another one using the number of segments (Nseg) and both of them yielded results with almost no difference as shown in the tables 4-19 and 4-20 so the researcher thought interpreting either one would suffice the purpose. The model is highly insignificant, the R-squared is 0.1609 and the t-test is highly insignificant as well, as shown below. The sign of the coefficient is negative. It can be inferred that the hypothesis is not supported.

Table 4-19 Hypothesis 4 with sdiv

dppe	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_cap_o~3	.3087025	.1060564	2.91	0.004	.0991336	.5182714
ind_growth	.0865524	.2308027	0.38	0.708	-.3695168	.5426216
cap_riv_in~h	-.5057518	.550512	-0.92	0.360	-1.593571	.5820672
lnemp	.0239366	.019144	1.25	0.213	-.0138921	.0617654
barrier	-5.83e-07	.0000441	-0.01	0.989	-.0000877	.0000865
sdiv	-.1779897	.0852408	-2.09	0.038	-.3464268	-.0095527

Table 4-20 Hypothesis 4 with Nseg

dppe	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_cap_o~3	.3141795	.1053253	2.98	0.003	.1060552	.5223037
ind_growth	.0785246	.2291363	0.34	0.732	-.3742518	.5313009
cap_riv_in~h	-.5146375	.5464249	-0.94	0.348	-1.59438	.5651053
lnemp	.0262442	.018598	1.41	0.160	-.0105056	.0629941
barrier	4.29e-07	.0000437	0.01	0.992	-.000086	.0000869
NSeg	-.0612457	.0236954	-2.58	0.011	-.108068	-.014423

4.2.4.1. Hypothesis 4a

Again, after looking at the two way relationships, it was thought interesting to investigate how the moderator 'industry growth' affects the two one way relationships meaning the impact on challenger by leader and vice versa in the capacity position aspects. Hence, the interaction of industry growth (ind_growth) and challenger firm's lagged capacity position (cap2) is created abbreviated as cap2_ind_g~h whose impact is investigated on the leader firm's capacity position (cap0). This is a one sided test. The control variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the another one using the number of segments (Nseg) and both of them yielded results with almost no difference as shown in tables 4-21 and 4-22 below so the researcher thought interpreting anyone would suffice the purpose. The model is highly insignificant, the R-squared is 0.2328 and the t-test of the interaction term

is highly insignificant as well, as shown below. The sign of the coefficient is positive. Since it is insignificant for any practical values of level of significance, this hypothesis is not supported.

Table 4-21 Hypothesis 4a with sdiv

cap0	Coef	Std. Err.	t	P>|t|	Lower	Upper
cap2	-.0723973	.0921387	-0.79	0.433	-.2544646	.10967
ind_growth	.0220369	.1611159	0.14	0.891	-.2963303	.340404
cap2_ind_g~h	.2411533	.551949	0.44	0.663	-.8495052	1.331812
lnemp	.0158976	.0132571	1.20	0.232	-.0102985	.0420938
barrier	-.0000164	.0000307	-0.54	0.593	-.0000771	.0000442
sdiv	-.1048526	.0597647	-1.75	0.081	-.2229483	.0132432

Table 4-22 Hypothesis 4a with Nseg

cap0	Coef	Std. Err.	t	P>|t|	Lower	Upper
cap2	-.0660688	.0909363	-0.73	0.469	-.2457602	.1136226
ind_growth	.0152116	.1594873	0.10	0.924	-.2999375	.3303606
cap2_ind_g~h	.2278802	.5445148	0.42	0.676	-.8480881	1.303849
lnemp	.0191111	.0128378	1.49	0.139	-.0062566	.0444788
barrier	-.0000152	.0000304	-0.50	0.618	-.0000752	.0000448
NSeg	-.0412964	.0164989	-2.50	0.013	-.0738983	-.0086944

4.2.4.2. Hypothesis 4b

The interaction of industry growth (ind_growth) and leader firm's lagged capacity position (cap) is created abbreviated as cap_ind_gr~h whose impact is investigated on the challenger firm's capacity position (cap01). This is a one sided test. The control variables are the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the another one using the number of segments (Nseg) and both of them yielded results with almost no difference as shown in tables 4-23 and 4-24 below so the researcher thought interpreting either one would suffice the purpose. The model is highly insignificant, the R-squared is 0.1928 and the t-test of the interaction term is highly

insignificant as well, as shown below. The sign of the coefficient is negative. Since it is insignificant for any practical values of level of significance, this hypothesis is not supported.

Table 4-23 Hypothesis 4b with sdiv

cap01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap	.0161871	.1155348	0.14	0.889	-.2121112	.2444854
ind_growth	.0200905	.1550996	0.13	0.897	-.2863883	.3265694
cap_ind_gr~h	-.2285725	.544362	-0.42	0.675	-1.304239	.847094
lnemp	.0095681	.0128248	0.75	0.457	-.015774	.0349101
barrier	.0000113	.0000297	0.38	0.703	-.0000474	.0000701
sdiv	-.0528028	.0575539	-0.92	0.360	-.1665301	.0609245

Table 4-24 Hypothesis 4b with Nseg

cap01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap	.0219582	.1151198	0.19	0.849	-.20552	.249436
ind_growth	.0206437	.1552607	0.13	0.894	-.2861536	.3274409
cap_ind_gr~h	-.2522984	.5428756	-0.46	0.643	-1.325028	.8204309
lnemp	.0082234	.0125525	0.66	0.513	-.0165806	.0330274
barrier	.000011	.0000298	0.37	0.711	-.0000478	.0000698
NSeg	-.0124711	.0160391	-0.78	0.438	-.0441646	.0192224

4.2.5. Hypothesis 5

The relationships of the focal and rival firms are now introduced with the moderator market share difference (msharediff). The moderator which is the interaction term of the lagged inventory position (mean_inv_o~3) and market share difference is abbreviated as inv_riv_ms~f.. A negative coefficient is expected of the variable inv_riv_ms~f., as discussed in chapter 2. The regression is run where the inventory position of the focal firm (dintof) is regressed against the inventory position of the rival firm (mean_inv_o~3), market share difference (msharediff) and the moderator term inv_riv_ms~f with the control variables firm size (lnemp), barrier and diversification. This

is a two sided moderated test. Again this is tested with two regressions one using GEI as a proxy for diversification, the another one using the number of segments (Nseg) and both of them yielded results with almost no difference as shown in tables 4-25 and 4-26 below so the researcher thought interpreting either one would suffice the purpose. The overall model is significant with the value of F as 2.63 and the p-value of the F-test as 0.0000 with the number of observations as 199. The p-value of the t-test of the moderator term is 0.965 which is insignificant with respect to any practical used level of significance. The coefficient of determination, R-squared, is .5031. The sign of the coefficient is negative. R-squared of 50.31% indicates that 50.31% of the variability of the inventory position of the focal firm is explained by this model, which is significant at the p-value of 0.0000. The regression equation is represented as follows on the basis of the results given in the following table

Dintof= .5363013 mean_inv_o~3 -.1686686 msharediff -.0324453 inv_riv_in~h- .0949656 lnemp+ .0000309 barrier + .0460999 sdiv

The hypothesis, thus, is not supported.

Table 4-25 Hypothesis 5 with sdiv

dintof	Coef.&	Std. Err.	t	P>|t|	Lower	Upper
mean_inv_o~3	.5363013	.682643	0.79	0.433	-.8130738	1.885676
msharediff	-.1686686	.8653596	-0.19	0.846	-1.879218	1.541881
inv_riv_ms~f	-.0324453	.7350012	-0.04	0.965	-1.485317	1.420426
lnemp	-.0925883	.0391159	-2.37	0.019	-.1699085	-.0152682
barrier	.0000309	.0001124	0.27	0.784	-.0001913	.0002531
sdiv	.0460999	.1626666	0.28	0.777	-.2754418	.3676417

Table 4-26 Hypothesis 5 with Nseg

dintof	Coef.&	Std. Err.	t	P>|t|	Lower	Upper
mean_inv_o~3	.534679	.6810919	0.79	0.434	-.8116301	1.880988
msharediff	-.172809	.8653335	-0.20	0.842	-1.883307	1.537689
inv_riv_ms~f	-.0283477	.7344578	-0.04	0.969	-1.480145	1.423449
lnemp	-.0931922	.0385019	-2.42	0.017	-.1692986	-.0170857
barrier	.0000304	.0001124	0.27	0.787	-.0001917	.0002526
NSeg	.015393	.045365	0.34	0.735	-.0742798	.1050657

4.2.5.1. Hypothesis 5a

As shown in the previous hypothesis above, there is no moderation of market share difference found on the two sided relationship between the focal and rival firms in the area of inventory management. Next, it was investigated if individually the challenger firm has a moderated effect of market share difference on the leader firm's inventory position and vice versa. The interaction of market share difference (msharediff) and challenger firm's lagged inventory position (intd2) is created abbreviated as intd2_msha~f whose impact is investigated on the leader firm's inventory position (intd0). This is a one sided test. The control variables remains the same. Using GEI as a proxy for diversification, the p-value of the t-test is 0.05, as shown in table 4-27 below, which is significant at higher levels of significance. However, using the number of segments (Nseg) the p-value of the t-test is 0.02, as shown in the table 4-28, which is significant at the conventional 5% significance level. The model is highly insignificant; the R-squared is 0.2717. The sign of the coefficient is positive.

Table 4-27 Hypothesis 5a with sdiv

intd0	Coef.	Std. Err.	t	P>|t|	Lower	Upper
intd2	-.0728509	.1877829	-0.39	0.699	-.44404	.298338
msharediff	.1224097	.1438714	0.85	0.396	-.1619798	.4067992
intd2_msha~f	.0145013	.2854782	0.05	0.960	-.5498013	.5788039
lnemp	.0017391	.0064297	0.27	0.787	-.0109704	.0144487
barrier	-7.71e-06	.0000186	-0.42	0.679	-.0000444	.000029
sdiv	.0180201	.026777	0.67	0.502	-.0349098	.07095

Table 4-28 Hypothesis 5a with Nseg

intd0	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd2	-.0641468	.1877633	-0.34	0.733	-.4352971	.3070035
msharediff	.121956	.1440686	0.85	0.399	-.1628232	.4067352
intd2_msha~f	.0046041	.2858814	0.02	0.987	-.5604953	.5697036
lnemp	.002897	.0063229	0.46	0.648	-.0096014	.0153954
barrier	-7.31e-06	.0000186	-0.39	0.695	-.0000441	.0000295
NSeg	.002384	.0074925	0.32	0.751	-.0124264	.0171943

4.2.5.2. Hypothesis 5b

Here, the leader firm's lagged inventory performance's impact (intd) is tested on the challenger firm's inventory performance (intd01) with market share difference (msharediff) as the moderator. This is a one sided test. The control variables remain the same. GEI and Nseg yield almost very similar results as shown in the tables 4-29 and 4-30 below. The model is highly significant with F-value of 2.84 and p-value of the F-test as 0.0000, the R-squared is 52.16%. The t-test is highly significant. The R-squared of 52.16% indicates that 52.16% of the variability in the challenger firm's inventory performance is explained by the lagged inventory performance of the leader firm and the moderator controlling for firm size, diversification and barriers to entry.

Table 4-29 Hypothesis 5b with sdiv

intd01	Coef.&	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd	.6456275	.8413381	0.77	0.444	-1.017439	2.308694
msharediff	-.1374119	.8359256	-0.16	0.870	-1.78978	1.514956
intd_mshar~f	-.1858023	.8959858	-0.21	0.836	-1.95689	1.585286
lnemp	-.096915	.038044	-2.55	0.012	-.1721163	-.0217136
barrier	.0000456	.0001095	0.42	0.678	-.0001708	.0002619
sdiv	.0404899	.1572993	0.26	0.797	-.2704424	.3514222

Table 4-30 Hypothesis 5b with Nseg

intd01	Coef.&	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd	.6422306	.8407286	0.76	0.446	-1.019631	2.304092
msharediff	-.1414301	.8359901	-0.17	0.866	-1.793925	1.511065
intd_mshar~f	-.1801447	.8959785	-0.20	0.841	-1.951218	1.590929
lnemp	-.0978441	.0374912	-2.61	0.010	-.1719527	-.0237356
barrier	.000045	.0001094	0.41	0.682	-.0001713	.0002613
NSeg	.0145387	.0439365	0.33	0.741	-.0723102	.1013876

4.2.6. Hypothesis 6

The impact of market share difference is investigated next in the relationship of leader and challenger firm's capacity position. The moderator which is the interaction term of the lagged capacity position of the rival firm (mean_cap_o~3) and market share difference (msharediff) is abbreviated as cap_riv_ms~f. A negative coefficient is expected of the variable cap_riv_ms~f. The regression is run where the capacity position of the focal firm (dppe) is regressed against the capacity position of the rival firm (mean_cap_o~3), market share difference (msharediff) and the moderator term cap_riv_ms~f with the control variables firm size (lnemp), barrier and diversification. This is a two sided moderated test with number of observations is 201. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yielded results with almost no difference, as shown

in tables 4-31 and 4-32 below, so the researcher thought interpreting either one would suffice the purpose. The model is highly insignificant, the R-squared is 0.1668. The p-value of the t-test is .111 which is insignificant at 5% and 10% but significant at higher levels of significance.as well, as shown below. The sign of the coefficient is negative. It can be inferred that the hypothesis is not supported.

Table 4-31 Hypothesis 6 with sdiv

dppe	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_cap_o~3	.4261654	.1394702	3.06	0.003	.1505241	.7018067
msharediff	.1284524	.3613216	0.36	0.723	-.5856439	.8425487
cap_riv_ms~f	-.4923854	.3074401	-1.60	0.111	-1.099993	.1152226
lnemp	.0261404	.0198432	1.32	0.190	-.0130767	.0653575
barrier	.0000108	.0000571	0.19	0.850	-.0001021	.0001237
sdiv	-.1621599	.086333	-1.88	0.062	-.3327838	.0084639

Table 4-32 Hypothesis 6 with Nseg

dppe	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_cap_o~3	.43276	.1381681	3.13	0.002	.1596921	.705828
msharediff	.1364907	.3586259	0.38	0.704	-.572278	.8452594
cap_riv_ms~f	-.4976903	.3040108	-1.64	0.104	-1.098521	.1031401
lnemp	.0288713	.0193406	1.49	0.138	-.0093524	.067095
barrier	.0000124	.0000567	0.22	0.828	-.0000996	.0001244
NSeg	-.0570806	.023924	-2.39	0.018	-.1043628	-.0097985

4.2.6.1. Hypothesis 6a

After looking at the two way relationships, it was thought interesting to investigate how the moderator 'market share difference' affects the two one way relationships meaning the impact on challenger by leader and vice versa in the capacity position aspects. Hence, the interaction of market share difference (msharediff) and challenger firm's lagged capacity position (cap2) is created abbreviated as cap2_mshar~f whose

impact is investigated on the leader firm's capacity position (cap0). This is a one sided test. The control variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yielded results with almost no difference, as shown in tables 4-33 and 4-34 below, so the researcher thought interpreting anyone would suffice the purpose. The model is highly insignificant, the R-squared is 0.2446 and the t-test of the interaction term is highly insignificant as well, as shown below. The sign of the coefficient is negative, as expected. This hypothesis is not supported.

Table 4-33 Hypothesis 6a with sdiv

cap0	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap2	.0390663	.1207519	0.32	0.747	-.1995811	.2777138
msharediff	.3174078	.250173	1.27	0.207	-.1770204	.811836
cap2_mshar~f	-.2031123	.2360825	-0.86	0.391	-.6696929	.2634684
lnemp	.0169719	.0137418	1.24	0.219	-.0101866	.0441305
barrier	.0000162	.0000397	0.41	0.684	-.0000623	.0000947
sdiv	-.1065646	.060182	-1.77	0.079	-.225505	.0123758

Table 4-34 Hypothesis 6a with Nseg

cap0	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap2	.0410943	.1193596	0.34	0.731	-.1948015	.27699
msharediff	.3254899	.2474021	1.32	0.190	-.1634621	.8144419
cap2_mshar~f	-.1948328	.2327344	-0.84	0.404	-.6547964	.2651309
lnemp	.0203396	.0133398	1.52	0.129	-.0060244	.0467036
barrier	.0000182	.0000393	0.46	0.644	-.0000594	.0000958
NSeg	-.0420083	.0166114	-2.53	0.013	-.074838	-.009178

4.2.6.2. Hypothesis 6b

The interaction of market share difference (msharediff) and leader firm's lagged capacity position (cap) is created abbreviated as cap_mshare~f whose impact is investigated on the challenger firm's capacity position (cap01). This is a one sided test.

The control variables are the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yield results with almost no difference, as shown in tables 4-35 and 4-36, so the researcher thought interpreting either one would suffice the purpose. The model is highly insignificant, the R-squared is 0.2013 and the t-test of the interaction term is highly insignificant as well, as shown below. The sign of the coefficient is negative, as expected. This hypothesis is not supported.

Table 4-35 Hypothesis 6b with sdiv

cap01	Coef.	Std. Err.	T	P>|t|	Lower CI	Upper CI
cap	-.0172028	.1729097	-0.10	0.921	-.3589322	.3245266
msharediff	-.2921029	.2429765	-1.20	0.231	-.7723084	.1881026
cap_mshare~f	-.0031003	.4315202	-0.01	0.994	-.8559334	.8497328
lnemp	.0101267	.0133451	0.76	0.449	-.0162478	.0365011
barrier	-.0000204	.0000383	-0.53	0.594	-.0000961	.0000552
sdiv	-.0519184	.0575608	-0.90	0.369	-.1656785	.0618417

Table 4-36 Hypothesis 6b with Nseg

cap01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap	-.0130024	.1730521	-0.08	0.940	-.3550133	.3290084
msharediff	-.2953627	.2430926	-1.22	0.226	-.7757977	.1850723
cap_mshare~f	-.007138	.4321613	-0.02	0.987	-.8612381	.8469621
lnemp	.0087782	.0131006	0.67	0.504	-.0171131	.0346695
barrier	-.0000212	.0000383	-0.56	0.580	-.0000969	.0000544
NSeg	-.0121997	.0161199	-0.76	0.450	-.0440581	.0196587

4.2.7. Hypothesis 7

The relationships of the focal and rival firms are now introduced with the moderator industry concentration (hhi_s). The moderator which is the interaction term of the lagged inventory position (mean_inv_o~3) and industry concentration is abbreviated as 'hinv'. A negative coefficient is expected of the variable hinv, as discussed in chapter 2. The regression is run where the inventory position of the focal firm (dintof) is regressed

against the inventory position of the rival firm (mean_inv_o~3), industry concentration (hhi_s) and the moderator term hinv with the control variables firm size (lnemp), barrier and diversification. This is a two sided moderated test. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yielded results with almost no difference, as shown in tables 4-37 and 4-38, so the researcher thought interpreting either one would suffice the purpose. The overall model is significant with the value of F as 2.6 and the p value of the F test as 0.0000 with the number of observations as 200. The p value of the t test of the moderator term is 0.709 which is insignificant with respect to any practical used level of significance. The coefficient of determination, R-squared, is .50. The sign of the coefficient is negative, as expected. R-squared of 50% indicates that 50% of the variability of the inventory position of the focal firm is explained by this model, which is significant at the p value of 0.0000. The hypothesis, thus, is not supported.

Table 4-37 Hypothesis 7 with sdiv

dintof	Coef.&	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_inv_o~3	.8982784	1.050302	0.86	0.394	-1.177846	2.974403
hhi_s	-.8648793	1.938266	-0.45	0.656	-4.696235	2.966477
hinv	-.4204739	1.126055	-0.37	0.709	-2.646337	1.805389
lnemp	-.0901311	.039469	-2.28	0.024	-.1681491	-.0121132
barrier	.0000276	.0000956	0.29	0.773	-.0001614	.0002166
sdiv	.0390323	.1629421	0.24	0.811	-.2830542	.3611187

Table 4-38 Hypothesis 7 with Nseg

dintof	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_inv_o~3	.8977587	1.044918	0.86	0.392	-1.167722	2.963239
hhi_s	-.8867001	1.939643	-0.46	0.648	-4.720778	2.947378
hinv	-.4179684	1.121554	-0.37	0.710	-2.634935	1.798999
lnemp	-.0911408	.03877	-2.35	0.020	-.1677772	-.0145043
barrier	.0000269	.0000956	0.28	0.779	-.0001622	.0002159
NSeg	.0143611	.0453317	0.32	0.752	-.0752456	.1039679

4.2.7.1. Hypothesis 7a

As shown in the previous hypothesis above, there is no moderation of industry concentration found on the two sided relationship between the focal and rival firms in the area of inventory management. Next, it was investigated if individually the challenger firm has a moderated effect of industry concentration on the leader firm's inventory position and vice versa. The interaction of industry concentration (hhi_s) and challenger firm's lagged inventory position (intd2) is created abbreviated as intd2_ind_~c whose impact is investigated on the leader firm's inventory position (intd0). This is a one sided test. The control variables stay the same. Using GEI as a proxy for diversification, the p-value of the t-test is .65, as shown in 4-39, which is insignificant at any practically used levels of significance. Similarly, using the number of segments (Nseg) the p-value of the t-test is .66, as shown in 4-40, which is also insignificant. The model is highly insignificant; the R-squared is 0.2722. The sign of the coefficient is positive.

Table 4-39 Hypothesis 7a with sdiv

intd0	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd2	-.2401299	.403145	-0.60	0.552	-1.037023	.5567637
hhi_s	.248189	.3219772	0.77	0.442	-.3882609	.8846389
intd2_ind_~c	.2474281	.5445083	0.45	0.650	-.8288973	1.323753
lnemp	.0019671	.0064375	0.31	0.760	-.0107578	.0146921
barrier	-.0000125	.0000158	-0.79	0.429	-.0000437	.0000187
sdiv	.0183053	.0266715	0.69	0.494	-.0344159	.0710266

Table 4-40 Hypothesis 7a with Nseg

intd0	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd2	-.2304377	.4035794	-0.57	0.569	-1.02819	.5673146
hhi_s	.2469701	.3226999	0.77	0.445	-.3909084	.8848485
intd2_ind_~c	.2383165	.545299	0.44	0.663	-.8395718	1.316205
lnemp	.003156	.0063315	0.50	0.619	-.0093595	.0156715
barrier	-.0000121	.0000158	-0.77	0.445	-.0000434	.0000191
NSeg	.0024077	.0074689	0.32	0.748	-.012356	.0171714

4.2.7.2. Hypothesis 7b

Here, the leader firm's lagged inventory performance's impact (intd) is tested on the challenger firm's inventory performance (intd01) with industry concentration (hhi_s) as the moderator. This is a one sided test. The control variables stay the same. GEI and Nseg yielded almost very similar results as shown in the tables 4-41and 4-42 below. The model is highly significant with F-value of 2.8 and p-value of the F-test as 0.0000, the R-squared is 52.30%. The t-test is highly insignificant. The R-squared of 52.16% indicates that 52.16% of the variability in the challenger firm's inventory performance is explained by the lagged inventory performance of the leader firm and the moderator controlling for firm size, diversification and barriers to entry. This hypothesis is not supported.

Table 4-41 Hypothesis 7b with sdiv

intd01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
intd	1.120711	1.193123	0.94	0.349	-1.237726	3.479149
hhi_s	-.7803475	1.877309	-0.42	0.678	-4.491209	2.930514
intd_ind_c~c	-.6910441	1.269028	-0.54	0.587	-3.199522	1.817434
lnemp	-.0939353	.038463	-2.44	0.016	-.1699648	-.0179059
barrier	.0000404	.000093	0.43	0.664	-.0001434	.0002242
sdiv	.0333703	.1578618	0.21	0.833	-.2786739	.3454145

Table 4-42 Hypothesis 7b with Nseg

intd01	Coef.&	Std. Err.	t	P>|t|	Lower	Upper
intd	1.117225	1.18854	0.94	0.349	-1.232154	3.466603
hhi_s	-.8013308	1.878922	-0.43	0.670	-4.51538	2.912719
intd_ind_c~c	-.6856552	1.265131	-0.54	0.589	-3.18643	1.815119
lnemp	-.0953276	.0378177	-2.52	0.013	-.1700816	-.0205736
barrier	.0000396	.000093	0.43	0.671	-.0001443	.0002234
NSeg	.0136261	.0439956	0.31	0.757	-.0733395	.1005918

4.2.8. Hypothesis 8

The impact of industry concentration is investigated on the relationship of leader and challenger firm's capacity position. The moderator which is the interaction term of the lagged capacity position of the rival firm (mean_cap_o~3) and industry concentration (hhi_s) is abbreviated as hcap. A negative coefficient is expected of the variable as the literature suggests as described in chapter 2. The regression is run where the capacity position of the focal firm (dppe) is regressed against the capacity position of the rival firm (mean_cap_o~3), industry concentration (hhi_s) and the moderator term hcap with the control variables firm size (lnemp), barrier and diversification. This is a two sided moderated test with number of observations is 205. The model is highly insignificant; the R-squared is 0.1704. Using sdiv as the operationalization for the diversification, the p-value of the t-test is .106, as shown in table 4-43, which is insignificant at 5% and 10% but significant at higher levels of significance.as well, as shown below. However, using Nseg as the operationalization for the diversification, the pvalue of the t test is .095, as shown in table 4-44, which is insignificant at 5% but significant at 10% and higher levels of significance. The sign of the coefficient is negative, as expected.

Table 4-43 Hypothesis 8 with sdiv

dppe	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_cap_o~3	.8312622	.3683465	2.26	0.025	.1034047	1.55912
hhi_s	.1642519	.6611829	0.25	0.804	-1.142254	1.470758
hcap	-.9619272	.5917101	-1.63	0.106	-2.131154	.2072998
lnemp	.0249908	.0190262	1.31	0.191	-.0126052	.0625867
barrier	3.73e-06	.0000485	0.08	0.939	-.0000922	.0000996
sdiv	-.1584988	.0859742	-1.84	0.067	-.328385	.0113874

Table 4-44 Hypothesis 8 with Nseg

dppe	Coef	Std. Err.	t	P>|t|	Lower CI	Upper CI
mean_cap_o~3	.8477786	.3633191	2.33	0.021	.1298552	1.565702
hhi_s	.1964457	.6558636	0.30	0.765	-1.099549	1.492441
hcap	-.981044	.5833254	-1.68	0.095	-2.133703	.1716147
lnemp	.0281688	.0184915	1.52	0.130	-.0083706	.0647082
barrier	5.74e-06	.0000481	0.12	0.905	-.0000893	.0001008
NSeg	-.0576109	.0237297	-2.43	0.016	-.1045011	-.0107208

4.2.8.1. Hypothesis 8a

After looking at the two way relationships, it was thought interesting to investigate how the moderator 'industry concentration' affects the two one way relationships meaning the impact on challenger by leader and vice versa in the capacity position aspects. Hence, the interaction of industry concentration (hhi_s) and challenger firm's lagged capacity position (cap2) is created abbreviated as cap2_ind_c~c whose impact is investigated on the leader firm's capacity position (cap0). This is a one sided test. The control variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yielded results with almost no difference as shown in tables 4-45 and 4-46 so the researcher thought interpreting either one would suffice the purpose. The model is highly insignificant, the R-squared is 0.2396 and the t-test of the interaction term is highly insignificant as well, as shown below. The sign of the coefficient is negative, as expected. This hypothesis is not supported.

Table 4-45 Hypothesis 8a with sdiv

cap0	Coef	Std. Err.	t	P>|t|	Lower	Upper
cap2	.1860047	.2893147	0.64	0.521	-.3856849	.7576943
hhi_s	.4174521	.4576463	0.91	0.363	-.4868631	1.321767
cap2_ind_c~c	-.3711448	.4417111	-0.84	0.402	-1.243972	.5016821
lnemp	.0163577	.0131809	1.24	0.217	-.0096879	.0424032
barrier	-3.49e-06	.0000337	-0.10	0.918	-.0000702	.0000632
sdiv	-.1056761	.0598032	-1.77	0.079	-.2238481	.0124959

Table 4-46 Hypothesis 8a with Nseg

cap0	Coef	Std. Err.	t	P>|t|	Lower	Upper
cap2	.1827819	.2854062	0.64	0.523	-.3811845	.7467484
hhi_s	.444172	.4527181	0.98	0.328	-.4504049	1.338749
cap2_ind_c~c	-.3576257	.4352952	-0.82	0.413	-1.217775	.5025233
lnemp	.0196083	.0127662	1.54	0.127	-.0056178	.0448345
barrier	-1.43e-06	.0000334	-0.04	0.966	-.0000673	.0000645
NSeg	-.0418076	.0164861	-2.54	0.012	-.0743844	-.0092308

4.2.8.2. Hypothesis 8b

The interaction of industry concentration (hhi_s) and leader firm's lagged capacity position (cap) is created abbreviated as cap_ind_conc whose impact is investigated on the challenger firm's capacity position (cap01). This is a one sided test. The control variables stay the same. Again this is tested with two regressions one using GEI as a proxy for diversification, the other using number of segments (Nseg) and both of them yielded results with almost no difference, as shown in tables 4-47 and 4-48, so the researcher thought interpreting either one would suffice the purpose. The model is highly insignificant, the R-squared is 0.1959 and the t-test of the interaction term is highly insignificant as well, as shown below. The sign of the coefficient is negative, as expected. This hypothesis is not supported.

Table 4-47 Hypothesis 8b with sdiv

cap01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap	-.0857411	.5087954	-0.17	0.866	-1.091128	.9196454
hhi_s	-.3796812	.4461215	-0.85	0.396	-1.261223	.5018607
cap_ind_conc	.1156451	.8672629	0.13	0.894	-1.598078	1.829368
lnemp	.0095504	.0128125	0.75	0.457	-.0157672	.034868
barrier	-2.14e-06	.0000326	-0.07	0.948	-.0000665	.0000622
sdiv	-.0519411	.0571789	-0.91	0.365	-.1649274	.0610452

Table 4-48 Hypothesis 8b with Nseg

cap01	Coef.	Std. Err.	t	P>|t|	Lower CI	Upper CI
cap	-.0716082	.509716	-0.14	0.888	-1.078814	.9355973
hhi_s	-.3847406	.4465632	-0.86	0.390	-1.267155	.4976741
cap_ind_conc	.0962091	.8690483	0.11	0.912	-1.621042	1.81346
lnemp	.0081261	.0125595	0.65	0.519	-.0166915	.0329438
barrier	-2.78e-06	.0000326	-0.09	0.932	-.0000671	.0000616
NSeg	-.0119765	.0160076	-0.75	0.456	-.0436077	.0196548

4.2.9. Hypothesis 9

Controlling for the firm size and the industry, the impact of inventory position on the financial performance is tested where Tobin's Q, roe and roa are used for operationalizing the financial performance.

First of all testing inventory position with Tobin's Q as shown below, the number of observations were 1331. The overall model is significant with an F-value of 52.02 and the p-value of the F-test as 0.0000. R squared is 10.52% meaning the model predicts 10.52% of the variability in financial performance. A unit change in the inventory position of a firm would cause the Tobin's Q to rise 25.7%. The estimated regression equation is given as follows.

Ln Q= .5116483 + .2570243 dintof -.0642313 lnemp -.0000363 sich

Table 4-49 Hypothesis 9- LnQ

lnQ	Coe	Std. Err.	t	P>|t|	Lower	Upper
dintof	.2570243	.0310308	8.28	0.000	.1961495	.3178991
lnemp	-.0642313	.0075389	-8.52	0.000	-.0790208	-.0494417
sich	-.0000363	.0000282	-1.29	0.198	-.0000916	.000019
_cons	.5116483	.0895614	5.71	0.000	.335951	.687345

Now, testing inventory position with roe as shown below, the number of observations were 1395. The overall model is significant at 10% with an F-value of 52.02 and the p-value of the F-test as 0.0633. R-squared is 0.52%. A unit change in the inventory position of a would cause the roe to rise by .844 keeping other factors constant. The estimated regression equation is given as follows.

Table 4-50 Hypothesis 9- roe

roe	Coeff	Std. Err.	t	P>|t|	Lower CI	Upper CI
dintof	.8448506	.3128948	2.70	0.007	.231054	1.458647
lnemp	.0118751	.0758984	0.16	0.876	-.1370127	.1607628
sich	-.000014	.0002796	-0.05	0.960	-.0005626	.0005346
_cons	.01582	.8868355	0.02	0.986	-1.723859	1.755499

Finally, testing the relationship using roa as a proxy for financial performance with the number of observations as 1476, we noticed a significant model with the value of F- statistic as 104.37, the p-value of the F-test as 0.0000. The R-squared is 17.54 means 17.54 percentage of the variability in financial performance through ROA is explained by this model containing inventory position. The p-value of the t-test is 0.0000 however, the coefficient of the dintof turned out to be negative which is contrary to the hypothesis.

Table 4-51 Hypothesis 9- roa

roa	Coeff	Std. Err.	t	P>|t|	Lower CI	Upper CI
dintof	-2.500836	.1596192	-15.67	0.000	-2.813941	-2.187731
lnemp	.2502073	.0374135	6.69	0.000	.1768178	.3235968
sich	.0002241	.0001389	1.61	0.107	-.0000484	.0004965
_cons	-.941383	.4412566	-2.13	0.033	-1.806942	-.0758243

4.2.10. Hypothesis 10

Controlling for the firm size and the industry, the impact of capacity position on the financial performance is tested where Tobin's Q, roe and roa are used for operationalizing the financial performance.

First of all testing capacity position with Tobin's Q, as shown below, the number of observations were 1131. The overall model is significant with an F-value of 34.21 and the p-value of the F-test as 0.0000. R-squared is 8.33% meaning the model predicts 8.33% of the variability in financial performance. A unit change in the capacity position of a firm would cause the Tobin's Q to rise 11.44%. The p-value of the t-test is .126 so this is insignificant. Hence, the hypothesis is not supported.

Table 4-52 Hypothesis 10- lnQ

lnQ	Coe	Std. Err.	t	P>|t|	Lower CI	Upper CI
dppe	.1144566	.0748096	1.53	0.126	-.032325	.2612382
lnemp	-.0836618	.0083742	-9.99	0.000	-.1000925	-.0672311
sich	-.000023	.0000318	-0.72	0.469	-.0000853	.0000393
_cons	.5110368	.1008192	5.07	0.000	.3132228	.7088508

Now, testing the capacity position with roe as shown below, the number of observations were 1196. The overall model is insignificant and R-squared is 0.02%. The t -test is completely insignificant. This is, therefore, not supported.

Table 4-53 Hypothesis 10- roe

roe	Coe	Std. Err.	t	P>|t|	Lower CI	Upper CI
dppe	-.0983671	.6696763	-0.15	0.883	-1.412243	1.215508
lnemp	.0348331	.0747573	0.47	0.641	-.1118375	.1815036
sich	.0000798	.0002814	0.28	0.777	-.0004724	.0006319
_cons	-.1653144	.8918955	-0.19	0.853	-1.915174	1.584545

Finally, testing the relationship using roa as a proxy for financial performance with the number of observations as 1255, we noticed a significant model with the value of F- statistic as 18.95, the p-value of the F-test as 0.0000. The R-squared is 4.35% means 4.35 percentage of the variability in financial performance through ROA is explained by this model containing capacity position. The p-value of the t-test is insignificant. The hypothesis is not supported.

Table 4-54 Hypothesis 10- roa

roa	Coe	Std. Err.	t	P>|t|	Lower	Upper
dppe	.0538131	.4034106	0.13	0.894	-.7376228	.8452491
lnemp	.3497317	.0464919	7.52	0.000	.258521	.440942
sich	.0002548	.0001744	1.46	0.144	-.0000875	.000597
_cons	-1.169906	.5535711	-2.11	0.035	-2.255936	-.0838755

4.3. Hypotheses summary

The analysis and the results presented above tested the hypotheses given in chapter 2. While some of them are not supported, some of them showed strong significance and hence were supported. One of the points to note is using the Generalized Entropy Index or the Number of segments of a firm as a proxy for the construct 'diversification' did not yield much difference in results except for one occasion. The coefficient of determination, the p-value tests, F-test, t-tests and parameter coefficients were almost identical. While both the main effects hypotheses were supported on a two way level analysis which will be a key contribution of this research in terms of a successful and significant dyadic analysis in the field of operations planning

and control that is backed by the established concepts from strategic management, the one way analysis at few occasions are not supported as well. The moderated hypotheses showed mixed results. The moderator 'industry growth' is supported on a two way analysis indicating that the rival's lagged inventory position has a positive impact on the focal firm and also the effect of leader's lagged inventory performance to challenger's inventory performance is found significant and supported, the research did not find enough evidence to support that the challenger's past inventory leanness impacts the leader's inventory leanness. Industry growth did not show any evidence of moderating the capacity position of the leader and challenger firms. The moderator 'market share difference' did not moderate the two way relationship of the focal and rival firms; it did not moderate the impact of leader's past inventory leanness to the challenger's inventory leanness; however it showed support of moderating the challenger's past inventory leanness to leader's inventory leanness. Market share difference showed some significance to moderating the dyadic analysis but no evidence was found that it moderated the either of the two one way hypothesis. The moderator 'industry concentration showed no effects of moderation on the inventory leanness imitation of the leader and challenger firms. It did not show any moderation to the two one way relationship of imitation of capacity position of the leader and the challenger firms but showed some support of the moderating the dyadic relationship of imitation of leader and challenger firms in capacity position. The results of the analysis of the hypothesized relationships are discussed above. Tabulating the summary of the hypotheses classifying them into main effects hypotheses and moderated hypotheses along with their significance levels is thought to be helpful to view the results at a glance. Hence, the following table presents the summary of the hypotheses results or the summary of this chapter.

Table 4-55 Hypotheses Summary

Hypotheses	Results	Significance levels
Main Effects Hypotheses		
1	Supported	1%
1a	Not supported	
1b	Supported	1%
2	Supported	1%
2a	Not supported	
2b	Not supported	
Moderated Hypothesis		
3 (Industry Growth)	Supported	1%
3a	Not supported	
3b	Supported	1%
4	Not supported	
4a	Not supported	
4b	Not supported	
5 (Market Share Difference)	Not supported	
5a	Supported	5%
5b	Not supported	
6	Supported	15%
6a	Not supported	
6b	Not supported	
7 (Industry Concentration)	Not supported	
7a	Not supported	
7b	Not supported	
8	Supported	10%
8a	Not supported	
8b	Not supported	
9	Supported	
10	Not supported	

Chapter 5

Conclusion

The impacts of the rival firm's strategy on the focal firm have been researched and validated in the areas of strategic management. However, the decisions related to operations have been conventionally strategized using internal planning and control. The internal planning constitutes of decisions those are taken within the firm's boundary not considering the external contingencies like competition. An example of this internal planning is the use of various ways of calculating the ideal inventory to order and/or hold, like the use of economic order quantity. But with the growing competition and a constant gaze on the rivals' actions, the decisions of operations planning was felt to be reassessed where the activities occurring outside the firm's boundary was thought to be significant.

The research has combined the strategic management variables with the basic strategies in operations management and aimed to define some missing links in the literature which will further assist researchers and practitioners to have some valuable insights on the topic. Using the econometric panel data analysis to address the issue of the leader and challenger's behavior and their actions and reactions triggered as a result of destructive competitive rivalry in the domain of operations planning and control pertaining to the decisions of inventory and capacity management, this research aims to contribute useful insights. While this research will assist the leader and the challenger firms in better managing the competition under various circumstances, this research also aims to draw attention of the researchers in the field of operations planning that external factors like competition affect the operations decisions significantly, which has been ignored by large in the field. In this sense, this research will set a new beginning.

The findings of this research are further discussed as follows where the results are summarized and analyzed in terms of the individual hypotheses.

5.1 Discussion of hypothesis 1

It may not be incorrect to assume that the leader being the highest market share holder in an industry became too complacent and that may be the reason that the impact of challenger's past inventory leanness did not make a significant impact on it. The leader firms are enjoying the market supremacy and believe that the operations strategy they are adopting is better, and so overall they rely more on their internal strategy of operations planning and control. Challengers, on the other hand, are the ones who want to overtake the leader's position and so are always at a lookout on the actions of the leader. Thus, the impact of the leader's past inventory leanness has such a high significance on challenger's inventory leanness. These are the two one way hypothesis however, looking at a single dyadic relationship to test the impact of competitive rivalry among firms both ways, the research has found very high significance and coefficient of determination.

5.2 Summary of hypothesis 2

To test for the single dyadic relationship to see the impact of competitive rivalry among firms both ways in context to the capacity position, the research has found very high significance and coefficient of determination. Thus, it validates hypothesis 2 that the competitive rivalry and the concept of creative destruction hold among firms. The significance for hypothesis 2 was not as higher as hypothesis 1 and the reason for that could be the fact that the imitation of the inventory strategies by the rival firms would require lesser time however capacity management being relatively longer strategic decision would involve more time. Capacity management strategies as automation implementation in a plant by a focal firm would involve a long time by the rival firm to

imitate but an imitation in the inventory management could be shorter and so the effects of imitation was relatively stronger.

5.3 Summary of hypothesis 3

In the summary of hypothesis 1, the author mentioned that the leader being the highest market share holder in an industry may became complacent and so they do not respond to the challenger's action. Apart from the complacency it may be their self-belief or over confidence that they do not react. The finding here is that even if the industry is growing and the challenger is aggressively trying to strategize to overtake the existing leader to claim and attain better economic gains from the growing industry, the leader still is not reacting to that actions and stimulus of the challenger. In the growing industries, challengers, on the other hand, are extremely vigilant in giving reactions and responses as a result of the changes in inventory position of the leader firm in the past period. Looking at a single dyadic relationship to test the impact of competitive rivalry among firms both ways when industry is growing, the research has found very high significance and coefficient of determination.

5.4 Summary of hypothesis 4

As the industry grows, there is no increase or decrease of the impact of leader's lagged capacity position on the challenger and vice versa. Also, there is no moderation of industry growth for two sided relationship between the focal and rival firms in the area of capacity management. The negative sign on the coefficients of the moderator indicates that as the rival firm keeps more capacity position with the industry growth, the focal firm decreases their capacity. A plausible reason for this maybe as the industry grows and a pressure emerge to win a share of profit and attack the niche faster, a firm wants to reduce the capacity so that they can reduce the money tied in the capacity and choose

some profitable opportunities for financial gains. But since the result is highly insignificant, it can be concluded by saying that the hypothesis is not supported.

5.5 Summary of Hypothesis 5

Hypothesis 5 is not supported, 5a is supported and 5b is not supported either. Hence, we fail to reject the hypothesis that the moderator 'market share difference' has no impact on the relationship of the focal and the rival firms' inventory management. The support of 5a indicates that the leader firm's complacency and confidence increases as the market share difference increases however, when the challenger firm's market share starts to approach the leader firm's market share, the complacency reduces and the leader firm becomes more and more prompt in imitating the moves to produce the counter moves to maintain their position as a market leader.

5.6 Summary of hypothesis 6

This hypothesis is weakly supported at a 15% significance level. Hence, based on the data we can infer that market share difference makes an impact on the leader challenger competitive actions and reactions in capacity management. Thus, if the market share difference decreases, the complacency of the focal firm decreases and hence the capacity management strategies are imitated according to the capacity position of the rival firm in the previous period.

5.7 Summary of hypothesis 7

This hypothesis is not supported. Hence, based on the data we cannot infer that industry concentration makes an impact on the leader challenger competitive actions and reactions in context to inventory management.

5.8 Summary of hypothesis 8

This hypothesis is weakly supported (at 10% level of significance). Hence, based on the data we can infer that industry concentration makes an impact on the leader

challenger competitive actions and reactions in context to the capacity management decisions. As the industry concentration increases, the rivalrous moves leading to the actions and reactions would be less and hence the stability will be higher as explained in detail in chapter 2 citing the works of Young and colleagues (1996), Caves & Porter (1978), Gort (1963) and Ferrier, Smith and Grimm (1999).

The reason for the insignificance of hypotheses 7 and 8 can be since this research is only looking for the behaviors of the top two firm across any industry, the variable industry concentration did not explain any extra variability in the model. Since, the top two firms are only considered whether an industry had many or fewer firms was completely ignored in the model and so industry concentration appeared as the insignificant moderator. A plausible solution is to include those values of industry concentration in the sample whose herfindahl index is higher than .7.

5.9 Summary of Hypothesis 9

With significant results, it is definitely not incorrect to assume and infer that inventory position has an impact on the financial performance. The Tobin's Q measure clearly indicated with strong significance that there is a positive impact. Using the return on assets measure, the relationship was found negative. However, this is not too unusual as the researches in the past have shown minimal or varied impacts on performance also (Cannon, 2008; Koumanakos, 2008; Podsakoff, 2003).

5.10 Summary of hypothesis 10

With all the three proxies, hypothesis 10 is not supported and so based on this sample there is not enough evidence to say that the capacity position has an impact on its financial performance.

The research, thus, aims to contribute to the field of operations management in the following key ways.

The study will add to the competitive dynamics aspect of business to the operations strategy. Linking to the ample theoretical basis to support the arguments, the research aims to find the missing links and fill those gaps. The operations strategic decisions like inventory management and capacity management are analyzed under the lens of competitive dynamics in the leader and challenger firms of an industry. While the concepts of competitive rivalry and mutual destruction and imitation are often studied in greater detail at the enterprise level, the study of Schumpeterian perspective of 'perennial gale of creative destruction' is rare at the operations level, which this study has aimed to cover.

The moderators like market share gap, industry growth and industry concentration have been linked in this study with operational parameters to see the effect of action and reaction among the firms.

Econometric analysis possessing higher degrees of methodological rigor.

5.11. Limitations

There are some limitations of this research which the authors want to acknowledge. Use of Compustat is a limitation in itself as 'not publicly held' (Cagle, 2011) data and data which are not 'large enough for inclusion' (Cagle, 2011) are not recorded in Compustat. Missing data was a problem. The value of some count variables were negative which was dropped before the analysis. Some of the hypotheses are not supported from the data although they are strongly backed by the literature.

5.12 Future Extensions

This is a beginning and the author feels that there is a lot of room for future research in this domain. The author have used the popular definition and categorization of leader and challenger firms that the leader is the firm with the highest market share and the challenger is the one with the second highest market share.

However, it might be interesting to see what the results would be and how the imitation in inventory and capacity decisions would be among the top fifty percent of the companies and bottom fifty percent of the companies across several manufacturing industries. An interesting research would be to see and compare the research and development expenses across the leaders and challengers as R&D is considered to be a pillar of a firm's future success and strength and so the competitive investment in it is expected to be highly imitable. Also, the reaction the top firm of the industry can be compared to see how the rest of the firms imitate its operations strategy.

Appendix A

Generalized Entropy Index

If a firm sells 40% of its products in one segment and 60% of its products in the second segment, the diversity index for the firm is 0.67 as illustrated below.

Pi	ln(1/Pi)	(Pi*(ln(1/Pi))
0.4	0.916291	0.366516293
0.6	0.510826	0.306495374
	Sum	0.673011667

Similarly, if a firm sells 25% of its products in one segment and 75% of its products in the second segment, the diversity index for the firm is 0.56.

Pi	ln(1/Pi)	(Pi*(ln(1/Pi))
0.25	1.386294361	0.34657359
0.75	0.287682072	0.215761554
	Sum	0.562335145

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Biographical Information

Rajat Mishra has been appointed as a Visiting Professor in Quinnipiac University from fall 2013. He is involved in teaching operations management at UTA from fall 2011 and so far has taught six sections of the course with outstanding course evaluations and students feedbacks. He has been a part of teaching supply chain and logistics courses as a graduate teaching assistant where his job included grading assignments and exams and conducting lectures on the faculty's behalf. He is a level III tutor in statistics and was involved in tutoring statistics for Business, Criminal Justice, Psychology and Social Science departments.

Rajat Mishra is highly inclined towards research. Apart from working on papers from his dissertation, his other working papers deal with the areas regarding role of reverse logistics in operations, ISO research streams in operations and supply chain management and optimization models for operations strategy. His research interests include supply chain management, theoretical frameworks in operations strategy, inventory management models, statistics and econometrics.

With a master's in industrial engineering from UT Arlington and a bachelor's in mechanical engineering from IOE, Pulchowk, he possesses interdisciplinary skill sets to handle real world engineering problems. He has around 5 years of experience in the industry sector. He is a member of Decision Sciences Institute, Federation of Business Disciplines and South West Decision Sciences Institute.