

**CORPORATE STRATEGIC ACTION PORTFOLIOS AND FIRM PERFORMANCE
IN THE US TELECOM INDUSTRY (1984-2004)**

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In this study I investigate how a firm's corporate strategic action portfolios, defined as bundles of key corporate strategic actions, relate to deregulatory and technological changes, and to firm performance. I hypothesize that frequency and variety of a firm's corporate strategic action portfolios increase when environmental changes take place in the marketplace. I also hypothesize that the nature of a firm's corporate strategic action portfolios will be different depending on whether the changes are due to deregulation or technology. After establishing the relationship between environmental changes and a firm's corporate strategic action portfolios, this study measures the relationship between a firm's corporate strategic action portfolios and firm performance. All else being equal, it is hypothesized that a firm with higher levels of frequency and variety on corporate strategic action portfolios will perform better. The US telecommunications service industry provides the empirical background for testing these hypotheses.

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1.0 INTRODUCTION

This study is motivated by a simple research question: to what extent do firms' different corporate strategic actions¹, specifically defined as strategic action portfolios, change in response to deregulatory and technological changes?

In this study, I investigate how firms change (Venkatraman & Prescott, 1990) their corporate strategic portfolios, defined as bundles of key corporate strategic actions, in response to deregulatory and technological changes, and to firm performance. Strategic actions such as mergers and acquisitions have been frequently observed and reported in the media. It has been debated when and how often firms prefer one type of strategic action, such as mergers and acquisitions, to other actions, such as forming strategic alliance, divestiture or internal development. While there have been some efforts to discuss experience spillovers (Zollo & Reuer, 2001) across corporate development activities, it would be worthwhile to look at the dynamic relationships among the combinative capabilities (Kogut & Zander, 1992) of a firm's corporate strategic actions, viewed as strategic action portfolios, and the firm's survival and performance heterogeneity.

Two properties of a firm's strategic action effort – frequency and variety of strategic action portfolios will be discussed in detail how they respond to environmental changes, and

¹ Acquisitions (including mergers, full or majority acquisitions, and minority acquisitions); Strategic alliances (including JV and other equity alliances as well as non-equity alliances in technology, R&D, manufacturing, or marketing and licensing); and Divestitures (including spin-offs and sell-offs)

work to affect the firm's performance. I hypothesize that frequency and variety of a firm's strategic action portfolios increase when environmental changes take place in the marketplace. Both frequency and variety are two of the most frequently used strategic action measures in many other industry settings. In this study, these frequently used constructs are once again examined in the US telecom services industry context. After establishing the relationships between environmental changes and a firm's strategic action portfolios, this study explores to how a firm's strategic action portfolios influence performance. All else being equal, it is hypothesized that firms with higher levels of frequency and variety on strategic action portfolios will perform better financially over time.

This study further analyzes an interesting nature of firms' willingness to take strategic actions in response to environmental changes. Environmental changes, broadly defined as deregulatory and technological changes in the marketplace, trigger firms to take on strategic action portfolios both proactively and reactively. Due to the lengthy deregulatory processes (Kim & Prescott, 2005) and the extensive nature of infrastructure investment decisions, incumbents are better equipped with appropriating their strategic action portfolios in adapting to deregulatory changes. On the other hand, in the event of technological changes, incumbents try to exploit the existing technologies before they actually commit themselves to any upcoming new technologies. As a result, incumbents become more reactive in adapting to technological changes. Also, upgrading infrastructure such as telecom networks requires firms to take longer time to install new technological standards. As a result, incumbents tend to take their strategic actions reactively when new technological changes are fully accepted in the market.

The empirical setting in this study is the US telecom industry for the 20-year period between 1984 and 2004. During these times, the US telecom industry has experienced major

environmental changes driven by a series of deregulatory events and the introduction of new telecommunication technologies. All these environmental changes have redefined the fast-growing industry structure and competition, and reshuffle the key industry players tremendously. To name a few: AT&T was divested in 1984; in 1996, the Telecom Act 1934 was revised; wireless and Internet services became more popular with fast-growing number of subscribers and households. Also, convergence between telecom and broadcasting services made the industry boundaries more ambiguous and complex. All of these major environmental changes lowered entry barriers and caused strategic challenges to telecom service providers such as the RBOCs² to look for main sources of growth. In response to these changes, key telecom service providers have taken various strategic actions.

After AT&T's divestiture in 1984, major incumbents, also known as the seven RBOCs, maintained their administrative heritage (Collis, 1991), stemming from AT&T's century-old strategic decision making path. Intuitively, the seven RBOCs' historic administrative linkages would have set each RBOC's pattern of corporate strategic actions similar. Even more, dual regulatory bodies (federal-level FCC³ vs. state-level PUC⁴s) still heavily regulated on the seven RBOCs' strategic expansions, and limited them to consider only a few available strategic actions in their main local telephone businesses.

However, the industry became more competitive in the 1990s' as deregulatory and technological changes allowed each RBOC to implement different strategic actions. In the late 1980's and the early 1990's, the RBOCs took different action paths for their international expansion strategies (Sarkar et al., 1999). Noda & Collis (2001) also depicted multi-faceted

² RBOCs (Regional Bell Operating Companies)

³ FCC (Federal Communications Commission)

⁴ PUC (Public Utilities Commission)

dimensions of market, competitive, and organizational forces where such dynamic interplays shaped the RBOCs' different action paths in deploying wireless services.

In 2004, AT&T, a long distance carrier after 1984 divestiture, was bought by one of its once Baby Bells, SBC. The new AT&T (SBC + old AT&T) acquired another RBOC, Bell South in 2007. Verizon, the largest surviving RBOC prior to SBC's acquisition of AT&T, was a renamed RBOC when Bell Atlantic purchased NYNEX and subsequently merged with GTE. In fact, among those seven original RBOCs⁵, there are only three RBOCs (new AT&T, Verizon, and Qwest) in operation by 2007⁶.

Aside from well-publicized mega-M&A transactions among the RBOCs, other types of corporate strategic actions have been executed among the RBOCs and other telecom service providers. The main sources of growth among the RBOCs are no longer their traditional fixed-line telephone services. Today, new services like wireless and high-speed Internet are beginning to constitute a major share of the RBOCs' operating revenues. Furthermore, the RBOCs are faced with new groups of competitors such as Cable TV (CATV) operators and Internet-based service providers (e.g. Google). For example, US West merged with Qwest, a long distance and fiber-optic provider in 2000. Bell South and SBC jointly formed one of the national wireless providers, Cingular in 2000, and it later acquired AT&T Wireless in 2005. Also in 2005, Verizon acquired MCI, a long distance and fiber-optic provider. Also, global partnerships among major global telecom providers (e.g. World Partners and Concert) were formed and subsequently dissolved (Lee & Madhavan, 2004). Simultaneously, the RBOCs have added new services like

⁵ Bell Atlantic, Bell South, SBC, US West, Pacific Telesis, NYNEX, Ameritech

⁶ New AT&T is created by the mergers of SBC, Ameritech, Pacific Telesis, old AT&T, and Bell South. Verizon is created by the mergers of Bell Atlantic, NYNEX, and GTE. Qwest is created by the merger of US West and Qwest

high-speed broadband and IPTV services to their main businesses, while many have divested century-old traditional businesses such as telephone directory services.

These examples illustrate the RBOCs' strategic challenges in the industry as well as the needs for certain strategic actions the RBOCs should be equipped with in a fast-changing business environment. In order to sustain a competitive position in the marketplace, the RBOCs need to grow by reconfiguring their strategic commitment (Ghemawat, 1991) to new businesses. This study assumes that different levels of frequency and variety in their strategic action portfolios will facilitate firms' efforts to reconfigure their strategic commitment.

Generalizing from the above industry events, I also hypothesize that the nature (proactiveness vs. reactiveness) of a firm's strategic action portfolios will be determined by the fact that environmental changes are driven by deregulation or technology. As previously explained, lengthy deregulatory processes (Kim & Prescott, 2005) and the existing firms' strong ties with different regulatory bodies, incumbents are better equipped with appropriating their strategic action portfolios in adapting to deregulatory changes. Technology-related strategic actions (i.e., R&D and technology innovation) had been led by AT&T's Bell Labs. When the seven RBOCs emerged from AT&T's divestiture in 1984, Bell Labs stayed with AT&T and it took time for individual RBOCs to regain technological competencies. Furthermore, they didn't have any strong incentive to be innovative in the heavily-regulated local telephone market while key wireless and Internet technologies were led by newer IT ventures.

The overview of research model is depicted in Figure 1⁷.

⁷ Environmental changes have direct relationships with firm performance (shown as a dotted line in Figure 1). In this study, I focused more on the relationships between a firm's strategic action portfolios and firm performance in the telecom industry context. The relationships between environmental changes and firm performance will be examined for the future studies.

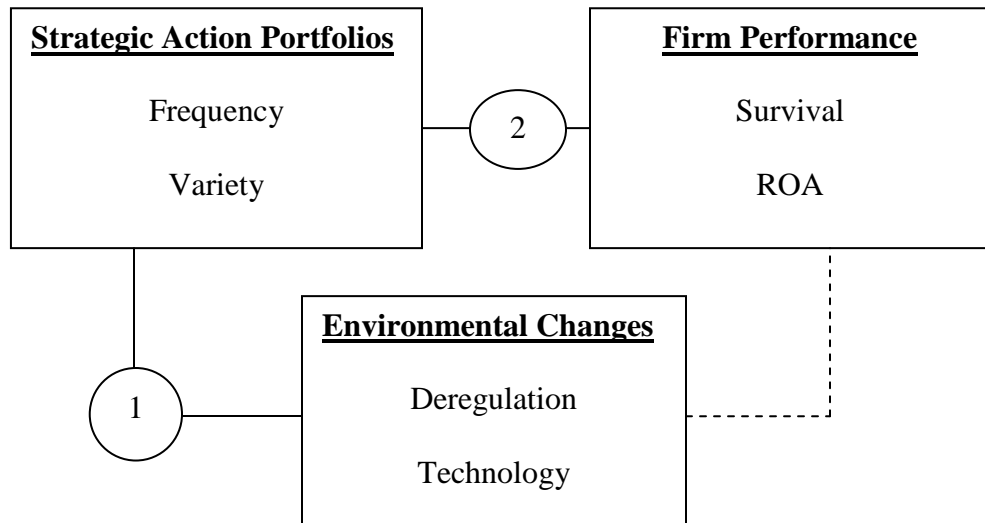


Figure 1 Overview of Research Model

2.0 LITERATURE REVIEW

The following sections will elaborate on the overview of research model illustrated above. The first proposition in this study will be discussed looking at the relationships between corporate strategic actions and environmental changes. Various theoretical grounds will be presented with their unique arguments in the relationships between corporate strategic actions and environmental changes. Next, the relationships between corporate strategic actions and deregulatory and technological changes will be studied in detail. This study will further extend the construct of strategic actions to strategic action portfolios that consider major corporate strategic actions. The second proposition in this study looks at corporate strategic action portfolios and firm performance.

2.1 STRATEGIC ACTIONS AND ENVIRONMENTAL CHANGES

Environmental changes promote organizational transformation by redrawing industry boundaries, shifting the scope of permissible strategic activities for incumbents and new entrants, and changing incentives for certain strategic behaviors (Delmas & Russo, 2005; Fuentelsaz, Gomez, & Polo, 2002; Miller & Chen, 1994). On the other hand, the choice of strategic actions initiated by organizations will constrain the way the environment unfolds. The firm's ability to select the right mix of strategic actions in a dynamic environmental condition can be a very

powerful tool to outperform others. Several theoretical frameworks covering such interactions with different assumptions will be studied.

Insights from industrial organization (IO) economics have been extremely important in developing strategic management models of how a firm achieves sustainable competitive advantage (Grimm et al., 2006). IO economics provides direct insights into how firms can obtain competitive advantages through strategic positioning in the context of industry structure and pursuing strategies that are appropriate to specific industry structure (Grimm et al., 2006). IO economics theory argues that a firm's competitive advantage is mainly influenced by industry structure and a firm's strategic actions can be emphasized as the firm's willingness to position the firm's low cost or differentiation strategies within an industry structure (Bain, 1968; Porter, 1981).

In case of scale-based industries like the telecom service industry, the industry structure would favor the incumbents' leveraging of their market dominance even after deregulatory or technological changes. Representing a more extreme flavor of environmental selection on organizational forms, organizational ecology argues that environmental and market conditions set the stage for certain firms to outperform others by virtue of their market compatibility rather than by their internal efficiency (Carroll, 1993). However, even among incumbents, environmental changes influence each firm's strategic behavior in different ways. Both IO economics and organizational ecology do not explain the heterogeneity of incumbents' strategic behaviors in response to environmental changes.

The strategic choice perspective (Miles & Snow 1978; Thompson 1967) argues that strategic adaptation is a dynamic process subject to both managerial actions and environmental forces. It implies that management should take into account the multiple ways that firms can

interact with their environments through the process of mutual adaptation between the organization and its environmental domain. Chakravarthy (1991) provided a framework for connecting strategic adaptation to deregulation. Environmental changes, such as deregulatory processes, are important attributes to a firm's choice of strategic behavior since they provide both incumbents and new entrants with asymmetric opportunities and threats. In particular, deregulation that eliminates entry barriers tend to force incumbents to seek for more deterrent activities in order to maintain their current market positions (Grimm & Smith, 1997). Utilizing a strategic choice perspective, a firm's choice of strategic actions is important in determining the firm's performance in a changing environment.

To further elaborate the dimension of different mix in developing firm's strategic actions, the resource based view of the firm (RBV), an effort to explain competitive advantage as acquiring an ownership of scarce and valuable resources and the firm's manipulating its resources, can be explored (Barney, 1991). Environmental changes require a firm to update a shared set of assumptions about resources, capabilities and objectives. In addition, a firm needs to be more flexible to uncertainties and update a shared set of assumptions about resources and capabilities (Clemons, 1997).

For example, business acquisition, resource redeployment, and asset divestiture can be elements of a dynamic process in which a firm changes its businesses by recombining internal and external resources (Capron et al., 2001). A firm's relative strategic position will be affected by the types of strategic actions that a firm implements. Miller & Shamsie (1996) found a firm's strategic positioning using different types of resources (property-based resources vs. knowledge-based resources) would differ when the level of environmental uncertainty had changed in the context of the seven major US film studios from 1936 to 1965. Grimm et al. (2005) argued that

strategic positions derived from a firm's mix of strategic actions were another resource that led to a better performance. It is possible to see a firm facing similar positioning in a certain industry structure may consider using more frequent and more various strategic activities in search for better performance.

Adner & Helfat (2003) emphasized that dynamic managerial capabilities were needed to achieve a firm's sustainable competitive advantage. Firms tend to see opportunities in a heterogeneous fashion when a new opportunity arises in a marketplace due to deregulatory or technological changes (Delmas & Russo, 2005). For some firms, a few changes to the existing resources would be required to pursue such opportunities. They could pursue a different set of strategic actions by leveraging their resource strengths. For other firms, making such moves would require developing resources that might threaten their existing competencies and competitive advantages (Delmas & Russo, 2005). A firm's ability to formulate and implement a different set of strategic actions could be considered as ways to utilize such dynamic managerial capability (Adner & Helfat, 2003). Through utilizing their strategic actions, a firm makes strategic adaptations to environmental changes that may ultimately lead to better performance (Walker et al., 2002).

Sometimes, environmental changes (both deregulatory and technological changes) have been initiated by policy makers in the US telecom industry. For incumbents, they develop their own routines of strategic action behaviors to cope with such environmental changes. Nelson & Winter (1982) argued that routines were made up of the conscious and tacit knowledge and skills held by firms who carried out certain types of strategic activities more frequently. Levinthal & March (1993) also argued that a firm's actions tended to be gradually rigid, narrow, and simple owing to the repeated use of their knowledge bases. Once the firm's choice of strategic actions

achieves success, their tendency is to continue to exploit their existing strategies that have worked in the past (Audia et al., 2000; Miller, 1994; Miller & Chen, 1994).

In other words, organizational inertia (Hannan & Freeman, 1984) forces a firm to be less motivated to compete aggressively. This leads a firm to be inattentive to the intelligence gathering and information processing activities (Miller, 1994). Typically, the firm's embeddedness in its institutional context is a basic reason for a firm's resistance to change (Greenwood & Hinings, 1996). Thus, the more firms are coupled to a prevailing organizational template in a highly structured institutional context, the higher their resistance to change (Greenwood & Hinings, 1996). However, their persistent and repetitive use of certain strategic action type(s) can be hampered when external conditions are changed to require alternative responses, a phenomenon known as a competency trap (Levitt & March, 1988). Organizational inertia may lead to self-destruction in not acquiring organizational legitimacy when major shifts in competitive, technological, social, and legal conditions impose the need to use new strategic actions in a timely manner (Audia et al., 2000; Reuf, 1997).

Oliver (1997) argued that a firm's sustainable advantage depended on the ability to manage the institutional context of its resource decisions. To survive, a firm must be able to reproduce and modify its routines in the face of industry evolution (Nelson & Winter, 1982). A firm may respond strategically, either by decoupling its structures from its operations or by seeking to defend itself from the institutional (or technological) pressures it has experienced (Scott, 2001). The central idea of neoinstitutionalism (Meyer & Rowan, 1977) is that an organization tends to conform to norms and cultural codes in an industry to gain legitimacy and, thus, to improve its performance or survival rates (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). As environmental changes occur, new sets of institutional legitimacy and competencies

need to be identified by firms. Greve (1995) found that mimetic isomorphism was stronger among similarly-sized firms as large firms tended to copy the strategic actions of other large firms in a population of savings and loan associations. When “structurally equivalent” firms such as the RBOCs in the telecom industry undertake similar actions, they became increasingly institutionalized (Burt, 1987).

For a firm’s efforts to be aligned with industry norms, isomorphism (DiMaggio & Powell, 1983) emphasizes the role of the firm’s mimetic behavior in explaining patterns of strategic actions among industry players. Haveman (1993) also suggested that members of an industry group would tend to imitate, either consciously or unconsciously, the actions of the largest or most profitable firms in that group (Webb & Pettigrew, 1999). Zuckerman (1999) demonstrated that the failure to acquire social legitimacy imposed an economic penalty on organizations in a financial market (Kim et al., 2006).

The RBOCs, that all have inherited AT&T’s administrative heritage, are envisaged adopting or abandoning particular initiatives that are then consciously or unconsciously copied by others (Abrahamson, 1991; Haveman, 1993; Greve, 1995). When new environmental changes are introduced, they copy each other’s strategic actions so that they acquire institutional legitimacy and new competencies in a changing environment (Baum & Oliver, 1991). Even strategic abandonment decisions are contagious, causing managers to examine what others do in the market for clues to pinpoint more environmentally aligned strategic actions, since the future performance of current and alternative strategies can be highly uncertain (Greve, 1995). While a firm’s actions are copied by others, even casual observation indicates the RBOCs’ strategic action patterns show interesting differences. Ambiguity in actions (or different sets of action portfolios in this study), similar to resource ambiguity (Barney, 1991), makes it difficult for a

firm to figure out which actions (or action portfolios) to copy. Despite a known recipe for success and a decision to pursue it, a firm may be unable to implement any necessary strategies on time because organizational culture can be highly inertial, even in the midst of environmental changes (Harrison & Carroll, 1991).

Based on the extensive literature discussed above, we may argue that firms adapt their strategic actions in response to environmental changes, and successful firms proactively adapt and frequently redefine their strategic actions in order to maintain their environmental alignment (Venkatraman & Prescott, 1990). I will now discuss some specific aspects of a firm's strategic action responses to deregulatory and technological changes.

3.0 THEORETICAL FRAMEWORK

This section extends the theoretical framework addressed by prior research by studying corporate strategic action portfolios, and how they affect a firm's performance. To accomplish this purpose, I first examine the relationships between individual strategic actions and environmental changes. Next, this study focuses on three key corporate strategic actions as strategic action portfolios and their relationships to firm performance.

3.1 STRATEGIC ACTIONS AND DEREGULATORY (TECHNOLOGICAL) CHANGES

Deregulation refers to the relaxation of governmental controls that govern a firm's strategic behavior. Deregulatory changes establish the ground rules of competition and create varieties of market behavior (Dobbin & Dowd, 1997). For instance, changes in antitrust law and enforcement at the turn of the century changed both the volume and reasons for acquisition actions in the early railroad foundings in Massachusetts between 1825 and 1922 (Dobbin & Dowd, 1997). Smith & Grimm (1987) also looked at the profound shift in the strategies of railroads following deregulation.

In a regulated environment, a regulatory agency controls the scale and scope of a firm's utilization of resources and capacity (Smith & Grimm, 1987). Another focus has been on the

deregulatory effects on competitive decisions such as prices, production costs, innovation, and productivity (Wholey & Sanchez, 1991). In particular, deregulation eliminates the market sharing arrangements established in the earlier regime. Utilization of excess capacity becomes more relevant when a firm experiences a transition in deregulation (Pettus, 2001). Thus, a firm is forced to explore alternative strategies in order to maintain congruence with deregulatory changes (Kashlak & Joshi, 1994; Walker et al., 2002).

Prior studies looked at different dimensions of a firm's strategic actions in adapting to deregulatory changes. Deregulatory changes influence the firm's entry and exit from a market (Wholey & Sanchez, 1991). Haveman (1993) found that savings and loans expanded extensively into new domains after they were allowed to compete in the fields previously closed to them. Walker et al. (2002) also found that new technological and competitive forms had emerged in the airline industry following institutional change that facilitated entry.

Along with deregulatory changes, technological changes are another dimension of environmental change firms should consider. Dowling et al. (1994) examined how technological changes had affected an industry's structure. Technological changes establish the ground rules of competition and create alternative market behavior (Henderson, 1993). New technology triggers firms to consider strategic action changes (Christensen, 1997). For example, the main sources of growth among the surviving RBOCs is no longer their traditional fixed-line telephone services; rather newer services like wireless and the high-speed broadband services are beginning to constitute a major share of a firm's revenue.

The fast growing diffusions of the above services have created a more intense competitive environment. In response to such changes, many firms have internally invested into the new generations of digital wireless networks, and have deployed thousand miles of fiber-

optic infrastructure around the world. Also, a significant number of firms have made a series of strategic alliances and engaged in significant merger and acquisition activities in order to be technologically innovative in the era of technological convergence. All of these examples illustrate the technological challenges in the industry as well as the actions that a firm needs to consider to be effectively competitive in the face of such challenges. The convergence of technologies brought a wide range of firms into direct competition as well as simultaneous collaboration with one another.

3.2 STRATEGIC ACTIONS TO STRATEGIC PORTFOLIOS

This study extends previous research of strategic actions to strategic action portfolios. In the competitive dynamics literature, competitive actions are defined as broader sets of externally directed, specific and observable competitive moves initiated by firms to improve or defend their relative competitive positions (Chen & Hambrick, 1995; Chen & MacMillan, 1992; Ferrier et al., 1999; Grimm & Smith, 1997; Smith et al., 1992). In contrast, this study focuses on three key corporate strategic actions as strategic action portfolios.

Corporate strategic actions are considered to reflect a firm's commitment (Ghemawat, 1991) or abandonment of resources in adapting to environmental changes. As environmental changes occur, a firm tries to choose the right mix of different strategic actions (i.e. strategic action portfolios) in order to achieve the best environmental fit (Pettus, 2001). A firm is not only exploiting its existing resources to maintain its market dominance but also exploring other types of resources outside its firm's boundaries for sustainable competitive advantages (March, 1991).

In this study, a firm's critical resource advantage will be reflected in the ways it builds, integrates, and reconfigures its corporate strategic action portfolios.

In the event of environmental changes, a firm may consider various types of strategic actions to expand or shrink its strategic boundaries. As deregulation eliminates the market sharing arrangements established in the earlier regime, a firm should explore alternative strategic actions to overcome such changes (Madsen & Walker, 2001). Regulators have typically been viewed M&A actions as anti-competitive practices in concentrated industries, and they have reluctantly approved M&A actions earlier among industry participants, in particular for the RBOCs. As a result, a firm's choice of corporate strategic actions tends to be limited to certain types of actions, such as strategic alliance actions, looking for areas where regulatory oversights are less restrictive in the global setting.

At the same time, technological changes may force a firm to acquire newly created assets or divest some of its existing assets so that it can be associated with technologically advanced resources. As a firm expands its strategic boundaries at all directions, a successful firm will be the one that adapts and redefines strategic action portfolios in order to maintain its environmental alignment (Venkatraman & Prescott, 1990).

Among corporate strategic actions that are focused in this study, strategic alliance actions have been one of the most frequently researched sources of competitive advantages in strategic management literature (Ireland et al., 2002). Deregulatory changes will influence the size and patterns of strategic alliance actions. Powell (1990) argued that institutional arrangements were critical in explaining the formation of alliances. Previous research also focused on the formation of strategic alliances using past relationships among partners (Gulati, 1995), and technological and geographical proximity among partners (Stuart, 1998).

In the competitive dynamics literature, strategic alliance actions are viewed as competitive responses to prevent others from gaining a competitive edge (Madhavan et al., 2004; Silverman & Baum, 2002; Garcia-Pont & Nohira, 2002; Park & Zhou, 2005). Strategic alliances also help firms to gain market power and additional access to complementary resources (Kogut, 1988). A firm with limited resource availability prefers strategic alliance actions to other actions.

Madhavan et al. (1998) found that inter-firm relationship networks could be viewed as strategic resources which were subject to change as the industry itself changed. Thus, different alliance patterns and different levels of alliance intensity can be good indicators of how operators are shaping their network positions in the fast-changing marketplace in search of market share and profitability (Madhavan et al., 1998). A firm is likely to differ in both competitive activity and competitive variety because of differences in alliance-based resource advantages (Gnyawali et al., 2001).

While strategic alliance activities are more frequently and easily used in response to environmental changes, the critical impacts of M&A activities in the US telecom service industry have been significant over last twenty years. In particular, the seven RBOCs' mega M&A deals have reshaped industry structure, and ultimately led to the seven RBOCs' different survival and failure stories since the AT&T divestiture in 1984. Typically, M&A actions are primarily motivated by the prospect of scale economies in the consolidated firms. In particular, horizontal acquisitions, which have been common in the US telecom industry, are considered to achieve productive efficiency through strategic reconfiguration (Capron & Mitchell, 1998).

While it is important to consider different corporate strategic actions individually, it is also worthwhile to look at both M&A and alliance actions as a whole. When a firm considers different strategic actions, its decisions are based upon its mix of different strategic actions rather

than considering a single individual strategic action at one time. Ultimately, a firm's performance should be measured by the whole reconfiguration of strategic actions or strategic action portfolios.

While both strategic alliance and M&A actions are extensively studied, divestiture actions have mostly been treated as side aspects or mirror images of even broader phenomena such as corporate restructuring or M&A actions (Brauer, 2006). For instance, prior studies considered make or buy choices in determining a firm's boundaries, but have not considered extending their boundaries to include divestiture actions. In fact, shareholder wealth gain on divestiture actions is reported as significant stock price increases on the announcement of a spin-off or sell-off (Buckley, 1991). It should be noted that a firm's strategic decisions to divest certain businesses or assets are often times considered simultaneously with other types of corporate strategic actions (Villalonga & McGahan, 2005).

For internal development actions, a firm's boundary expanding activities are often times initiated from its internally developed corporate ventures. While the large sum of a firm's internal capital expenditures are devoted to look for its growth, prior studies have not overlooked the importance of internal development actions together with other corporate strategic actions. The appendix section in this study will further analyze the effects of a firm's internal development actions.

Considering strategic actions in combination as portfolios has meaningful implications both for managers and policy makers. In particular, when a firm competes against other firms in the multiple layers of industry's value network (Stabell et al., 1998), different strategic actions should be concurrently considered because environmental changes force a firm to evaluate and reconfigure different strategic action types at the same time. For instance, certain types of

strategic actions may be restricted or allowed only to some extent when environmental changes occur.

The experiences gained in one strategic action often inhibit learning in another. The myopia of learning viewpoint (Levinthal & March, 1993) highlights the hazards of increasing specialization in a particular knowledge domain (Zollo & Reuer, 2001). On the other hand, absorptive capacity arguments (Cohen & Levinthal, 1990) suggest that a firm having developed superior knowledge in a specific area is more capable of expanding the span of its competence into the related domains, and this allows for the existence of positive learning externalities across firm's strategic actions (Zollo & Reuer, 2001). Prior research on corporate strategic actions has not explicitly examined different strategic actions that are embedded within accepted industry practices or as a function of the deregulatory or technological environments. Research on corporate strategic action portfolios will provide a more holistic view on a firm's strategic behavior and its efforts to sustain a competitive advantage.

3.3 STRATEGIC ACTION PORTFOLIOS AND FIRM PERFORMANCE

Each of corporate strategic actions examined in this study has significant implications for a firm's strategic success and its sustainable competitive advantage. After establishing the relationship between strategic action portfolios and environmental changes, this section analyzes how a firm's strategic action portfolios are related to firm performance. A firm's well-balanced and timely staged combinations of strategic actions in a tightly-fitted business environment are key characteristics for sustainable performance (Ferrier et al., 1999).

Prior studies tested how individual action was related to a firm's performance. Siggelkow (2001) presented how tight fit among firm's actions affected the firm's ability to react to environmental changes. Various action dimensions of overall action level (frequency), diversity of the types of actions (variety), and the degree of departure from industry norms (nonconformity) have been explored as key empirical indicators to measure the relationship between firm-level actions and profitability (Miller & Chen, 1996; Chen & McMillan, 1992; Ferrier et al., 1999; Grimm & Smith, 1997; Lee et al., 2000).

Competitive strategic actions are shaped by the sequence and speed of multiple actions. Ferrier (2001) characterized a firm's sequence of competitive actions to account for differences in their relative performance⁸. Studies on timing of entry actions have attempted to determine the advantages that early entrants are able to develop and hold over subsequent entrants, and further examine the differences in the ability of late movers to penetrate into the market (Shamsie et al., 2004). The timing and order of first movers' actions (Porter, 1980) capture the largest portion of the initial sales volume in the growing market, but their sales growth and market share will be at risk if not equipped with timely subsequent strategic actions and responses. Hopkins (2003) examined the question of whether it was better to respond quickly with individual competitive responses or wait until a broad strategic reorientation could be possible. His result suggested that the US firms that had a slower but more concentrated and aggressive response lost less market share than firms that responded quickly (Hopkins, 2003). Chen et al. (1995) also found that smaller airlines more actively initiated competitive challenges and were speedy but low-key, even secretive, in executing their competitive actions.

⁸ His findings suggested that a firms' sequence of competitive actions (measured as attack volume, attack duration, attack complexity, and attack unpredictability) was influenced by TMT heterogeneity, past performance, slack, and three industry characteristics (entry barrier, concentration, and industry growth)

The competitive dynamics literature has extended the analysis of a firm's individual action characteristics to the conceptualization of strategic action repertoires (Miller & Chen, 1996). Past organizational performance leads to strategic persistence, or organizational inertia (Hannan & Freeman, 1984) – a tendency for a firm to stick with the existing strategic actions that had worked in the past (Hannan & Freeman, 1984; Miller & Chen, 1994). Organizational inertia (Hannan & Freeman, 1984) has a positive association with firm performance during the early stage of organizational development, but can be detrimental to firm performance as organizations grow and mature in a dynamic environment (Lumpkin & Dess, 1995; Miller & Shamsie, 2001). Audia et al. (2000) also looked at the US airline and trucking industries, and found that success increased strategic persistence in the face of dramatic environmental changes and that this persistence would have negative revenue-based efficiency measure of performance compared to firms with lesser histories of success.

RBV proponents have argued that simplified repertoires give a firm a competitive edge by focusing its attention and efforts on developing unique, hard to copy skills and resources that could be beneficial both in creating a competitive advantage and in building valuable and rare resources in different industries (Miller et al., 1996; Miller & Chen, 1996). On the other hand, changing market conditions make a firm's existing resources obsolete, making it subject to market share erosion (Ferrier et al., 1999). Thus, factors such as competence-destroying technologies (Tushman & Anderson, 1986) or structure-loosening events (Madhavan et al., 1998) increase environmental uncertainty by destroying the existing competitive bases in the industry (Koka et al., 2006).

Strategic action portfolios can be understood as steps with which managers build, integrate, and reconfigure a firm's resources and dynamic managerial capabilities (Adner &

Helfat, 2003). Thus, strategic action portfolios change the firm's range of product offerings and their service locations, and ultimately lead to the firm's long term sustainability. When firms successfully navigate strategic action portfolios in response to deregulatory (technological) changes, they not only manage environmental risks better but also shape their industries and create their own potential opportunities. Successful firms have been the ones that effectively redefine industry boundaries and use resources for continual growth (McGee et al., 1995).

In the scale-based economies like telecom services, incumbents tend to have a competitive advantage over new entrants because they have larger pools of managerial talent and physical resources to draw from (Gentry, 2004). In other words, a firm with more frequent and more diverse strategic activity portfolios will enjoy better profitability. As the environment becomes more complex and unpredictable, some firms will find them difficult to develop sufficient resources or unable to replicate the successful player's diverse resource pools quickly to meet the market demand (Cohen & Levinthal, 1990). As elaborated in this section, prior studies report interesting interactions between a firm's strategic actions and performance in response to environmental changes such as deregulatory or technological changes. The following section looks at how these relationships have evolved in the US telecom service industry.

4.0 THE EVOLUTION OF THE US TELECOM INDUSTRY

This study covers the US telecom industry from 1984 to 2004. During this period a series of key regulatory reforms and technological innovations took place. While various types of competitive dynamics arguments are discussed in many other industries like the US airline industry (Miller & Chen, 1996) and the global steel industry (Hopkins, 2003; Gnyawali et al., 2006), the complexity and the evolving nature of the US telecom industry structure provides an additional interesting research setting to extend the existing literature in strategy (Chen, 1996; Ferrier et al., 1999).

In particular, this study focuses on the increasing number of RBOCs' strategic actions as they have encountered deregulatory and technological shifts from a naturally-monopolistic environment to a deregulated and more competitive environment. This section first briefly looks at the evolution of the US telecom industry from 1984 AT&T's divestiture, and then details the Telecom Act 1996, outlining how these deregulatory changes have influenced the RBOCs' corporate strategic actions. Also, it discusses the increasing acceptance of wireless telecom services as a key technological change in the telecom industry.

From the beginning of the telecom industry in 1879⁹ to 1984, AT&T enjoyed a dominant market position in the US telecom industry, regionally comprising 22 Bell Operating Companies (BOCs). In 1984, AT&T was broken into one long-distance company, the reconstituted AT&T, and seven regional bell operating companies (RBOCs) providing local services. GTE was the

⁹ Bell invented telephony in 1879

only other independent telephone operator with a comparable size against these RBOCs. Subsequently, the long-distance and international markets had been liberalized (Dawson et al., 2006). Long distance competition was initiated by MCI and Sprint, and became the main new entrants. While there was some competition in the long distance service market, it was limited by the regulatory restrictions on the number of new entrants and the absence of regulations requiring the incumbents to open their networks to be interconnected by new entrants at cost-based wholesale prices. In general, local access and local telephone services remained naturally monopolized by the incumbents (Fransman, 2001).

The decade from the mid-1980s was marked by an explosion in demand for new telecom products and services. The rapid growth in markets, the improvement of existing technologies and the emergence of new substitutes helped to fuel new entry and intensified competition in the industry. As previously mentioned, the seven RBOCs with the similar structure and services have shared with old AT&T's institutional legacy and administrative heritage, but over the next 15-year period, their strategic actions adapted to different structures and tried to pursue different product and service markets (Williams & Mitchell, 2004). The function of newly created RBOCs in 1984 was to maintain the local network and to provide access to those network facilities to AT&T, and its competitors, and the growing number of information service providers (Sterling, et al., 2006). It should be noted that the seven RBOCs were still prohibited to serve any inter-LATA¹⁰ long distance telecom services while they maintained their market dominance in the local telephone services.

The whole process of breaking up a century-old organization of AT&T was not easy, and the actual divestiture process went through a lengthy legal debates and approvals for several

¹⁰ LATA (Local Access Transport Area) defines that area in which RBOCs can provide their services. Each LATA may include more than one area code

years before the Justice Department finalized it in 1984. Obviously, the seven RBOCs were the key outcomes of AT&T divestiture in 1984, therefore, they couldn't proactively respond to the environmental changes at this time. However, the new post-divestiture environment became more complicated. For instance, those that had formerly slugged it out as adversaries now joined forces while former allies turned into vigorous competitors (Sterling, et al., 2006, p179). For the seven RBOCs, they began to look for ways to change and expand their market presence beyond their restricted local telephone services. Later, as the deregulatory process of amending 1934 Telecom Act became apparent in the mid-1990's, the seven RBOCs took their strategic positions rather proactively responding to regulatory change then. One purpose of this study is to compare with their strategic activities around these deregulatory changes.

As competition became more intense in the US telecom industry, more frequent and diverse corporate strategic activities were sought after among the seven RBOCs in search for new business ventures. For example, less than a month after the MFJ¹¹'s implementation in 1984, Bell Atlantic filed a petition to enter the equipment leasing market. Bell South also filed a motion to provide certain software programs and related services. Pacific Telesis field for permission to enter into foreign business ventures. In early 1990s, AT&T took over NCR, a strategic move into the computer equipment business, and then acquired McCaw Cellular, one of the major wireless service providers.

In 1995, AT&T went through the second breakup, called "trivestiture" - AT&T divided into three independent parts of very different sizes – AT&T, telecom service providers of long distance, wireless, and online services. Network Systems later became Lucent Technologies. And Global Information Systems, formerly NCR, began making bank and business computer

¹¹ MFJ (Modification of Final Judgment, also known as Divestiture Degree)

systems (Sterling et al., 2006, p179~187). It is worthwhile to look at AT&T's second divestiture in more detail. In particular, Lucent Technologies was officially separated from the control of AT&T for the first time, which then could be dated back to the era of Bell Labs. AT&T's Bell Labs led almost the majority of technological changes in the field. From then on, RBOCs' responses to technological changes needed to be modified because they no longer enjoyed a favorable first-mover advantage to technological changes in the US Telecom industry.

As other countries followed the privatization and liberalization in their telecom service sector, a series of cross-border M&As, strategic alliances and foreign investments flooded the international telecommunications market. The seven RBOCs played an important role in all of these strategic activities. Since the RBOCs were heavily regulated in the US, they looked for business growth outside the US telecom market. Many RBOCs invested into the global joint ventures with foreign telecom providers (Smith & Zeithaml, 1996). In many instances, foreign governments turned to the seven RBOCs and other investors for the monetary resources and the technological expertise in developing the telecom network infrastructure (Sterling, et al., 2006). Along with the seven RBOCs, foreign telecom operators such as NTT (Nippon Telephone & Telegraph), BT (British Telecom), DT(Deutsch Telecom), and FT (France Telecom) began to expand their global presence and became "new entrants" in each other's national markets by establishing global strategic alliances aimed at providing multinational firms with end-to-end telecom services.

In many countries, 100% FDI wasn't allowed in the area of telecommunication services, therefore, only a few strategic options such as international joint ventures (IJVs) were preferred by the seven RBOCs. IJVs provided the seven RBOCs with investment opportunities and with opportunities to gain experience in markets that were closed to them in the US (Sterling, et al.,

2006). Later in the 1990s', the seven RBOCs undertook a series of corporate strategic moves to expand their geographical coverage domestically, and moved into the new services such as CATV and wireless services.

The structure of the industry has changed once again with the amendment of Telecommunication Act in 1996 that permitted long-distance carriers to move into local markets, and local carriers to move into long-distance markets (Dawson et al., 2006). The 1934 Telecom Act was amended in 1996 with the intention of introducing competition at the regional and local levels. The Telecom Act 1996 contained specific sections (Section 251¹² and Section 271¹³) that promoted widespread entry of new entrants into the local exchange market as well as the RBOCs' reentry into the inter-LATA¹⁴ markets. The Telecom Act 1996 removed legal and regulatory barriers that traditionally have proscribed entry into Incumbent Local Exchange Carriers (ILECs) franchised territories, and imposed a set of resale, unbundling, and interconnection obligations on ILECs that enabled new entrants to efficiently utilize the existing local exchange networks in order for providing competing retail services to end users (Beard et al., 1998).

Also, the RBOCs actively began to participate in the rounds of FCC's wireless spectrum auctions and tried to expand their dominant positions in the wireless market. Despite the FCC's hope to promote more local competition, the Telecom Act 1996 provided the RBOCs with

¹² Section 251 covered general duty of telecom carriers and specific obligations of all local exchange carriers on interconnection among carriers. Even though facility-based competition was preferred to resale-based competition in the local exchange segment, the 1996 Telecom Act chose the policy direction of the resale-based market entry and the unbundled access in order to promote faster and broader competitive environment in the local segment. It was argued, at least initially, to be difficult for new entrants deploying sustainable amount of telecom infrastructure to compete against used-to-be dominant incumbents

¹³ In return for RBOCs' opening up with local exchange services, Section 271 relieved RBOCs' line of business restrictions. But RBOCs had to meet competitive checklist of 14 pro-competitive conditions in order to be authorized to offer in-region interLATA services. Section 271 began to take the opposite direction from the 1984 AT&T divestiture when RBOCs were prohibited from offering interLATA services

¹⁴ LATA stands for Local Access and Transport Area

strategic opportunities to maintain their dominance by reconfiguring their series of strategic actions. Even though most RBOCs' corporate strategic actions still required both federal- and state-level regulatory oversight, they were able to formulate more frequent and various strategic actions.

Along with deregulatory processes, technological advancement and service convergence stimulated the competitive market structure by forcing firms to compete with new services and technologies in vertically integrated upstream and downstream markets (Ware, 1998). Wireless technology had been continually upgraded with transmission quality and traffic volume capacity. Fast deployment of Internet infrastructure transformed communication networks with better data transmission capabilities and the multimedia functions at much low costs compared to those of the fixed line telephone networks.

In 2004, the US market was dominated by the 'big six' national wireless operators: Verizon Wireless, Cingular Wireless, AT&T Wireless, Sprint PCS, Nextel and T-Mobile. The merger and acquisition activities in the market have changed market dynamics (Dawson et al., 2006). With the acquisition of AT&T Wireless by Cingular (renamed as AT&T Mobility later) in November 2005, and the merger of Sprint and Nextel in August 2005, the market now has four main operators. A combined market share of over 80% of the US wireless subscribers allows these operators to share the advantages of national coverage, long-term operating experience, a large embedded network and customer support infrastructure (Dawson et al., 2006). Some operators have also benefited from ties to fixed-line parent companies.

From the standpoint of telecom operators' making strategic decisions, The Telecom Act 1996 triggered telecom operators to consider various options of strategic actions. It became possible for the RBOCs to extend their telecom services beyond their traditional local telephone

segments. The RBOCs were authorized to offer long distance inter-LATA telecommunications services originating in a state where it provided local services once certain conditions had been met to open the RBOCs' local markets in that state to competition (Schwartz, 2000). Allowing the RBOCs to offer long-distance services was intended to achieve the 1996 Telecom Act's competitive goals rapidly. Telecom operators adjusted their strategic actions in order to be adaptive to environmental changes (Koski & Majumdar, 2002; Noda & Collis, 2001; Smith & Zeithaml, 1996). As a result, a series of mega M&A actions among the RBOCs began to emerge in the marketplace. Alliance and other types of corporate strategic actions were frequently considered by the RBOCs. Also, the RBOCs sought after organizational transformation through corporate strategic actions by extending their business scope and geographical coverage significantly. Joshi et al. (1998) used Miles & Snow (1978)'s four typology to illustrate the patterns of the US telecom operators' strategic alliance actions¹⁵. Smith & Zeithaml (1996) also showed the analysis of the RBOCs' deploying capabilities that had acquired from international activities subsequently created the strategic flexibility into their strategic actions for the domestic businesses. Noda & Collis (2001) also looked at the evolution of intra-industry firm heterogeneity on the development of cellular telephone services among the RBOCs.

In mid-2006, several major wire-line & wireless telecommunications providers are worthwhile to look at in detail. AT&T, as the result of the merger between long-distance company AT&T and SBC (which was itself the result of the merger of several companies –

¹⁵ A firm took initiatives for changes (Prospectors). By doing that, a firm took advantage of first-mover advantages and led the market trends as it wished to be depending on its resource availability. On the other hand, a firm attempted to locate and maintain a secure niche (Defenders). Also, a firm reacted to the actions taken by competitors, a passive way of dealing with changes (Reactors). Lastly, a firm waited and anticipated how market would be shaped in the future (Analyzers)

Pacific Telesis, Ameritech, SNET and Southwestern Bell) became the largest telecom service providers in the US.

Next, Verizon, as the result of the merger between long-distance company MCI and Verizon (which was itself the product of the mergers among Bell Atlantic, Nynex and GTE) followed AT&T's strategic expansion. However, Verizon's strategic path to the current size went through quite different strategic action portfolios over the last 20 year period.

BellSouth was the only remaining incumbent local exchange provider serving the southeastern US regions from the 1984 AT&T break-up. Although AT&T acquired BellSouth later in 2006, BellSouth managed to keep its own strategic presence but experienced some difficulties in developing its competitive strategic positioning between new AT&T and Verizon.

Qwest, out of the US West that was one of the original ILECs in the western US, also struggled with positioning itself as a niche player in the Internet backbone and international telecom services. Among other long-distance carriers, Sprint, the wire-line arm of the combined wire-line and wireless operators was still a major provider of services to business customers. The mergers that had formed these companies have blurred the traditional lines between ILECs and inter-exchange carriers (IXCs or long-distance operators), and therefore made the regulatory environment more complex (Dawson et al., 2006).

In this section, I looked at some of recent deregulatory and technological changes in the US telecom industry. Regulatory reform and technological innovations began to transform the telecom industry structure, stabilizing the number of the surviving players (e.g. RBOCs) with an influx of new niche players (e.g. CLECs). The growing expansion of market boundaries has been also observed throughout the last 20-year period. All of the changes promoted more competition by eliminating the entry barriers into the markets. However, some surviving players (in particular

for RBOCs) have been successful in maintaining their market dominance even after the deregulatory and technological changes took place in the turbulent environment. One of the reasons we've witnessed different performance heterogeneity among the RBOCs can be explained as their unique ability to combine strategic actions, or strategic action portfolios, to cope with environmental changes, as hypothesized below.

5.0 HYPOTHESES

In this study, two main research questions are hypothesized and tested. First, I look at how a firm's corporate strategic action portfolios relate to both deregulatory and technological changes.

Hypotheses 1 through 4 test how a firm reconfigures its corporate strategic action portfolios in response to deregulatory and technological changes. In particular, two attributes - frequency and variety - in firm's strategic action portfolios will be discussed.

Hypotheses 5 and 6 focus on the different nature of a firm's strategic response positioning to deregulatory and technological changes. Lengthy deregulatory processes (Kim & Prescott, 2005) and a firm's strong ties to institutional building (Butler & Carney, 1986) enable firms to identify key issues and to overcome potential competitive risks in response to deregulatory changes. Ultimately, firms in particular for incumbents, will try to turn deregulatory changes to their advantages (Bailey, 1997). For instance, proactively-responding firms in the process of international expansion gain substantial first-mover advantages due to the transient nature of the windows of market opportunity and lengthy regulatory approval processes (Sarkar et al., 1999).

On the other hand, technological changes are difficult to predict and often times radical in nature, and incumbents have a tendency to limit a number of strategic actions they consider for technological changes in advance. Incumbents' prior commitment (Ghemawat, 1991) to the existing technologies may also delay a firm's speedy response to the technological changes.

Therefore, a firm takes a reactive strategic action positioning in response to technological changes.

Hypotheses 7 and 8 look at how a firm's corporate strategic action portfolios affect its performance. Walker et al. (2002) reported that the variation in performance among incumbents didn't significantly change when deregulation occurred even though the range of services and process innovations were initiated in the deregulated US airline industry. However, they questioned how incumbents leveraged their practices in response to institutional changes (Walker et al., 2002). This study looks at the frequency and variety of corporate strategic action portfolios to see if they will determine the performance heterogeneity among the RBOCs in the US telecom industry.

5.1 FREQUENCY OF CORPORATE STRATEGIC ACTION PORTFOLIOS AND DEREGULATORY CHANGES

Frequency of a firm's strategic actions is one of the mostly studied properties in the competitive dynamics literature. Frequency of action portfolios is the total number of a firm's corporate strategic actions in a given year (Miller & Chen, 1996; Gnyawali et al., 2006). Most prior studies measured this construct by the counts of a firm's individual strategic actions.

This study follows the same approaches. While a firm's total counts of strategic action are good measures for the frequency analysis, they may provide us biased results when simultaneously analyzing the multiple strategic actions with different magnitude. For example, M&A and divestiture actions require a firm's strong commitment with significant financial

resources being considered when compared to strategic alliance and joint venture actions. Therefore, this study measures the frequency of a firm's strategic actions in dollar amount.

While prior studies look at various types of actions individually, this study's strategic actions look at portfolios of a few important strategic actions. They are merger and acquisitions, strategic alliances and divestitures. In addition, a firm's internal development actions are also considered separately in the Appendix section. Although it is worthwhile to look at the extensive range of firm's strategic actions, this study focuses on the key corporate strategic actions as corporate strategic action portfolios that will provide us more meaningful assessment of a firm's actions and performance.

Deregulatory changes provide the framework for a firm's strategic behavior. In return, a firm actively constructs strategic (re)actions to each deregulatory policy shift. As to deregulatory policy shifts, a firm constructs a different set of strategy as optimal, and others often times copy and refine what leading firms have constructed in response to policy changes (Dobbin & Dowd, 1997). As competition intensifies in a deregulated environment, a firm's choices of available strategic actions tend to increase in adapting to deregulatory changes. A firm can take more alternative strategic actions when regulatory constraints are lifted. Deregulatory changes provide a firm with the flexibility to take different actions. As deregulatory changes occur, institutional norms are changing – a firm is taking more number of actions to be aligned with the changed industry norm.

For example, prior to the 1996 Telecom Act, a firm's allowable actions were strictly limited by regulators (Smith & Zeithaml, 1996). The RBOCs had to look for global strategic alliance actions outside the US market where the RBOCs' strategic flexibility was less restricted by the FCC. Global strategic alliance actions were considered to minimize their market share

losses caused by new entrants in the US market (Powell, 1990). Also, deregulations make the forming of ties more frequent and attractive, as in the case of the steel industry when antitrust regulations were relaxed in 1984 to facilitate research ventures between domestic partners (Madhavan et al., 1998).

As mentioned in the previous section, institutional theory explains why firms within a population exhibit similar (i.e. isomorphism) and stable (i.e. routines) action characteristics. Isomorphic behavior (DiMaggio and Powell 1983) is a constraining process that forces one firm to resemble others when both face the same set of environmental conditions. When competitors took similar actions, there were little chances that any single firm would be significantly successful or failing relative to others, thus, imitating others' strategic actions helped to preserve the status quo among incumbents even in industries where strong rivalry was maintained (Lieberman & Asaba, 2006). Deephouse (1996) showed that isomorphism in the strategies of commercial banks was related to organizational legitimacy conferred by bank regulators and the media, even in the heterogeneous presence of organizational age, size, and performance. Firms adopt more frequent strategic actions, not because they are efficient (*per se*), but because they furnish legitimacy in the eyes of outside stakeholders such as regulators (Deephouse, 1996).

Furthermore, deregulation energizes the latent potential for segmentation in markets, and a firm can use this segmentation to guide the reconfiguration of its resources (Delmas & Russo, 2005). When deregulatory changes occur, a firm begins to provide more number of services (for RBOCs, local services to long distance services and later wireless services) in the multiple coverage areas, and more strategic actions are necessary to secure new resource pools. As deregulation has unfolded in the telecom industry, so has a range of strategic responses (Delmas & Russo, 2005). Delmas & Russo (2006), using the electronic utility industry data, analyzed to

what extent deregulation triggered strategic changes to the resource bases of some firms. Their arguments were how non-market factors such as policy changes stimulated incumbents to change their resource bases (Delmas & Russo, 2006), and ultimately increase the frequency of a firm's strategic actions.

H1 All else being equal, frequency of a firm's strategic actions will increase significantly as deregulatory changes occur

5.2 FREQUENCY OF CORPORATE STRATEGIC ACTION PORTFOLIOS AND TECHNOLOGICAL CHANGES

A firm will explore more number of strategic actions when technological changes occur. When an organization faces high market uncertainty and needs to catch up with new technologies, forming new interorganizational network ties with new partners who have technological capabilities helps it improve its performance (Nohira & Garcia-Point, 1991). In order to obtain new technological resources outside their resource boundaries, a firm will be involved in corporate strategic actions such as M&As and JVs, ultimately increasing the number of strategic action portfolios.

Also, a firm tries to upgrade its existing technological infrastructure by considering different strategic actions when its strategic positions are at risk. For example, investigating the

probability and timing of entry by incumbents into emerging technical subfields of the US medical diagnostic imaging industry, Mitchell (1989) argued that firm's entry probability were greatly influenced by strategic actions that focused on technical threats to core products.

To some extent, a few significant technological breakthroughs have generally been pioneered by new entrants (Tushman & Anderson, 1986), and incumbents usually wait and see what others do, and try to take rather incremental but more frequent strategic actions to maintain their competitive advantages. They will have incentives to take different strategic action paths by adopting new technological platforms (or actions) when technological changes are started to be recognized as emerging technologies in the marketplace. It can be argued that incumbents would like to maintain (or enhance) their pre-existing relationships with the current vendors in order to maintain their existing technologies in full use. These long-term relationships will reinforce firms to undertake strategic actions reactively when technological changes occur. However, as technological changes stimulate the emergence of new services and expand a firm's prospects to vertically integrate and compete in upstream and downstream markets (Ware, 1998), more strategic actions will be likely to reconfigure a firm's strategic alignment (Venkatraman & Prescott, 1990) in a more unstable technologically-driven environment.

H2 All else being equal, frequency of a firm's strategic actions will increase significantly when technological changes occur

5.3 VARIETY OF CORPORATE STRATEGIC ACTION PORTFOLIOS AND DEREGULATORY CHANGES

Deregulatory changes determine which resources a firm should utilize in different institutional settings. Regulatory restrictions impose on a firm's choice of strategic actions. Barney (1991) argued that difficulties in a firm's adaptation to the regulatory changes might be partially attributed to the path-dependent nature of a firm's internal processes and factor-market positions. However, in order to compete effectively in the new regime, a firm needs to revise its existing capabilities and resources or suffers decreasing performance (Carroll et al., 1988). Also, a firm that has developed the ability to learn effectively might be able to adopt routines or behaviors that might meet the demands of the new institutional regime, even in the presence of traditional resource commitment (Walker et al., 2002). Moreover, Miller & Shamsie (1996) found that distinctive resources – property-based vs. knowledge-based resources – contributed to the Hollywood studios' value creation differently as environmental setting had changed from the stable and predictable environment to the more uncertain (changing and unpredictable) post-television environment.

In general, a firm will not know which type of strategic actions will be a fit to deregulatory changes at first. Often times, regulatory constraints for some strategic actions will be lifted as deregulatory changes allow more M&A and JV actions. As a result, a firm may be involved in executing more divestiture actions in order to take different mix of resources as deregulatory changes open up the new business opportunities. Therefore, deregulatory changes broaden a firm's choice of strategic actions in search for their business growth in a changed environmental setting. One of the key features of 1996 Telecom Act was to allow the RBOCs to broaden their business scope from the fixed-line local telephone to other telecom services,

including long distance and international telephone services. For the RBOCs, they had to come up with new sets of corporate strategic action portfolios to assess the effectiveness of each strategic action in different market segments.

H3 All else being equal, variety of a firm's strategic actions will increase significantly as deregulatory changes occur

5.4 VARIETY OF CORPORATE STRATEGIC ACTION PORTFOLIOS AND TECHNOLOGICAL CHANGES

Technological changes also affect the variety of a firm's strategic actions. Incumbents prefer cooperative arrangements over the acquisition of new entrants in order to internalize the new technology and thus maximize the value of their real options, particularly in the high uncertainty environments (Folta, 1998). Rothaermel (2001) examined the inter-firm cooperative actions between incumbents and new entrants, and incumbents used such actions to exploit complementary assets from new entrants in adapting to technological changes.

A firm will not know which type of strategic actions will be a fit to technological changes. Also, depending upon the types of technological changes, appropriate strategic actions can be considered. For instance, as 3G wireless technology becomes more apparent, a firm has to consider variety of strategic actions (e.g. JV and internal development actions) to fasten the

introduction of 3G wireless services into the market. For any geographic regions where a firm has not licensed to serve, M&A actions can be considered to expand its service coverage. To focus more on the wireless segment, a firm will divest non-core businesses as the main technological changes shifted from the fixed-lines to the wireless service markets. Miller et al. (1996) looked at two different organizational task environments (Castrogiovanni, 2002; Milliken, 1987). Their finding confirmed that a firm tended to expand its variety of strategic activities in a technologically unstable environment (Miller et al. 1996). In order to cope with technological changes, a firm is engaged in variety of strategic actions through acquiring or divesting assets, developing new markets, and allying its businesses with others¹⁶. For example, Ameritech's entry into CATV, SBC's international investments, and Sprint's creation of a product for global collaboration in multimedia production demonstrated that firms were creating and invading new markets through diversifying their strategic action portfolios (Berg & Jamison, 1997).

H4 All else being equal, variety of a firm's strategic actions will increase significantly when technological changes occur

¹⁶ AT&T's divestiture of Lucent Technologies and Cincinnati Bell's spinning off its data and billing business were the recent examples of companies shedding operations which, while perfectly good businesses, are better off separate from their formal companies (Berge & Jamison, 1997)

5.5 PROACTIVE STRATEGIC RESPONSES TO DEREGULATORY CHANGES

Siggelkow (2001) suggested that environmental changes could be classified with respect to the impacts they have on the industry landscape. According to his classification, the effect of environmental change on firms can be described as fit-destroying or fit-conserving since managers react differently to these two types of changes (Siggelkow, 2001). This study applies the similar approach to look at firm's willingness to take strategic actions in response to environmental changes. Forms of deregulation impact on the speed of adaptation in various internal governance mechanisms (Kim & Prescott, 2005). Deregulation process in the telecom industry takes a long path to be effective, and firms, in particular for incumbents, play important roles in shaping the scope of deregulatory changes. As a result, a firm will be proactively involved with strategic actions when deregulatory changes occur, and a firm's strategic actions will be increased even prior to the deregulatory events occur.

The earlier firms get involved in the process of deregulatory changes, the more strategic influences they will have (Bailey, 1997) as firms generate a mix of strategic actions in advance to strengthen their capabilities (or maintain their market dominance). With incumbents' strong ties to institutional building (Butler & Carney, 1986), they utilize the opening of policy window, a period when incumbents created the strategic use of information to shape a policy path in their favor (Bailey, 1997; Owen & Braeutigam, 1978). In other word, incumbents identify the key regulatory issues, overcome potential political difficulties by redrafting proposals, and thereby turn the politically propitious events to their advantages (Bailey, 1997).

Depending upon the nature of deregulatory changes, a firm makes its strategic actions whether certain deregulatory changes create an incentive to join with competitors (improving collective advantages) or to be apart from competitors (improving relative advantages). Thus, a

firm sets the stage to what extent deregulatory changes would be unfolded by proactively increasing its strategic actions prior to deregulatory changes became effective. For example, a firm with discernible market power and leadership positions proactively undertakes a set of deterrent actions to achieve a competitive advantage (Grimm & Smith, 1997). Sarkar et al. (1999) argued that proactively-responding firms in the process of international expansion gained substantial first mover advantages due to the transient nature of the policy windows of market opportunity.

H5 All else being equal, when deregulatory changes occur, a firm's strategic actions will be more proactive

5.6 REACTIVE STRATEGIC RESPONSES TO TECHNOLOGICAL CHANGES

In contrast, a firm has a difficult time predicting how fast technology changes unfold in the marketplace. Telecom service firms, in particular large incumbents such as the RBOCs, tend to wait and see what types of technologies will be dominating ones in the industry. As a result, a firm has limited options of strategic actions it could proactively consider to cope with technological changes. A firm's strategic actions are more reactive to technological changes than those to deregulatory changes. For incumbents, prior commitment (Ghemawat, 1991) to the existing technologies may also delay their responses because changing or even abandoning the

existing resources and technological knowledge bases will receive stronger resistance both internally and externally. Unlike new entrants being aggressively innovative to new technologies in the marketplace, incumbents tend to be more reactive in shifting their strategic action portfolios.

Innovative technological changes award proactive firms with first mover advantages. However, a firm may wait and see what others would respond to technological changes, and second mover advantages can be more effective to the uncertain nature of technological changes. Since the introduction of wireless telecom services in early 1980s', wireless technologies have undertaken a series of technological evolution from the analogue to the more efficient digital networks. Even among digital wireless technologies, different technology standards were introduced and upgraded in the market. Since it requires lengthy time and extreme amount of resources to deploy any new telecom infrastructure, a firm tends to be more reactive in taking strategic actions to upgrade its technologies when technological changes occur. Also, a firm takes rather conservative approaches in adapting its strategic actions to newer versions of wireless technology standards.

H6 All else being equal, when technological changes occur, a firm's strategic actions will be more reactive

5.7 FREQUENCY OF CORPORATE STRATEGIC ACTION PORTFOLIOS AND FIRM PERFORMANCE

Performance can be an outcome of a continuous series of strategic actions, and Ferrier et al. (1999) argued that market leaders were less competitively aggressive and slow in carrying out competitive actions, and as a result they were more prone to experience market share erosion and/or dethronement relative to industry challengers.

To understand the performance of a firm, one must analyze the firm as a system of interconnected choices: choices with respect to activities, policies and organizational structures, capabilities, and resources (Siggelkow, 2001). Ferrier (2001) argued that the more actions a firm carried out in response to environmental changes, the better its profitability and market share would be. A firm with more actions will enrich its series of action portfolios that ultimately lead to better performance. As a firm accumulates its strategic actions, it creates its internal organizational assets in the form of action repertoires, routines, and knowledge about how to carry out such actions (Miller & Chen, 1994). Both deregulatory and technological changes influence a firm's decision to make specific strategic actions. Therefore, a firm executing more number of strategic actions will perform better.

H7 A firm with higher frequency of corporate strategic action portfolios will perform better

5.8 VARIETY OF CORPORATE STRATEGIC ACTION PORTFOLIOS AND FIRM PERFORMANCE

Variety of strategic action portfolios looks at a firm's propensity to execute broader range of corporate strategic activities as opposed to concentrating on a narrow range of strategic activities in a given year (Miller & Chen, 1996). A firm carrying broad and complex strategic action portfolios will experience better profitability than those with narrow and simple ones (Ferrier, 2001). Prior studies have argued that a firm's success led to action simplicity, and its performance consequence is negative when environmental changes had occurred as in case of the US airline and trucking industries (Audia et al., 2000). A function of organizational and environmental properties such as a firm's good past performance, munificent homogeneous market, a lack of breadth in competitive experiences, and the complacency that accompanies a firm's age and size are all attributed to competitive simplicity that attenuates managerial search or restricts knowledge of competitive alternatives (Miller & Chen, 1996). While routines and stability induce a firm to converge and be persistent with its simple action portfolios, opportunistic adaptations through various strategic action portfolios are more likely among firms facing environmental changes (Miller et al., 1996).

H8 A firm with higher variety of corporate strategic action portfolios will perform better

In this section, I explained the underlying relationships between a firm's strategic action portfolios and performance in response to deregulatory and technological changes. The above hypotheses focused on two properties of action portfolios, frequency and variety. The next section will operationalize the eight hypotheses that will be tested in my study.

6.0 DATA AND ANALYSIS

As indicated earlier, the US telecom industry provides a fast-changing industry setting as evidenced by regulatory and technological changes during the last 20 years. While various types of competitive dynamics arguments have been discussed in the US airline industry (Miller & Chen, 1996) and the global steel industry (Hopkins, 2003; Gnyawali et al., 2006), the complexity and the evolving nature of the US telecom industry structure provides an another interesting and a renewed research setting to extend the existing literatures in strategic actions and corporate strategy (Chen, 1996; Ferrier et al., 1999).

While some prior studies in the telecom industry setting were mainly focused on the earlier periods in the US telecom history, the current competitive landscape requires a whole new perspective on the public policy, technology and competitive strategic behaviors among key players. For example, Barnett (1997) looked at the dynamics of competitive intensity among telephone operators in PA from 1879 to 1934. However, it was the era when FCC did not exist to regulate the industry in 1934. A firm's strategic actions then were quite different from those of the current telecom operators in the 1990s. Even though there were many independent telecom carriers offering services regionally, AT&T dominated the US telecom industry since its inception to the marketplace. Koski & Majumdar (2002) covered the last 20 year period from 1984 to 2004, but their focus was to examine how new entrants (responding to the introduction

of the 1996 Telecom Act) influenced the behavior of incumbents. Also, their scope of strategic actions included both strategic and tactical actions as Miller & Chen (1996) did.

Smith & Zeithaml (1996) studied the differences in the RBOCs' redeploying and managing portfolios of corporate strategic actions prior to the 1996 Telecom Act, where some RBOCs' international market experiences influenced their successful performance in the domestic market later. Also, Noda & Collis (2001) explored how intra-industry firm heterogeneity shaped the US cellular rollout strategies among the seven RBOCs prior to the 1996 Telecom Act. Outside the US, Fjeldstad (2004) looked at the European mobile phone operators' strategic actions as they faced a more complex and dynamic environment, and indicated that market penetration, concentration, and time evolution drove the likelihood of inter-firm cooperation and the types of strategic actions taken by key telephone operators.

The current study focuses on the corporate strategic action portfolios as the RBOCs' strategic adaptation mechanism in order to cope with the evolving competitive dynamics in the US telecom industry. While Miller & Chen (1996) provided with meaningful insights for competitive dynamics in the US airline industry, their results did not capture the effective relationship between strategic actions and firm performance due to the wide range of strategic and tactical actions¹⁷ being considered altogether.

The current study focuses on a few key corporate strategic actions as determining drivers for competitive dynamics in the US telecom industry. As the market experiences both deregulatory and technological transformations, these corporate strategic actions play very important role in adapting to or aligning with a new industry paradigm. This study investigates two properties of corporate strategic action portfolios – frequency and variety. Even though

¹⁷ Miller & Chen (1996) included 21 strategic and tactical actions

there are many other important properties in relating to firm's corporate strategic action portfolios, the above two properties are the most commonly researched ones in the competitive dynamics literature (Chen & MacMillan, 1992; Grimm & Smith, 1997; Ferrier, 1999; Ferrier et al., 2004; Miller & Chen, 1996; and Miller & Chen, 1994, 1996). This study also tests the importance of frequency and variety of corporate strategic action portfolios on performance. By focusing on to the key strategic actions, defined as corporate strategic action portfolios, it will give us more meaningful insights to investigate the relationships between strategic actions and firm performance.

6.1 DATA COLLECTION

The RBOCs' key corporate strategic actions were compiled from the SDC Platinum Database¹⁸. First, firm-level corporate strategic action data included the RBOCs' key strategic actions that occurred chronologically between 1984 and 2004. Next additional information were coded such as the participating firms' geographic locations (domestic vs. foreign) and industry classifications (SIC 4813¹⁹ vs. non-4813). While some strategic action data contained corresponding dollar values to complete the transactions, many other strategic actions such as strategic alliance actions could be focusing on the non-monetary relationships among participants with no dollar values to be reported in completing the transactions. For those strategic actions with no monetary values, detailed approximation process was conducted to fill in the missing values.

¹⁸ 2.3 version

¹⁹ SIC 4813 – Telecommunications (wired)

Firm-level performance variables were readily extractable from the Compustat database in the Wharton Research Data Services (WRDS). Key financial performance data such as return on investments (ROI) and return on assets (ROA) were also extracted from the Compustat database. Each firm's 10Ks (SEC filing) were consulted to check the validity of firm-level strategic actions and performance variables.

Industry-specific control variables were collected from several governmental agencies. For the total US population and Gross Domestic Product (GDP), US Department of Commerce's Bureau of Economic Analysis and Bureau of the Census data were used. Since the Census data were not available between 2000 and 2004, the total US population's annual estimates²⁰ from the Census Bureau were used. For the total number of wireless subscribers, CTIA²¹'s Semi Annual Wireless Industry Survey from January 1985 to December 2005 was used.

6.2 MEASURES

To empirically test the relationships among variables collected from the multiple data sources, key measures for independent, dependent and control variables are detailed in this section. For the relationships between corporate strategic action portfolios and performance, different financial performance measures including return on assets (ROA) are considered. Two of the most frequently used attributes, frequency and variety of strategic action portfolios, are used as independent variables in this study. Measures for these two attributes are similar to Miller &

²⁰ Table 1: Annual Estimates of the Population for the US: April 1, 2000 to July 1, 2004 (NST-EST2004-01), Population Division, US Census Bureau, December 22, 2004

²¹ CTIA – The Wireless Association (www.ctia.org) is an international organization representing all sectors of wireless communications – cellular, personal communication services and enhanced specialized mobile radio

Chen (1996) and Gnyawali et al. (2006). Lastly, some industry-specific and firm-specific control variables are added to control the relationships between a firm's strategic action portfolios and environmental changes.

6.2.1 Dependent Variables

The probability of a firm's survival is one of the strongest measures for performance, and circumvents the well-understood limitations of the widely used financial accounting and market-based measures. Among the seven original RBOCs being incorporated in 1984, only four RBOCs (AT&T (formerly SBC), Bell South²², Verizon (formerly Bell Atlantic including GTE and NYNEX), and Qwest (formerly US West) are in operation by the end of 2004. It is worthwhile to compare the patterns of these surviving RBOCs' corporate strategic action portfolios to those who are no longer in business and see if there are any differences between these two groups.

Other than measuring a firm's survival, the main dependent variables in this study are financial performance measures such as return on invested capital (ROIC) and return on assets (ROA). These two variables are frequently used accounting measures to test the relationships between a firm's strategic actions and performance (Miller & Chen, 1996; Ferrier, 1999). ROIC is calculated by dividing firm's net income after tax with the sum of stockholder's equity and debt from. It takes the same approach to calculate ROA, replacing invested capital (IC) for firms' total assets. Since the key corporate strategic actions in this study are closely related to a firm's

²² AT&T (formerly SBC) acquired Bell South in 2006

asset bases and investment decisions, these two accounting measures will show positive relationships with frequency and variety of corporate strategic action portfolios.

Return on Invested Capital (ROIC)

= *NOPLAT (net operating profit less adjusted taxes) / IC (invested capital)*

= *(revenue–COGS–operating expenses–depreciation charges–adjusted taxes) / (value of stockholder’s equity + value of debt)*

Return on Assets (ROA)

= *NOPLAT (net operating profit less adjusted taxes) / TA (total assets)*

= *(revenue–COGS–operating expenses–depreciation charges–adjusted taxes) / TA (total assets)*

6.2.2 Independent Variables

The seven RBOCs’ corporate strategic actions are coded from the SDC database. Strategic alliance actions include a broader range of firm’s partnering with other firms from equity partnerships to the long term marketing relationships. As long as any RBOCs are involved in the strategic alliance transactions, all of their domestic and foreign alliances are entered into the sample.

M&A actions include when any of the seven RBOCs acquire more than 50% of other firm’s total equity (or assets). The same reasoning is applied to divestiture actions when the seven RBOCs divest any of their existing businesses (or assets) to others. In addition, the seven

RBOCs' actions are further categorized into firm size (RBOCs vs. non-RBOCs), service scope (SIC 4813 vs. non-SIC 4813) and geographic location (domestic vs. foreign). These detailed categorizations can be applied to code different dimensions of corporate strategic actions. However, only the total annual counts of corporate strategic actions at their effective date are considered in this study.

Miller & Chen (1996) conceptualized the construct of competitive simplicity²³ in three different dimensions. This study follows Miller & Chen (1996)'s approach, using two of their three index variables – frequency and variety - to measure firm's corporate strategic action portfolios.

Frequency of corporate strategic action portfolios is the total number (or annual dollar values) of a firm's corporate strategic actions in a given year (Miller & Chen, 1996; Gnyawali et al., 2006). Three major corporate strategic actions – strategic alliance, M&A and divestiture actions will be individually counted to measure the frequency of a firm's corporate strategic action portfolios. For some specific strategic actions, it takes more than a year from the announcement of the individual strategic action to the actual effective date. In this study, the effective date of strategic actions is considered for annual action counts. And then, they are summed up in counts and dollar values.

In order to determine the impact of frequency of corporate strategic action portfolios on performance, each action's reported transaction amount (in million dollars) can be aggregated annually. Thus, the differential impacts of a single mega-M&A action versus multiple smaller-

²³ Miller & Chen (1996)'s three indexes are following. The R index is a range measuring the number of types of actions – an inverse index of simplicity, the C index is a concentration assessing the numerical emphasis on those most commonly employed types of actions, and the D index is a dominance assessing the single most common type of action employed by a firm – the smaller the range of types of actions, the greater the concentration on a few types of actions, or the more dominance a single type of action, the simpler the competitive repertoires (p. 426)

scale corporate strategic actions will be correctly reflected in the analysis of firm-level performance. When the corresponding dollar values of strategic actions are missing in the SDC database, I look at other sources such as a firm's 10K annual reports. If such efforts are not successful, I take the approximate dollar estimates drawn from the same corporate strategic action types. For strategic actions with missing dollar values, I took strategic actions with dollar values separately. Then, dollar values are converted to dollar values in the base year of 1984. I also took into account of strategic actions' characteristics such as action types (M&A, divestment and strategic alliances) and action scope (foreign vs. domestic). Based upon the characteristics of these actions' characteristics; average dollar values (base year) are calculated and these dollar values are applied to strategic actions with missing dollar values. With respect to the total number of a firm's corporate strategic actions in a given year, this study takes a similar approach to that used in Gnyawali et al. (2006).

Frequency of corporate strategic action portfolios for firm $i = \sum N_{ik}$

where N_{ik} refers to the number of four corporate strategic actions that firm i undertook in a given year.

Variety of corporate strategic action portfolios is the range of strategic actions undertaken by a firm across different corporate strategic actions (Miller & Chen, 1996; Gnyawali et al., 2006). Gnyawali et al. (2006) defined the competitive variety as the range of actions undertaken by a firm across the various aspects of the value chain. Miller & Chen (1996) defined the concentration index based on the standard deviation of the standard scores across the 21 types of

actions for an airline in a given year, and this standard deviation was standardized by dividing the total number of actions in order to adjust for the firm-size differences (p. 427).

$$\text{Variety of corporate strategic action portfolios for firm } i = 1 - \sum (N_{ij} / N_i)^2$$

where $N_{i, j}$ is the number of actions in the j th aspect of four corporate strategic actions for firm i ; thus, $(N_{i, j} / N_i)$ is the proportion of each corporate strategic actions from the corporate strategic action portfolios for i . If firm is focusing on a single corporate action type, variety of action portfolios will be close to zero.

For environmental changes, both deregulatory and technological changes are considered as firms adapt their frequency and variety of strategic action portfolios. For deregulatory changes in this study, the revision of Telecom Act in 1996 is used. The revision was the most comprehensive deregulatory change that reshaped the telecom industry environment during the 20 year period. The year of 1996 was used as a year of deregulatory changes in this study. For example, it eliminated the regional coverage restrictions and allowed new entrants to serve the basic telecom services. According to Kim & Prescott (2005), form of deregulatory process in telecom industry was low in pace and scope, therefore, a firm's strategic actions would be considered and executed in multiple-years. To count for such industry characteristics, several time ranges are used as dummy variables. For example, year 1995 (1 year minus from 1996) and year 1997 (1 year plus from 1996) are used as ± 1 year window period to examine if frequency of firms' strategic action portfolios change depending upon different pre- and post-time ranges when environmental changes occur.

Among many other technological changes in this industry, the emergence of wireless technologies is the focus of this study. In the late '1990s, 3G wireless standards became more apparent as the next generation wireless technology in the industry. As a result, key telecom operators began to consider more strategic actions in order to deploy more advanced wireless technologies and services. The year of 2000 was used as a year of technological changes in this study. It was the year when the annual total number of wireless subscribers outnumbered those of the fixed-line telephony subscribers for the first time. It was one of the major technological shifts, showing the signs of increasing growth rate of new telecom technologies and services such as wireless and the high-speed Internet services. To cope with such shifts, telecom operators had to consider modifying their corporate strategic action portfolios in order to sustain their sustainable competitive advantages. Another technological characteristic during the same period is that different communication technologies have begun to converge with each other. To name a few, VoIP²⁴ and CATV providers can now serve traditional telephony through different communication platform. Technological convergence forces incumbents (e.g. RBOCs) to formulate their strategic actions by rearranging their resource pools in anticipation of competing against new entrants.

Similar to deregulatory change dummy variables, several time ranges are used as technological change dummy variables. For example, year 1999 (1 year minus from 2000) and year 2001 (1 year plus from 2000) are used as ± 1 year window period to examine if frequency of firms' strategic action portfolios change depending upon different pre- and post-time ranges when technological changes occur.

²⁴ VoIP (Voice over Internet Protocol)

6.2.3 Control Variables

Firm age and size are often considered as organization-related control variables (Miller & Chen, 1996). In case of the seven RBOCs, since all were divested from AT&T at the same time in 1984, the age of each RBOC' is almost the same for all. However, firm size varies among the seven RBOCs. In this study, each RBOC's total asset size is controlled. Also, each RBOC's major serving areas, measured as the number of the top 100 MSAs each RBOC serves, can be assessed for the firm size effects. The RBOCs' cross-ownership with foreign telecom operators can be controlled as well since it may affect the RBOCs' decisions to modify strategic action portfolios. Even though major global partnerships (entities such as World Partners, Concert and Global One) are now inactive (or even dissolved in many cases), their roles as global alliance networks (Lee & Madhavan, 2004), learning experiences (Smith and Zeithaml, 1996; Gulati, 1995) among global partners will influence to the RBOCs' frequency and variety of strategic action portfolios. Industry controls such as the growth of annual GDP and annual population are also included in this study. Summary statistics of each variable are also shown in Table 1.

Table 1 Summary Statistics at 10% Significance Level

	Obs =137	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Allcountfreq	4.8540	4.4796	1.0000													
2	SQAllvariety	3159.883	2134.064	0.6237*	1.0000												
3	LNAllrealfreq	5.5488	3.2134	0.6944*	0.5164*	1.0000											
4	SQAllrealvarp	1556.901	1640.281	0.3814*	0.6036*		1.0000										
5	Y9597	0.1533	0.3616	0.2908*	0.2529*	0.2391*		0.0000									
6	Y9498	0.2774	0.4493	0.2650*	0.2089*	0.2120*	0.1613	0.6868*	1.0000								
7	Y9901	0.0729	0.2611						-0.1738*	1.0000							
8	Y9802	0.1241	0.3309				-0.1654	-0.1601		0.7455*	1.0000						
9	Pcpincome	21445.8	5527.201	0.1520	0.1697	0.1674		0.1667	0.2517*	0.2854*	0.3618*	1.0000					
10	Tasset	33323.64	31907.71						-0.2019*			0.6041*	1.0000				
11	Opincome	7803030	7336214							0.1678		0.6241*	0.9646*	1.0000			
12	Wsub	259851.3	16183.23	0.2157*	0.1752	0.1809*		0.1507	0.2483*	0.4639*	0.4861*	0.8714*	0.5278*	0.5649*	1.0000		
13	Uspop	7888.48	1383.583	0.2523*	0.2249*	0.1802*		0.1492	0.2259*	0.3358*	0.4157*	0.9146*	0.5649*	0.5960*	0.9448*	1.0000	
14	Nrival	179.438	112.0771								0.1443	0.3219*	0.5577*	0.5492*	0.4501*	0.5312*	1.0000

* 5% significance level (Obs = 111 for SQAllvariety and SQAllrealvariety)

6.3 ANALYSIS

From the previous section, I explained that strategic actions and environmental changes interact with each other. Both institutional and technical environments play important roles in shaping a firm's strategic behavior.

Previous research has taken different approaches to study the impact of environmental changes on a firm's strategic actions and performance. First, event study method is frequently used to look at the market responses to accounting information announcements. This approach uses dichotomous event as independent variable and explains variance in a continuous dependent variable (Harrison, 2006). For event studies in capital market research, stock price variance model is assessed whether specific events create abnormal stock returns. Specific event can be a release of information to market participants through the news media about corporate or governmental actions (Park, 2004), and abnormal returns are the differences between the observed returns and the estimated returns derived from a particular stock return model (Park, 2004; Brown & Warner, 1985).

Second, business history studies use the case method to address the impact of environmental changes on firm's performance. For example, Christensen (1993) reported how the large-scale, integrated firms failed to respond to the emerging market segments, and they were driven out the market by networks of less integrated firms with more improved, new-architecture products in the disk drive industry. Barley (1986) linked institutions and strategic actions to outline a theory of how technology impacted on different organizational structures by altering institutionalized roles and patterns of interaction. Munir & Phillips (2005) explored the

role of institutional entrepreneurs in the process of institutional change that coincided with the adoption of a new technology using the detailed case study of Kodak's roll film camera.

Third, the event history model, such as survival model (e.g. hazard model) in organizational ecology, uses continuous and other independent variables to explain time-dependent rate of a dichotomous dependent variable (Harrison, 2006). Wholey & Sanchez (1991) looked at the entry and exit rates of different types of firms when institutional changes occurred. Barnett & Carroll (1993) and Barnett (1997) discussed the impact of institutional constraints on the organizational survival of the early telephone operators in PA. Russo (2001) looked at the regulatory effects on creating new field such as independent (or non-utility) power production in America from 1978 to 1992.

Fourth, the visual mapping method provides evidence of the presence of industry patterns of strategy and suggests that early and late adopters exist in the empirical findings of the UK insurance industry between 1990 and 1996 (Webb & Pettigrew, 1999). And the speed at which a company would adopt an innovation is determined by the characteristics of the innovation and a number of contextual factors, including the nature of the industry and a variety of organizational and individual characteristics (Webb & Pettigrew, 1999). Also, Nath & Newell (1998) used the causal map methods to describe managers' interpretations of environment events and how firms responded to such environmental changes to achieve a better "fit", or the alignment between a firm's strategy and its environment (Venkatraman & Prescott, 1990).

This study first details the seven RBOCs' different strategic action portfolios with graphical illustrations, describing the evolution of the seven RBOCs' survival after the 1984 AT&T divestiture. Graphical illustrations, as later shown from Figure 2 to Figure 7, provide

strong visual effects on the firm's corporate strategic actions in response to environmental changes.

In addition to various qualitative analyses, different quantitative analyses can be utilized to relate the firm's strategic behaviors in response to environmental changes. Elsbach (1994) used ANOVA to compare the effectiveness of verbal accounts in managing organizational legitimacy in the California cattle industry. Delacroix & Swaminathan (1991) used an event-history analysis to examine the joint effect of organizational characteristics and of environmental variation on organizational change in the wine industry. Afuah (2004) used the least squares dummy variables to explore the impact of technological changes on a firm's co-opetitors on a firm's entry timing.

For the impacts of environmental changes on firm's frequency of corporate strategic action portfolios, I have considered different analyses such as ANOVA, least squares dummy variables (LSDV), Wilcoxon rank sum (Mann-Whitney) test (for non-parametric models) and the negative binomial regression models. For the simple comparison of environmental changes impacting on a firm's frequency of corporate strategic action portfolios, this study has extensively utilized the dummy variable regression with least squares dummy variables (LSDV) estimator. Since this study focuses on the corporate strategic action portfolios of the seven RBOCs, using the LSDV method is a practical proposition given the need for a small number of dummy variables. In other word, the LSDV estimator is practical only when N is small.

In order to use the LSDV estimator, frequency and variety of firms' unique corporate strategic action portfolios are separately converted into the natural logarithm and quadratic forms respectively. To complement the unique patterns of firms' corporate strategic action portfolios in

responding to the tested environmental changes, the results from alternative models such as the non-parametric model of Wilcoxon rank-sum test will be discussed in the separate section.

To capture the environmental changes on strategic action portfolios, I break down the dummy variables into several time spans. In this study, I use the year dummy variables at the time of deregulatory and technological changes (t) plus $t \pm 1$ year variables. For deregulatory changes, the year of Telecom Act 1996 is used as the base year, and then, y9597 (1995-1997) dummy variable is selected. For technological changes, y9901 dummy (1999-2001) variable is selected when the total number of wireless service subscriptions have outnumbered the fixed serviced subscriptions in 2000.

Frequency of corporate strategic action portfolios $_i = \beta_0 + \beta_1$ firm-specific variable $+\delta$ year dummy variable $_i + \varepsilon$

Variety of corporate strategic action portfolios $_i = \beta_0 + \beta_1$ firm-specific variable $+\delta$ year dummy variable $_i + \varepsilon$

For the impact of environmental changes on a firm's variety of corporate strategic action portfolios, the LSDV estimator is also utilized. Statistical operationalizations from hypotheses H1 to H4 will be similar except for substituting frequency of corporate strategic action portfolios with variety of corporate strategic action portfolios in response to deregulatory and technological changes.

The occurrence of a firm's strategic actions will be proactively frequent even before deregulatory changes occur as tested in H5. On the other hand, the occurrence of a firm's strategic actions will be reactively frequent after technological changes occur as tested in H6. The variety of corporate strategic action portfolios will be also examined if they show any proactiveness or reactiveness nature of strategic actions when environmental changes occur. These two hypotheses are tested with the LSDV estimator. To examine a firm's proactiveness vs. reactiveness of strategic actions in response to environmental changes, different time frames with $t\pm 2$ years of deregulatory and technological changes will be considered as dummy variables to see if they show significantly different coefficients in the regression model. In this study, for deregulatory changes, I look at the frequency of corporate strategic action portfolios with $t\pm 2$ year (1994-96 and 1996-98) dummies. For technological changes, another $t\pm 2$ year (1998-2000 and 2000-2002) dummies are taken to compare with the frequency of corporate strategic action portfolios. Both count and dollar measures are used to test these hypotheses.

For the relationship between the frequency and variety of corporate strategic action portfolios and performance, random effect GLS regression method with robust standard error estimator is used. Starting with base model for H7 and H8, some control variables are used. For firm-specific control variables, a firm's annual total assets and profit margins are controlled. Firms with more assets and profit margins will consider more frequent and various strategic actions since they have enough resource pools to play with. The total number of rival firms in each RBOC's service areas (by state) is controlled because the intensity among competitors will affect firm performance. The total number of wireless service subscribers are also controlled since the fast-growing wireless services will be greatly affecting the RBOCs' performance. The remaining two control variables are considered to take account of industry-specific

characteristics. Both annual per capita personal income and the total number of population in the firm's service area (by state) are added since this information will affect the firm's desire to consider the frequency and variety of corporate strategic actions. After the above control variables are considered, two independent variables in this study, frequency and variety of corporate strategic action portfolios are added and tested separately.

Base model

$$Y(\text{performance}) = a + b_1 * X_1 + b_2 * X_2 + b_3 * X_3 + b_4 * X_4 + b_5 * X_5 + b_6 * X_6 + \epsilon_i$$

X_1 : firms' total assets

X_2 : firms' profit margins

X_3 : the total number of rival firms in the firm's service area (by state)

X_4 : the total number of wireless subscriptions in the firms' service area (by state)

X_5 : per capita personal income (annual) in the firms' service area (by state)

X_6 : the total number of population in the firms' service area (by state)

Frequency – Firm Performance Model

$$Y(\text{Performance}) = a + b_0 * X_f + b_1 * X_1 + b_2 * X_2 + b_3 * X_3 + b_4 * X_4 + b_5 * X_5 + b_6 * X_6 + \epsilon_i$$

X_f : frequency of firms' strategic actions

Variety – Firm Performance Model

$$Y(\text{Performance}) = a + b_0 * X_v + b_1 * X_1 + b_2 * X_2 + b_3 * X_3 + b_4 * X_4 + b_5 * X_5 + b_6 * X_6 + \epsilon_i$$

X_v : variety of firms' strategic actions

To analyze the sensitivity of the above testing methods, a couple of other alternative methods are also considered. The ANOVA model tests if frequency and variety of a firm's corporate strategic action portfolios will significantly differ during the selected years. Also, the non-parametric model of Wilcoxon rank sum (Mann-Whitney) test can be used to determine whether there is a difference between the pre-event and the post-event period populations. This alternative can be effective when it requires no assumptions about the population probability distributions.

For count measures, negative binomial regression model can be complemented to see if frequency of corporate strategic action portfolios is more likely when regulatory changes occur. Organizational ecologists have extensively used this model to analyze the founding rates of firms in the industry. It overcomes the limitation of the Poisson model through the inclusion of an over-dispersion parameter (Swaminathan, 1998). The negative binomial model is more flexible (than Poisson model) by allowing the variance of the counts to have a different value than the mean. The model assumes that the coefficient of variation of the expected count increases linearly with the expected count (Swaminathan, 1998). The same approach is used here to model the relationship between the frequency of strategic action portfolios (rate), λ_t , and the vector of covariates (deregulatory changes), x_t , where ε has a gamma distribution. The model is specified as follows;

$$\ln \lambda_t = \alpha + \beta x_t + \varepsilon$$

In order to look at the sensitivity of using different time spans, I test both $t \pm 1$ and $t \pm 2$ year dummy variables to see if different time ranges will affect the frequency and variety of corporate strategic action portfolios.

7.0 RESULTS

The results of this study should be taken into consideration of the US Telecom industry context. Prior to AT&T's divestiture in 1984, AT&T, so called 'Ma Bell', dominated the industry, and the other firms' strategic considerations were extremely limited. Since then, competitive industry landscapes have emerged with more new telecom providers. Even though this study is limited to look at the key seven RBOCs' corporate strategic action portfolios, their strategic significances are very important to shape the most of the US telecom industry structure. Their market shares are still more than 80% of the wire-line telephone market, and they have strong presences in the wireless and broadband Internet services as well. The following section will look at the graphical illustrations of the RBOCs' corporate strategic action portfolios first, and then report the statistical results of hypotheses shown in the previous section.

7.1 GRAPHICAL ILLUSTRATIONS

This study first details the RBOCs' different patterns of corporate strategic action portfolios with graphical illustrations. In prior studies, Barley (1986) used the plot charts to discuss the impact of CT scanner technological changes on organizational structure. Webb & Pettingrew (1999) also presented the visual mapping charts to provide the temporal development of strategic patterns in the US Insurance industry. In this study, graphical illustrations below (Figure 2 and

Figure 3) clearly indicate that corporate strategic action portfolios show interesting patterns when deregulatory changes occur. The increasing pattern of corporate strategic action portfolios is detected around the event of deregulatory change in 1996 when count measure is used. Apparently, graphical illustrations using the action counts and the action's dollar measures show different patterns. When dollar value is used, frequency of corporate strategic action portfolios is peaked in 1997 just after the deregulatory event has occurred.

For technological changes, corporate strategic action portfolios do not show any significant increases in 2000 when count measure is used. But dollar measure shows another peak of increasing frequency of corporate strategic action portfolios around the year 2000 when technological focus has shifted to the wireless from the wire-line telecom services.

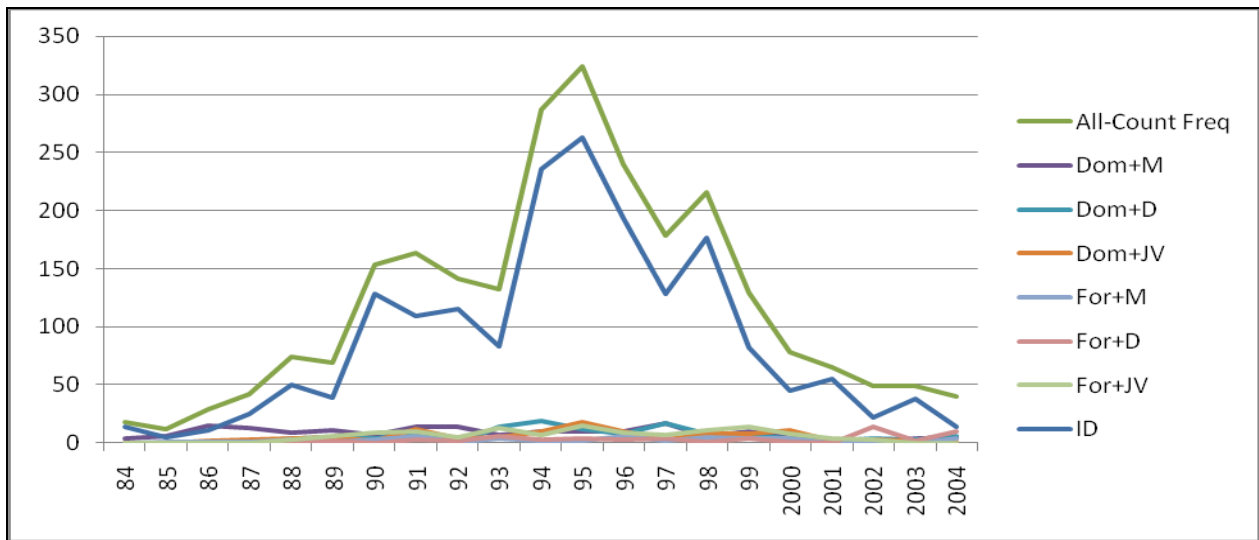


Figure 2 Frequency of Corporate Strategic Action Portfolios – All Firms (Count)

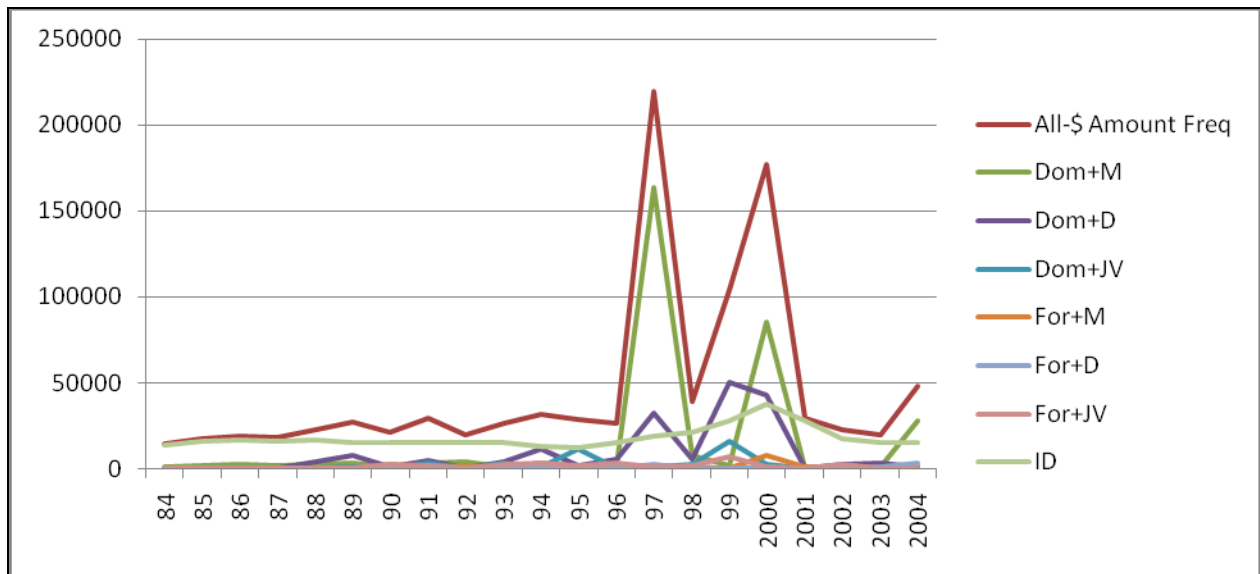


Figure 3 Frequency of Corporate Strategic Action Portfolios – All Firms (Dollar)

Interestingly, internal development actions take up the disproportionate majority of strategic actions in a given year when count measure is used. Since the proxy variables in measuring a firm’s internal development actions have something to do with these results, I decided that a firm’s internal development actions be analyzed in a separate section.

When dollar value is used, domestic M&A actions are the most frequently used strategic actions among the RBOCs when deregulatory event is occurred around the year of 1996. Also, even though the counts of strategic alliance actions are relatively higher than that of M&A actions, the different patterns of M&A actions in dollar measures show important strategic impacts on the competitive dynamics. When count measure is considered, strategic actions do not increase when technological changes occur. On the other hand, strategic action counts are

decreased after the year of 2000. When dollar measure is used, frequency of corporate strategic action portfolios is once again peaked in 2000.

The following figures (Figure 4 ~ Figure 7) show clearly that each firm has different patterns of strategic actions at different time period when dollar measure is used (figures in count measure are not shown here). Overall, a group of firms, which have been acquired by others during the study period (Nynex, Ameritech, and Pacific Telesis) show lower level of frequency and variety of corporate strategic actions. On the other hand, Bell Atlantic (now Verizon) and Bell South show relatively higher level of frequency and variety of strategic actions. Bell South has been consistently focused on all three strategic actions both for domestic and foreign operations. On the other hand, Bell Atlantic has been involved in two major mega-billion deals with Ameritech and Nynex, and ultimately changed its corporate name to Verizon. Whereas Bell South has maintained its conservative strategic behavior from the AT&T's era, Verizon's strategic actions have temporally evolved from one action to others such as domestic M&A actions to foreign JV actions. Unlike Bell South and Bell Atlantic, SBC has been slow in executing the number of strategic actions until SBC began to participate in the mega-billion deals later in the 1990s'.

Strategic actions from US West and Qwest show interesting changes as well. US West has been heavily involved in numerous strategic actions until it was acquired by a foreign operator, Qwest. Qwest's different patterns of strategic actions, focusing more on the domestic operations, have something to do with the changes in Qwest's management style responding to environmental changes.

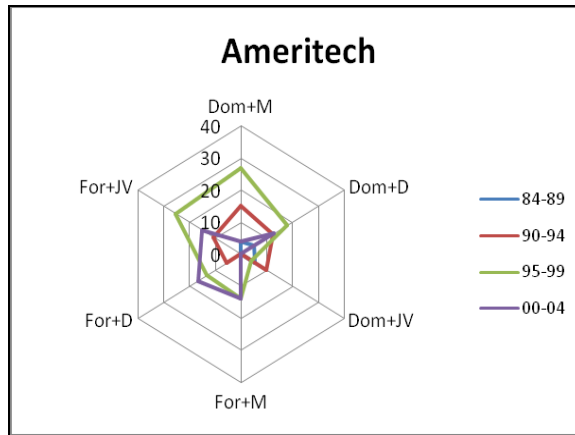


Figure 4 Variety of Corporate Strategic Action Portfolios – Ameritech (Dollar)

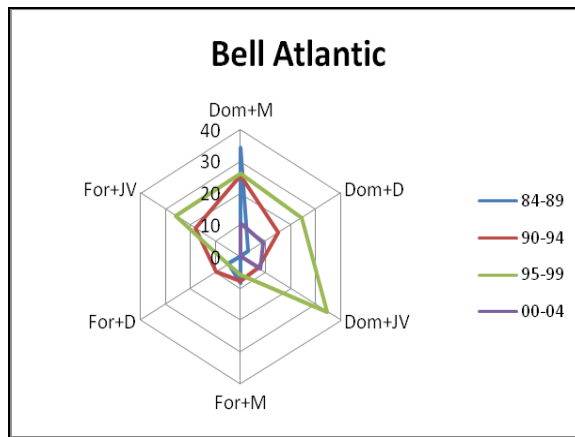


Figure 5 Variety of Corporate Strategic Action Portfolios – Bell Atlantic (Dollar)

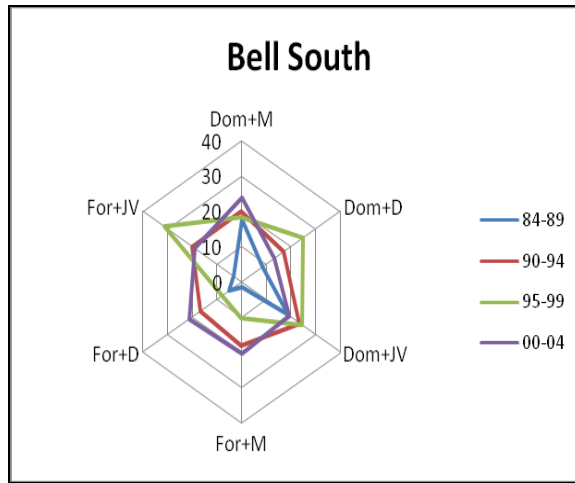


Figure 6 Variety of Corporate Strategic Action Portfolios – Bell South (Dollar)

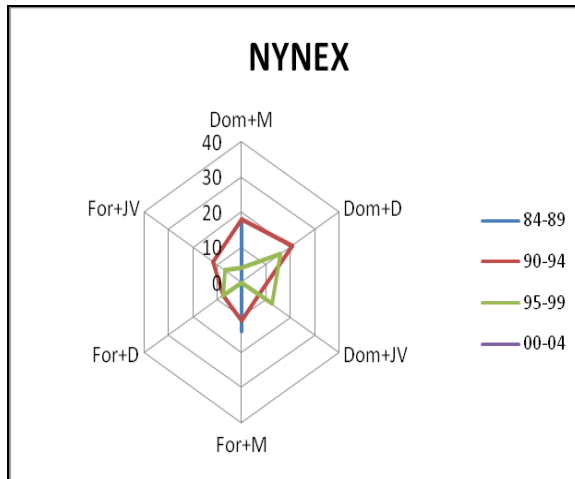


Figure 7 Variety of Corporate Strategic Action Portfolios – NYNEX (Dollar)

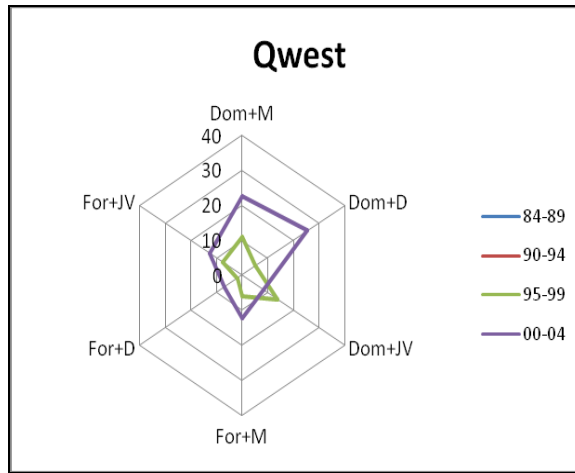


Figure 8 Variety of Corporate Strategic Action Portfolios – Qwest (Dollar)

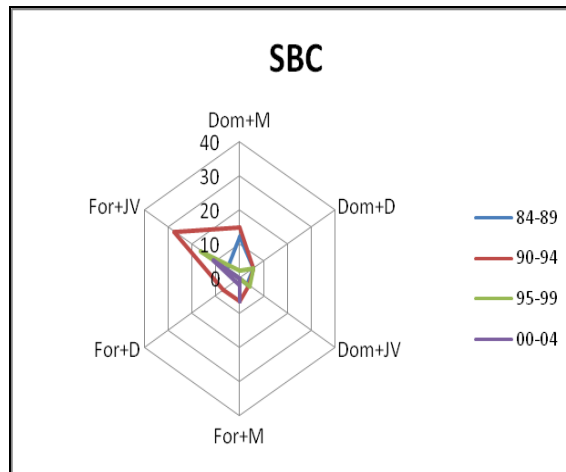


Figure 9 Variety of Corporate Strategic Action Portfolios – SBC (Dollar)

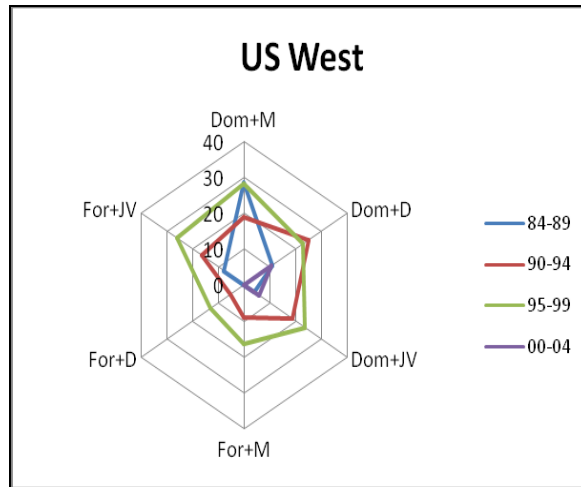


Figure 10 Variety of Corporate Strategic Action Portfolios – US West (Dollar)

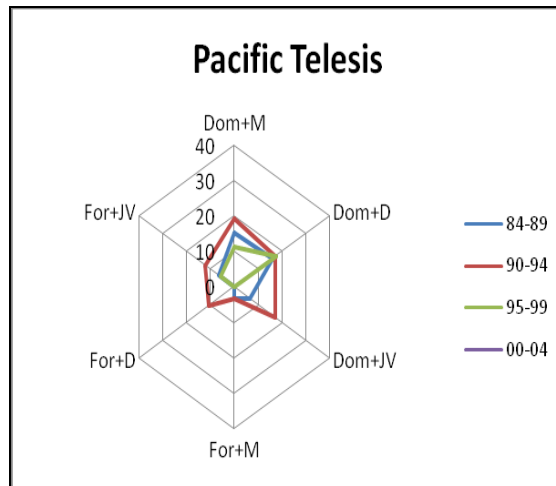


Figure 11 Variety of Corporate Strategic Action Portfolios – Pacific Telesis (Dollar)

7.2 RESULTS OF FREQUENCY (VARIETY) OF CORPORATE STRATEGIC ACTION PORTFOLIOS AND DEREGULATORY (TECHNOLOGICAL) CHANGES

For the relationships between frequency of corporate strategic action portfolios and deregulatory changes (H1), H1 is supported in count measure as well as in dollar measure. For frequency of corporate strategic action portfolios on technological changes (H2), H2 is not supported neither measures.

For H1, when count measure is used, frequency of a firm's corporate strategic action portfolios significantly increases around the time when deregulatory changes occur (significant at the 5% level). These results confirm that frequency (both count and dollar measures) of a firm's corporate strategic action portfolios does increase when regulatory changes occur.

For H2, neither count nor dollar measures are supportive. When alternative methods are used, their results do not show any significant improvement in testing H2. A few reasons not having significant results in H2 are discussed in the Limitation section later.

For the relationships between variety of corporate strategic action portfolios and deregulatory changes (H3), H3 is supported at the 5% significance level when count measure is used. When dollar measure is used, the result is not supportive even at the 10% significance level.

Variety of corporate strategic action portfolios on technological changes (H4) is not supported in both count and dollar measures. Thus, all else being equal, variety of a firm's corporate strategic action portfolios is significantly increased as deregulatory changes occur only when count measure is used.

Table 2 Frequency (Variety) of Corporate Strategic Action Portfolios on Deregulatory Changes

Least Squares		H1	H1	H3	H3
Dummy Variables (LSDV)		Allcountfreq (count measure)	LNAllrealfreq (dollar measure)	SQAllvareityp (count measure)	SQAllrealvarietyyp (dollar measure)
Y9597	t	3.52	2.44	2.55	0.51
	P > [t]	0.001**	0.016**	0.012**	0.608

** 5% Significance Level: * 10% Significance Level

Table 3 Frequency (Variety) of Corporate Strategic Action Portfolios on Technological Changes

Least Squares		H2	H2	H4	H4
Dummy Variables (LSDV)		Allcountfreq (count measure)	LNAllrealfreq (dollar measure)	SQAllvareityp (count measure)	SQAllrealvarietyyp (dollar measure)
Y9901	t	-1.57	0.34	-0.48	-0.43
	P > [t]	0.120	0.738	0.632	0.669

** 5% Significance Level: * 10% Significance Level

7.3 RESULTS OF PROACTIVE VERSUS REACTIVE STRATEGIC RESPONSES TO ENVIRONMENTAL CHANGES

For proactive versus reactive strategic responses to environmental changes, a firm's corporate strategic action portfolios tend to be more proactive when deregulatory changes occur (H5), and to be more reactive when technological changes occur (H6).

Proactive strategic responses to deregulatory changes are supported in this study. Corporate strategic action portfolios in count measure are more frequent even prior to a change in deregulation. When both pre-event and post-event periods are compared, the standardized coefficient for pre-event period is 5.011 while the standardized coefficient for post-event period is 2.190 when count measure is tested. Even though both coefficients are significant at the 10% level, the frequency of a firm's corporate action portfolios are twice more likely in the pre-event period. I compare the coefficients of pre-event period with post-event period to test the null hypothesis, $H_0: b_{\text{pre-event period}} = b_{\text{post-event period}}$. The F value is 5.42 and is significant at the 5% level, indicating that the coefficient of pre-event period is significantly different from the coefficient of post-event period. The larger coefficient of the pre-event period indicates that a firm's strategic actions will be more proactive when deregulatory changes occur. Frequency of corporate strategic action portfolios in dollar measure shows the meaningful significance when changes in deregulation.

Furthermore, variety of a firm's corporate strategic action portfolios shows consistent results. A firm takes various types of strategic actions proactively even before deregulatory changes occur. Thus, this study finds proactive strategic responses in the variety of a firm's corporate strategic action portfolios when deregulatory changes occur. The significance levels are at the 5% both in count and dollar measures, but the differences in the coefficients of pre-

event and post-event periods are much smaller when variety of a firms' corporate strategic action portfolios are tested in H5. It is due to the fact that several mega-billion dollar M&A deals have been made just after deregulatory changes in 1996, and these excessive financial commitments have some effects on the significance level. During the pre-1996 period, a firm has been more flexible with executing different types of corporate strategic actions when count measure is considered.

For H6, this study shows no significance that technological changes have to do with a firm's reactive strategic responses. One interpretation may be that a firm does not take its strategic actions reactively after technological changes occur. Either count or dollar measures are not significant. For the RBOCs, technological changes may not play any significant motivating roles in considering strategic actions reactively.

Table 4 Proactive versus Reactive Strategic Responses to Environmental Changes (Frequency)

LSDV		H5	H5	LSDV		H6	H6
Deregulatory Changes		Allcountfreq (count measure)	LNAllrealfreq (dollar measure)	Technological Changes		Allcountfreq (count measure)	LNAllrealfreq (dollar measure)
Y9496	t	4.55	3.66	Y0002	t	-0.06	-0.05
	P > [t]	0.000**	0.000**		P > [t]	0.950	0.964

** 5% Significance Level; * 10% Significance Level

Table 5 Proactive versus Reactive Strategic Responses to Environmental Changes (Variety)

LSDV		H5	H5	LSDV		H6	H6
Deregulatory Changes		SQAllvarietyp (count measure)	SQAllrealvarietyp (dollar measure)	Technological Changes		SQAllvarietyp (count measure)	SQAllrealvarietyp (dollar measure)
Y9496	t	4.24	2.85	Y0002	t	-1.48	-1.85
	P > [t]	0.000**	0.005**		P > [t]	0.143	0.068*

** 5% Significance Level; * 10% Significance Level

7.4 RESULTS OF FREQUENCY (VARIETY) OF CORPORATE STRATEGIC ACTION PORTFOLIOS AND FIRM PERFORMANCE

For the relationships between frequency (variety) of corporate strategic action portfolios and firm performance (H7 & H8), only the frequency hypotheses (H7) measured in count and dollar measures are supported at the 10% and 5% significance levels respectively.

To test the hypotheses 7 and 8, first, the base model indicates that all control variables are significantly related to the firms' performance at the 5% level. Both ROA and ROI performance indicators are tested, but the results using ROA performance indicators are shown here. When frequency and variety constructs are tested, both count and dollar measures are separately tested for ROA performance indicator.

Investigating the relationship between frequency of a firm's corporate strategic action portfolios and performance in count measure shows that a firm with more frequent corporate

strategic action portfolios performs better at the 10% significance level. When the dollar measure is used, the result is significant at the 5% significance level. It is an interesting result that needs to be further investigated for the detailed relationships between a firm's corporate strategic action portfolios and performance. While the count measure of a firm's corporate strategic action portfolios provides us with the positive nature of a firm's performance, the dollar measure of a firm's corporate strategic action portfolios provides us with more meaningful picture between a firm's corporate strategic action portfolios and performance.

Regarding the relationship between variety of a firm's strategic action portfolios and performance, a firm with variety of corporate strategic action portfolios does not show any better performance with any one of count or dollar measures. Once again, in the late 1990s', the RBOCs have been involved in the series of mega-billion dollar M&A deals with other telecom operators. Also, they have tried to diversify into different layers of info-communication services by investing into the Internet start-ups and deploying the high-speed fiber-optic infrastructure. The market has not been favorable to all of these strategic actions along with bursting the Internet bubble in the 1990s'. This can be one of the reasons why the relationship between variety of corporate strategic action portfolios and performance shows insignificant results in Table 6.

Table 6 Frequency (Variety) of Corporate Strategic Action Portfolios and Firm Performance

Random Effects GLS Regression With Robust SE	Base Model	Base Model	H7	H7	H8	H8
	ROA	ROI	ROA Frequency	ROA Frequency	ROA Variety	ROA Variety
Variable			Allcountfreq	LNAllrealfreq	SQAllvariety	SQAllrealvariety
Measures			count	dollar	count	dollar
Z	3.01	2.13	3.14	2.93	3.48	3.54
P > Z	0.003**	0.033**	0.002**	0.003**	0.001**	0.000**
Uspop	-0.0000801	-0.0001572	-0.0000842	-0.000074	-0.0000946	-0.0000933
Z	-2.57	-2.86	-3.61	-3.30	-3.73	-3.66
P > Z	0.010**	0.004**	0.000**	0.001**	0.000**	0.000**
Nrival	0.0032819	0.0108466	0.0034794	0.0036468	0.0039398	0.0038601
Z	1.88	3.45	2.67	2.71	3.06	2.98
P > Z	0.060*	0.001**	0.008*	0.007**	0.002**	0.003**
Tasset	-0.0000219	-0.0000543	-0.0000177	-0.0000184	-0.0000206	-0.0000214
Z	-4.15	-4.96	-3.93	-4.18	-4.95	-3.80
P > Z	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
Promar	0.4131121	0.717757	0.4293664	0.4310544	0.4249868	0.4255102
Z	8.18	5.88	8.92	8.74	9.09	8.84
P > Z	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
pcpincome	0.000197	0.00047	0.0001699	0.0001544	0.0001708	0.0001719
Z	2.63	3.99	3.52	3.25	3.36	3.40
P > Z	0.008**	0.000**	0.000*	0.001**	0.001**	0.001**
Allcountfreq			0.0548487			
Z			1.89			
P > Z			0.058*			
LNAllrealfreq				0.0573544		
Z				1.99		
P > Z				0.046**		
SQAllvariety					0.0000611	
Z					1.42	
P > Z					0.156	
SQAllrealvariety						0.000068
Z						1.48
P > Z						0.138

** 5% Significance Level: * 10% Significance Level

7.5 ALTERNATIVE ANALYSIS

This section describes some alternative analysis using different estimation methods. Overall, the results in this section are confirming the results in the main section with some interesting comparisons. For the first four hypotheses (H1 ~ H4), different methods such as ANOVA, negative binomial regression and Wilcoxon rank sum test are used. Also, both ± 1 year and ± 2 year window dummy variables are tested in order to assess the firm's different levels of frequency and variety of corporate strategic action portfolios responding to deregulatory and technological changes. For the relationship between a firm's performance and corporate strategic action portfolios, return on investment (ROI) is used as an alternative performance indicator instead of ROA.

For the relationship between frequency of a firm's corporate strategic action portfolios and deregulatory changes (H1), H1 is supported, and both count and dollar measures result in the same results when all three alternative statistical methods are used. The only time H1 is not supported is when 2 year window (y9498) dummy variable is used with the negative binomial regression model.

For frequency of a firm's corporate strategic action portfolios on technological changes (H2), H2 is not supportive both in count and dollar measures when ANOVA and Wilcoxon rank sum test are used. Interestingly, when negative binomial regressions are tested using count measure for H2, both 1 year window (y9901) and 2 year window (y9802) dummy variables are significant at the 5% level. These contrasting results may indicate that the unique frequency patterns of a firm's strategic actions (as shown in Figure 2) are properly captured using the negative binomial regression method. Also, the frequent numbers of a firm's strategic actions are intensively executed during the narrower time span of environmental changes.

As shown in the graphical illustrations from Figure 2 to Figure 7, when collected sample distributions of a firm's corporate strategic actions show the non-linear characteristics, non-parametric model of Wilcoxon rank sum (Mann-Whitney) test is preferably used to other alternative models. When Wilcoxon rank sum test is used, the results are consistent with other alternative methods. H1 is supported both in count and dollar measures while H2 is not supported.

Therefore, for H1, when count measure is used, the frequency of a firm's corporate strategic actions increases significantly around the time when deregulatory changes occur (significant at the 5% level). The results are consistent with ANOVA, negative binomial regression, and Wilcoxon rank sum test. These results confirm that frequency of a firm's corporate strategic action portfolios does increase when regulatory changes occur.

For H2, when count measure is used, only the negative binomial regression model is significant at the 5% level.

For the relationship between variety of a firm's corporate strategic action portfolios and deregulatory changes (H3), H3 is supported when count measure is used, but for variety of a firm's corporate strategic action portfolios on technological changes (H4), H4 is not even partially supported. All else being equal, variety of a firm's corporate strategic action portfolios increases significantly as deregulatory changes occur when both count and dollar measures are used. The results are consistent with all alternative methods. However, variety of a firm's corporate strategic action portfolios does not increase significantly as technological changes occur (H4). The relationship between variety of a firm's corporate strategic action portfolios and technological changes is significant at the 10% level only when dollar measure is used with ± 2 year window dummy variable (y9802) in the Wilcoxon rank sum test model.

Table 7 Frequency (Variety) of Corporate Strategic Action Portfolios on Deregulatory Changes – Alt. I

ANOVA		H1	H1	H3	H3
Rank Sum Test		Allcountfreq (count measure)	LNAllrealfreq (dollar measure)	SQAllvareityp (count measure)	SQAllrealvariety (dollar measure)
Y9597	F	17.14	9.61	8.26	0.86
	Prob > F	0.0001**	0.0024**	0.0049**	0.3572
Y9498	F	13.18	6.82	5.22	3.08
	Prob > F	0.0004**	0.0101**	0.0244**	0.0821

** 5% Significance Level: * 10% Significance Level

Table 8 Frequency (Variety) of Corporate Strategic Action Portfolios on Deregulatory Changes – Alt. II

Wilcoxon		H1	H1	H3	H3
Rank Sum Test		Allcountfreq (count measure)	LNAllrealfreq (dollar measure)	SQAllvareityp (count measure)	SQAllrealvariety (dollar measure)
Y9597	Z	-3.141	-2.995	-2.634	-1.064
	Prob > [Z]	0.0017**	0.0027**	0.0084**	0.2875
Y9498	Z	-3.250	-2.827	-2.164	-1.632
	Prob > [Z]	0.0012**	0.0047**	0.0305**	0.1026*

** 5% Significance Level: * 10% Significance Level

Table 9 Frequency of Corporate Strategic Action Portfolios on Deregulatory (Technological) Changes –

Alt. III

Negative Binomial Regression	H1	H1	H2	H2
	Allcountfreq (count measure)	LNAllcountfreq (count measure)	SQAllcountfreq (count measure)	SQAllcountfreq (count measure)
Y9597	0.3688222			
Z	2.08			
P > [Z]	0.038**			
Y9498		0.1694455		
Z		0.96		
P > [Z]		0.338		
Y9901			-0.6714065	
Z			-2.09	
P > [Z]			0.037*	
Y9802				-0.7162647
Z				-2.72
P > [Z]				0.007**
Pcpincome	0.0000404	0.0000415	0.0000572	0.0000646
Z	2.28	2.16	3.28	3.65
P > [Z]	0.023**	0.031**	0.001**	0.000**
Tasset	-0.0000285	-0.0000302	-0.0000378	-0.0000398
Z	-2.68	-2.76	-3.59	-3.82
P > [Z]	0.007**	0.006**	0.000**	0.000**
Opincome	0.0001179	0.0001262	0.0001622	0.00017
Z	1.98	2.12	2.66	2.85
P > [Z]	0.048**	0.034**	0.008**	0.004**

** 5% Significance Level: * 10% Significance Level

Table 10 Frequency (Variety) of Corporate Strategic Action Portfolios on Technological Changes – Alt. I

ANOVA		H2	H2	H4	H4
		Allcountfreq (count measure)	LNAllrealfreq (dollar measure)	SQAllvareityp (count measure)	SQAllrealvariety (dollar measure)
Y9901	F	1.32	0.56	0.49	0.96
	Prob > F	0.2531	0.4546	0.4863	0.3308
Y9802	F	0.14	0.02	0.86	0.83
	Prob > F	0.7100	0.9016	0.3550	0.3649

** 5% Significance Level: * 10% Significance Level

Table 11 Frequency (Variety) of Corporate Strategic Action Portfolios on Technological Changes – Alt. II

Wilcoxon Rank Sum Test		H2	H2	H4	H4
		Allcountfreq (count measure)	LNAllrealfreq (dollar measure)	SQAllvareityp (count measure)	SQAllrealvariety (dollar measure)
Y9901	Z	1.136	-0.423	1.077	1.523
	Prob > [Z]	0.2558	0.6720	0.2813	0.1277
Y9802	Z	1.120	-0.020	1.392	1.686
	Prob > [Z]	0.2628	0.9843	0.1639	0.0919*

** 5% Significance Level: * 10% Significance Level

For the relationships between frequency (variety) of corporate strategic action portfolios and performance (H7 and H8), only the count measures for frequency (variety) of corporate strategic action portfolios are supportive with ROI indicator at the 10% and 5% significance levels respectively. However, when dollar measure is used, the results are insignificant testing both frequency and variety constructs. Once again, in the late 1990s', the RBOCs have been involved in the series of mega-billion dollar M&A deals with other telecom operators. Also, they have tried to diversify into different layers of info-communication services by investing into the Internet start-ups and deploying the high-speed fiber-optic infrastructure. The market has not been favorable to all of these strategic investments along with bursting the Internet bubble in the 1990s'. This can be one of the reasons why the relationship between frequency (variety) of corporate strategic action portfolios and firm performance (ROI) shows insignificant results when dollar measure is used.

Table 12 Frequency (Variety) of Corporate Strategic Action Portfolios and Firm Performance – Alt.

Random Effects GLS	Base Model	Base Model	H7	H8	H7	H8
Regression With Robust SE	ROA	ROI	Frequency & ROI	Variety & ROI	Frequency & ROI	Variety & ROI
Measures			count	count	dollar	dollar
Wsub	1.03e-07	1.90e-07	2.10e-07	1.94e-07	3.08e-07	3.09e-07
Z	3.01	2.13	2.42	2.26	3.00	3.02
P >[Z]	0.003**	0.033**	0.016*	0.024**	0.003**	0.003*
Uspop	-0.0000801	-0.0001572	-0.0001953	-0.00018	-0.0002463	-0.0002422
Z	-2.57	-2.86	-3.47	-3.30	-4.06	-4.03
P >[Z]	0.010**	0.004**	0.001**	0.001**	0.000**	0.000**
Nrival	0.0032819	0.0108466	0.0115042	0.0123381	0.0134826	0.0134596
Z	1.88	3.45	3.62	3.78	4.37	4.38
P >[Z]	0.060*	0.001**	0.000**	0.000**	0.000**	0.000**
Tasset	-0.0000219	-0.0000543	-0.0000502	-0.0000505	-0.0000586	-0.0000606
Z	-4.15	-4.96	-4.43	-4.56	-4.00	-4.24
P >[Z]	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
Promar	0.4131121	0.717757	0.7096546	0.7113675	0.6960949	0.6971286
Z	8.18	5.88	6.14	6.13	6.36	6.23
P >[Z]	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
Pcpincome	0.000197	0.00047	0.0005142	0.0004847	0.0006015	0.0006042
Z	2.63	3.99	4.41	4.29	5.14	5.19
P >[Z]	0.008**	0.000**	0.000**	0.000**	0.000**	0.000**
Allcountfreq			0.1207337			
Z			2.61			
P >[Z]			0.067*			
LNAllvariety				0.1835402		
Z				2.54		
P >[Z]				0.011**		
SQAllrealfreq					0.0001095	
Z					1.11	
P >[Z]					0.266	
SQAllrealvariety						0.0000774
Z						0.81
P >[Z]						0.420

** 5% Significance Level: * 10% Significance Level

8.0 LIMITATIONS

Prior to AT&T divestiture in 1984, there had been little considerations for a firm to pursue corporate strategic action portfolios since AT&T was the only leading player with significant market positions in the market and a firm's corporate strategic decisions were heavily regulated. Telecom Act 1996, a major deregulatory change in the US Telecom industry served as a shock that required firms to adapt their strategies to the new rules of the game.

As this study argues with two dimensions of corporate strategic action portfolios – frequency and variety, the impact of deregulatory changes on the RBOCs' strategic behaviors have varied among firms. Some firms have emerged from deregulation as survivors while others exited via either bankruptcy or takeover by the surviving RBOCs. Technological changes also provide opportunities to increase firms' flexibility and options in making their services more attractive to the market. In return, an increase in technological uncertainty will affect a firm's frequency and variety of corporate strategic action portfolios that may have significant payoffs in the future.

However, this study looks at these two inter-related environmental changes as a stand-alone effect to the firm's strategic decision making processes, influencing the firm's strategic considerations rather separately. Clearly, deregulatory and technological changes are inter-related, and the interactive nature of these environmental changes will play an interesting role in formulating and implementing different patterns of a firm's corporate strategic action portfolios.

In other words, by providing consistent rules of competition and usage in the marketplace, telecom (de)regulatory policies facilitate the evolution and growth of newly developing technologies as can be exemplified in the deployment of 3rd generation (3G) digital cellular networks along with the FCC's spectrum auction policies. As Majumdar & Venkataraman (1998) recognized in their study, institutional influences played an important role in a firm's technology adoption decisions. Policy changes from the rate-of-return based regulation to the price-cap based regulation enhanced a firm's incentive to be more technologically efficient since profits were influenced by a firm's cost savings attained from the price-cap in each service bracket (Majumdar & Venkataraman, 1998). At state-level, the policy of incentive regulation was implemented at different times by the state-level PUCs, and these regulatory changes influenced the level of a firm's new technology investments at state level (Majumdar & Venkataraman, 1998). Therefore, 'technology-forcing' regulatory instruments could have been effective in driving a series of technological changes (Lee et al., 2007).

Also, this study looks at the two most-studied properties of a firm's corporate strategic action portfolios – frequency and variety. Again, these two properties are independently analyzed with respect to their performance effects. The effects of frequency and variety of corporate strategic action portfolios on performance interact in a subtle way. Shankar & Bayus (2003) looked at the home video game industry and questioned why smaller network-sized (in terms of customer base) firms (Nintendo) with stronger network strength (the marginal impact of a unit increase in network size on demand) overtook the sales of a firm with a larger network size (Sega). Their conclusions could be applied to this study that firm performance was a function of frequency and variety of corporate strategic action portfolios. It is perhaps a topic for future investigations to see which properties of action portfolios might be more influential in

determining a firm's long-term performance. Interacting effects between frequency and variety of corporate strategic action portfolios would be related to the uncertainty level of organizational task environment (Castrogiovanni, 2002; Milliken, 1987). This study should further extend the interaction effects between frequency and variety of corporate strategic action portfolios at different environmental uncertainty levels. In addition, further studies should be done in looking at the organizational characteristics and action repertoires. For instance, diversity of top management teams (TMT) will be related to the characteristics of action repertoires such as complexity, change and timing of action portfolios.

For each hypothesis, further refinement should be considered. The results from H1 to H4 present very interesting contrasts when count and dollar measures are used. While prior studies have focused on analyzing the strategic action's count measure, this study indicates that alternative measures may produce totally different outcomes. When different types of strategic actions are considered, merely counting the total number of actions may produce a deceiving signal to analyze the relationships between frequency of corporate strategic action portfolios and environmental changes. Due to the limited data availability in dollar value of different action types, the literature has been quiet on the alternative measures testing the strategic impact of different action types. This study takes a very basic approximation method to use the different action types in dollar value. More sophisticated and refined ways to approximate missing data in dollar value should be considered.

To better understand the proactiveness and reactiveness of corporate strategic action portfolios on environmental changes as hypothesized in H5 and H6, it will be interesting to examine if any variations of a firm's strategic action proactiveness are detected in the four stylized forms of deregulation (Kim & Prescott, 2005). Depending upon different pace and scope

dimensions of deregulatory changes, a firm's willingness to take any specific strategic actions proactively or reactively will vary. Also, the study should be refined why different statistical results are produced when count and dollar measures are used. For technological changes on the reactivity of corporate strategic action portfolios, are there any other specific drivers (or events) to impact on the relationship between technological changes and strategic actions? Since the RBOCs are telecom service providers, unlike telecom equipment manufacturers, technological changes may have less direct influences on the reactivity of corporate strategic actions.

It will be interesting to see how other performance measures will be related to a firm's strategic actions as hypothesized in H7 and H8. Accounting measures such as ROI and ROA have been criticized by focusing too much on firm's short term performance. Also, it will be worthwhile to look at the strategic action versus performance relationships when highly publicized mega-billion dollar M&A deals are differently treated in the sample. Even though those mega-billion dollar M&A deals are significant enough to change firm's strategic directions in the future, they are too huge deals to achieve positive returns in a short time period.

Finally, when a firm considers strategic actions, its motives to be involved in such strategic actions are not necessarily directed toward enhancing their performance measures. Even though a firm's competitive positioning (measured by the number of rivals in a firm's service areas) is controlled, more refined classification of a firm's strategic actions will be necessary to test the relationship between strategic actions and performance.

Lastly, frequency and variety of a firm's corporate strategic action portfolios should be moderated by other firm-specific factors such as TMT characteristics. Executives' propensity to adopt particular strategic actions depends on their perception of how well their firms can control

their business environment and on the costs of introducing such changes into their organizations. Since this study only looks at the key incumbents, the RBOCs with similar administrative heritages in the US telecom industry, the immediate extension of this study will include different types of firms with different administrative heritages (or firms with different organizational sizes) in the industry. When compared the market behaviors between entrepreneurial firms and established firms in the competitive local exchange telecom industry (Gentry & Jamison, 2004), their study showed substantially different investment patterns between these two strategic groups. When strategic actions by different types of firms are analyzed, more detailed firm-specific data should be collected and complemented to the current study's existing data set.

9.0 IMPLICATIONS

Despite the increasing importance of the relationships between public policy and strategy, a firm's strategic actions in response to environmental changes have been often overlooked in the policy making processes. Many firms are oftentimes unable to take a holistic view of how regulatory and technological changes affect their corporate strategic behaviors (Beardsley et al., 2005). This study emphasizes the firm's strategic adaptation mechanism, viewed as a firm's corporate strategic action portfolios, in response to two major environmental changes. It also tries to assess the impact of a firm's corporate strategic action portfolios on firms' performance heterogeneity. In sum, this study builds on the premise that adaptive strategic actions such as strategic alliances, M&As, and divestitures are commonly observed in a heavily regulated industries such as the US telecom industry, and they tend to vary across firms.

In this study, I hypothesize that firms demonstrate different patterns of corporate strategic action portfolios, and some patterns are more strongly associated with favorable long term performance than others. Both regulatory and technological changes increasingly shape the structure and conduct of industries and sets in motion major shifts in economic value (Beardsley et al., 2005). Successfully navigating these changing processes could allow firms not only to manage regulatory and technological risks better but also to shape their industries and to create potential opportunities for themselves (Beardsley et al., 2005).

Two dimensions of a firm's corporate strategic action portfolios are examined in this study. First, frequency of corporate strategic action portfolios is important when business environments become uncertain. When environments become complex and dynamic due to deregulatory and technological changes, firms need to reconfigure their resource pools to be able to match environmental conditions, and ultimately sustain their competitive advantages. Reconfiguring the firm, often defined as corporate restructuring, can be performance-enhancing for the firm (Bowman & Singh, 1993).

As Oliver (1991) offered a typology of different strategic responses to environmental changes, this study looks at the occurrence of the alternative strategic actions when deregulatory and technological changes occur. In particular, deregulatory changes reset the legitimating process through redefining industry norms and shared logic (Scott, 2001; DiMaggio & Powell, 1983; Oliver, 1991). As a result, firms explore different types of strategic actions which will be competitively adaptable to new regulatory paradigm. In particular for the incumbents (mainly for the RBOCs) in the US telecom industry, institutional changes broaden the heterogeneity of firms' strategic actions to search for new opportunities and subsequently extend their necessary resources in the new environment. This study indicates that a firm's strategic actions do increase when deregulatory changes occur (H1). When both count and dollar measures are used to test H1, the results are significantly consistent with different statistical approaches being used.

Regarding technological changes, firms should also reconfigure their resource pools by executing different strategic actions to adapt to technological (dis)continuities. This study looks at the simple relationships between firms' frequency of corporate strategic action portfolios and technological advancement. The results are expected that firms will increase their strategic actions in order to adapt to new technological paradigm. The US telecom industry has witnessed

a series of technological development from the fixed line telecom services to wireless telecom services. Along with a wider variety of telecom products are being served and the service coverage is extended, convergence of different communications services (i.e. VoIP) requires a firm to consider different set of strategic actions. Learning new technologies internally has been the most frequently used form of actions among incumbents (RBOCs) since they have led the most of technological breakthroughs in the US Telecom industry. As technological changes occur, firms begin to compete against new entrants with advanced technological expertise, and all lead to more numbers of a firm's strategic actions responding to technological changes.

However, this study looks at the one particular event, which is predicted to have a significant impact on a firm's corporate strategic action portfolios. When wireless services were commercially recognized in the early 1980's, they were considered as complementary services to the main fixed-line services. Now, wireless services are replacing the fixed-line services, and become the key technological backbones of telecom service providers. When wireless technology advanced to the third and fourth generations of wireless services, the numbers of wireless service subscriptions have began to surpass the number of fixed-line service subscriptions since 2000. This event can be considered as one of the most significant technological shifts in the US telecom industry, and a firm's strategic actions are predicted to increase accordingly. The results show that frequency of a firm's corporate strategic action portfolios on technological changes (H2) is not supported. However, when count measure is alternatively used with negative binomial regression model, H2 shows significant results both with $t\pm 1$ (y9901) and $t+2$ (y9802) dummy variables being used.

The above results should be noted with two interesting implications. First, technological changes can be very complex processes that a firm's choices of considering different corporate

strategic actions will be different depending upon the nature of technological changes. For example, Lavie (2006) presented three mechanisms of capability reconfiguration – substitution, evolution, and transformation – that analyzed the incumbents’ responses to technological changes. To some extent, the impact of technological changes can be tested on a continuous basis, not as a single event impacting on firms’ corporate strategic actions.

Second, when dollar measure is used, a firm’s frequency of strategic actions on technological changes is significantly related. Usually, it takes significant amount of a firms’ strategic commitment to deploy new technology infrastructure in the telecom industry. While just counting the number of strategic actions will not take into account of a firm’s strategic commitment, strategic actions measured in dollar value will provide more fruitful analyses on the relationships between a firm’s corporate strategic action portfolios and environmental changes.

Firm’s variety of corporate strategic action portfolios is the ability to act in various arenas, and if the ability is only challenged when environmental pressure forces one’s hand, and one must respond quickly, then variety as a viable competitive weapon is only knowable after the fact (Bourgeois, III, 1994; 227). In the US telecom industry, a firm’s strategic actions have been regulated by FCC. In return, incumbents (e.g. RBOCs) have enjoyed natural monopoly status in their regulated coverage areas (e.g. LATAs). Even after AT&T’s divestiture in 1984, the RBOCs’ strategic actions were limited to the non-regulated services and their overseas operations. Deregulatory changes in 1996 opened up the new opportunities for the RBOCs to consider variety of strategic actions. This study partially confirms that a firm’s corporate strategic action portfolios do increase when deregulatory changes occur (H3).

However, when technological changes are considered for a firm’s variety of corporate strategic action portfolios, the results are rather insignificant in this study. Once again, the

characteristics of technological changes in this study have limited the firm's choice of strategic actions. As mentioned, this study focuses on the technological changes in the event when wireless services have outnumbered the traditional fixed line services. Firms have explored various types of telecom services other than wireless services, and the event of technological changes in this study may have overlooked them. Also, the speed of technological changes may take different forms as the case in the deregulatory changes (Kim & Prescott, 2005), and as a result, a firm's strategic actions to reconfigure their capabilities will be determined accordingly.

For both frequency and variety of corporate strategic action portfolios, a firm's strategic actions will be sequentially executed as defined as competitive repertoires (Miller & Chen, 1996). This study looks at another dimension of a firm's corporate strategic action portfolios, competitive speed (Nayyar & Bantel, 1994). Competitive speed refers to how quickly firms act in the event of environmental changes (Nayyar & Bantel, 1994), and this study looks at the proactive versus reactive responses to deregulatory and technological changes. A firm's capability to act proactively is likely to achieve superior performance (Lee et al., 2000). However, to perform speedy strategic actions, firms should consider additional costs that arise from the potential pitfalls of deciding too early before uncertainty has been adequately resolved or appropriate measures have been taken to guard against unforeseen events (Wernerfelt & Karnani, 1987). As a result, firms will take reactive responses of their strategic actions to certain environmental changes.

This study shows rather interesting results in regards to a firm's proactive versus reactive responses to environmental changes. Since incumbents (RBOCs in this study) have long history of close ties with the regulators in the US telecom industry, they have better positions to prepare for such deregulatory changes. As a matter of fact, all RBOCs were active participants in

numerous policy making forums and the congressional hearings before 1996 Telecom Act was revised and passed in the Congress. Also, lengthy deregulatory process provided them to proactively response to deregulatory changes. The results in this study confirm that a firm's strategic actions (both frequency and variety of corporate strategic action portfolios) will be more proactive when deregulatory changes occur (H5).

On the other hand, when technological changes occur, a firm's strategic actions are not reactive (H6). However, it should be noted that the firm's reactive strategic responses to technological changes are significant when dollar measure is used. Firms will wait and see what others do when technological changes are involved with the likelihood of additional costs associated with executing strategic actions proactively. In particular, significant strategic commitments such as corporate strategic actions in this study will force firms to respond reactively to technological changes.

Lastly, prior studies have shown mixed results about the relationships between frequency and variety of corporate strategic action portfolios and performance (Ferrier, 1999, Miller & Chen, 1996). A firm with more frequent and various types of strategic actions is supposed to be better equipped with sustaining its competitive advantage in response to environmental changes. However, too many frequent and diverse strategic actions will deplete a firm's available resources quickly, and ultimately will be incapable of responding to any unforeseen environmental changes.

While prior studies have looked at wide ranges of competitive actions, this study looks at the key corporate strategic actions that will directly impact on a firm's performance. The results in this study only confirm the positive relationships between frequency of corporate strategic action portfolios and performance (H7) when both count and dollar measures are used. However,

H8 is not supportive when count or dollar measures are used. It is due to the fact that a firm's frequent use of various strategic actions results into the detrimental competitive effects of industry overcapacity (Porter, 1980) as we have witnessed them during the IT & Internet bubbles in the late 1990's.

APPENDIX A

RESULTS OF INTERNAL DEVELOPMENT ACTIONS

In addition to the above three major corporate strategic actions, a firm's internal development actions were separately measured and analyzed their influences on the relationships between environmental changes and corporate strategic action portfolios in this section.

A firm's internal development actions may be equally important to assess the firm's competitive dynamics along with other external strategic actions like M&A and strategic alliance actions. In particular for incumbents, the majority of resources and actions are internally consumed and the studies using only the external strategic action types may provide us with biased results. However, the above arguments can be further elaborated when this study's use of proxy variables in internal development actions is refined, and use more sophisticated ways to collect a firm's internal development actions.

Since the main data source, SDC, does not report the firm-level internal development actions, other telecom industry-specific measures are considered. In this section, the incremental increases in the number of a firm's telecom switches (exchanges) are used as proxy in the FCC's

annual telephone industry infrastructure and service quality reports²⁵. To telecom service operators, the number of telecom switches (exchanges) can be considered as one of the key determining factors for their internally developed actions. As a firm initiates more internally developed corporate strategic actions, the more number of new switches (exchanges) will be added. Also, the number of telecom switches (exchanges) will take the significant portions of a firm's capital expenditures, a frequently used dollar value proxy to measure the level of a firm's internal development efforts. The following tables are separately tested results of a firm's corporate strategic action portfolios including internal development actions.

²⁵ Statistical Report, Telephone Industry Infrastructure and Service Quality, Wireline Competition Bureau, FCC (www.fcc.gov)

Table 13 Summary Statistics at 10% Significance Level (Including Internal Development Actions)

	Obs = 137	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Allcountfreq	18.3431	23.4554	1.0000													
2	Allvariety	39.3432	27.6457	-0.1588	1.0000												
3	Allrealfreq	7113.314	16430.34		0.1883*	1.0000											
4	Allrealvarp	29.51066	23.4577	0.3633*	0.5835*		1.0000										
5	Y9597	0.1533	0.3616	0.3197*	0.1551	0.1660	0.2170*	1.0000									
6	Y9498	0.2774	0.4493	0.39114*			0.2267*	0.6868*	1.0000								
7	Y9901	0.0729	0.2611						-0.1738*	1.0000							
8	Y9802	0.1241	0.3309					-0.1601		0.7455*	1.0000						
9	Pcpincome	21445.8	5527.201			0.2907*		0.1667	0.2517*	0.2854*	0.3618*	1.0000					
10	Tasset	33323.64	31907.71	-0.1420		0.2432*	-0.2189*		-0.2019*			0.6041*	1.0000				
11	Opincome	7803030	7336214			0.2684*	-0.1676			0.1678		0.6241*	0.9646*	1.0000			
12	Wsub	259851.3	16183.23			0.3004*		0.1507	0.2483*	0.4639*	0.4861*	0.8714*	0.5278*	0.5649*	1.0000		
13	Uspop	7888.48	1383.583	0.1584		0.2438*		0.1492	0.2259*	0.3358*	0.4157*	0.9146*	0.5649*	0.5960*	0.9448*	1.0000	
14	Nrival	179.438	112.0771	0.1709*							0.1443	0.3219*	0.5577*	0.5492*	0.4501*	0.5312*	1.0000

* 5% significance level

Table 14 Frequency (Variety) of Corporate Strategic Action Portfolios on Deregulatory Changes (Including Internal Development Actions) – Alt. I

ANOVA		H1	H1	H3	H3
		Allcountfreq (count measure)	Allrealfreq (dollar measure)	Allvareityp (count measure)	Allrealvariety (dollar measure)
Y9597	F	16.80	4.27	4.43	7.98
	Prob > F	0.0001**	0.0408**	0.0373**	0.0055**
Y9498	F	27.90	1.15	0.50	8.19
	Prob > F	0.0000**	0.2855	0.4824	0.0049**

** 5% Significance Level: * 10% Significance Level

Table 15 Frequency (Variety) of Corporate Strategic Action Portfolios on Deregulatory Changes (Including Internal Development Actions) – Alt. II

LSDV		H1	H1	H3	H3
		Allcountfreq (count measure)	Allrealfreq (dollar measure)	Allvareityp (count measure)	Allrealvariety (dollar measure)
Y9597	t	4.10	2.07	2.10	2.82
	P > [t]	0.000**	0.041**	0.037**	0.005**
Y9498	t	5.28	1.07	2.07	2.86
	P > [t]	0.000***	0.286	0.041**	0.005**

** 5% Significance Level: * 10% Significance Level

Table 16 Frequency (Variety) of Corporate Strategic Action Portfolios on Deregulatory Changes
(Including Internal Development Actions) – Alt. III

Wilcoxon		H1	H1	H3	H3
Rank Sum Test		Allcountfreq (count measure)	Allrealfreq (dollar measure)	Allvareityp (count measure)	Allrealvariety (dollar measure)
Y9597	Z	-2.990	-1.512	-1.835	-2.479
	Prob > [Z]	0.0028**	0.1306	0.0665*	0.0132**
Y9498	Z	-3.948	-0.942	-0.649	-2.557
	Prob > [Z]	0.001**	0.3460	0.5162	0.0106**

** 5% Significance Level: * 10% Significance Level

Table 17 Frequency of Corporate Strategic Action Portfolios on Deregulatory (Technological) Changes
(Including Internal Development Actions) – Alt. IV

Negative Binomial Regression	H1	H1	H2	H2
	Allcountfreq (count measure)	Allcountfreq (count measure)	Allcountfreq (count measure)	Allcountfreq (count measure)
Y9597	0.2385606			
Z	1.40			
P >[Z]	0.161			
Y9498		0.24743411		
Z		1.52		
P >[Z]		0.130		
Y9901			-0.5424179	
Z			-2.01	
P >[Z]			0.045**	
Y9802				-0.3756434
Z				-1.76
P >[Z]				0.078*
Pcpincome	0.0000619	0.0000564	0.0000749	0.0000772
Z	3.94	3.27	4.98	5.03
P >[Z]	0.000**	0.001**	0.000**	0.000**
Tasset	-0.0000257	-0.0000243	-0.0000326	-0.0000327
Z	-2.91	-2.73	-3.78	-3.78
P >[Z]	0.004**	0.006**	0.000**	0.000**
Opincome	0.0000987	0.0000973	0.0001334	0.0001313
Z	2.03	2.02	2.66	2.66
P >[Z]	0.043**	0.044**	0.008**	0.008**

** 5% Significance Level: * 10% Significance Level

Table 18 Frequency (Variety) of Corporate Strategic Action Portfolios on Technological Changes (Including Internal Development Actions) – Alt. I

ANOVA		H2	H2	H4	H4
		Allcountfreq (count measure)	Allrealfreq (dollar measure)	Allvareityp (count measure)	Allrealvariety (dollar measure)
Y9901	F	0.53	3.13	0.20	1.87
	Prob > F	0.4682	0.0794*	0.6590	0.1737
Y9802	F	0.03	1.75	0.75	1.14
	Prob > F	0.8690	0.1878	0.3896	0.2882

** 5% Significance Level: 10% Significance Level

Table 19 Frequency (Variety) of Corporate Strategic Action Portfolios on Technological Changes (Including Internal Development Actions) – Alt. II

LSDV		H2	H2	H4	H4
		Allcountfreq (count measure)	Allrealfreq (dollar measure)	Allvareityp (count measure)	Allrealvariety (dollar measure)
Y9901	t	-0.73	1.77	-0.44	-1.37
	P > [t]	0.468	0.079*	0.659	0.174
Y9802	t	-0.17	1.32	1.77	-1.07
	P > [t]	0.869	0.188	0.079*	0.288

** 5% Significance Level: * 10% Significance Level

Table 20 Frequency (Variety) of Corporate Strategic Actions on Technological Changes (Including Internal Development Actions) – Alt. III

Wilcoxon Rank Sum Test		H2	H2	H4	H4
		Allcountfreq (count measure)	Allrealfreq (dollar measure)	Allvareityp (count measure)	Allrealvarietyp (dollar measure)
Y9901	Z	-0.402	-2.325	0.880	1.212
	Prob > [Z]	0.6880	0.0201**	0.3786	0.2254
Y9802	Z	-1.248	-1.887	1.340	0.983
	Prob > [Z]	0.2121	0.0592*	0.1801	0.3258

** 5% Significance Level: * 10% Significance Level

Table 21 Proactive versus Reactive Strategic Responses to Environmental Changes (Frequency – Including Internal Development Actions)

LSDV		H5	H5	LSDV		H6	H6
Deregulatory Changes Frequency		Allcountfreq (count measure)	Allrealfreq (dollar measure)	Technological Changes Frequency		Allcountfreq (count measure)	Allrealfreq (dollar measure)
Y9698	t	1.10	1.86	Y0002	t	-0.29	1.64
	P > [t]	0.272	0.066*		P > [t]	0.775	0.103
Y9498	t	4.84	-1.18	Y9800	t	-0.24	0.95
	P > [t]	0.000**	0.240		P > [t]	0.813	0.343

** 5% Significance Level: * 10% Significance Level

Table 22 Proactive versus Reactive Strategic Responses to Environmental Changes (Variety – Including Internal Development Actions)

LSDV		H5	H5	LSDV		H6	H6
Deregulatory Changes Variety		Allvarietytyp (count measure)	Allrealvarietytyp (dollar measure)	Technological Changes Variety		Allvarietytyp (count measure)	Allrealvarietytyp (dollar measure)
Y9698	t	-0.85	0.65	Y0002	t	0.70	-1.32
	P > [t]	0.394	0.518		P > [t]	0.487	0.188
Y9498	t	1.79	2.45	Y9800	t	-1.43	-0.54
	P > [t]	0.075*	0.016**		P > [t]	0.155	0.588

** 5% Significance Level: * 10% Significance Level

Table 23 Frequency (Variety) of Corporate Strategic Action Portfolios and Firm Performance (Including Internal Development Actions)

Random Effects GLS Regression With Robust SE	Base Model	Base Model	H7	H8	H7	H8	H7	H8	H7	H8
	ROA	ROI	Frequency & ROA	Variety &ROA	Frequency & ROA	Variety & ROA	Frequency & ROI	Variety &ROI	Frequency & ROI	Variety & ROI
Measures			count	count	dollar	dollar	count	count	dollar	dollar
Wsub	1.03e-07	1.90e-07	9.80e-08	1.05e-07	9.46e-08	1.08e-07	1.93e-07	2.12e-07	1.76e-07	2.20e-07
Z	3.11	2.31	2.91	3.07	2.70	3.14	2.41	2.58	2.10	2.68
P >[Z]	0.002**	0.021**	0.004**	0.002**	0.007**	0.002**	0.016**	0.010**	0.036**	0.007**
Uspop	-0.0000801	-0.0001572	-0.0000646	-0.0000786	-0.0000663	-0.0000736	-0.0001507	-0.0001876	-0.0001531	-0.0001757
Z	-2.80	-2.79	-2.79	-3.24	-2.80	-3.13	-2.74	-3.23	-2.71	-3.13
P >[Z]	0.005**	0.005**	0.005**	0.001**	0.005**	0.002**	0.006**	0.001**	0.007**	0.002**
Nrival	0.0032819	0.0108466	0.0024089	0.0036622	0.0032369	0.0030612	0.0086679	0.0120979	0.0112071	0.010519
Z	2.29	3.73	1.95	2.97	2.64	2.55	2.94	4.09	3.82	3.67
P >[Z]	0.022**	0.000**	0.052*	0.003**	0.008**	0.011**	0.003**	0.000**	0.000**	0.000**
Tasset	-0.0000219	-0.0000543	-0.0000157	-0.0000197	-0.0000198	-0.0000171	-0.0000435	-0.0000548	-0.0000556	-0.0000475
Z	-5.07	-5.76	-3.75	-5.06	-4.95	-4.19	-4.35	-5.87	-5.83	-4.88
P >[Z]	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
Promar	0.4131121	0.717757	0.4276416	-0.4334366		0.4313522	0.7024959	-0.7187688	0.7164601	0.7131105
Z	28.44	21.36	30.58	31.15		31.05	21.12	21.59	21.28	21.51
P >[Z]	0.000**	0.000**	0.000**	0.000**		0.000**	0.000**	0.000**	0.000**	0.000**
Pcpincome	0.000197	0.00047	0.0001295	0.0001674		0.0001456	0.0004127	0.0005159	0.0004676	0.0004585
Z	2.85	4.02	2.65	3.38		3.01	3.55	4.35	3.99	2.82
P >[Z]	0.004**	0.000**	0.008**	0.001**		0.003**	0.000**	0.000**	0.000**	0.005**
Allcountfreq			0.0086833				0.0245141			
Z			2.31				2.74			
P >[Z]			0.021**				0.006**			
Allvariety				0.0052345				0.136024		
Z				1.72				1.87		
P >[Z]				0.085*				0.062*		
Allrealfreq					1.81e-06				0.0000116	
Z					0.34				0.91	
P >[Z]					0.734				0.362	
Allrealvariety						0.0072135				0.0197742
Z						1.96				2.26
P >[Z]						0.05**				0.024**

** 5% Significance Level: * 10% Significance Level

APPENDIX B

DESCRIPTIONS OF KEY VARIABLES

Allcountfreq: frequency of strategic action portfolios (annual count)

LNAllrealfreq²⁶: frequency of strategic action portfolios (annual dollar amount)

SQAllvariety: variety of strategic action portfolios (annual count)

SQAllrealvarp: variety of strategic action portfolios (annual dollar amount)

y9597: deregulatory changes - Telecom Act 1996±1 yr window dummy variable

y9498: deregulatory changes - Telecom Act 1996±2 yr window dummy variable

y9901: technological changes - 3G wireless subscriptions outnumber wire-line subscriptions in 2000±1 yr window dummy variable

y9802: technological changes - 3G wireless subscriptions outnumber wire-line subscriptions in 2000±2 yr window dummy variable

wsub: wireless subscriptions (source: CTIA)

uspop: US populations (source: US Census Data)

nrival: number of competitors in each RBOCs' region (source: D&B Million Dollar Directory)

tasset: the RBOCs' total asset (source: Compustat)

opincome: the RBOCs' operating income (source: Compustat)

pcpincome: average per capital income by the RBOC's regions (sources: US Department of Commerce, Bureau of Economic Analysis)

²⁶ Effective date is used from the SDC database. Missing data are coded with averaged real dollar amount, all data are converted to real dollar amount (base year 1984)

roa: return on assets (source: 10K Report)

roi: return on investment (source: 10K Report)

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