

THE COMPETITIVE EFFECTS OF RBOC INTERLATA ENTRY
ON LOCAL TELEPHONE MARKETS

DISSERTATION

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By

Chang Hee Lee, B.A., M.P.A., M.A.

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The Ohio State University
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Dissertation Committee:

Dr. Douglas N. Jones, Adviser

Dr. Anand Desai

Dr. Edwin A. Rosenberg

Approved by

Adviser

School of Public Policy and Management

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ABSTRACT

Section 271 of the Telecommunications Act allows the Regional Bell Operating Companies (RBOCs) to enter interLATA telecommunications markets (previously prohibited by the Modification of Final Judgment in 1982), provided they open local telephone networks to competition. An important question is whether such policy has achieved the intended policy goals of the 1996 Act. This dissertation attempts to provide evidence of the competitive effects of RBOC interLATA entry on local telephone markets.

To explore the effects of RBOC interLATA entry on local markets, I examine three dimensions of local markets: basic residential local service rates, quality of service, and investment in broadband technologies, incorporating both the supply-side and the demand-side characteristics of the market. For the analysis, I use two approaches. First, I conduct a regression analysis of panel data set composed of observations from 24 states over the period 1999-2002. The results indicate mixed effects of RBOC interLATA entry on the three dimensions. I find that RBOC interLATA entry does not have a statistically significant effect on basic residential local service rates charged by the RBOCs. The results suggest that RBOC interLATA entry has mixed effects on quality-of-service and investment in broadband technologies, with some measures showing improvements and other measures showing deteriorations or no effects. Second, focusing on the states where

RBOC interLATA entry was allowed during the study period, I compare the performances of the RBOCs in the Section 271 year and those in the *pre*-Section 271 year and in the *post*-Section 271 year. The results show mixed effects of RBOC interLATA entry on various measures of the three dimensions during the three-year period—no significant effect on basic residential local service rates, mixed effects on quality of service, but significant effects on the two measures of investment in broadband technologies (high-speed lines and fiber).

Although a definitive conclusion may be possible only with more empirical research, these two analyses indicate that, so far (after seven years), the intended goals of the 1996 Act have not been fully achieved.

Dedicated to my family

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VITA

February 12, 1967	Born - Youngcheon, Kyungbuk, Republic of Korea
1992	B.A., Seoul National University, Seoul, Republic of Korea
1994	M.P.A., Seoul National University, Seoul, Republic of Korea
1993 - 1998	Deputy Director, Ministry of Information and Communication, Seoul, Republic of Korea
2000	M.A., Syracuse University, Syracuse, NY
2000 - present	Graduate Research Associate, The National Regulatory Research Institute, Columbus, OH

PUBLICATIONS

1. Davis, V. W., Rosenberg, E., & Lee, C. (2002). *Performance assurance plans: State experience so far*. Columbus, OH: The National Regulatory Research Institute.
2. Lee, C. (2001). Advanced telecommunications in rural areas. *NRRI Quarterly Bulletin*, 21, 219-231.

3. Lee, C. (2002). *State regulatory treatment of advanced telecommunications services: Results of the 2002 survey*. Columbus, OH: The National Regulatory Research Institute.
4. Rosenberg, E., & Lee, C. (2003). *State analysis of competition in telecommunications markets: Results of an NRRI survey*. Columbus, OH: The National Regulatory Research Institute.
5. Rosenberg, E., Lee, C., & Pérez-Chavolla, L. (2002). *State universal service funding mechanism: Results of the NRRI's 2001-2002 survey*. Columbus, OH: The National Regulatory Research Institute.

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CHAPTER 1

INTRODUCTION

The history of U.S. public utility industries (e.g., telecommunications, electric power, natural gas, and water) shows us an evolutionary development in the sector over time, though there were some radical changes at times.¹ The structure of the public utility sector, especially the telecommunications industry on which this study is focused, has been largely shaped by state and federal regulation² and by competition in the market, with the underlying driving force of technology. With respect to the relationship between regulation and competition,³ people may have different views as to the direction of influence between the two in the telecommunications industry. Some emphasize the role of regulation that defined the competitive landscape of the telecommunications industry

¹ One example is the divestiture of AT&T in 1984.

² The coexistence of federal and state regulation of public utilities is sometimes referred to as “two-tiered regulation,” and it is one of the defining characteristics of the U.S. regulatory system (K. G. Wilson, 2000, p. 21).

³ For an excellent discussion about the relationship between regulation and competition, see Loevinger (1966).

structures. For example, a study by Economics and Technology and Hatfield Associates (1994) maintained, “Not one of the major competitive achievements would have been possible without affirmative regulatory intervention,” characterizing it as one essential feature of the road to competition in all segments of telecommunications marketplace (p. iv). Sappington and Weisman (1996a) also pointed out the influence of regulatory policy on competition in the telecommunications industry.

On the other hand, one could argue that competitive market forces led regulatory agencies, once believed by some to act in favor of monopolies, to adopt pro-competitive policies. This can be explained by some examples of regulators’ reluctance to open markets to competition in the past. For instance, the Federal Communications Commission (FCC) attempted to stop MCI from providing Execunet service, a switched long-distance service, by arguing that the service was not allowed by its 1971 Specialized Common Carrier decision that allowed competition in private line market (Sappington & Weisman, 1996a). Woroch (2002) also observes the reluctance that existed among state and federal regulators in supporting competition in both equipment and long distance service. A rather extreme view is given by Huber (1998), who even argues that much of the FCC’s work, for most of its life, has had the effect of protecting monopoly.

It is obvious that regulatory policy affects competition in the industry. But, at the same time, competition in the market plays an important role in shaping the direction of regulatory policy. Thus, it seems fair to say that both regulation and competition contributed to the development of the U.S. telecommunications industry, continuously interacting each other. The evolution of the telecommunications industry in the United

States is a good example. As one study properly observes, the development of the telecommunications industry can be depicted as “a complex dance of technology, regulation, and competition” (Vogelsang & Woroch, 1998).

However, it is widely recognized that technological development is one of the driving forces behind the evolution of the telecommunications industry, continuously influencing on and interacting with regulatory policies and market competition (Pool, 1983; Sappington & Weisman, 1996a; Vietor, 1994; Woroch, 2002). Baer (1989) explains that technology influences communications policy in three principal ways: first, it opens new possibilities and expands the range of choices, which may require government action, approval or coordination (e.g., fiber optic systems, touch-tone telephones, and telephone answering machines); second, it may bring unforeseen problems as it is widely adopted, demanding governmental response (e.g., electronic fraud); and third, it may disturb the distinctions made by legislators and regulators to separate communications services and the industries providing them (e.g., voice communication over the Internet that can be provided by both telephone companies and cable TV operators).

Telecommunications policy in the United States for the last century has shown varying degrees of relative emphasis on government regulation and market-driven competition in response to the development of technologies. Sometimes the role of regulation was emphasized, and other times reliance on market competition was preferred to government intervention.⁴ For instance, during the New Deal era in the 1930s, the FCC

⁴ A detailed account of the development of regulation and competition in the telecommunications industry is discussed in chapter 2.

was created to regulate the telecommunications industry through price and entry control. In contrast, the Telecommunications Act of 1996 in principle gives priority to competition over regulation as a main tool to achieve its general policy objectives for telecommunications consumers—lower prices, higher quality services, and the rapid deployment of new telecommunications technologies.⁵

However, over the last two decades or so, roughly from the late 1970s to the present, the two main and closely related policy themes relating to the public utility industries—especially the telecommunications industry—were *deregulation* and *competition*, and they have been widely discussed among academic scholars and policymakers. The main policy trend in the American public utility industries and network industries such as telecommunications, electricity, airlines, and so forth has largely been deregulation for the period, reshaping competitive landscapes in the markets into very different ones from the old ones. Over this period, the regulatory reform⁶ movement swept through several industries including telecommunications. Hence, this period can be characterized as “an era of regulatory reform.”⁷ In addition, there seems to be a growing consensus among the mainstream academic scholars that regulation is at

⁵ See the preamble of the Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996).

⁶ The term “regulatory reform” may mean different things to different people, and could be used as a neutral concept to mean either more or less regulation. Indeed, some authors such as Kay & Vickers (1990) use the term “regulatory reform” to mean a paradoxical combination of deregulation and reregulation. However, in the United States, by the mid-1970s it came to mean procompetition (see, Horwitz, 1989, p. 213), which I think is closely related to deregulation.

⁷ For excellent discussions of regulatory reform between 1960s and 1980s in the United States, see Derthick & Quirk (1985, especially chapter 2) and Horwitz (1989, especially chapter 7). For a more economic account of deregulation, see Winston (1993).

best a “necessary evil” which should be exercised to the minimum extent possible.

Instead, many scholars argue, competition will work better than regulation in those industries, such as telecommunications, which have been traditionally regulated by federal and state agencies, and therefore regulation should be replaced with competitive forces as much as possible.

However, some scholars raise serious concerns about the consequences of premature deregulation,⁸ citing the recent events in the electric and telecommunications industries,⁹ which provide examples of market failure in a deregulated environment. This sort of market failure under deregulated industry conditions, or the “deregulatory failure” as Shepherd (2002) puts it, has revealed various undesirable results, including, but are not limited to, continuing market power by large near-monopoly or oligopoly companies, increasing concentration, decreasing quality of service in some cases, vulnerability of consumer protection, and moral hazard and accounting fraud of utility companies. Thus, Jones (1998) cautions that “it is not true (as some assert) that the worst results of deregulation are superior to the best results of traditional regulation” (p. 1). Similarly, Melody (2002) observes that whenever regulation has been reduced, weakened, or eliminated, the performance of highly imperfect utility markets has not improved in any demonstrable way. He further goes to argue that in most cases market failures have

⁸ See, for example, Cudahy (2001), Jones (1998), Gorak (2002), E.S. Miller (2001), Shepherd (2002), and Trebing (2001, 2002a).

⁹ These events include California electric power crisis in 2001, a series of bankruptcies and corporate scandals including Enron (December 2001), Global Crossing (January 2002), and WorldCom (July 2002).

become worse, sometimes much worse. Nonetheless, the mainstream argument for deregulation continues to remain, even stronger in some cases as a way of advocating further deregulation as a remedy to the existing problems.

The U.S. telecommunications industry has witnessed two major policy events that changed the competitive landscape dramatically over the past two decades: the divestiture of the Bell System in 1984 as a result of the 1982 Modification of Final Judgment (MFJ)¹⁰ and the Telecommunications Act of 1996. The MFJ and the breakup of the Bell System were designed mainly to eliminate the ability and incentives of the local Bell Operating Companies (BOCs) to discriminate among suppliers of long distance service (Brock, 1994) by requiring the Bell companies to provide long distance companies with equal access to the network. As Sappington and Weisman (1996a) observe, a central effect of divestiture was to ensure that a single firm no longer provided end-to-end connectivity in the telecommunications industry. The 1984 divestiture of the Bell System has produced a large volume of research in theory and practice, though there is a wide range of different views and arguments about the effects and results of the divestiture presented to the academic and policy communities.

Another major policy event was the passage of the Telecommunications Act of 1996, which led to a series of academic and practical policy debates about whether the Act succeeded or failed. The fundamental goal of the Telecommunications Act of 1996 is increasing competition in all telecommunications markets with more focus on local

¹⁰ United States v. AT&T, 552 F. Supp. 131 (D.D.C. 1982), *aff'd sub nom.* Maryland v. United States, 460 U.S. 1001 (1983).

service markets. The general theme in the Act is promoting competition through deregulation in the telecommunications industry, as clearly stated in the preamble of the Act.¹¹

Among the measures aimed at increasing competition in the market, Section 271, which allows the old Bell companies, often referred to as Regional Bell Operating Companies (RBOCs), to enter previously restricted interLATA¹² long distance market under certain conditions,¹³ has drawn much attention from both researchers and practitioners alike. However, it seems appropriate to state that much of the research efforts so far have focused on theoretical debates over the potential effects of RBOC entry into long distance telephone markets, rather than empirical studies. This may be explained by the fact that it was only recently that the RBOCs' Section 271 applications for individual states were approved by the FCC.¹⁴ Since the first approval of Verizon's (Bell Atlantic at the time) application for interLATA service in New York in December 1999, the FCC has recently completed approvals of all applicable applications for interLATA service in 49 jurisdictions in December 2003, which include applications by

¹¹ The preamble of the 1996 Act states, "To promote competition and reduce regulation"

¹² A LATA (Local Access and Transport Area) is a geographical area created by the MFJ, which generally centered upon a city or other identifiable community of interest, and RBOCs were prohibited from providing interLATA telecommunications services. See Kaserman & Mayo (1995) and Sappington & Weisman (1996a). An interLATA service is a telecommunications service between LATAs.

¹³ Section 271 of the 1996 Act requires the RBOCs to meet certain conditions to get the FCC's approval of applications to provide in-region, interLATA services. The thrust is to make RBOCs to open their local telephone networks to competitors before they enter interLATA markets. Details about the conditions are discussed in chapter 4.

¹⁴ In fact, the first six applications for 4 states (Michigan, Oklahoma, South Carolina, and Louisiana) during the 1997-1998 period were unsuccessful—one withdrawn and five denied.

all four RBOCs (BellSouth, Qwest, SBC, and Verizon). The first Section 271 approval by the FCC was over four years ago. Though this is perhaps not long enough for a definitive conclusion, a preliminary conclusion about the competitive effects brought about by RBOC interLATA entry is now possible.

With respect to the analysis or assessment of competition and its effects in the U.S. telecommunications industry in the last twenty years or so, the existing literature that looked at the status and effects of telephone competition resulting from federal and state policies is based largely on economic analysis.¹⁵ Traditionally, economists studied the market structure, competition, and performance of an industry applying the “structure-conduct-performance” (SCP) model of industrial organization theory in economics. Although the modern view of the paradigm recognizes that causation among the three elements flows in both directions simultaneously (Kaserman & Mayo, 1995), it seems that the emphasis of this paradigm on the characteristics of the supply side of an industry has not been changed much. Then it is no accident that economic analyses based on the SCP paradigm look at industry performance in terms of primarily the supply or industry-side criteria or indicators, implicitly leaving the demand side out of the analytic framework. This raises an issue as to the basic approach to evaluating public policies by which in many cases consumers are directly affected.

Thus, this dissertation attempts to fill some of the void existing between the relatively rich theoretical studies and the relatively limited empirical studies on the

¹⁵ Derthick and Quirk (1985) argue that deregulation cannot be explained mainly by reference to economic events, criticizing economic theories of deregulation. Although I agree with them to the extent that economic theories of deregulation cannot account for all aspects of regulation or deregulation, the focus of my dissertation, competitive effects of telecommunications policy, in its nature permits me to state that the majority of the existing literature on this subject is based on economic analysis.

subject. I assert that it is important to analyze or evaluate telecommunications policy based on what I call a “balanced perspective,” which incorporates both the supply side-oriented firm’s perspective and the demand side-oriented consumer’s perspective. Accordingly, this study assesses the effects of RBOC provision of long distance service not only from the traditional industry focus perspective of industrial organization theory (the SCP model), but also from a consumer-oriented view of competition (focusing on quality of service, consumer satisfaction, etc.).

With this in mind, my dissertation investigates the following research question. What effects does RBOC entry into in-region interLATA service markets¹⁶ have on competition in local telephone markets? In particular, whether RBOC provision of in-region interLATA long distance services brings competitive effects or benefits to consumers, especially residential consumers, of local telephone service is the key research question of this dissertation. To address the research question, I develop a model, based on the dominant firm - competitive fringe model, which takes into account major factors affecting local telephone markets. And I conduct an empirical analysis to explore the effects of RBOC entry into interLATA long distance markets. To incorporate both the consumer’s perspective and the firm’s perspective, I examine the three different dimensions of local telephone markets: *basic residential local service rates*, *quality of service* (including customer satisfaction), and *investment in broadband technologies*. The three dimensions include twelve measures in total. For the analysis, I adopt two approaches. First, I develop a panel data set of 24 states that represent all four existing

¹⁶ In-region interLATA services are services between LATAs provided by the RBOCs in their own local service territories.

RBOCs geographically over the period 1999 - 2002. With the data set, I conduct statistical tests employing the fixed effects model to see whether RBOC interLATA entry brought benefits to residential consumers in light of the three dimensions. Second, I examine the same issue by comparing the performances of the RBOCs for the twelve measures in the year when the Section 271 approval was given and those of one year before and one year after the approval, employing the hypothesis testing with dependent samples technique.

In the first approach, the regression results show mixed indications about the effects of RBOC entry into interLATA long distance markets. Specifically, I find no evidence that RBOC interLATA entry is associated with lower basic residential local service rates charged by the RBOCs. In terms of local telephone quality-of-service, the regression results show that, of the nine quality-of-service measures, only two measures reveal statistically significant effects of Section 271 entry by the RBOCs. That is, the empirical analysis suggest that Section 271 entry by the RBOCs is likely to decrease the percent of residential local telephone consumers dissatisfied with business office provided by the RBOCs, meaning an improvement of quality-of-service. In contrast, however, the results indicate that Section 271 entry by the RBOCs is likely to decrease the percent of the installation orders completed by commitment date by the RBOCs, meaning deterioration of quality-of-service. In terms of investment in broadband technologies, the regression results indicate that only one of the two measures show significant effects of Section 271 entry by the RBOCs. Specifically, the RBOCs' entry into interLATA market shows a positive relationship with investment in broadband technologies measured by the total number of high-speed lines that are deployed by all

types of providers including wireline telephone companies, cable operators, and wireless carriers. However, another measure in this category, the percentage of fiber optic cables to the total loop and interoffice cables for the RBOCs, does not show significant effects of RBOC interLATA entry.

In the second approach, I find similar results showing mixed indications about the effects of Section 271 entry by the RBOCs. In terms of basic residential local service rates, I find no evidence that the rates between the pre-Section 271 year and Section 271 year, and the rates between the Section 271 year and post-Section 271 year are significantly different in the states where RBOC entry into interLATA market was allowed. In terms of quality of service, two of the nine measures—percent of residential consumers dissatisfied with installation and percent of residential consumers dissatisfied with repair—show deteriorations between the pre-Section 271 year and Section 271 year, while one measure—percent of consumer repeat trouble reports—shows an improvement between the Section 271 year and post-Section 271 year. In terms of investment in broadband technologies, the two measures in this category—number of high-speed lines and percent of fiber—show consistent improvements over the three-year period. Thus, the empirical analysis based on the two approaches suggests that Section 271 entry by the RBOCs would bring about mixed effects on local telephone markets.

The remainder of this dissertation is organized as follows. I begin by looking at theoretical and practical development of regulation and competition in the U.S. telecommunications industry in chapter 2. In chapter 3, I discuss economic models of competition, major theoretical frameworks for assessment of competition, and the existing literature on competition in telephone markets. In chapter 4, I present the

background and basic context of the RBOC interLATA entry under Section 271 of the 1996 Act, and discuss the literature on the competitive implications of RBOC provision of long distance services. In chapter 5, I examine the competitive effects of RBOC interLATA entry on local telephone markets. Finally, I conclude this dissertation in chapter 6 with a summary of the main research findings, some policy implications of the research, and directions for future research.

CHAPTER 2

THEORIES OF PUBLIC UTILITY REGULATION AND THE EVOLUTION OF THE U.S. TELEPHONE INDUSTRY

2.1 Introduction

In this chapter, I discuss the development of regulation and competition in the U.S. telephone industry in the context of traditional commission regulation. Specifically, I discuss (1) the concept and origin of public utility; (2) general theories of regulation with a focus on public utilities, including (a) the rationale for and scope of regulation, and (b) major theories that provide explanations for rationale for regulation and regulatory agencies' behaviors; (3) two distinct modern economic perspectives on public utility regulation (the neoclassical perspective and the institutionalist perspective); and (4) the evolution of regulation and competition in the U.S. telephone industry for more than a century.

2.2 The Concept and Origin of Public Utility

Historically, certain categories of industries (e.g., telecommunications, electricity, water, and natural gas and at an earlier time air and surface transportation) have been

labeled as “public utilities” and they were given a different overall regulatory treatment from many other industries. There are certain characteristics that are common in this category of industries, which distinguish them from other industries in terms of the scope and extent of social or public control of businesses.¹

Bonbright, Danielsens, and Kamerschen (1988) provide six conditions often associated with the regulation of companies that are generally classified as public utilities²: (1) public utilities are often characterized by technical conditions of production (e.g., “economies of scale”) that lead to lower unit costs with ever increasing levels of output within their legally and/or economically restricted market area; (2) a public utility provides a service that is “important,” “essential,” “vital”—perhaps a “necessity” for which present livelihood or future societal growth mandates the supply; (3) most regulated industries are capital intensive (i.e., the ratio of fixed cost to variable cost is large); (4) most regulated industries sell services, rather than goods which ordinarily cannot be stored (water and natural gas are exceptions); (5) costs vary by time of use and consumers have diurnal, periodic, and seasonal demands; and (6) public utilities are normally granted partial or complete territorial integrity, being provided franchises as

¹ Glaeser (1927, pp. 3-4) describes this in two phrases, *common elements* and *distinctive elements*: that is, the term “public utility” is used as a collective name covering diverse industries that are grouped together because certain common elements involved in their operation give them unity; at the same time they are classified apart from other industries because there is something distinctive about them which we do not find true of other industries.

² See Greer (1993) for a similar characterization. He points out four characteristics of regulated industries: (1) they are usually considered vital industries (e.g., communications and energy); (2) nearly all regulated industries sell services (e.g., a phone call or a kilowatt-hour of electricity) rather than commodities—unlike commodities, services cannot be stored; (3) most regulated industries are capital intensive; and (4) many regulated industries manifest market failures and imperfections (e.g., monopoly power and externalities).

exclusive (or quasi-exclusive) suppliers of a particular configuration of services in a given geographical area. According to them, only the first, under certain circumstances, is a necessary condition.

Similarly, Phillips (1993) summarizes differences between public utilities and other industries as follows: (1) public utilities (with some important exceptions, such as motor and domestic water carriers, natural gas producers and some portions of the telecommunications industry) tend toward monopoly or, more accurately, the firms in these industries seem to operate more efficiently as monopolies—if economic power is not to be controlled by the market, it must be controlled by public authority; (2) some regulation may be undertaken for social or political reasons, such as promoting regional development or for national defense purposes; (3) there is a high degree of public interest attached to the services rendered by public utilities, which is the primary legal basis of regulation; and (4) regulation is undertaken by administrative commissions with jurisdiction over the rates and services of these industries. Furthermore, as Phillips points out, public utilities in the United States can be characterized by “private” ownership and “public” regulation (pp. 5-7).

Although not all of the characteristics described above may be necessary conditions to classify a certain industry or business as a public utility, these characteristics provide a general idea about public utilities in a conventional sense. However, as Bonbright et al. (1988) note, the term “public utility” is one of popular usage rather than of precise definition. Hence, the coverage or classes of industries under the label of “public utilities” may vary depending on individuals. But there are certain groups of businesses identified by scholars as public utilities. According to Bonbright et al.,

historically public utilities have been divided into two major classes: (1) those enterprises which supply, directly or indirectly, continuous or repeated services through more or less permanent physical connections between the plant of the supplier and premises of the consumer (e.g., electricity, gas, water, and telecommunications), and (2) the public transportation agencies.

Welch (1968) provides three main classes of businesses falling within the category of conventional public utilities, adding that the list is not exhaustive: (1) transportation and related services, (2) communications services, and (3) home, commercial, and industrial service utilities (e.g., natural gas, electric light and power, and water supply).

In addition, Shepherd (1991) presents four broad sectors that have had “regulated utilities”—energy, communications, transport, and urban services. In each sector, he argues, only part should clearly be regulated, while the rest could nearly or definitely be competitive. Shepherd attempts to outline the sectors and parts as shown in Table 2.1.

Primarily Monopolies	Primarily, Partly, or Potentially Competitive
Local telephone service*	Long-distance telephone service
Local electric-power distribution	Specialized postal services
Local natural-gas distribution*	Railroads
Basic postal services	Waterways
Cable television	Oil and gas pipelines
Urban transit	Airlines
Water and sewage	Broadcasting
	Hospitals
	Trucking

Note: * There are now some instances where competition is emerging in a limited way.

Source: Shepherd (1991, p. 336)

Table 2.1: Traditional utility sectors and their current status

However, as Bonbright et al. (1988) point out, since there has been considerable debate over which parts are which, regulation in a specific sector of an industry or market should be regarded as an evolving or evolutionary phenomenon, rather than something that is writ in stone.

Why did some classes of businesses fall within the category of public utilities and thereby become subject to detailed government regulation? This question leads us to the discussion of the origin and concept of public utility.

The concept of public utility has hardly been defined in a clear and uniform manner. Indeed, the idea of utility to the public is a very vague one that could serve at the best only for distinctions of degree and not for distinctions of kind (Batson, 1933).

Glaeser (1957) defines public utility as follows:

In its most extended sense the term *public utilities* is designed to cover certain industries which in the course of time have been classified apart from industry in general and have likewise been distinguished from governmental services with which, however, they often are intimately related. The basis of the classification is essentially economic and technological, although the meaning of the term is derived from the law.³ (p. 8)

Thus, Glaeser notes, the term public utility does not refer to any specific industry but is used as a collective name for an entire group of industries.

Phillips (1993) defines public utility in a similar but more succinct manner, saying that the term refers to a diverse group of businesses that have been subjected over several decades to detailed local, state, and federal regulation of rates and service.

According to Trebing (2001), the public utility concept emerged as the product of three factors: (1) public concern over the performance of the railroads as the nation's first large-scale industry; (2) the designation of selected types of enterprises as a "business affected with a public interest"; and (3) the widespread acceptance of the natural monopoly concept as the preferred method for achieving efficiency and equity goals in public utility industries.

As a practical matter of regulation, however, the concept of public utility has evolved through the common-law concept of a business "affected ("charged" or "clothed") with a public interest," which was first generally articulated in the landmark decision of the U.S. Supreme Court in *Munn v. Illinois*.⁴ In the case involving an Illinois

³ Bain (1959) shows a similar reasoning by saying, "The concept of a public utility is essentially a creation of legislation, but social scientists have endeavored to rationalize legislative procedure by identifying the intrinsic common characteristics which our lawmakers have set aside for special 'public utility' treatment . . ." (p. 589).

⁴ *Munn v. Illinois*, 94 U.S. 113 (1877).

law establishing regulation for grain elevators and warehouses in the city of Chicago, the Court upheld the validity of the statute. Chief Justice Waite, quoting from Lord Chief Justice Hale of Britain more than two hundred years before *Munn*, said:

Looking, then, to the common law, from whence came the right which the Constitution protects, we find that when private property is “affected with a public interest, it ceases to be *juris private* only.” . . . Property does become clothed with a public interest when used in a manner to make it of public consequence, and affect the community at large. When, therefore, one devotes his property to use in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled by the public for the common good, to the extent of the interest he has thus created.⁵

The public utility principle established in *Munn* has provided the foundation for comprehensive regulation of monopoly and quasi-monopoly telephone, electricity, gas, and water and other public utilities in the United States (Melody, 1997). Since this decision, the United States Supreme Court reviewed many cases that influenced the designation of public utilities.⁶ As Samuels (2002) writes, the domain of “businesses affected with the public interest” transformed into that of public utility regulation.

The United States Supreme Court’s attempt to define a certain category of “businesses affected with the public interest” came to an end in 1934. In *Nebbia v. New York*⁷ involving a New York law to regulate milk industry, the Supreme Court ruled:

⁵ *Munn v. Illinois*, 94 U.S. 113 (1877). See Welch (1968, pp. 6-7).

⁶ See Phillips (1993, pp. 93-118) for leading court cases regarding public utility status as businesses “affected with a public interest.”

⁷ *Nebbia v. New York*, 291 U.S. 502 (1934).

It is clear that there is no closed class of or category of businesses affected with a public interest, and the function of courts in the application of the Fifth and Fourteenth Amendments is to determine in each case whether circumstances vindicate the challenged regulation as a reasonable exertion of governmental authority or condemn it as arbitrary or discriminatory. . . . The phrase “affected with a public interest” can, in the nature of things, mean no more than that an industry, for adequate reason, is subject to control for the public good. In several of the decisions of this court wherein the expressions “affected with a public interest,” and “clothed with a public use,” have been brought forward as the criteria of the validity of price control, it has been admitted that they are not susceptible of definition and form an unsatisfactory test of the constitutionality of legislation directed at business practices or prices. These decisions must rest, finally, upon the basis that the requirements of due process were not met because the laws were found arbitrary in their operation and effect. But there can be no doubt that upon proper occasion and by appropriate measures the state may regulate any of its aspects, including the prices to be charged for the products or commodities it sells.⁸

The *Nebbia* case has two important implications in the regulation of public utilities. First, the U.S. Supreme Court abandoned its attempt to distinguish a peculiar category of industries “affected with a public interest” (Phillips, 1993). Second, it had an effect to allow expansion of government regulation over many industries and thus made the concept of a business “affected with a public interest” no longer synonymous with the traditional “public utility” concept (Bonbright et al., 1988; Phillips, 1993).⁹

Although the scope and strength of it as a basis for regulation seemed to be weakened over the last several decades, the concept of “public utility” did not disappear and has been widely used in the regulation of industries and in numerous scholarly

⁸ *Nebbia v. New York*, 291 U.S. 502 (1934). See Welch (1968, pp. 47-48).

⁹ Some legal views, however, interpret the decision somewhat differently from those of some economists. For example, Welch (1968, p. 3) states that, “Some economics writers see in this decision a virtual carte blanche permission to regulate business from the standpoint of economic and social policy, without regard to the traditional legal doctrines. . . . But the still prevailing legal view is that state legislation should not depart from the traditional lines of business subject to regulation as ‘affected with a public interest.’”

discussions. But it has not been without challenges. A critical attack on the public utility concept came from Horace Gray. In his well-known article, “The Passing of the Public Utility Concept” (1940), Gray argued that, “The public utility status was to be the haven of refuge for all aspiring monopolists who found it too difficult, too costly, or too precarious to secure and maintain monopoly by private action alone” (p. 9). He went on to explain that, “It [the public utility concept] originated as a system of social restraint designed primarily, or at least ostensibly, to protect consumers from the aggressions of monopolies; it has ended as a device to protect the property, i.e., the capitalized expectancy, of these monopolists from the just demands of society, and to obstruct the development of socially superior institutions” (p. 15). Thus, Gray claimed that the public utility concept had become obsolete.¹⁰

Several decades later, Kahn (1983) observed that Gray’s celebration was premature, but then he argued, “it *is* [italics in original] now possible to talk realistically about the passing of the public utility concept” (p. 5) because of the dramatic modifications and abandonments of the traditional institution during the 1970s and the early 1980s such as the widespread deregulation movement and intensified challenges to regulation. Kahn went on to argue, “history is on the way to proving Horace Gray something of a prophet—a premature one . . . and a simplistic one, but something of a prophet nonetheless” (p. 27).

¹⁰ It should be noted, however, that Gray did not support the market-driven laissez-faire approach. Rather, he called for less reliance upon private enterprise and more upon direct government action. See E. S. Miller (1995, p. 284).

Now twenty years after Kahn's observation and despite these criticisms, some scholars, notably institutional economists, still generally defend the validity of the public utility concept. They counter the criticisms against the public utility concept and the regulation of public utilities,¹¹ largely relying on the market realities. In other words, their main argument against the critics of the public utility concept centers on the persistent market conditions that are far from the ideal or ideological ones of advocates of market competition as a substitute for regulation.

For instance, E. S. Miller (1995) argues that the public utility concept is not obsolete.¹² This is because, she maintains, despite the prevailing [mainstream economics' free market] ideology, not all markets are effectively or contestably competitive. That is to say, the conditions that gave the public utility concept life—the ability to extract excessive prices from captive consumers, the presence of economies of scale and scope, high entry barriers ensuring concentrated markets—persist. However, Miller believes that in spite of the viability of the public utility concept, its application today is at risk.

Another prominent institutional economist in modern times, Harry Trebing, in a recent writing (2001), describes the changing nature of the public utility concept. Trebing observes that the rapid growth in industry concentration as a result of deregulation, together with the serious deficiencies in current public policies—e.g., price caps' failure to address oligopolistic pricing strategies and unsuccessful results of mandated

¹¹ This does not mean that institutional economists defend all of the actual practices of state and federal public utility regulation.

¹² D. B. Smith (1995) joins this view and adds, "As economic, social, and technical conditions change, the public utility concept may be redefined" (p. 122).

interconnection—strongly suggests that the real world differs sharply from the vision of an unfettered free market economy promoted by the champions of deregulation. Then he proposes the application of the “institutionalist model of regulation,” which was developed by institutional economists during the period between 1920s and early 1960s and makes it an essential element of government intervention to achieve a degree of consumer protection that would not be provided by imperfectly competitive markets, as a way of rehabilitating the public utility concept.

As Samuels (2002) puts it, the concepts of “business affected with a public interest” and “public utility category” constitute a linguistic exercise within which certain normative decisions are framed and expressed. Therefore, perhaps the utility of the term *public utility* may well depend upon the market performance of current and future actual operations of regulation, not on argument.

2.3 Theories of Public Utility Regulation

Regulation is a frequently used term in academic literature and in practice. Yet, it is not often clearly defined (Mitnick, 1980). Rather it is defined in various ways.¹³ Examples of some broad definitions of regulation are: “the intentional restriction of a subject’s choice of activity, by an entity not directly party to or involved in that activity” (Mitnick, 1980, p. 5); “any attempt by the government to control the behavior of citizens, corporations, or subgovernments” (Meier, 1985, p. 1); or “sustained and focused control

¹³ For discussions of the definition of regulation, see Mitnick (1980) and Spulber (1989).

exercised by a public agency over activities that are valued by a community” (Selznick, 1985, p. 363). However, these definitions seem to be overly broad such that any aspect of government activities could be included in the concept of regulation.

In an attempt to categorize the various meanings of regulation, some authors present three main meanings of regulation (Baldwin, Scott, & Hood, 1998; Baldwin & Cave, 1999). According to them, regulation can be defined in three different senses: (1) regulation as a specific set of commands—where regulation involves the promulgation of a binding set of rules to be applied by a body devoted to this purpose; (2) regulation as deliberate state influence—where regulation has a more broad sense and covers all state actions designed to influence industrial or social behavior; and (3) regulation as all forms of social control or influence—where all mechanisms affecting behavior—whether these be state-derived or from other sources (e.g., markets)—are deemed regulatory.

In terms of public utilities regulation, in particular for our purposes in the context of U.S. utility regulation, Reagan (1987) offers a useful definition of regulation as “a process or activity in which government requires or proscribes certain activities or behavior on the part of individuals and institutions, mostly private but sometimes public, and does so through a continuing administrative process, generally through specifically designed regulatory agencies” (p. 15).

2.3.1 The Rationale for Regulation

With respect to the basic question of “why regulate,” there has been much discussion surrounding this issue. Among others, Breyer (1982) well summarizes a broad

set of rationales for regulation that have traditionally been given by government or scholars. According to Breyer, typical justifications for regulation are: the control of monopoly power; rent control or “excess profits”; compensating for spillovers (externalities); inadequate information; excessive competition; and other justifications that have been used less often in the United States and elsewhere, such as unequal bargaining power, rationalization (e.g., industrywide planning), moral hazard, paternalism, and scarcity.¹⁴ As Baldwin and Cave (1999) point out, however, in any one sector or industry the case for regulating may well be based not on a single but on a combination of rationales.

Many of the above rationales can actually be grouped under the category of market failure.¹⁵ Thus, perhaps the primary rationale for regulation, along with other elements of public policy toward industry, is to remedy various kinds of market failure (Kay & Vickers, 1990). Market failure in economic theory is usually defined as the situations in which ordinary market coordination does not lead to an efficient (perfectly competitive) equilibrium (L. S. Friedman, 2002). In other words, it refers to the failure of market system to produce Pareto efficient allocation.¹⁶ Market failure could occur from various conditions.¹⁷ According to Stiglitz (2000), there are six basic market failures:

¹⁴ See also Baldwin & Cave (1999) and Kuttner (1996).

¹⁵ It should be noted, however, that many scholars argue that market failure does not always justify government regulation; government failure or regulatory failure has been a frequent subject for debate as well. See, for instance, Coase (1960), who argued that “All solutions have costs and there is no reason to suppose that government regulation is called for simply because the problem is not well handled by the market or the firm” (p. 18) and that under certain conditions efficient allocation can be reached by negotiations between parties without government intervention.

¹⁶ A classic article on the subject by Bator (1958) defines “market failure” in allocation theory as “the failure of a more or less idealized system of price-market institutions to sustain ‘desirable’ activities or to

imperfect competition (e.g., monopoly), public goods, externalities, incomplete markets,¹⁸ imperfect information, and unemployment and other macroeconomic distributions.

Among the various types of market failures, as Pierce (1994) points out, natural monopoly, a subset of the problem of monopoly, is the best known and most studied form of market imperfections. It is especially so in the public utility industries. From an economic perspective, the existence of natural monopoly is probably the most traditional and most commonly cited rationale for government regulation. A natural monopoly, according to Kahn (1970/1988), is “an industry in which the economies of scale—that is, the tendency for average costs to decrease the larger the producing firm—are continuous up to the point that one company supplies the entire demand” (p. 123-124). More loosely defined, a natural monopoly is said to exist when a single firm can produce a good or service at least cost.

As shown in Kahn’s definition of natural monopoly, the traditional notion of natural monopoly is based on the existence of economies of scale throughout the relevant range of production on the market (Braeutigam, 1989). However, Baumol (1977) showed

estop ‘undesirable’ activities” (p. 351). Bator observes that the equilibrium conditions which characterize a system of competitive markets will exactly correspond to the requirements of Paretian efficiency. A Pareto efficient (or Pareto optimal) allocation refers to an economic outcome when it is impossible to make some individuals better off without making some other individuals worse off (Mas-Colell, Whinston, & Green, 1995).

¹⁷ For example, Shepherd (1997) lists nineteen categories of market imperfections.

¹⁸ Incomplete markets refer to a type of market failure whenever private markets fail to provide a good or service even though the cost of providing it is less than what individuals are willing to pay; examples include certain insurance and capital markets (Stiglitz, 2000).

that the critical concept on which the appropriate definition of natural monopoly rests is the subadditivity of the cost function,¹⁹ not the economies of scale.²⁰ Thus, the more recent definition of natural monopoly is equivalent to subadditivity of the cost function over the relevant range of output.²¹ Train (1991) explains that a natural monopoly arises from two sources: economies of scale and economies of scope.²² According to him, whether a natural monopoly exists depends on the overall cost situation, considering both economies or diseconomies of scope and/or scale.

Traditionally the telecommunications industry, especially the local telephone service portion, has been regarded as a typical example of natural monopoly. Historically, the natural monopoly argument for the telecommunications industry was based on the economic and technological characteristics of the industry (Laffont & Tirole, 2000; Viscusi, Vernon, & Harrington, 2000). That is, traditionally telephone service has been provided by a wire-based system that entails large fixed costs in several parts of the network and low marginal costs of adding a subscriber or conducting a call. The duplication of the network, therefore, was deemed neither privately profitable nor

¹⁹ Let $\bar{X}$ be some particular level of output. Then the cost function $C(X)$ is said to be subadditive at $\bar{X}$ if the following condition is satisfied: $C(X) = C(X_1 + X_2 + \dots + X_n) < C(X_1) + C(X_2) + \dots + C(X_n)$, for any $n > 2$ and any set of positive outputs $(X_1, X_2, \dots, X_n)$ adding up to $\bar{X}$. See Schmalensee (1979).

²⁰ For a critique of Baumol's definition in terms of applicability, see Boyer (1981).

²¹ This point has been made in many works. See, for example, Berg & Tschirhart (1988) and Viscusi, Vernon, & Harrington (2000). For the evolution of the natural monopoly concept, see Sharkey (1982) and Hazlett (1985).

²² Economies of scope are said to exist if a given quantity of each of two or more goods can be produced by one firm at a lower total cost than if each good were produced separately by different firms (Train, 1991).

socially desirable. The natural monopoly concept was in fact the basis of AT&T's argument against the breakup of the Bell System in 1984, and the economic rationale underlying the breakup decision was that the predivestiture AT&T was not a natural monopoly.

However, empirical evidence on this issue is mixed. Some studies, such as Nadiri and Schankerman (1981) and Christensen, Cummings, and Schoech (1983), found significant economies of scale using AT&T's cost data over the periods 1947-1976 and 1947-1977, respectively. In contrast, other studies showed that the cost functions of AT&T and local exchange carriers before the divestiture were not subadditive at the given output levels, suggesting that the Bell System was not a natural monopoly (Evans & Heckman, 1983, 1984, 1988; Shin & Ying, 1992).²³

Perhaps, as Waverman (1989) observed, the weight of the evidence of all these studies is not strong enough, since changing the level of aggregation, the functional form, the constraints imposed, or the objective function dramatically changes the results. Practically, however, the notion of natural monopoly in the telecommunications industry has been challenged by many over the years, and it seems that to a large extent its importance as a basis for regulation of the telecommunications industry has been diminished. This is largely because of the technological advances made over the last several decades, such as microwave, fiber-optic cable, and digital technologies, and competition in the industry.

²³ For a critique of Evans & Heckman (1983) with a different conclusion, see Charnes, Cooper, & Sueyoshi (1988). For reviews of these and other studies, see Fuss (1983), Waverman (1989), and Fuss & Waverman (2002).

2.3.2 The Scope of Regulation

From the history of regulation toward private business in the United States, broadly there are two identified scopes of regulation: economic regulation and social regulation.²⁴ Economic regulation can take different forms of restrictions on business activities. The essence of economic regulation is the limitation of firm behavior regarding price, quantity, and entry into and exit out of markets, though other variables such as product quality and investment can also be controlled under economic regulation (Viscusi et al., 2000).²⁵ Social regulation has a broad scope and covers all areas of regulation that are not subsumable under the rubric of economic regulation (Reagan, 1987). It generally deals with health, safety, environmental protection, and consumer protection issues.

2.3.2.1 Economic Regulation

Economic regulation is primarily concerned with market power. As noted above, economic regulation is imposed on public utilities through controlling three major elements—price, quantity, and entry and exit. An example of quantity regulation is to require the firm to meet all demand, under capacity constraints, at the regulated price

²⁴ Asch and Seneca (1989) use the terms “old-style regulation” and “new-wave regulation” instead of economic regulation and social regulation.

²⁵ See also Greer (1993) for a similar discussion of economic variables controlled by regulation. Bolter, Duvall, Kelsey, and McConnaughey (1984) list four elements of economic regulation: market entry and exit, price fixing, standards of quality and conditions of service, and obligation to serve all applicants for service under reasonable conditions.

(Viscusi et al., 2000). Entry and exit regulation, along with price regulation, is one of the two main tools of regulation in the public utility industries. One example in the telecommunications industry is the line-of-business restrictions imposed on the Regional Bell Operating Companies (RBOCs) by the MFJ when the RBOCs were divested from AT&T in 1984.

Price regulation is the most common form of economic regulation in the public utility industries and may be imposed on the level and structure of rates that companies charge for their services. Traditionally, price regulation of telecommunications services at the federal and state levels relied on rate-base, rate-of-return regulation.²⁶ Rate-of-return regulation can be viewed as a form of cost-plus regulation in which the firm's operating costs are estimated and then prices for its services are set to generate revenues that cover these costs plus a reasonable return on investment (Sappington and Weisman, 1996a). This can be expressed as a formula by which a regulator determines a public utility's total revenue requirement as follows²⁷:

$$R = O + (V - D) r$$

where R is the total revenue required, O is the operating costs, V is the gross value of the tangible and intangible property, D is the accrued depreciation of the tangible and reproducible property, and r is the allowed rate of return. The net value or investment (V – D) is often referred to as the “rate base.”

²⁶ For an in-depth discussion about rate-of-return regulation as an institution of monopoly regulation, see Sherman (1989).

²⁷ Phillips (1993, pp. 176-179).

Rate-of-return regulation faced significant criticisms from many economists in the 1960s and 1970s. The main criticism about rate-of-return regulation was centered on the argument that it provides insufficient incentives for cost reduction by linking allowed revenues to realized production costs and hence allows the regulated utility firm to operate inefficiently²⁸ (Sappington & Weisman, 1996a; Vogelsang & Mitchell, 1997).

However, some scholars provide different views. For example, Jones (1991) argues that old style regulation (rate-of-return regulation) was characterized by reasonably workable, though unpleasant, disincentives for utility misbehavior to improve efficiency. These included cost disallowance, prudence reviews, employment of regulatory lag, occasional ordering of management audits, making invidious comparisons with other utilities, selective public jawboning, and direct shaving of the allowed rate of return. In addition, Shepherd (1992) reviews empirical studies and finds that there is little evidence that standard (rate-of-return) regulation has caused more than moderate possible harms to efficiency in natural-monopoly cases as often criticized.

According to Vogelsang and Mitchell (1997), the increase in competition and the pressure on firms to become more efficient after the AT&T divestiture triggered various alternative regulatory schemes. These alternatives to rate-of-return regulation are often referred to as incentive regulation.²⁹ In the telecommunications industry, many

²⁸ A classic article on this subject is Averch & Johnson (1962), who argued that a monopoly under rate-of-return regulation for price control tends to overinvest in capital equipments by substituting too much capital for other inputs such as labor and thus does not operate efficiently; this phenomenon is commonly referred to as the “Averch-Johnson effect” (also known as “gold-plating”).

²⁹ Kridel, Sappington, & Weisman (1996) define incentive regulation as “the implementation of rules that encourage a regulated firm to achieve desired goals by granting some, but not complete, discretion to the firm” (p. 271).

alternatives to the traditional rate-of-return regulation have been employed in the United States, which include banded rate-of-return regulation, earnings sharing, revenue sharing, rate case moratoria, price-cap regulation, and deregulation.³⁰ The most common form of alternative regulation is price-cap regulation. Price-cap regulation, also known as RPI-X regulation, in public utility industries was first introduced in Britain to regulate British Telecom (BT) when it was privatized in 1984.³¹ The key features of price-cap regulation are that, for a prespecified period of four to five years, the utility can make any changes it wishes to prices, provided that the average price of a specified basket of its goods and services does not increase faster than RPI-X, where RPI is the Retail Price Index³² and X is a number specified by the regulator (Beesley & Littlechild, 1989). The X factor, usually referred to as productivity offset, is added to account for improvement in the firm's productivity. Some price cap plans also include so-called the Z factor to reflect exogenous factors affecting the firm's costs beyond the regulated firm's control such as the change of laws, rules, or regulations.

³⁰ For a good review of different forms of incentive regulation applied to the telecommunications industry, see Sappington and Weisman (1996a, chap. 4) and Sappington (2002); for a general review of incentive regulation, see Pfeifenberger & Tye (1995); for an electric-utility-focused general review, see Joskow & Schmalensee (1986).

³¹ For a general review of price-cap regulation with the British experience, see Armstrong, Cowan, & Vickers (1994, chap. 6) and Rees & Vickers (1995).

³² In the United States, Gross National Product Price Index (GNP-PI) was used for AT&T instead of Consumer Price Index (CPI), American equivalent to RPI.

Influenced by the British experience with price-cap regulation,³³ in the United States price cap was first applied to AT&T in 1989³⁴ and soon spread across the states in the 1990s for regulation of local service providers.³⁵ According to a recent compilation of *State Telephone Regulation Report*,³⁶ as of May 2003, 40 states (including one state that has mixed regimes of price caps and rate-of-return regulation) and the District of Columbia adopted some form of price-cap regulation for basic local exchange service provided by the largest incumbent local exchange carrier in their jurisdiction; only seven states (including two states that have mixed regimes) applied rate-of-return regulation.³⁷ At present, Nebraska is the only state in which all telephone services rates were deregulated beginning January 1, 1987. The Nebraska Public Service Commission can only review a rate increase for basic local exchange service if enough of the affected subscribers sign a petition.³⁸

³³ For a comparison of incentive regulation in the United Kingdom and the United States, see Crew & Kleindorfer (1996).

³⁴ A detailed description of price cap plan for AT&T's long distance services is provided in Mitchell & Vogelsang (1991, pp. 167-173 and 276-285).

³⁵ For time series and cross-sectional data about state regulatory regimes adopted for local exchange carriers during the period 1984-1998, see Abel & Clements (1998).

³⁶ *State Telephone Regulation Report*, 21 (9-11), May 9, 2003, May 23, 2003, and June 6, 2003, respectively.

³⁷ Note, however, that rate-of-return regulation is still widely used in state commission regulation for small incumbent local exchange carriers.

³⁸ For a comprehensive case study of the Nebraska "experiment," see Mueller (1993).

When it was introduced, price-cap regulation was claimed to be superior to rate-of-return regulation³⁹ because, in principle, it provides the utility with incentives to (1) minimize costs, (2) undertake cost-reducing innovation, and (3) diversify into a noncore market if and only if diversification is efficient; it also provides (4) no incentives to misreport cost allocations and choose an inefficient technology (Braeutigam & Panzar, 1989). It is also argued that price-cap regulation reduces administrative costs for regulators (Beesley & Littlechild, 1989; Mitchell & Vogelsang, 1991).

However, price-cap regulation has some potential drawbacks as well as practical difficulties. Some of the problems include, but are not limited to, the possibility of prices to diverge significantly from realized production costs, the difficulty associated with setting of the index of costs, and problems with adjustment of the X factor.⁴⁰ In practice, while there have been some positive effects reported, the existing empirical evidence does not seem to provide a definitive conclusion that incentive regulation in general and price-cap regulation in particular resulted in a dramatic performance improvement in the telecommunications industry.⁴¹ Indeed, incentive regulation, including price-cap regulation, should not be viewed as a “one-size-fits-all” proposition (Sappington & Weisman, 1996b).

³⁹ Geradin and Kerf (2003) provide an excellent summary of pros and cons of both rate-of-return regulation and price-cap regulation.

⁴⁰ For a discussion about theoretical and practical problems of price-cap regulation, see Shepherd (1992), Laffont & Tirole (2000), and Sappington (2002).

⁴¹ For a review of empirical studies of the effects of incentive regulation in the telecommunications industry, see Kridel, Sappington, & Weisman (1996). See also Abel (2000) for a more recent review of the empirical literature on price-cap regulation.

2.3.2.2 Social Regulation

In the United States, beginning in the mid-1960s the number of federal regulatory agencies and the scope of regulatory activity vastly expanded (Breyer, 1982). The new form of regulatory activities in the 1960s and 1970s differ from the traditional economic regulation. Its focus was concerned with physical harm to people's well-being such as safety, health, and environmental issues. Unlike economic regulation, social regulation is not limited to a specific category of industries, i.e., public utilities. The U.S. Congress created a number of new regulatory agencies to deal with these issues during the two decades. Some examples are National Highway Traffic Safety Administration (NHTSA, 1970), Environmental Protection Agency (EPA, 1970), Occupational Safety and Health Administration (OSHA, 1970), and Consumer Product Safety Commission (CPSC, 1972).

The primary economic rationale for social regulation lies in the market failures of the externalities type, whereas economic regulation stems most often from fears of monopoly power (Reagan, 1987). Ogus (1994) provides two types of market failure as the public interest justifications for social regulation: inadequate information and externalities. Individuals usually have inadequate information concerning the quality of goods or services offered by providers, which may lead to a market failure. Externalities (or spillover effects) in market transactions affect individuals who are not involved in the transactions. Externalities can be either positive or negative in its nature. Social regulation is usually focused on negative effects.

In the public utility industries including telecommunications, social regulation can take the form of quality of service regulation, certain information disclosure requirements,

and consumer protection measures. Federal and state regulatory commissions also perform consumer education function to help consumers make informed decisions. As an important component of quality of service regulation, currently the vast majority of states have quality of service standards set by state laws or commission rules.⁴² Regarding the information disclosure requirement, telephone companies are usually required to make necessary information such as tariffs available to consumers as well as regulators.

The need for consumer protection and education in the telecommunications industry increases as the consumers are increasingly exposed to various consumer-related problems in a changing environment. Some examples of such problems facing consumers and regulators in the telecommunications industry include slamming and cramming.⁴³

Trebing (1999) properly observes the challenges to consumer protection and education in a new environment:

As markets replace regulated sources of supply, consumers will be compelled to negotiate directly with vendors in these markets to acquire utility services. If these markets are assumed to be both efficient and competitive, then the consumers' first line of protection would involve informed decisionmaking and free choice. This, in turn, would place primary emphasis on providing consumers with the type of information needed to make rational decisions. But if there is a strong potential for the exercise of market power and the selective exploitation of customer classes, then an entirely different form of consumer activism is called for. Information regarding prices and reliability loses much of its significance when placed in the context of market failure. (p. 426)

⁴² For a compilation of state quality of service standards for retail telephone service, see Pérez-Chavolla (2003).

⁴³ Slamming is the illegal practice of changing a consumer's telephone service provider without permission, and cramming refers to the practice of placing unauthorized, misleading, or deceptive charges on a consumer's telephone bill. See FCC (2002, March 25 & August 13).

2.3.3 Theories of Regulation

There are various theories developed over the years to explain the rationale for regulation and the behavior of regulatory agencies. Broadly speaking, a key distinction among different theories of regulation stems from whether regulation is based on “public interest” or “private interest.”⁴⁴ Some authors, such as Horwitz (1989) and Vietor (1994), add the organizational behavior theory as one of the major categories, which considers the organizational imperatives of an agency to be the key variable in understanding regulatory behavior. Another important point in classifying theories of regulation lies in the approach of the theory to regulation. That is, the normative theory prescribes the way in which regulation ought to be designed to maximize social welfare, while the positive theory predicts the way regulation will work in practice (Newbery, 1999). These theories are often overlapping and nonexclusive. Following Phillips (1993), below I discuss the four major theories of regulation widely cited in the literature.

2.3.3.1 Public Interest Theory

The public interest theory of regulation, the oldest theory of government regulation of business, holds that regulation is undertaken to protect consumers from the abuses of market imperfections (Phillips, 1993). Thus, this theory views regulation as response to public-interest-related objectives (Mitnick, 1980), and treats the creation of

⁴⁴ For surveys of regulation theory based on this perspective, see Mitnick (1980) and Ogus (1994).

regulatory agencies as the victorious result of the people's struggle against private corporate interests (Horwitz, 1989). This theory has been referred to as "normative analysis as a positive theory" by some authors (Joskow & Noll, 1981). According to Viscusi, et al. (2000), normative analysis as a positive theory uses normative analysis to generate a positive theory by saying that regulation is supplied in response to the public's demand for the correction of a market failure or for the correction of highly inequitable practices such as price discrimination.

The advantage of the public interest theory is that, when sophisticated, it is grounded in historical understandings about the origins of some regulatory agencies (Horwitz, 1989). However, the public interest theory of regulation drew several criticisms. First, as Mitnick (1980) points out, there is no single public interest conception.⁴⁵ Oftentimes, the notion of public interest is vague and hard to define in agreeable terms in practice. From an economist's point of view, public interest can be translated into social welfare. As Arrow's impossibility theorem demonstrated, however, there is no political mechanism or social choice rule of aggregating individual preferences to satisfy all of the desired characteristics of a choice mechanism (Arrow, 1963).

Second, a large amount of evidence suggested that regulation did occur in industries, such as trucking and taxicab industries, that are neither natural monopolies nor plagued by externalities (Viscusi et al., 2000), which are market imperfections on which the public interest theory stands. Posner (1974) argued that "some fifteen years of theoretical and empirical research, conducted mainly by economists, have demonstrated

⁴⁵ Mitnick (1980, chap. 4) discusses the various conceptions of public interest.

that regulation is not positively correlated with the presence of external economies or diseconomies or with monopolistic market structure” (p. 336). As a consequence of a series of attacks and criticisms against the public interest theory, by the late 1960s it appeared to be more of a normative paradigm than a description of the actual process of regulation (Trebing, 1981).

2.3.3.2 Capture Theory

The capture theory of regulation is an outgrowth of criticisms and empirical evidence against the public interest theory in the 1950s and the 1960s. The capture theory states either (1) that regulatory agencies were created to protect consumers, but that subsequently they became captives of the industries they regulate, or (2) that regulatory agencies were created to serve the interests of the industries they regulate, in response to the demands of the industries for cartel management placed upon the legislature.⁴⁶ The main argument of the capture theory is that regulatory agencies are “captured” by the industries they are supposed to regulate. Thus, according to Horwitz (1989), the implication of the capture theory is that a captured agency systematically favors the private interests of regulated parties and systematically ignores the public interest.

While the capture theory, to some extent, provides a realistic view of regulatory agencies’ behavior, it is subject to several criticisms. First, as Trebing (1981) points out, the capture theory does not explain regulatory practices that are clearly not in the best

⁴⁶ Phillips (1993, p. 183), citing Bernstein (1955) and Kolko (1965).

interests of the regulated firm. He goes on to argue that the FCC could scarcely be regarded as a competent cartel manager promoting the interests of the regulated firm, AT&T, in the years since the “Above 890” decision.⁴⁷ Second, the capture theory does not explain why regulation is controlled by the industry, even though there may be different interest groups affected by the regulation including consumer and labor groups as well as firms (Viscusi et al., 2000). Third, the capture theory has no predictive or explanatory power when a single agency regulates separate industries having conflicting interests (Posner, 1974). Using the FCC as an example, it has jurisdictions over a broad concept of communications industry, which can actually be divided into separate industries such as telephone, broadcasting, and cable TV. The capture theory does not explain which industry will be favored when the FCC makes a decision that may have conflicting interests from those industries. Fourth, the capture theory provides little insight into the opportunities for regulatory reform and thus leads to the conclusion that the only reasonable option for public policy is to deregulate; it does not answer the question that arises when the industry contains structural features which would significantly limit competition in the absence of any form of regulation (Trebing, 1981).

One of the well-known subset of the capture theory is the “life cycle” theory,⁴⁸ formulated by Bernstein (1955). Bernstein described the historical life of a regulatory commission employing a biological metaphor. According to this model, a regulatory

⁴⁷ See Brock (1994) about the “Above 890” decision and its implications. In short, in 1959 the FCC determined to license private microwave systems using microwave frequencies higher than 890 MHz for their own use over the objection of AT&T.

⁴⁸ For a more general discussion of the life cycle of public organizations, see Downs (1967) who presents “the life cycle of bureaus” to explain how bureaus are created, grow, and die.

commission follows a life cycle divided into four periods: gestation, youth, maturity, and old age. This theory holds that toward the end of the cycle, a regulatory commission becomes an organization captured by the industry that it is supposed to regulate. The problem with the life cycle theory is that its relatively unitary treatment of agencies ignores the different circumstances surrounding, and reasons for, their creation (Horwitz, 1989).

2.3.3.3 Interest Group Theory

Interest group theory of regulation (often referred to as the “economic theory of regulation”)⁴⁹ focuses on the formation of political coalitions to explain both the creation of regulation and the behavior of regulatory agencies (Phillips, 1993). This theory argues, according to Trebing (1981), that the formulation of political coalitions is necessary if regulation is to survive and prosper. In this theory, regulators are viewed as “arbitrators” between special interest groups in an effort to maximize support.

The early version of economic theory of regulation was presented by Stigler. In his influential article in 1971, Stigler argued that, “as a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit” (p. 3). According to Peltzman (1989), the most important element of this theory is its integration of political behavior with the larger body of economic analysis, i.e., the demand and supply sides of

⁴⁹ Trebing (1981) uses the name “coalition-building theory” instead of interest group theory. Interestingly, Posner (1974) views the economic theory of regulation as a version of the capture theory along with the political scientists’ formulation of capture theory.

regulation. Peltzman (1976) builds on Stigler's work and extends the theory of economic regulation by arguing that regulators allocate benefits across consumer and producer groups so that total political utility is maximized.⁵⁰ The general idea of this line of argument is that regulation is likely to be biased toward benefiting interest groups that are better organized (so that they are more effective at delivering political support) and gain more from favorable legislation (so that they are willing to invest resources in acquiring political support) (Viscusi et al., 2000).

Becker (1983, 1985, 1989) goes along with the basic argument of Stigler and Peltzman, but he focused more on competition among interest groups for political influence.⁵¹ In Becker's model, politicians and bureaucrats are assumed to carry out the political allocations resulting from the competition among interest groups. Thus, in this model regulation is determined by the relative influence of interest groups. In an empirical study, Kaserman, Mayo, and Pacey (1993) test the economic theory of regulation against the public interest theory using the data about observed variation in state decisions to deregulate AT&T's prices of intrastate interLATA services and argue that their results support the economic theory of regulation but fail to support the public interest theory.

While the interest group theory of regulation offers some insights into regulatory agencies' behavior, it is not without criticisms. Based on the differences between politics

⁵⁰ Lee (1980) presents a model of "just" regulation in which both the consumers and the producers are better off.

⁵¹ For a general discussion of the roles of interest groups in the regulatory process, see Noll & Owen (1983).

and economics,⁵² J. Q. Wilson (1980) criticizes the economic model of regulation theory and discusses “the politics of regulation.” He argues that policy proposals, especially those involving economic stakes, can be classified in terms of the perceived distribution of their costs and benefits. Wilson presents four types of regulatory politics: majoritarian politics, interest-group politics, client politics, and entrepreneurial politics.⁵³ According to him, “interest-group politics” is likely to occur when both costs and benefits are narrowly concentrated. In his model, interest-group politics is just one of the four main types of politics of regulation.

The interest group theory assumes that regulators are motivated to broaden their base of support, votes, or power but these actions may be neither appropriate nor necessary for commissioners who are appointed for a definite term of office (Trebing, 1981). Even if the theory assumes that interest groups influence regulators through elected officials such as legislators or administrative executives, it ignores the fact that legislators may have different interests from interest groups and regulators may have different interests from legislators or administrative executives, which may be explained

⁵² J. Q. Wilson (1980, pp. 362-363) provides three major differences between economics and politics: First, politics concerns preferences that do not always have a common monetary measuring rod; second, political action requires assembling majority coalitions to make decisions that bind everyone whether or not he belongs to that coalition; third, whereas economics is based on the assumption that preferences are given, politics must take into account the efforts made to change preferences.

⁵³ Majoritarian politics is expected when both costs and benefits are widely distributed; client politics is likely to result when the benefits of a prospective policy are concentrated but the costs widely distributed; and entrepreneurial politics is likely to occur when the benefits, though small, are widely distributed but the costs are to be borne by a small segment of society (J. Q. Wilson, 1980).

by the principal-agent model. Another limitation to the application of this theory is that there are substantial constraints on regulatory policy from judicial review, especially in the United States (e.g., MFJ).

In addition, the interest group theory fails to enable us to predict specific industries in which regulation will be found because the theory does not specify what is the number of members of a coalition that maximizes the likelihood of regulation (Posner, 1974). Finally, as Trebing (1981) notes, the interest group theory provides little basis for judging circumstances under which regulation enhances the general welfare of society.

2.3.3.4 Equity-Stability Theory

The equity-stability theory of regulation explains the growth of regulation in terms of the desire of legislators to replace markets with administrative-judicial types of institutional arrangements which are better qualified to promote fairness, social values, and stability (Trebing, 1981). This theory was developed by Owen and Braeutigam (1978), who argued that too little attention has been paid to the implications of the institutional framework of procedure in the administrative process. According to them, when we focus on this process it is at least arguable that regulation, at the cost of some efficiency and of some progressivity, may have provided substantial benefits to individuals by protecting them from some of the risk they would otherwise face in the efficient but ruthless market.

Owen and Braeutigam (1978) argue that most people wish to reduce the risks that they face in the free market which is subject not only to the periodic cycles of

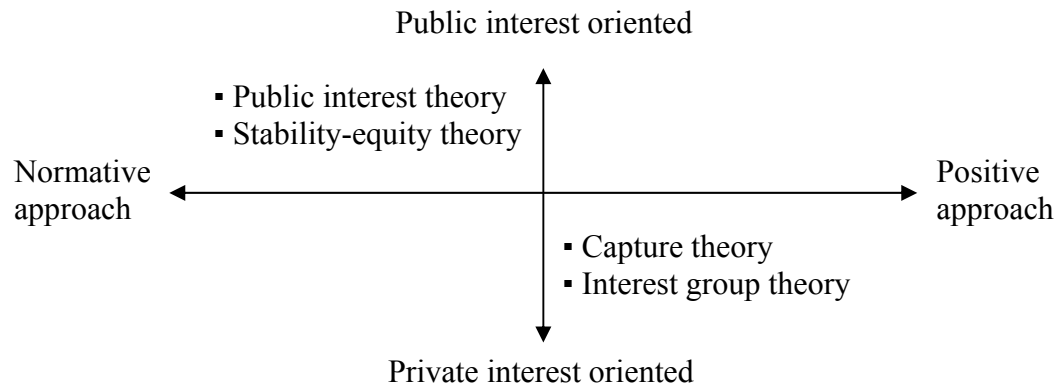
macroeconomic activity but also to sudden and total dislocation of particular micro-sectors as a result of shifts in technology and demand. Thus, risk-averse individuals are willing to trade off some efficiency for increased procedural fairness. In this theory, regulation exists to slow down the rate at which the free market redistributes income, thus reducing the market risks faced by voters. This stability-equity theory therefore emphasizes social goals (equity and fairness) as apposed to economic goals (efficiency) and stability as opposed to rapid change (Phillips, 1993).

While the theory provides some insights into the rationale for regulation and regulatory behavior (e.g., the universal service requirement in the telecommunications industry), it faces several criticisms. First, it has very limited explanatory power in the cases of deregulation which we have seen over the past two decades. Second, the stability-equity theory assumes the trade-off between efficiency and equity or fairness. However, as Trebing (1981) points out, the real trade-off may be between highly imperfect markets on the one hand and efforts to improve both efficiency and equity objectives under regulatory reform on the other. Third, the theory does not provide any guidance to regulators as to which group should be given preferential treatment (Phillips, 1993; Trebing, 1981).

2.3.3.5 A Thought on the Theories of Regulation

As noted earlier, these theories of regulation can be broadly classified in terms of two criteria: public interest v. private interest and normative approach v. positive

approach. With some risk of oversimplification, the four theories of regulation can be classified as follows.



Source: Author's construct

Figure 2.1: Classification of theories of regulation

It should be emphasized, however, that these theories often overlap with each other and the lines drawn among theories are not clear as they appear here. In other words, the classification is only to show the relative location where each theory might be when seen through the two lenses I suggested—public interest v. private interest and normative approach v. positive approach.

As can be seen in the discussions above, it is appropriate to say that all of the four major theories of regulation reviewed here contributed, at least to some extent, to our understanding of the rationale for regulation and the behavior of regulatory agencies. At the same time, it is equally arguable that none of the four theories alone can account for all aspects of actual regulation in practice. Rather, it is perhaps reasonable to state that

each theory has its own value either in explaining regulation (positive aspect of regulation) or in guiding regulation (normative aspect of regulation) or in both aspects.

2.4 Theoretical Perspectives on Regulation and Competition in Public Utility Industries

In the history of public utility regulation, several perspectives on economic thought have played and continue to play a key role in shaping regulatory policies in the United States. Broadly speaking, there are two distinct schools of thought that are in contrast with each other in many respects in their approach to the regulation of public utilities—neoclassical economics and institutional economics. In the economics profession, it is widely recognized that neoclassical economics has been in the dominant position for over one century and has been regarded as the “mainstream” or “orthodox” theory to explain economic phenomena including regulation. Institutional economics has been a major dissenting voice against the “orthodoxy” of neoclassical economics and at times (e.g., the decades of the mid-1930s to the mid-1970s) achieved major standing in the actual conduct of utility regulation.⁵⁴

These two schools of thought have contrasting views of market and government role in the economy. In this section, I briefly discuss basic differences between neoclassical economics and institutional economics in their foundations and analytical approaches to regulation and competition with a focus on public utility industries.

⁵⁴ According to Dugger (1977), “neoclassical economics” refers to the rejuvenation of the classical economics of Smith and Ricardo by the marginalists Jevons, Menger, and Walras, and also to the theoretical culmination of this dominant school by such scholars as Marshall and Samuelson; “institutional economics” refers to the work of Veblen and Commons along with subsequent work of such economists as Ayres, Galbraith, Means, and Myrdal.

2.4.1 Comparison between the Neoclassical Approach and the Institutionalist Approach

Dugger (1979) discusses the differences between neoclassical economics and institutional economics in terms of three preconceptions. First, they are different in the kind of model or theory constructed. Neoclassicists seek to construct predictive models or theories, whereas institutionalists seek to construct pattern models or theories. According to Dugger, a predictive model explains human behavior by carefully stating assumptions and deducting implications (predictions) from them⁵⁵; a pattern model explains human behavior by carefully placing it in its institutional and cultural context.

Second, neoclassical economics and institutional economics differ in the unit of analysis. The former uses the ‘individual’ (consumer or firm) as its unit of analysis. In contrast, the latter takes the ‘institution’ as its unit of analysis. Institutions are generally defined as “the regular, patterned behavior of people in a society and the ideas and values associated with these regularities” (Hodgson, Samuels, & Tool, 1994, p. 402). Commons (1931) defined an institution as “collective action in control, liberation and expansion of individual action” (p. 649) and equated an institution with “a going concern” such as a corporation, labor union, and political party (Commons, 1970, p. 34-35). Unlike the neoclassical approach that assumes rational utility-maximizing individuals with given

⁵⁵ This point was clearly made by M. Friedman (1953) by saying that “The ultimate goal of a positive science is the development of a ‘theory’ or ‘hypothesis’ that yields valid and meaningful (i.e., not truistic) predictions about phenomena not yet observed” (p. 7).

preferences, the institutional approach does not take individuals as given: rather, it sees that individuals interact to form institutions, while individual purposes or preferences also are molded by socio-economic conditions (Hodgson, 1998).⁵⁶

Third, both schools are different in their psychological perspectives. The neoclassical approach explains human behavior with the individual, not the institution, which is usually known as methodological individualism. In contrast, the institutional approach takes the psychological perspective of behaviorism. According to Dugger (1979), behaviorism grounds the roots of human action in institutional structures (norms, working rules, use and wont) rather than in individual preferences, which are considered to be either largely derivative or unreliable due to their introspective or subjective nature.

In short, according to Dugger (1979), neoclassical economics can be understood as a set of hierarchic theories or predictive models composed of individual firms and individual consumers as the building blocks, with subjectivism or methodological individualism as the psychological foundation. In contrast, institutional economics can be understood as a set of concatenated theories or pattern models composed of institutions as the building blocks and with behaviorism as the psychological foundation.⁵⁷

In terms of methodology, it has long been recognized that institutional economics is different from mainstream neoclassical economics in that the former focuses on “process,” whereas the latter focuses on “equilibrium” (Dugger, 1977; Hamilton, 1919;

⁵⁶ Elsewhere, Hodgson (2000) argued that the idea that the individual is socially and institutionally constituted is the single most important characteristic of institutionalism.

⁵⁷ Some authors compare the relationship between neoclassical economics and institutional economics to the one between physics and biology (Dugger, 1977; Hodgson, 1998).

E. S. Miller, 2002). While neoclassical economics is mainly interested in analyzing the final equilibrium, institutional economics is primarily interested in understanding evolutionary changes of institutions over time.

Another main difference between neoclassical economics and institutional economics lies in the concept of efficiency. According to Klein and Miller (1996), neoclassical economics involves an individualistic view of efficiency. Thus, efficiency is defined as the allocation of resources to “highest” (monetarily most remunerative) uses. In contrast, Klein and Miller explain, institutionalist efficiency involves social and public, as well as private and individualist, criteria. Unlike neoclassical economics, institutional economics does not uncouple efficiency and equity: efficiency has a sizable equity component (E. S. Miller, 2002).

In addition to the above differences in methodological and philosophical foundations, as P. A. Klein (1984) points out, the biggest distinction between mainstream neoclassical economics and institutionalism lies perhaps in the view of the public sector and its role in the economy. The two schools have markedly different perspectives on the regulation and competition of public utility industries.

According to Trebing (1987), the neoclassical approach to public policy is premised on the belief that market-oriented rational behavior by free agents can serve as the normative guideline for defining the role of government; in contrast, the institutional approach to public policy is based on the need for government control of the potential abuses inherent in the exercise of market power. Generally speaking, as E. S. Miller (2002) observes, the neoclassical approach envisions market forces as almost invariably free and neutral and sufficient for control of market power. In this perspective, the policy

recommendation with regard to public utility industries is largely deregulation on the ground that competition is better than government regulation at achieving economic efficiency.

Perhaps one of the extreme groups of this camp would be the so-called “Chicago school” economists.⁵⁸ They assert that market structure is determined by each firm’s relative efficiency, rather than any abuses or monopolizing actions, and thus, monopoly merely reflects superior efficiency (Shepherd, 1991). The Chicago school sees that “monopolies are usually transitory, with freedom of entry working to eliminate their influence on prices and quantities within a fairly short time period” (Reder, 1982, p. 15). It is also argued that the social costs of public regulation exceed the social costs of private monopoly (Posner, 1975). While there was a considerable difference between the earlier generation and the new generation of Chicago school economists,⁵⁹ one thing is consistent: their position toward regulation of industry is that regulation is harmful, inefficient, and unnecessary. In addition, the Chicago school economists developed a theory about regulatory behavior (known as the “economic theory of regulation”), which primarily states that regulation serves the interests of industry or strong interest groups,

⁵⁸ Shepherd (1997) describes the ‘original’ Chicago school and the ‘new’ Chicago school: the original Chicago school led by Frank Knight, Henry Simons, and Jacob Viner in the 1920s and 1930s was opposed to monopoly of every kind; however, the school’s viewpoint was reversed by Aaron Director and George Stigler in the 1950s—they saw monopoly to be limited, brief, and weak unless supported by government. This viewpoint was further pressed by the followers such as Harold Demsetz, Richard Posner, and Sam Peltzman in the 1960s and 1970s.

⁵⁹ Simons saw monopoly as a threat to democracy but opposed to regulation; rather, he proposed public ownership for public utilities. The new generation members of the Chicago school considered monopoly to be brief and weak and concentrated their attack almost entirely on government regulation. For reviews of Chicago school economics, See H. L. Miller (1962) and Trebing (1976).

rather than the public interest as suggested by the traditional public interest theory.⁶⁰ At best, as Trebing (1984a) describes, the Chicago theory portrays regulation as a faltering political effort to replace efficient markets with ill-defined equity goals.

The neoclassical approach is generally critical of regulation of public utilities and government intervention in the market. The Chicago school's strong advocacy for free-enterprise economy is beyond dispute (H. L. Miller, 1962). Indeed, neoclassical economics, in general, supported deregulation and provided theoretical grounds for it. It is recognized by both camp that economists, especially neoclassical economists, played a significant role in the deregulation movement (Trebing, 1984a; Winston, 1993). Berg and Tschirhart (1995) argue that neoclassical economics made significant contributions to public utility analysis in such areas as pricing (e.g., peak-load or time-of-use pricing) and promotion of efficiency, alternative regulatory framework (e.g., price caps), and deregulation.

However, the neoclassical approach to public utility regulation has been criticized on several grounds. According to Trebing (1987), the neoclassical models build from restrictive assumptions and use the normative aspects of the ideal competitive model too extensively. Thus, the neoclassical approach does not address current real-world problems of market failure and market concentration (E. S. Miller, 2002). It is also criticized that the neoclassical approach suffers from the shortcomings inherent in the concept of consumer surplus, which is caused by its reliance on consumer surplus for judgments of net changes in welfare (Trebing, 1984a). In addition, the neoclassical

⁶⁰ For reviews of the Chicago school theory of regulation, see Haid (2001) and Peltzman (1989).

approach to public utility regulation has focused almost exclusively on the narrow concept of efficiency (usually allocative efficiency). However, efficiency is only one of many objectives to most regulators (Berg & Tschirhart, 1995), and the neoclassicists have essentially disregarded equity and distributional effects (Trebing, 1984a). In fact, some authors (Jones, 2001; Jones & Mann, 2001) point out that the fairness criterion still remains as an important concept in the actual public utility regulation, even more important than efficiency as perceived by state and federal regulatory commissioners.⁶¹

The institutional approach to regulation of public utilities stands in sharp contrast. Unlike the neoclassical approach's confidence in the free market system, the institutionalists are generally concerned with the potential abuses of market power. Although it has been said by some institutionalists that the institutional approach is not always pro-regulation,⁶² it seems reasonable to say that institutionalists are more inclined to remedy market failures by social control, i.e., public regulation, than are neoclassicists. As Trebing (1987) points out, institutional economists played a major role in developing the rationale and format for government regulation of business during the Progressive and New Deal eras.

The institutional approach sees the need for regulation to promote public interest or social values that cannot be derived exclusively from monetary or market-oriented

⁶¹ For an excellent discussion of economic efficiency and fairness, see Zajac (1995).

⁶² See, for example, P. A. Klein (1984), E. S. Miller (2002), and Trebing (1987).

measures (Trebing, 1987). Moreover, institutionalists view regulation as an evolutionary process. Thus, it follows that the form and method of regulatory intervention may need to be changed to meet changing circumstances (E. S. Miller, 2002; Trebing, 1987).

In summary, the institutional approach recognizes the deficiencies of market forces that may not be appropriate for controlling market power, and its policy recommendation tends to be social control of business to serve the public interest, rejecting the laissez-faire approach suggested by most neoclassicists.

Despite the contributions made by intuitionists to the understanding of market imperfections and the application of regulation, the institutional approach has been criticized by others. An early scathing criticism of institutionalism came from a neoclassical economist. Homan (1932) wrote that “institutional economics, differentiated from other economics by discoverable criteria, is largely an intellectual fiction, substantially devoid of content” (p. 15). To him, therefore, the controversy between posited institutional economics and posited neoclassical economics is “obsolete, unreal, silly, and beside the point” (p. 16). However, P. A. Klein (1990) defends the validity of institutionalism as a school by saying that despite the initial controversy as to whether the original institutionalist movement was more than ‘mere dissent,’ institutionalism has been recognized as a distinctive movement, and that the current generation as well as the earlier generation of institutionalism legitimately constitute a school of economic thought.

The institutionalist approach also has been criticized as largely descriptive and lacking coherent technical and analytical tools such as those developed by neoclassicists. Thus, the institutionalist approach does not predict very much or very well. In other words, it tries to explain what *is* but does not say much about what *will be*. Hodgson

(1993), an institutionalist, points out “the mid-century impasse” of institutionalism: the “old” institutionalism⁶³ established the importance of institutions but then proceeded in a more descriptive direction, leaving many of the core theoretical questions unanswered.

With respect to the institutionalists’ position on public utility regulation, some major figures of the school, such as Commons, Glaeser, and Bonbright, accepted and elaborated the public interest theory (Trebing, 1987). However, the public interest theory of regulation faced significant criticisms as early as in the 1940s. One of the attacks on the theory came from an institutionalist economist (Gray, 1940). Further, this traditional theory of regulation came under serious attack by the neoclassical economists, most notably by the Chicago school. The Chicago school economists, represented by Stigler, Peltzman, and Becker, criticized the public interest theory by saying that regulation occurs not because of protection of the public interest but because of the industry or interest groups’ needs.

2.4.2 A Brief Thought on the Two Approaches: Are They Substitutes or Complements?

One might see the sharp differences between the neoclassical approach and the institutional approach as sufficient to conclude that the two approaches are indeed substitutes in regulatory thought. However, despite their differences in approach to

⁶³ The original institutional economics of Veblen, Commons, and Mitchell is sometimes called the “old” institutionalism to distinguish it from the “new” institutional economics (also known as the transaction cost economics) that became prominent primarily by the works of Coase and Williamson. However, many current institutionalists who generally follow and extend the intellectual tradition of the earlier generation of institutionalism do not think that the “new” institutional economics is compatible with the institutionalist perspective. Rather, they regard the “new” institutional economics as an extension of neoclassical orthodoxy. See Dugger (1990) and E. S. Miller (1993).

economic reasoning and policy recommendations, one could argue that they should be regarded as complementary approaches. That is to say, so far neither approach has historically proven to be the “true and only theory” that explains every aspect of regulation fully and accurately. One approach is good in some respects, but then the other is better in some respects.

For example, it is hardly disputable that the neoclassical economists contributed significantly to the development of many important theoretical and analytical concepts and frameworks (i.e., marginal pricing schemes, demand analysis, and many cost concepts) that are widely used by the general population of economists, policy scholars, and analysts. On the other hand, the institutionalists made a significant contribution to some aspects of regulation that are often disregarded or untouched by the neoclassical economists. The recognition of potential abuses of concentration and market power (and relevant policy proposals) and the attention to other social values such as distributional equity or fairness as well as to economic efficiency in the regulatory process is primarily the institutionalists’ contribution in the economics profession.

In fact, this possibility of synthesis of the two approaches has been recognized by some scholars. Commons (1931) himself, one of the founders of American institutionalism, acknowledged that institutional economics cannot be separated from the “marvelous discoveries and insight” (p. 648) of the classical and psychological economists. In his terms, “Institutional economics is not divorced from the classical and psychological schools of economists” (p. 657). Dugger (1977) also observes that the two schools of thought should be viewed as complements rather than as substitutes. While he recognizes the differences between the two approaches, Dugger emphasizes the need for

synthesis between the two schools as a key to the further progress of economic understanding, citing Schumpeter's analysis of economic change within capitalism in 1950 as an example. If the call for synthesis of two different approaches has not yet been realized, it is perhaps the task of current and future scholars in this field.

2.5 The Evolution of Regulation and Competition in the U.S. Telephone Industry

Telecommunications regulation in the United States has evolved over the last several decades at different paces in time. As discussed earlier, the telecommunications industry, more specifically the telephone industry, has long been viewed as a subset of a broader category of public utility industries. Public utility industries have been the subject of extensive regulation by federal and state regulatory agencies, though with varying degrees. Thus, it may be useful to better understand telecommunications regulation in the context of general regulation of business and its evolution over time. Accordingly, this section first briefly discusses the phases of economic regulation for over a century and then reviews the evolution of regulation and competition in the U.S. telephone industry.

2.5.1 The Phases of Regulation and the Era of Regulatory Reform

From the American history of regulation, one can find general policy trends that lasted for certain periods of time by which one may roughly define different eras. Economic regulation of public utilities displays this pattern well. In general, it is

commonly accepted that economic regulation in the United States emerged from the late nineteenth century⁶⁴ and was significantly extended during the New Deal era of Franklin D. Roosevelt. As some authors point out,⁶⁵ this era of relatively stable economic regulation lasted until the 1970s. Economic regulation has experienced substantial changes since then.

Some scholars describe the evolution of regulation according to several phases. For example, Horwitz (1989) explains the development of regulation using the three phases of regulation. According to Horwitz, there have been three major waves of regulatory genesis in American history, each period characterized by a particular set of problems, a particular kind of politics, and a particular type of regulatory agency: the Progressive Era (1900-1916), the New Deal Era (1930-1938), and the Great Society Era (1965-1977).⁶⁶

In the Progressive Era (1900-1916), regulatory agencies such as the Federal Reserve Board (1913) and the Federal Trade Commission (1914) were established to formulate general market rules for business behavior. The New Deal Era (1930-1938) was characterized by price-and-entry control for the protection of key industries destabilized by the economic conditions of the Great Depression. Many new regulatory agencies were created during this period including the Federal Communications

⁶⁴ *Munn v. Illinois*, 94 U.S. 113 (1877). For its content and implications for regulation, see my discussion in section 2.2.1.

⁶⁵ See, for example, Vietor (1994) and Kuttner (1996).

⁶⁶ See Horwitz (1989, pp. 65-82) for details.

Commission (1934), the Securities and Exchange Commission (1934), and the Civil Aeronautics Board (1938). As Horwitz (1989) points out, a major characteristic of this phase of regulation is that each agency was given jurisdiction over a single industry. The third phase was the Great Society Era (1965-1977) during which regulatory agencies expanded regulation beyond purely economic concerns. Regulatory agencies established during this period such as the Environmental Protection Agency (1970) tried to control “externalities,” the unintended social consequences of business behavior, and pursued largely social regulation in its nature.

As a more comprehensive and focused coverage for utility regulation, Trebing (1984b) observes that the regulation of public utilities has gone through five phases, each of which played a role in shaping the basic character and performance of regulatory institutions: (1) populist/Progressive reform (1877-1920); (2) political inaction in the 1920s; (3) New Deal reforms (1933-1944); (4) postwar stability (1945-1968); and (5) rising costs, destabilizing technological advance, and growing disenchantment with regulation (1969-present).⁶⁷

During the first phase, the state power to regulate private business was established by *Munn v. Illinois* in 1877 and subsequently expanded by court decisions. In phase (2), according to Trebing (1984b), there were a few overt demands for regulatory action and regulatory role was largely a passive review function. During phase (3), however, a wide range of new regulatory activities was undertaken including the creation of the Federal Communications Commission in 1934. As Trebing points out, the public interest theory

⁶⁷ See Berg & Tschirhart (1988) for key regulatory events applying Trebing’s classification.

of regulation gained a big support during this period. Phase (4) can be characterized as a stable period in economic regulation. However, Trebing points to the federal and state regulatory agencies' overlooking of some generic issues that emerged during this period, such as the impact of rate-of-return regulation on economic efficiency, which eventually brought pressures for change in the next phase. During phase (5), strong pressures for change broadly affected the regulation of public utility industries and public confidence in regulation seriously weakened. In the telecommunications industry, the long distance market was open to competition, and perhaps the biggest change since the enactment of the Communications Act of 1934, the modification of final judgment (MFJ), occurred during this period.

As the attacks against government regulation in general, economic regulation in particular, came from several fronts, the policy trend toward regulated industries shifted from regulation to deregulation under the banner of "regulatory reform." Criticism on regulation came from at least three major groups: the economics profession, the consumer movement, and politicians (Viator, 1994). As Viator points out, by 1971 the intellectual critique of economic regulation, represented by Alfred Kahn of Cornell University and George Stigler of the University of Chicago, had spread throughout the mainstream economics profession. Criticism on regulation also came from consumer movement led by Ralph Nader in the 1960s. A serious political attack on regulation came from Senator Edward Kennedy in the mid-1970s through a series of hearings on regulation he sponsored.

According to L. J. White (1999), a fundamental change began in the late 1970s. As he describes, within a decade, the federal government deregulated air, rail, truck, and

bus transport and natural gas production and transport with respect to rates, entry, and exit. Broad regulatory reform initiatives were undertaken over a wide range of industries from the late 1970s to the early 1980s.⁶⁸ Kuttner (1996) writes that the reversal from regulation to deregulation came with “stunning speed” (p. 232). He further states that the word “deregulation,” which only entered popular discourse in 1976, had become a widely shared policy objective by 1978.

Then why did the change occur? Regarding the driving forces or causes of regulatory reform or deregulation, several scholars presented their views. According to Horwitz (1989), deregulation was a political process, whereby the economic and political problems enveloping certain industries turned a surprisingly heterogeneous political coalition between conservative free market economic theory and a left-liberal theory of political participation against continued regulation. Horwitz argues that deregulation occurred because of “a complex mosaic of regulatory, political, economic, legal, and ideological factors” (p. 198) and technological changes as well in telecommunications. While he admits that deregulation “*could not have occurred* without these supporting, underlying factors,” (p. 198) he emphasizes that deregulation is at bottom a *political* phenomenon and it is basically a story of political movement from regulatory activism to regulatory “reform.”

A similarly political, but more phase-oriented, view of deregulation was presented earlier by Derthick and Quirk (1985). In their study of deregulation in the late 1970s and the early 1980s, especially in the sectors of airlines, trucking, and telecommunications,

⁶⁸ See Winston (1993) for major regulatory reform initiatives.

they observed that the accumulation of political forces in support of procompetitive deregulation—the evolution of a political or policy idea—went through three stages: (1) analytic prescription, (2) political symbol, and (3) policy fashion. In the first phase, according to Derthick and Quirk, economists who were highly critical of economic regulation advocated deregulation as a way of reducing the social costs that, they argued, often resulted from public utility regulation. Derthick and Quirk admitted that without this academic critique of policy the reforms “would never have occurred,”⁶⁹ but then they stressed that the academic critique had to go beyond being merely academic and enter into the stream of policy discussion in Washington (p. 36). In the second phase, some major political figures (Presidents Ford and Carter and Senator Edward Kennedy) took deregulation as a way of responding to widely shared desires, sentiments, and values, turning it into a political symbol. And finally, deregulation turned into a policy fashion, a preferred style of policy choice by a wide range of officeholders and their critics.

A much narrower and technical explanation about the causes of regulatory reform was suggested by Perl (1997). He argues that despite the fact that industry performance in public utilities was generally viewed as quite good for several decades, a broad-based trend toward deregulation and regulatory reform occurred because of two factors, both of which pressed for regulatory reform: (1) growth in market size and technical changes in

⁶⁹ Indeed, Nelson (1987) argues that economists made three major contributions to economic deregulation: first, economists helped to undermine the progressive-era ideology which provided the intellectual foundations for economic regulation; second, economists showed that regulation resulted in an inefficient use of resources in specific cases; and third, the economics profession provided key policy entrepreneurs for the political struggle to achieve deregulation. Although economists are not the only group of supporters of and contributors to deregulation and putting aside the evaluation of consequences of deregulation, it seems fair to say that their contributions to the deregulation movement are widely recognized.

public utility industries, which made competition more feasible, and (2) disparities between prices and costs caused by regulatory policies, which created substantial incentive for competitive entry.

Whatever forces drove the deregulation movement, one thing seems to be clear. That is, if we can label the period from the 1930s to the 1960s as “the era of (economic) regulation,” now we are living in “the era of regulatory reform,” which has come mostly to mean “deregulation.”⁷⁰ This is especially true in the telecommunications industry in which we have seen continuous movement toward deregulation and competition since the 1970s in large measure. In the following section, I briefly review the evolution of telephone regulation in the United States.

2.5.2 A Brief History of U.S. Telephone Regulation

The telephone industry has been regarded at least until the 1970s by many people as a typical example of natural monopoly which has such properties as economies of scale and scope. Thus, the regulation of the telephone industry focused on securing “just and reasonable” prices and universal service by controlling the monopoly service provider, AT&T, in almost all segments of the market. However, even under the

⁷⁰ Although “regulatory reform” and “deregulation” are related, they are not necessarily synonymous. However, the regulatory reform movement since the late 1970s generally focused on deregulation. See note 6 in chap. 1.

monopoly structure in the industry, deregulation and competition gradually came. As a result, there appears to be a consensus that the natural monopoly argument is no longer applicable to today's telephone industry—or at least great parts of it.⁷¹

In the U.S. telephone industry, regulatory reform or deregulation has gradually been realized over the past several decades in almost all segments of the industry, though the degrees of deregulation vary from sector to sector and from state to state, and it is not complete in some sense. Many observers divide the development of U.S. domestic telephone industry and its regulation into several stages. Depending on the researcher's point of view, the stages classified by authors may not exactly be the same but they appear to be more common than different.

For example, Greer (1993) divides the history of the telephone industry from its inception until the divestiture of AT&T into four periods: (1) monopoly by patent (1876-1894); (2) open competition (1894-1913); (3) monopoly by regulation (1913-1956); and (4) partial deregulation (1956-1982). C. H. Kennedy (2001) discusses the development of telecommunications regulation according to three stages: (1) the age of monopoly (1913-1968); (2) the age of hybrid regulation (1968-1996); and (3) the age of competition (1996-present). Perhaps a representative work in this area is Brock (1981). In his extensive and in-depth study of the development of the telecommunications industry, Brock offered six phases to explain the history of the telecommunications industry:

⁷¹ Even some author like K. G. Wilson (2000) argues that “there was nothing ‘natural’ about AT&T’s vertically integrated monopoly. The historical record suggests that it was ‘unnatural’ result of an informal alliance between regulator and regulated” (p. 148). Still, some services and the local exchange remain arguably non-competitive.

(1) the telephone challenge (1876-1879); (2) Bell patent monopoly (1879-1894); (3) the decline of monopoly power (1894-1907); (4) the decline of competition (1907-1935); (5) the era of regulated monopoly (1934-1956); and (6) new competition (since 1956).

In this section, I briefly review the history of U.S. telephone industry with emphasis on regulatory policy. For the sake of discussion, I divide the development of the telephone industry and its regulation into six phases with help of the above studies: (1) Bell patent monopoly (1876-1894); (2) early competition (1894-1907); (3) decline of competition and establishment of commission regulation (1907-1934); (4) regulated monopoly (1934-1969); (5) increasing competition and deregulation (1969-1996); and (6) transition to full competition (1996-present).

2.5.2.1 Bell Patent Monopoly (1876-1894)

On February 17, 1876, Alexander Graham Bell, a teacher for the deaf, filed an application for patent titled “Improvement in Telegraphy” and the patent was granted March 3, 1876 (Brock, 1981). After an initial patent infringement litigation and settlement with Western Union in 1879, the Bell Telephone Company founded in 1877, predecessor to AT&T, soon gained a monopoly position in the newly developed telephone business until the original Bell patent expired in 1893. During this period, telephone service was largely confined to local areas (especially large cities), but by the expiration of the patent monopoly, the Bell System had installed 266 thousand telephones or 4 telephones per 1000 of population (Brock, 2002). During this period, there was no consistent and uniform regulation or regulatory body toward telephone service at the

federal or state level with few possible exceptions.⁷² However, municipal governments regulated public utilities including telephone for their use of public rights-of-way through franchise contracting, which often contained terms and conditions of service (Priest, 1993).

2.5.2.2 Early Competition (1894-1907)

Once the original Bell patent expired in 1893, a large number of new companies often called “independent telephone companies” entered the telephone business. With a few exceptions, their service offering was initially focused on small cities and rural areas where the Bell System did not provide service. Soon, however, the independent telephone companies began offering service in direct competition with the Bell System in major cities. Thus, this period may be characterized as the early competition among the Bell System and many independent telephone companies. The intense competition led to sharply reduced prices and an expansion of telephone coverage, and by 1902 Bell’s national market share diminished to just over 50 percent (Greer, 1993). One feature of the early competition was that it was “non-interconnected competition” (Brock, 2002, p. 49), which gave the Bell System, which had a wider coverage and long distance network, a competitive advantage over the independent telephone companies. During this period, no major regulatory change occurred.

⁷² See Cohen (1992, pp. 41-43).

2.5.2.3 Decline of Competition and Establishment of Commission Regulation (1907-1934)

The year 1907 has important meanings in the history of telecommunications industry and its regulation in at least two respects. First, in 1907, Theodore Vail, president of AT&T, developed a three-pronged strategy to restore AT&T's market dominance and profitability that were weakened by the independent companies: (1) merger with a telegraph company and the independent telephone companies; (2) a welcome to regulation; and (3) increased emphasis on fundamental research and the purchase of important outside patents (Brock, 1981). The first two are worth noting here.

AT&T pursued a merger strategy aggressively to reduce the threat from competition. It purchased enough of Western Union's, a telegraph company, stock to control it in 1909 and consolidated many independent companies. Indeed, Vail's strategy was apparent in his statement in AT&T's *1909 Annual Report*, "The Bell system was founded on the broad lines of 'one system,' 'one policy,' 'universal service,' " which meant that the Bell System intended to establish a centrally coordinated monopoly (Mueller, 1997, p. 38). This aggressive merger process threatened competitors by way of AT&T's refusal of interconnection of the independent companies' networks to its long distant network, which eventually led to a settlement between the Department of Justice and the Bell System in 1913. In this agreement, generally known as the Kingsbury Commitment, AT&T agreed to (1) give up the ownership of Western Union, (2) allow interconnection with the independent telephone companies, allowing them to use AT&T's long-distance facilities, and (3) stop acquiring other directly competing companies. The Kingsbury Commitment prevented the complete takeover of the industry

by the Bell System, but it also reduced the competition between Bell and the independent companies (Brock, 1981). In fact, as C. H. Kennedy (2001) points out, the Kingsbury Commitment effectively confirmed an unchallenged Bell System monopoly of telephone service in most of the United States. In addition to the merger strategy, AT&T welcomed regulation as a move to preserve its monopoly power in justifying a system without competition (Brock, 2002).

Second, from 1907 a meaningful state regulation of telephone service started to take place by establishing state regulatory commissions (often named public utilities commissions or public service commissions). By 1920, more than two-thirds of the states had regulatory commissions (Phillips, 1993). At the federal level, systematic regulation of telephone service was established by the Communications Act of 1934, which created the Federal Communications Commission (FCC).⁷³

2.5.2.4 Regulated Monopoly (1934-1969)

With the establishment of the FCC, the telephone industry, most of which was controlled by AT&T by the time, transformed into a regulated monopoly. AT&T's monopoly position was protected in part by regulatory decisions and in part by its own patent control (Brock, 1981). Indeed, the early FCC was characterized as “an ideal

⁷³ In 1910, the interstate telephone service along with telegraph became subject to the Interstate Commerce Commission (ICC) jurisdiction under the Mann-Elkins Act of 1910. However, the ICC, primarily charged with interstate railroad regulation, did not act on many significant telephone issues. For example, during the period of ICC jurisdiction between 1910 and 1934, only four rate cases were processed (Phillips, 1993).

regulatory agency” from AT&T’s perspective because the FCC provided very little restriction on AT&T’s interstate rates and activities but it helped prevent competition from arising (Brock, 2002).

During this period, the customer premises equipment (CPE) market was gradually deregulated through the Hush-A-Phone case (1956) and the Carterfone decision (1968),⁷⁴ although a full competition in the CPE market had to wait until the FCC’s Computer II decision in 1980 (Brock, 1994).⁷⁵

In the long distance sector, a meaningful FCC decision, often known as “Above 890 Decision,” was made in 1959. In the case involving the allocation of frequencies higher than 890 MHz, the FCC concluded that adequate frequencies were available for both common carrier and private microwave systems, whereby allowing the licensing of private microwave systems. Although major, as Greer (1993) points out, the decision was quite limited because it only allowed private microwave systems but not new common carriers that could provide service to the public.

In spite of these events, it is perhaps reasonable to state that AT&T’s status as a regulated monopoly remained stable throughout the period, though its status gradually began weakened. This is truer in terms of telephone service provision, since no significant competitive threat was posed during this period.

⁷⁴ By these cases, telephone attachments and connecting devices that did not cause harm to the telephone network were allowed.

⁷⁵ The FCC issued an order about a CPE certification/registration program in 1975, which required all terminal equipment to meet specified technical criteria in order to prevent harm to the network. This decision allowed customers to interconnect any terminal equipment that met the technical standards, and hence opened the CPE market to competitors. However, the full deregulation of CPE came in Computer II decision in 1980.

2.5.2.5 Increasing Competition and Deregulation (1969-1996)

During this period, several significant changes occurred in terms of regulation and competition of the telephone industry. Four major policy events greatly affected the competitive landscape of the previously dominated industry in almost all segments by a single company (AT&T). In 1969, the FCC approved Microwave Communications, Inc. (MCI)'s application for a public microwave system between St. Louis and Chicago, which allowed MCI to provide "specialized" services⁷⁶ to meet special needs. This decision, often called "the MCI decision," was the first case in which the FCC allowed a competitive provider to provide public long distance service, though it was limited to "specialized services." In response to a large number of similar applications right after the MCI decision, the FCC further expanded competition in specialized services by establishing a general policy in favor of new entrants in its "Specialized Common Carrier Decision" in 1971.

A major challenge to the AT&T's long distance service came in 1975 when MCI began offering "Execunet" service, a service that was almost identical to AT&T's switched long distance service. Although the FCC ruled in its decision in 1976 that MCI's service was not authorized and should be stopped, MCI appealed the decision to

⁷⁶ The service MCI proposed was private line service using microwave systems.

the Court of Appeals and won in the court in 1977. This court ruling wrote a new chapter in the history of telephone industry through opening the public switched long distance telephone market to competition.⁷⁷

Finally, in 1982, the divestiture of AT&T was agreed in a consent decree between AT&T and the Department of Justice (DOJ), ending the eight-year antitrust suit against AT&T filed in 1974. Under the Modification of Final Judgment (MFJ) scheme⁷⁸ overseen by Judge Harold Greene of the U.S. District Court for the District of Columbia, AT&T retained long-distance part (Long Lines) of the former Bell System, Bell Laboratories (R&D), and Western Electric (manufacturing). The local service part was given to the seven newly created Regional Bell Operating Companies (RBOCs).⁷⁹ The RBOCs were required to provide nondiscriminatory access to their networks for all long distance companies. The RBOCs were also prohibited from providing interLATA long distance service and information service, and manufacturing telecommunications equipment although they could sell it. The MFJ took effect in January 1984.

Divestiture, of course, had a significant effect on the telecommunications industry. As Sappington and Weisman (1996a) point out, a central effect of divestiture was that a single firm no longer provided end-to-end connectivity in the telecommunications

⁷⁷ In practice, however, AT&T did not allow the other long distance companies to have good access or interconnection to its local switches. So, for example, customers of competing long distance carriers had to dial extra digits compared to the customers of AT&T. This was part of the reason the DOJ filed a suit against AT&T.

⁷⁸ Regarding the contents of the MFJ and its implications, see, for example, Vietor (1994) and Sappington & Weisman (1996a).

⁷⁹ They were NYNEX, Bell Atlantic, BellSouth, Ameritech, SBC, US West, and Pacific Telesis.

industry. This means that the MFJ opened the long distance market to full competition through line-of-business restrictions, effectively removing a significant competitive advantage of AT&T as an integrated firm. Although evaluations of the industry performance after the divestiture vary from commentator to commentator,⁸⁰ it seems almost certain that the MFJ dramatically changed the industry structure and the behaviors of telephone companies. Since the MFJ, no major structural policy change in the telephone industry occurred until 1996, except decisions by the MFJ court to relax some restrictions such as removal of information service restriction from the RBOCs in 1991.

In 1995, the FCC adopted another major deregulatory policy toward the long distance telephone industry by classifying AT&T as a nondominant carrier in the domestic interexchange market, which freed AT&T from price-cap regulation for its residential service. Subsequently, the FCC detariffed, i.e., eliminated tariff filing requirements, for all the interexchange carriers (IXCs) in 1996.⁸¹

2.5.2.6 The Hope: Transition to Full Competition (1996-Present)

Although the MFJ played a key role in shaping the competitive structure of the telecommunications industry over the period 1982-1996, the pressures for a broader competition and deregulation continued to accumulate. Arguably the biggest overall shift in United States telecommunications policy since the Communications Act of 1934 came

⁸⁰ I discuss this in the literature review in the next chapter.

⁸¹ The FCC's order became effective in 2000 due to legal disputes. See C. H. Kennedy (2001).

with the Telecommunications Act of 1996 (Katz, 1997). According to Katz, the most important feature of the 1996 Act is that it reflects a change in attitude toward competition in telecommunications markets.⁸² The Act marks a fundamental shift in regulatory objective from protecting monopoly to promoting competition by removing line-of-business restrictions imposed by the MFJ.

Two major phenomena after the 1996 Act are perhaps a sweeping trend of mergers and acquisitions among different telecommunications companies and entry of The RBOCs into long distance service market. Over the relatively short period since enactment of the Act, the seven RBOCs at the time of MFJ reduced to only four (Verizon, BellSouth, SBC, and Qwest) through a series of mergers.⁸³ The second major feature of this period is that the RBOCs entered the long distance market. After an initial slow pace of approval for the first five years, the FCC granted approvals rather quickly since 2001, completing all the applicable processes in 49 jurisdictions including the District of Columbia as of December 31, 2003 (FCC, 2004, January 15).

Although, as I discuss later in chapter 3, views about the success of the Telecommunications Act of 1996 are widely different from person to person, the period after the 1996 Act may be characterized by the hope of “transition to full competition”

⁸² However, not all commentators agree. See, for example, Aufderheide (1999) who argues that the passage of the Act “demonstrated the power of incumbency, the messiness of the legislative process, the volatility of the industries involved, and the strength of non-economic factors” (p. 60)

⁸³ Mergers involving the RBOCs during this period are: SBC/Pacific Telesis (January 31, 1997); Bell Atlantic/NYNEX (August 14, 1997); SBC/Ameritech (October 8, 1999); US West/Qwest (March 10, 2000); and Bell Atlantic/GTE (June 16, 2000) to form Verizon. See FCC (2002, November 15).

without general objection. However, one cannot say for certain when the “transition,” if it ever ends sometime in the future, might be completed to reach a truly competitive marketplace in the telecommunications industry.

CHAPTER 3

THEORIES OF COMPETITION AND ITS ASSESSMENT IN TELECOMMUNICATIONS

3.1 Introduction

As Vickers (1995) points out, although the concept of competition has always been central to economic thinking, it is one that has taken on a number of interpretations and meanings. Competition may be defined either as a process or as a state of affairs (O'Driscoll, 1986). Similarly, it may also be defined either by focusing on the conduct of economic agents (sellers and buyers) or by focusing on market structure (Scherer & Ross, 1990). Some economists and noneconomists use the term “competition” in the sense of rivalry. For example, Stigler (1957) described competition “in the sense of rivalry in a race—a race to get limited supplies or a race to be rid of excess supplies” (pp. 1-2). Technically speaking, however, competition in economic theory differs from rivalry in that a firm in a (perfectly) competitive market is a price taker, whereas firms in a rivalry situation may affect market price (Carlton & Perloff, 2000; Scherer & Ross, 1990).¹

¹ Note, however, that rivalry is often a characteristic of oligopoly or imperfect competition.

The telecommunications industry may exhibit different forms of market structure and competition depending upon the product, geography, and stage of development. To assess competitive effects of telecommunications policies on the market, it is necessary to understand a basic theoretical background about the theory of competition. In this chapter, I discuss (1) economic models that characterize and explain competition in the market; (2) assessment of competition and its application to the telephone industry, including literature review on competition in telephone markets; and (3) implications for the dissertation derived from the theoretical frameworks and the literature.

3.2 Economic Models of Competition

In this section, I begin by a discussion of basic economic models of competition in terms of market structure as a basis for a theory of competition. Then some major alternatives to the established basic models, i.e., workable or effective competition and contestability theory, are discussed. Where possible, I also discuss the applicability of each model to the analysis of the telecommunications industry. Finally, I discuss some other views about competition—the dynamic competition theories.

3.2.1 Basic Models of Market Structure

Economic research has developed models of market structures, which reflect the degree of competition. Shepherd (1997) identifies six main categories of market structure, ranging from pure monopoly to pure competition: pure monopoly, dominant firm, tight

oligopoly, loose oligopoly, monopolistic competition, and pure competition. Among those, monopoly and perfect competition (“pure competition” in Shepherd’s terms) are arguably the two most basic models of market structure. Below, I discuss these basic models of market structure, except for monopolistic competition.²

3.2.1.1 Monopoly

In a monopoly, one extreme of the market structure continuum, one firm has a 100 % market share. A monopolist can set the price of its product. In other words, a monopolist is a price maker, whereas a competitive firm is a price taker. When a firm has the ability to profitably set price above competitive levels, i.e., above marginal cost, the firm is said to have monopoly power or market power (Carlton & Perloff, 2000). Since the degree of monopoly power is inversely related to the demand elasticity³ faced by the firm (Cabral, 2000), a monopoly market usually has highly inelastic demand. The monopoly model of market structure and the issue of market power have been at the center of academic discussions in the literature on public utility regulation for several decades, since until recently most public utility services in the United States were

² I exclude the monopolistic competition model because it has not much practical implications for the study of the current telephone industry. An industry is characterized as monopolistic competition if there is free entry and each firm faces a downward-sloping demand curve (Carlton & Perloff, 2000). In this model, each firm makes zero economic profits in the long run due to free entry and has market power based on a downward-sloping demand curve that derives from product differentiation. Thus, this model combines characteristics of monopoly (market power) and perfect competition (zero economic profits).

³ The (price) elasticity of demand is defined as the percentage change in quantity demanded in response to a given small percentage change in price: formally, $\epsilon \equiv (p/q)(dq/dp)$. If the absolute value of the elasticity of demand is greater than 1, the demand curve is *elastic*; when the absolute value of the elasticity of demand is 1, the demand curve is said to have *unitary elasticity*; and if the absolute value of the elasticity of demand is less than 1, the demand curve is *inelastic*. See Carlton & Perloff (2000, pp. 65-66).

provided by (near) monopolies. One of the major issues regarding public policy toward public utility industries was whether these industries were “natural monopolies.”⁴ At least until the 1970s, the telephone industry in general, the local portion of the industry perhaps until more recently, has been generally regarded as a natural monopoly, although it was not a “pure” monopoly. In practice, much of the long distance service was provided by a regulated monopoly, AT&T, until 1969 when the FCC authorized MCI to provide “specialized service.” For the local telephone service, it was the Telecommunications Act of 1996 that legally opened local markets to competition nationwide, though some states, New York and Illinois, for example, had taken steps to open local markets to competition before the 1996 Act. Many local markets, however, still remain being dominated by the Bell Operating Companies (BOCs).⁵

3.2.1.2 Perfect Competition

The opposite extreme of monopoly on the market structure continuum, perfect competition, is perhaps the fundamental model of market structure in economic theory. In fact, all other models of market structure are usually explained as departures from the model of perfect competition. In that sense, the perfect competition model provides an ideal against which other models of market competition can be compared. A perfectly

⁴ For a brief discussion about the natural monopoly issue in the public utility industries and empirical evidence in the telecommunications industry, refer to section 2.3.1 above.

⁵ According to a recent FCC report on local competition, the nationwide competitive local exchange carrier (CLEC) share of end-user switched access lines is only about 15% as of June 2003. See FCC (2003, December).

competitive market is one that has many sellers (and buyers), none of which can affect the market price. For a market to be perfectly competitive, the following assumptions are to be met (Carlton & Perloff, 2000, p. 57):

- (1) Homogeneous good: all firms sell an identical product; consumers view the products of various firms as the same and hence are indifferent between them;
- (2) Perfect information: buyers and sellers have all relevant information about the market, including the price and quality of the product;
- (3) Price taking: buyers and sellers cannot individually influence the price at which the product can be purchased or sold; each buyer and seller takes the price as given by the market;
- (4) No transaction costs: neither buyers nor sellers incur costs or fees to participate in the market;
- (5) No externalities: each firm bears the full costs of its production process and does not impose externalities⁶—uncompensated costs—on others;
- (6) Free entry and exit: firms can enter and exit the market quickly at any time without having to incur special expense (no barriers to entry or exit); and
- (7) Perfect divisibility of output: firms can produce and consumers can buy a small fraction of a unit of output; as a result, the amount of output demanded or supplied varies continuously with price.

⁶ An externality is present whenever the well-being of a consumer or the production possibilities of a firm are directly affected by the actions of another agent in the economy (Mas-Colell, Whinston, & Green, 1995).

If a market is perfectly competitive, it has three general properties in the long-run equilibrium (Scherer & Ross, 1990). First, the cost of producing the last unit of output (the marginal cost) is equal to the price paid by consumers for that unit, which is a necessary condition for profit maximization. Second, with price equal to average total cost for a representative firm in the market, economic (i.e., supranormal) profits do not exist. Third, each firm produces its output at the minimum cost, meaning that resource allocation is made efficiently.⁷

Perhaps the most important value or advantage of the perfect competition model, among other things, is that it forms a basis for much of economic analysis of market structure or industrial organization in theory and practice. In theory, the perfect competition model can be used to compare the theoretical properties of the model to those of other models of market structure. In practice, perfect competition is an ideal state or outcome, at least from the economic efficiency standpoint, to which real market results or policy outcomes can be compared, which then provides a reference for possible improvement in market organizations.

Although the properties of perfect competition are desirable in a society, the applicability of the perfect competition model faces various criticisms. The most common criticism of the perfect competition model is that it is unrealistic. The model is based on several assumptions, such as perfect information and no transaction costs, which may never or be barely true in real markets. Thus, the perfect competition model can hardly be

⁷ In fact, the socially desirable properties of the market system (supposedly the one of perfect competition) were characterized by Adam Smith, generally known as the father of economics, by his famous term “an invisible hand.” According to him, by pursuing their own interests individuals frequently promote the social interest more effectually than they really intend to promote it. See A. Smith (1776/1993, p. 292).

applied to any real market situation. However, Stigler (1957) defends the usefulness of the perfect competition model in two respects. First, he argues that all concepts sufficiently general and sufficiently precise to be useful in scientific analysis must be abstract. Second, Stigler goes on to argue that the concept of perfect competition has defeated its newer rivals (i.e., the rival doctrines of imperfect and monopolistic competition) in the work of economic theorists, pointing out that the concept of perfect competition is used more widely by the economic profession in its theoretical work than other models.

Indeed, Stigler makes a point in his first line of argument because no scientific model, especially in social science, can explain or predict social phenomena perfectly. However, when it comes to application of a theoretical model to the real world beyond pure theoretical work, caution must be taken in interpreting the predictions and results of the model. In addition, it appears that Stigler's second point does not necessarily guarantee the superiority of the perfect competition model. The mere fact that it is used more widely by economic theorists than other models does not fix or reduce its own defects. This is where one needs to be careful when analyzing real markets based on the perfect competition model. Even though the perfect competition model may have a broader use than others do, the model one should apply to the market must be one that fits most the reality of the market in analysis.

In the case of the telephone industry as in other public utility industries, the perfect competition model cannot be applied directly, since the industry structure is by no measure perfectly competitive. It can be argued, however, that the perfect competition

model provides a benchmark or a standard that displays the “best outcome” to which the actual market outcomes can be compared and improvements can be made based on the comparison.

3.2.1.3 Dominant Firm - Competitive Fringe Model

Although the two extreme models of competition (monopoly and perfect competition) have been given much weight in textbooks and academic discussions, they have limited applicability to actual markets. Rather, from a public policy point of view, the models between the two extremes—e.g., the dominant firm model and the oligopoly models—are often more relevant because they better fit many industries. That is, industries in which a single firm or a few firms have a large market share are common.

The dominant firm model, also known as the dominant firm - competitive fringe (DF-CF) model, was originally developed by Forcheimer in 1908 (Blank, Kaserman, & Mayo, 1998). This model has been advanced by many theoretical and empirical studies for several decades,⁸ but in general it fell into disfavor in the

⁸ Examples of theoretical studies include Stigler (1940), Saving (1970), Gilbert (1978), and Cherry (2000); examples of industry-oriented studies are Stigler (1965, the steel industry), Yamawaki (1985, the iron and steel industry), Suslow (1986, the aluminum industry), and Bjorndal, Gordon, & Singh (1993, the fresh salmon industry).

1980s (Cherry, 2000). However, the dominant firm - competitive fringe model has been used more often in recent years in the telecommunications industry, as the industry transforms increasingly into a more competitive structure.⁹

The dominant firm - competitive fringe model assumes a market environment in which one firm with a large market share¹⁰ (the dominant firm) faces many small firms, each having a very small share of the market (typically called the “competitive fringe”).¹¹ Although it is assumed that each fringe firm has a relatively small market share, collectively they may constitute a substantial share of the market (Carlton & Perloff, 2000). The basic assumptions of this model are (1) the dominant firm is a price setter and the fringe firms are price takers; (2) the dominant firm behaves passively, meaning that the dominant firm sets the price and quantity to produce based on its residual demand curve derived from subtracting the estimated total quantities produced by the fringe firms at each price from the market demand curve (Stigler, 1940; Worcester, 1957); and (3) the product is homogeneous (Kahai, Kaserman, & Mayo, 1996). In addition, it is often assumed that the dominant firm has accurate information on the costs of the competitive fringe firms (Rosenberg & Clements, 2000), which implies that the dominant firm can

⁹ Some recent studies of the telecommunications industry applying the dominant firm model include Kahai, Kaserman, & Mayo (1996), Schoenwald (1997), Blank, Kaserman, & Mayo (1998), Trebing & Estabrooks (1998), Abel (1999, 2002), Abel & Clements (2001), and Clements (2001).

¹⁰ There is no real consensus on the proper measure of dominance in terms of market share. However, several studies indicate that dominance occurs when one firm (the dominant firm) controls around 40-50% or more, but less than 100%, of the market. For example, Scherer & Ross (1990), Shepherd (1997), and Stigler (1947) apply 40%, and Cabral (2000) and A. P. White (1981) suggest 50% as the criterion.

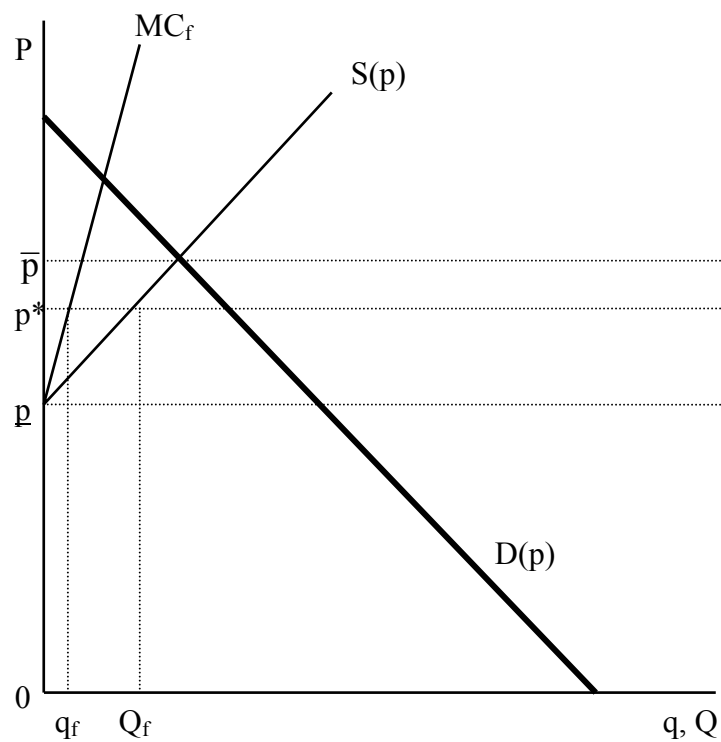
¹¹ This model can be extended to the case of a dominant k-firm cartel, in which the largest k firms maximize joint profits with respect to residual demand (Scherer & Ross, 1990).

predict the competitive fringe's reactions to each price set by itself. Based on these assumptions, the behaviors of the dominant firm and the competitive fringe of the traditional dominant firm model¹² can be explained by Figure 3.1.¹³

¹² Two best-known models of the dominant firm theory are the price leadership model and the limit pricing model (A. P. White, 1981). I briefly discuss the limit pricing model after the traditional price leadership model.

¹³ The discussion about the behaviors of the dominant firm and the competitive fringe draws on Carlton & Perloff (2000, pp. 112-118).

(a) Competitive Fringe



(b) Dominant Firm

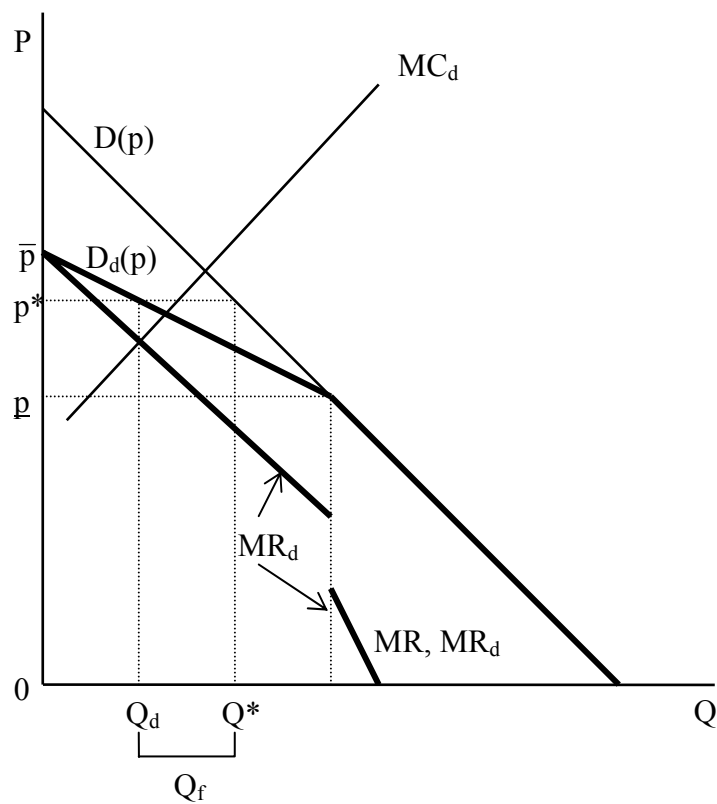


Figure 3.1: The dominant firm and the competitive fringe

Panel (a) shows the competitive fringe and panel (b) represents the dominant firm. $D(p)$ is defined as the market demand function. MC_f is a representative competitive-fringe firm's marginal cost curve, which is also the fringe firm's supply curve for prices above the fringe firm's shutdown price $\underline{p}$. Given that the fringe firms are price takers, each competitive-fringe firm acts as if it has a horizontal demand curve at the market price as given by the dominant firm. This means that the marginal revenue for a fringe firm is equal to the market price. Thus, each competitive-fringe firm maximizes its profit by choosing its output q such that the marginal cost equals the market price. The competitive fringe's aggregate supply curve, $S(p)$, is the horizontal summation of the individual fringe firm's supply curves. If there are n fringe firms and q_f is the output of a typical fringe firm, the competitive fringe's aggregate supply function is $S(p) = nq_f(p)$. $D_d(p)$ is the dominant firm's residual demand function, which is derived by the horizontal difference between the market demand function and the competitive fringe's supply function at each price: $D_d(p) = D(p) - S(p)$. MC_d is the dominant firm's marginal cost curve and is flatter than the representative fringe firm's marginal cost curve to show the dominant firm's cost advantage over the fringe firm. Finally, MR_d represents the dominant firm's marginal revenue curve, derived from its residual demand function $D_d(p)$, and MR represents the dominant firm's marginal revenue curve, based on the market demand function $D(p)$. MR_d has two distinct sections that are discontinuous at the point where the dominant firm's residual demand function, $D_d(p)$, and the market demand function, $D(p)$, meet.

The crucial difference between the dominant firm - competitive fringe model and the monopoly model is that the dominant firm takes the competitive fringe's actions into

account when setting the price to maximize its profits. That is, the existence of the competitive fringe restrains the dominant firm's pricing behavior (Viscusi, Vernon, & Harrington, 2000). To see this point, I illustrate the model by considering the competitive fringe's behavior first and then the dominant firm's behavior.

As noted above, the competitive fringe firms are price takers. Hence, their output decisions are affected by the price set by the dominant firm. If the dominant firm sets the price at $\underline{p}$ or below, as can be seen in panel (a) of Figure 3.1, the fringe firms produce nothing because $\underline{p}$ is the fringe firms' shutdown point. As a result, the market becomes a monopoly and all the market demand is met by the dominant firm. If the price is set between $\underline{p}$ and $\bar{p}$, a portion of the market demand will be served by the fringe firms. At the price $\bar{p}$, where the fringe firms' aggregate supply curve, $S(p)$, and the market demand curve, $D(p)$, meet, the entire market demand will be supplied by the competitive fringe.¹⁴

The dominant firm's pricing (or output) decision is constrained by the fringe firms. Its residual demand curve, $D_d(p)$, is kinked by the existence of the competitive fringe as shown in panel (b) of Figure 3.1. At the price $\bar{p}$ or above, the dominant firm faces zero residual demand, $D_d(p)$, because the fringe firms supply the entire market demand, $D(p)$. On the other hand, at the price $\underline{p}$ or below, the fringe firms produce no output and the dominant firm serves the entire market as a monopoly. If the price is set between $\underline{p}$ and $\bar{p}$, the market demand will be split by the dominant firm and the competitive fringe. The dominant firm's output is decided by its residual demand, $D_d(p)$, which is derived by the market demand, $D(p)$, less the competitive fringe's aggregate supply, $S(p)$. Thus, the dominant firm, constrained by the competitive fringe, sets the price between $\underline{p}$ and $\bar{p}$, at a

point where it can maximize the profits. The pricing decision by the profit maximizing dominant firm is made by the general rule, i.e., equating its marginal revenue, MR_d , and the marginal cost, MC_d . In panel (b) of Figure 3.1, this equilibrium price is represented by p^* , which is derived based on the dominant firm's residual demand curve, $D_d(p)$. At the price p^* , each competitive fringe firm's output is set at the q_f level and the competitive fringe's aggregate output is produced at the Q_f level. The dominant firm facing the residual demand curve, $D_d(p)$, affected by the competitive fringe's supply, produces its output at the Q_d level. In other words, the dominant firm's output, Q_d , is derived by the total output, Q^* , based on the market demand, $D(p)$, less the competitive fringe's output, Q_f : formally, $Q_d = Q^* - Q_f$ (or $Q^* = Q_d + Q_f$).

The above discussion is based on the static model of the dominant firm with competitive fringe. However, the dominant firm industry structures evolve over time. Some firms remain as the dominant firm, but others do not. The dominant firm - competitive fringe model has been developed to incorporate the dynamic aspects of industry evolution. The new factor that the dynamic model of the dominant firm - competitive fringe brings in is the size of the fringe changes over time (Viscusi, Vernon, & Harrington, 2000). As long as there is a possibility for positive economic profits, the existing fringe firms' expansion or additional entry of new firms would occur.

The strength of the dominant firm - competitive fringe model is that its applicability to real markets is much greater than the pure monopoly model. Many industries can be explained by the dominant firm model. Examples include U.S. Steel in the steel industry in the early twentieth century, IBM in the mainframe computer industry

¹⁴ This is the same at prices above $\bar{p}$.

in the 1960s through 1980s, Kodak in the photographic film industry in the 1980s, and AT&T in the long distant telephone industry in the 1970s through mid-1990s. Its main weakness is that by definition the model assumes the dominant firm behaves passively, allowing the fringe firms to supply the market demand as much as they can at the price it set. As Shepherd (1997) points out, however, the dominant firm will not hold up a single-price umbrella while letting fringe firms steal its market position.

The dominant firm - competitive fringe model can be used to explain and analyze the current local telephone industry in the United States. The industry is composed of large incumbent local exchange carriers (ILECs) and many small competitors, often referred to as competitive local exchange carriers (CLECs), in most markets. The ILECs, represented by former Bell Operating Companies (BOCs) in most states, currently face competitors in local telephone markets, but by no means are the competitors comparable to the ILECs at present.¹⁵ The ILECs retain a dominant position.¹⁶ Moreover, the ILECs possess several competitive advantages over the CLECs. The ILECs control local access networks and enjoy economies of scale, which gives the incumbents a cost advantage. They also have first-mover advantages such as lower marketing costs and brand-name recognition.¹⁷ The incumbent firms may earn a competitive advantage by experience

¹⁵ This does not preclude a possibility of a well-established company in other service areas, e.g., AT&T in the long distance, being treated as a competitive fringe in the local market, even though it may be comparable to large ILECs such as Bell Operating Companies in its firm size and other capacities.

¹⁶ According to a recent FCC report, the ILECs as dominant firms control 85% of the end-user switched access lines nationwide and only 15% of the market is served by the CLECs as of June 2003 (FCC, 2003, December).

¹⁷ Rosenberg & Clements (2000) note that brand-name recognition may be a “two-edged sword,” which refers to not only the positive effect but also the negative effect of a company’s reputation.

through learning-by-doing (Tirole, 1988). Switching costs that consumers incur when they switch from a product to another substitute¹⁸ and customer inertia may make it difficult for new competitors to enter the market. Thus, it seems that conditions and market environment in the local telephone industry are well suited for the application of the dominant firm - competitive fringe model.

3.2.1.4 Oligopoly

An oligopoly is a market structure in which a small number of firms exist.¹⁹ In contrast to monopoly and perfect competition, in an oligopolistic market structure each firm knows that it can affect market price and a firm must consider its rival firms' actions in deciding its own actions. Thus, the essence of oligopoly is *recognized interdependence* among firms (Viscusi, Vernon, & Harrington, 2000).²⁰ Oligopoly shares the presence of strategic interactions among firms with the dominant firm - competitive fringe model, but it differs from the dominant firm model in that there is no single dominant firm.

Oligopoly may be divided into two types based on market share. Tight oligopoly exists

¹⁸ Klemperer (1987a, 1987b, 1987c) suggests three types of consumer switching costs: (1) transaction costs, such as the costs of closing a checking account with one bank and opening another account with a competitor and of changing long distance telephone service providers; (2) learning costs, such as the costs of switching to a new brand of computer; and (3) artificial switching costs, such as airlines' "frequent-flyer" programs.

¹⁹ If the number of firms is two, it is called "duopoly."

²⁰ Because of the element of strategic interactions in oligopoly models, one may view oligopoly models as examples of game theory, which uses formal models to analyze conflict and cooperation between players (Carlton & Perloff, 2000).

when the leading four firms have a combined market share of over 60%, while loose oligopoly exists when the leading four firms have a combined market share below 40% (Shepherd, 1997).

Economists developed several models of oligopoly that differ in their assumptions. In fact, unlike perfect competition or pure monopoly, there is no single “theory of oligopoly” (Shapiro, 1989). The two best-known models of oligopoly are the Cournot model and the Bertrand model. The basic difference between the two models is the decision variable that firms employ to compete. Firms compete in quantity in the Cournot model and in price in the Bertrand model.

The first and still the most widely used model of oligopoly was presented by a French Mathematician Cournot in 1838. The basic Cournot duopoly model assumes that two firms produce a homogeneous product and choose simultaneously their own output levels. The market price is set at the level where market demand equals the total outputs by the firms. Each firm is assumed to maximize its profits by choosing its optimal output level based on its conjecture of the rival firm’s output. That is, each firm chooses the quantity of production based on its reaction function, $q_i = R_i(q_j)$, given its beliefs about the rival firm’s output levels. The reaction function represents the optimal choice of one firm given its beliefs about the other’s output choice. Thus, the equilibrium point in the Cournot model, often called the “Cournot equilibrium,” exists at the intersection of the reaction curves of both firms. Figure 3.2 illustrates this. In the equilibrium, Point N in

Figure 3.2, the two firms (firm 1 and firm 2) divide the market equally and it is a Nash equilibrium.^{21, 22} In other words, a firm cannot increase its profit by choosing another output level other than point N given its rival firm's output choice.

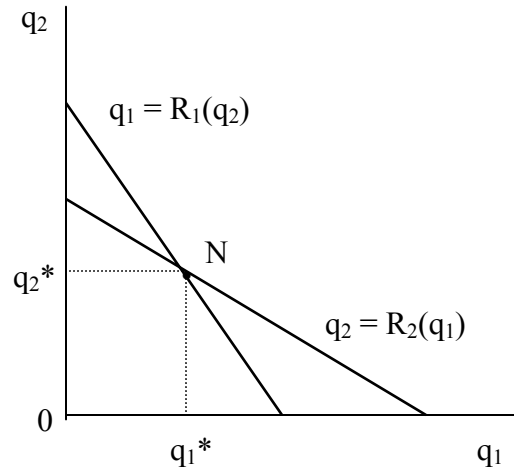


Figure 3.2: Cournot equilibrium

In the Cournot model, quantity is a firm's key decision variable. However, as Shapiro (1989) points out, in practice businesses choose prices rather than quantities as their strategic decision variables. The Bertrand model is based on this criticism. In the Bertrand model, it is assumed that firms set prices rather than quantities. Firms are assumed to choose simultaneously their prices, given their beliefs about the rival firm's

²¹ A Nash equilibrium in game theory is defined as follows: A strategy profile $\hat{s} = (\hat{s}_1, \dots, \hat{s}_I)$ is a Nash equilibrium if for each player i and $s_i \in S_i$, $u_i(\hat{s}) \geq u_i(\hat{s}_1, \dots, \hat{s}_{i-1}, s_i, \hat{s}_{i+1}, \dots, \hat{s}_I)$, where the players are indexed by $i = 1, \dots, I$, their strategy sets are denoted by S_i , and for $s = (s_1, \dots, s_I) \in \prod_{j=1}^I S_j$, $u_i(s)$ is i 's payoff if the strategy profile s is played. See Kreps (1990, p. 404).

²² Because the Cournot equilibrium is a special case of the Nash equilibrium where firms have strategies over quantities, it is often referred to as a Cournot-Nash equilibrium (Carlton & Perloff, 2000).

price. In addition, it is assumed that firms produce homogeneous goods and have constant, symmetric marginal costs. In the basic Bertrand duopoly model under these assumptions, consumers will buy from the firm with the lowest price. Each firm knows that if it sets price above marginal cost, all market demand will go to the rival firm. Thus, each firm will set its price equal to marginal cost, making zero economic profits. The Bertrand equilibrium, therefore, reveals the same outcome as that of the perfect competition model. Since it is hard to believe that just a few firms, even two, yield a competitive market price, the derived outcome of the basic Bertrand model is often called as the “Bertrand paradox” (Tirole, 1988, p. 210).

Although the two models of oligopoly have similar assumptions, they predict different market outcomes (Cabral, 2000).²³ The Cournot model predicts that the equilibrium price is between the monopoly price and the competitive price, whereas the Bertrand model predicts that the equilibrium price is equal to marginal cost as in the case of perfect competition model. The degree to which each model can explain industries depends on the characteristics of the industry.

With respect to the applicability of oligopoly models to the telephone industry, neither the Cournot model (quantity competition) nor the Bertrand model (price competition) approximates the *local* telephone industry, at least for the present. In the local markets, the ILECs, the Bell Operating Companies in particular, currently possess

²³ Tirole (1988) argues, considering the temporal dimension, that the Cournot and Bertrand models should not be seen as two rival models giving contradictory predictions of the outcome of competition in a given market, since firms almost always compete in prices. Rather, he suggests, they depict markets with different cost structures, the Bertrand model for industries with fairly flat marginal costs and the Cournot model for industries with sharply rising marginal costs.

dominant position and the dominant firm model can provide a closer approximation of the industry. In addition, the ILECs have much of the capacity in the form of network facilities, whereas the competitors have only a small portion of local network and it is difficult to increase their capacity in a short period due to the high sunk costs involved in investment.

However, the *long distance* telephone industry after the mid-1990s appears to represent an oligopolistic market structure.²⁴ Many scholars studied competition and regulation in the long distance telephone industry, applying the oligopoly model.²⁵ The oligopolistic structure of the long distance telephone industry may be changed by RBOC entry into long distance markets, the approvals of which have recently been completed in December 2003. However, the direction of the possible change is not clear. It may lead to a more competitive structure; it may also result in a tighter oligopoly or a dominant firm structure. Nonetheless, it appears reasonable to say that the oligopoly model is currently a close approximation of the long distance industry and may be so for the near future.

²⁴ If one views the dominant firm - competitive fringe model as a subset of oligopoly models, as some authors do (Horning et al., 1988; Scherer & Ross, 1990), the long distance industry may be regarded as an oligopolistic structure for at least the last two decades.

²⁵ See, for example, MacAvoy (1995, 1996) and Trebing (1995, 1996, 1997).

3.2.2 Alternatives to the Basic Models

As mentioned, the perfect competition model has been the fundamental paradigm of the standard economic theory for discussions of market structure and competition. However, despite the strengths of the perfect competition model as a theoretical framework, the applicability or validity of the model in explaining real-world markets has been doubted. Limits of the standard theory of market structure (especially the applicability of the perfect competition model as a practical tool) prompted some economists to suggest alternative models. Notably, two very different models have been proposed: the concept of “workable competition” and the theory of “contestable markets.”²⁶ Below, I briefly discuss these two challenges to the standard theory of market structure.

3.2.2.1 Workable/Effective Competition

The concept of “workable competition,” also known as “effective competition,” was first presented by Clark (1940).²⁷ In his influential article, Clark noted that perfect

²⁶ As Spence (1983) observes, the theory of contestable markets may be “best thought of as a generalization of the theory of perfect competition” (p. 981). However, I treat the theory here as an alternative to the standard theory based on the basic models of market structure because one of the original authors of the theory claims that it is an “uprising” in the theory of industry structure (Baumol, 1982), and because the authors emphasize the “fundamental distinctions” between their model and the basic models, i.e., perfect competition, oligopoly, and monopoly (Baumol, Panzar, & Willig, 1988, pp. 43-46).

²⁷ In 1961, Clark shifted the emphasis from “workable competition” to “effective competition” focusing on the dynamic aspect of competition (Clark, 1961). For purposes of this study, I use the terms “workable competition” and “effective competition” interchangeably.

competition “does not and cannot exist and has presumably never existed,” and that the perfect competition model is “an unreal or ideal standard which may serve as a starting point of analysis and a norm with which to compare actual competitive conditions” (p. 241) and thus it does not provide reliable guidance to judging actual market conditions. The idea of workable competition is that if some of the restrictions of the perfect competition model are relaxed, the outcome may still be reasonably close to the competitive result (Lawton, Rosenberg, Marvel, & Zearfoss, 1994). Several attempts have been made to define the concept of workable competition.²⁸ Stigler (1942) notes that “An industry is workably competitive when (1) there are a considerable number of firms selling closely related products in each important market area, (2) these firms are not in collusion, and (3) the long run average cost curve for a new firm is not materially higher than for an established firm” (pp. 2-3). Bain (1950) emphasizes the condition of entry to markets as the most strongly associated factor to workability.

Noting that definitions of workable competition which set forth a necessary set of conditions neglect the dynamic forces that shape an industry’s development, Markham (1950) proposes an alternative approach to the concept of workable competition that shifts the emphasis from a set of specific structural characteristics to an appraisal of a particular industry’s overall performance against the background of possible remedial actions. According to him, “An industry may be judged to be workably competitive when, after the structural characteristics of its market and the dynamic forces that shaped them have been thoroughly examined, there is no clearly indicated change that can be effected

²⁸ A good review of the early literature on the concept of workable competition, see Sosnick (1958).

through public policy measures that would result in greater social gains than social losses” (p. 361). However, as Markham admitted, the suggested definition of workable competition is not free from value judgments. Thus, Sosnick (1958) argues that the concept of workable competition has limited implications for public policy because workability is relative to the variety of subjective judgments of value and fact.²⁹ Indeed, there appears to be no complete agreement on the definition or criteria of workable competition in the literature. As Stigler (1968) observed, “How close an industry should be to competition . . . to be workably competitive has never been settled” (p. 12). Despite the lack of agreed-upon definition, however, the concept of workable or effective competition has not disappeared and, in fact, it seems very much alive in the textbooks and literature.³⁰

The criteria for judging workability or effectiveness of competition suggested by scholars are often divided into the three traditional categories of industrial organization theory, i.e., structure, conduct, and performance.³¹ For example, Shepherd (1987) discusses the criteria of effective competition in terms of the three categories. With regard to market structure, Shepherd lists three criteria: (1) no dominance in market share,

²⁹ Stigler seems to agree on the limited value of the concept of workable competition when he said, “The workably competitive industry . . . is a concept which is unlikely to assist in the study of the subject to which it pertains” (Stocking, Kahn, Griffin, & Stigler, 1956, p. 505).

³⁰ Some of the studies that looked at individual industries based on the concept of workable or effective competition include Petit (1957, the softwood plywood industry), Pickering (1970, the British television rentals industry), R. C. Levin (1981, the railroad industry), and Colton (1993, the telecommunications industry).

³¹ For an extensive list of criteria for workable competition, see Scherer & Ross (1990, pp. 53-54).

(2) at least several comparable rivals,³² (3) low entry barriers.³³ In terms of behavior, Shepherd notes that (1) no collusion and (2) no actions to harm competitors (such as unilateral selective anticompetitive actions in pricing) should be present for competition to be effective. Finally, in terms of performance, effective competition yields (1) efficient allocation of current resources, (2) X-efficiency,³⁴ (3) optimal innovation, (4) equity in income, wealth, and opportunity, and (5) broader elements of good performance, including freedom of choice and social diversity.

Trebing (1997) has a similar view in terms of market structure. According to him, effective competition exists where there are at least five or six comparable rivals without significant entry barriers and no single firm exercises dominance. In addition, Trebing adds that demand conditions are assumed to be essentially elastic across the board.

Vickers (1996) provides simpler conditions for effective competition. He argues that for competition to be effective two conditions need to be met: (1) vigorous rivalry among firms should be present, and (2) the rivalry should promote economic efficiency.

Even though the concept of workable or effective competition may seem simple, the difficulty arises when one applies it to a real market situation from a public policy

³² Shepherd (1997) states that five comparable firms is “bare-bones minimum number” (p. 8).

³³ For compilations of common causes of entry barriers, see Chessler (1996) and Shepherd (1997).

³⁴ X-efficiency is a concept first used by Leibenstein (1966), which is connected with the possibility of the variable performance for given units of the inputs. His main argument was that microeconomic theory focuses on allocative efficiency to the exclusion of other types of efficiency that are much more significant in many cases. According to Leibenstein, “for a variety of reasons people and organizations normally work neither as hard nor as effectively as they could,” and X-inefficiency occurs in “situations where competitive pressure is light” because many people would “trade the disutility of greater effort, of search, and the control of other peoples’ activities for the utility of feeling less pressure and of better interpersonal relations” (p. 413).

perspective. As mentioned earlier, there is no consensus on the criteria for workable competition. In addition, application of the criteria may be affected by subjective value judgments. The determination of effective competition in the case of public utility industries, however, appears to be more complicated than other industries. As Vickers (1996) points out, the history and technology of the utilities make effective competition difficult, and sometimes impossible, to achieve.

In the telecommunications industry, for example, it has long been recognized by many observers that local telephone competition is not easy to achieve, and effective competition may not develop without proper regulatory schemes. In fact, this is precisely why the Telecommunications Act of 1996 prescribes several important measures, such as the interconnection requirement, the unbundled network element (UNE) provision, and the preconditions for interLATA market entry, which are imposed on the Regional Bell Operating Companies with the intention of bringing competition to local markets.

However, as Lawton et al. (1994) observe, despite the difficulties encountered in defining workable or effective competition, it is perhaps reasonable to argue that public policy should attempt to ensure workably competitive market structures, if not the perfectly competitive structures, unless the cost of achieving such structures exceeds the net benefits.

3.2.2.2 Contestability Theory

Another significant challenge to the standard theory of market structure was presented by a group of economists, Baumol, Panzar, and Willig in 1982.³⁵ The theory of contestable markets was intended to provide “no less than a unifying theory as a foundation for the analysis of industrial organization” (Baumol, 1982, p. 15). A perfectly contestable market is defined as one that is accessible to potential entrants and has two properties: (1) the potential entrants can, without restriction, serve the same market demands and use the same productive techniques as those available to the incumbent firms, i.e., there are no entry barriers; and (2) the potential entrants evaluate the profitability of entry at the incumbent firms’ pre-entry prices, assuming that they can sell as much of the corresponding good as the quantity demanded by the market at their own prices if they undercut incumbents’ prices³⁶ (Baumol, Panzar, & Willig, 1988, p. 5). Simply put, a contestable market is “one into which entry is absolutely free, *and exit is absolutely costless* [italics in original]” (Baumol, 1982, p. 3).³⁷

³⁵ Their book in 1982 is based on their (and some others’) earlier works during the late 1970s and the early 1980s. For a description of the research process leading to the 1982 book, see the foreword of the book written by Bailey.

³⁶ This means that potential entrant are assumed to be undeterred by prospects of retaliatory price cuts by incumbents and, instead, to be deterred only when the existing market prices leave them no room for profitable entry (Willig, 1990).

³⁷ Baumol explains that (1) by free entry they (Baumol, Panzar, and Willig) mean no cost discrimination against entrants vis-à-vis incumbents, and that (2) by absolute freedom of exit they mean that any firm can leave without impediment, and in the process of departure can recoup any costs incurred in the entry process. The latter essentially implies no sunk cost.

According to Baumol, the crucial feature of a contestable market is its vulnerability to hit-and-run entry. If there is any window of profit opportunity, an entrant can enter and seize it, and even exit the market without cost before the incumbent firms' price changes in a contestable market. Thus, as Willig (1990) states, the theory of contestable markets emphasizes the pressures of potential competition from potential entrants. The authors and advocates of the contestable market theory maintain that a market can be contestable not only in perfectly competitive markets but also in industries characterized by oligopoly or monopoly. According to the theory, the market structure itself has little or no meaning as long as there are no barriers to entry and exit. Baumol and Sidak (1994) argue that a market can be contestable regardless of its firms' size distribution and the presence of scale economies in it. This is based on their position that "potential entry or competition for the market disciplines behavior almost as effectively as would actual competition within the market" (Bailey, 1981, p. 178).

Thus, the theory of contestable markets predicts welfare outcomes that are socially optimal.³⁸ The major welfare properties of contestable markets are: (1) in a perfectly contestable market, a firm can earn only zero economic profits, i.e., a normal rate of return on capital; (2) a perfectly contestable market does not allow any sort of inefficiency in production in industry equilibrium; (3) cross-subsidy cannot endure in a perfectly contestable market; and (4) in a perfectly contestable market, the prices that

³⁸ The outcomes are asserted to apply even if there are only a few incumbent firms. Hence, the proponents of the contestability theory claim that the theory is a generalization of the perfect competition model (Baumol, 1982; Baumol, Panzar, & Willig, 1983; Baumol & Willig, 1986; Baumol & Sidak, 1994).

prevail will be those required for economic efficiency and Pareto optimality, i.e., the prices must be equal to marginal costs (Baumol, 1982; Baumol & Sidak, 1994; Willig, 1990).

Since its introduction, the contestability theory produced a considerable amount of academic literature and policy debates with respect to its applicability to regulatory and antitrust policy. The proponents of the theory of contestable markets argue that the theory provides a unifying analytical structure to the theory of industrial organization. However, the robustness of the theory encountered immediate criticisms by many scholars. In a comment on the contestability theory, Weitzman (1983) observes that “contestability cannot serve as a useful focal point for a general theory of market forms because it is meaningless to simultaneously postulate the presence of fixed costs and the absence of the sunk costs, at least for any well-defined situation lending itself to the usual cost function approach” (p. 487).

Schwartz and Reynolds (1983) criticized the implausibility of the assumptions and the robustness of the contestable market theory. According to them, perfect contestability requires two conditions: (1) in response to high prices, an entrant can enter instantaneously at any scale; and (2) an entrant can undercut an incumbent’s price and exit with no loss of fixed costs before the incumbent can adjust price (i.e., “hit and run” entry and exit). Schwartz and Reynolds show that the results can differ dramatically from those obtained under perfect contestability if these conditions are relaxed even slightly.

In their defense, Baumol, Panzar, and Willig (1983) argue that perfect contestability does not require entry and exit to be instantaneous. Rather, they maintain, it is sufficient that the process be rapid enough so that the entrant does not find its

investment vulnerable to a retaliatory response by the incumbent. However, many commentators point out the importance of rapid price changes by incumbent firms as a strategic reaction to new entry, which can make markets noncontestable (W. A. Brock, 1983; Dixit, 1982; Schwartz, 1986).

The strict assumptions of the contestability theory were also strongly criticized by Shepherd (1984, 1995). Shepherd characterized the theory as the theory of “ultra-free” or “super-free entry,” which is based on three assumptions: (1) entry is free and without limit (“total entry” in Shepherd’s term), i.e., the entrant can immediately duplicate and entirely replace any existing firm; (2) entry is absolute, i.e., the entrant can establish itself before an existing firm makes any price response; and (3) entry is perfectly reversible, i.e., exit is perfectly free and sunk cost is zero. According to Shepherd, the assumption (2) implies that the incumbent regards the entrant as only negligibly small and does not react to it. Thus, he argues that the first two assumptions are mutually inconsistent because entry cannot be both trivial (from assumption 2) and total (from assumption 1).

The plausibility of the assumption of no sunk costs, or “almost” no sunk costs for “almost” perfectly contestable markets as in Baumol et al. (1983), was also questioned by many scholars on the grounds that most industries have considerable sunk costs with at least partial irreversibility of investment (Shepherd, 1984; Spence, 1983; Viscusi, Vernon, & Harrington, 2000).

As mentioned earlier, the theory of contestable markets stresses the importance of potential competition. In fact, the proponents of the theory originally emphasized the threat of entry (potential competition) as the disciplining force for incumbent firms, rather than actual competition among already existing firms in the market. However,

although potential competition is an important factor that may constrain market power as was studied by Bain (1956) and others, the effect of potential competition is not likely to be as powerful as the contestability theory suggests (Gilbert, 1989; Shepherd, 1983). In other words, the effect of potential competition clearly is not as large as that of actual competition.

The theory of contestable markets has also been empirically tested. Initially the proponents of the theory used the airline industry to make a case for their theory. This was based on the cost structure of the airline industry, whose sunk costs were believed to be small because the main investment, aircrafts, can be easily transferred to alternative markets. For example, Bailey (1986) argues that the airline industry, along with other post-deregulation industries reviewed in her article (stock brokerage, trucking and railways, telecommunications), exhibits many of the behavioral properties associated with contestability.

However, several empirical studies in the airline industry found little support for the contestability theory (Call & Keeler, 1985; Graham, Kaplan, & Sibley, 1983; Morrison & Winston, 1987). Both studies of Call and Keeler and Graham et al. have shown that fares have a positive and significant correlation with concentration levels. In addition, Morrison & Winston found that potential competition did constrain prices but the effect was less than that of actual competition. In fact, the inconsistency of the contestability theory with the airline industry was admitted by the principal authors of the theory, by saying that “post-deregulation experience in the airlines industry has revealed

several elements of the structure of supply that conflict significantly with the conditions necessary for the pure theory of contestability to apply without modification” (Baumol & Willig, 1986, p. 24).

In the case of telecommunications industry, it appears that the applicability of the contestable market theory has largely been rejected. For example, Horning et al. (1988) and Schuler (1986) point out that the entry and exit are not costless in the telecommunications industry where substantial fixed costs have to be committed and sunk in order to enter, which constitutes barriers to entry and exit. Based mainly on the slow decline of AT&T’s market share in the 1980s, Shepherd argues that significant entry barriers exist in the interexchange market, and that the contestability theory cannot be applied to the market (Shepherd & Granieri, 1990). Trebing (1986) also sides with these views by looking at market shares and barriers to entry and exit in the interexchange market, though he observes the possibility of contestability in a few limited submarkets such as reselling, adding that even hit-and-run resellers are vulnerable to retaliatory actions by the dominant firm.

In terms of public policy, the proponents of the contestability theory claim that the theory can serve as an excellent guide to the design of regulatory and antitrust policy. For example, Bailey (1981) argues that, “Unlike some policy prescriptions, the theory of contestable markets can readily be applied” (p. 179). While they admit that “a perfectly contestable market is a fictional ideal, no more to be found in reality than a market that is

perfectly competitive,” Baumol and Sidak (1994) maintain that a perfectly contestable market can serve as a model for regulation “because it offers all the guarantees of socially beneficial performance that perfect competition brings” (p. 43).³⁹

However, the critics of the contestability theory argue that the theory cannot be applied to real markets. Shepherd (1984), for instance, argues that the theory treats only a specialized, extreme set of conditions that are probably found in no real markets that have significant internal market power. In terms of the role of the theory in public policy, both sides have different views. Baumol and Willig (1986) assert that the theory of contestable markets supports neither extreme interventionists nor extreme noninterventionists on regulation and antitrust, but rather helps to identify and sharpen the roles of antitrust and regulation. Shepherd (1995) sees it differently. He argues that the contestability theory “has become extremely valuable to certain companies and their witnesses as a weapon to use against regulation and antitrust” (p. 307).

Despite these controversies, some scholars point out that the theory of contestable markets may contribute to the shift of the focus of regulatory policy toward removing artificial barriers to entry,⁴⁰ and that it can help antitrust policy to take proper account of potential competition (Dixit, 1982; Viscusi et al., 2000). On balance, it seems to be fair to say that the theory of contestable markets provided some insights into the traditional

³⁹ Bailey and Baumol (1984) argue that the model of contestable market is a better standard for public policy, particularly in the presence of economies of scale and scope.

⁴⁰ One could argue that the importance of entry barriers was already widely accepted prior to the contestability theory (Shepherd, 1984).

theory of competition and industrial organization by emphasizing the importance of potential competition, but that its applicability to real markets has been shown to be much more limited than the proponents claimed.

3.2.3 Other Views about Competition: Dynamic Competition Theories

The above discussions about economic models of competition are largely based on the traditional perspective of competition, which sees competition as a state of affairs. According to Baldwin (1995), this view holds that the dimensions of the competitive system can be classified by a set of structural attributes of the market. Thus, emphasis is given to such characteristics as the number of firms, concentration, and other structural variables in assessing the intensity of competition.

In contrast to the static view of competition, an alternative view of competition, collectively referred to as “dynamic competition theories,” sees competition as a process. Baldwin (1995) observes that the competitive struggle receives attention when competition is viewed as a process. The theories of dynamic competition place innovation and change at the heart of the competitive process (Ellig, 2001). Among the various theories of dynamic competition,⁴¹ the Schumpeterian view is the most widely discussed theory.

⁴¹ I discuss only the Schumpeterian view of competition here. Ellig and Lin (2001) review five principal dynamic competition theories: Schumpeterian competition, evolutionary competition, Austrian competition, path dependence, and resource-based competition. For a more extensive review of dynamic competition theories, see Hunt (2000).

Schumpeter (1942/1976) observed that the process of “creative destruction”—“the . . . process of industrial mutation . . . that incessantly revolutionizes the economic structure *from within* [italics in original], incessantly destroying the old one, incessantly creating a new one”—is the essential fact about capitalism (p. 83). According to Schumpeter view of the process, “every element takes considerable time in revealing its true features and ultimate effects,” and, thus, “there is no point in appraising the performance of that process *ex visu* of a given point of time; we must judge its performance over time, as it unfolds through decades or centuries” (p. 83). He further argued that “a system . . . that at *every* given point of time fully utilizes its possibilities to the best advantage may yet in the long run be inferior to a system that does so at *no* given point of time, because the latter’s failure to do so may be a condition for the level or speed of long-run performance” (p. 83, italics in original).

Schumpeter went on to argue that, in capitalist reality, it is not the kind of competition, such as price competition, within a rigid pattern of invariant conditions, methods of production and forms of industrial organization, as conceived in the traditional conception of competition that counts, but the “competition from the new commodity, the new technology, the new source of supply, the new type of organization (the largest-scale unit of control for instance)—competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives” (p. 84).

According to the Schumpeterian view of competition, then, monopolistic practices cannot not be regarded as bad as they would be in the traditional view of

competition, because “superiority is as a matter of fact the outstanding feature of the typical large-scale unit of control, though mere size is neither necessary nor sufficient for it” (Schumpeter, 1942/1976, p. 101). Thus, Schumpeter asserted:

What we have got to accept is that [the large-scale establishment or unit of control] has come to be the most powerful engine of [economic] progress In this respect, perfect competition is not only impossible but inferior, and has no title to being set up as a model of ideal efficiency. It is hence a mistake to base the theory of government regulation of industry on the principle that big business should be made to work as the respective industry would work in perfect competition. (p. 106)

Schumpeterian view of competition is a dynamic perspective, since it emphasizes the time dimension in the process of creative destruction. As Ellig and Lin (2001) point out, in the Schumpeterian competition market participants may have to tolerate short-run inefficiencies in order to gain long-run efficiencies.⁴² In terms of public policy, this perspective has an important implication. The traditional neoclassical perspective of competition that emphasizes allocative efficiency views monopoly and market power (perhaps except for natural monopoly) as socially undesirable. According to the Schumpeterian view of competition, however, large monopolistic firms are ideally suited for introducing the technological innovations that benefit society (Scherer & Ross, 1990). This is often referred to as “the Schumpeterian hypothesis”: a market structure involving large firms with a considerable degree of market power is the price that society must pay for rapid technological advance (Nelson & Winter, 1982).

⁴² Nelson & Winter (1982) called this the “Schumpeterian tradeoff” between static efficiency, in the sense of prices close to marginal production cost, and dynamic progress.

As to whether there is any causal linkage between market structure (or level of concentration) and innovation, Nelson and Winter (1978) argue that there are connections running in both directions, laying stress on the direction from innovation to concentration. Thus, they view that under a regime of Schumpeterian competition, temporary supranormal profits are the reward to successful innovations. However, in their review of the empirical literature on the relationship between firm size or market structure and R&D activity, Kamien and Schwartz (1975) found little empirical support for the hypothesis that R&D activity increases with firm size or with monopoly power. Instead, they found that R&D activity, measured either by input or output intensity, appears to increase with firm size up to a certain point but then it levels off or declines beyond it. They also argue that R&D activity may be nonlinearly related to industry concentration, adding a new empirically inspired hypothesis that a market structure intermediate between monopoly and perfect competition would promote the highest rate of inventive activity.

Scherer and Ross (1990) have a similar view. They find that Schumpeter was right in asserting that perfect competition has no title to being set up as a model of dynamic efficiency, but that his less cautious followers were wrong in implying that monopolies and cartels had any stronger claim to that title. According to Scherer and Ross, it is “a subtle blend of competition and monopoly, with more emphasis in general on the former than the latter” (p. 660) that is needed for rapid technological progress.

In the case of telecommunications industry, Trebing (1998) recognizes some examples of Schumpeterian change in telecommunications, including the competition between telephone companies’ Asymmetric Digital Subscriber Line (ADSL) technology

and cable TV companies' cable modem technology and the rivalry between wireless and wireline networks. However, Trebing argues that the Schumpeterian approach has significant deficiencies because it ignores the strategies by which firms seek to achieve dominance, foreclose entry, and shift costs and risks between customer classes as part of the process of exploiting new technology.

Bauer (1997) points out that in Schumpeter's model market power is achieved by superior performance and is sustainable only through continued excellent performance. Thus, he argues that the Schumpeterian view of competition through innovation has only limited applicability, since the market power of incumbent monopolies has typically not been acquired in a competitive process but been achieved from the previous regulatory regimes.

A major contribution of the Schumpeterian view of competition, and perhaps dynamic competition theories in general, to the modern thoughts on competition and industrial market analysis is that they provide a perspective that incorporates the time dimension into analysis and view competition as a dynamic process rather than a state of affairs at a certain point in time. However, one must exercise caution when applying this view of competition for public policy purposes. Although public policy should certainly consider the time dimension or dynamic effects, it is often required for public policy makers to address problems associated with the current state of affairs. Besides, a state of affairs at a point in time is often the outcome or result of cumulative effects of previous events.

Despite the insight provided by the Schumpeterian view of dynamic competition, there exists a danger when one interprets it as a supporting guide to public policy that

promotes or protects monopoly power. As Mason (1951) appropriately points out, Schumpeter's criticisms of the limitations of static economic analysis as an intellectual foundation for public policy needs to be taken seriously, whether his view of competition as the process of creative destruction could be made to yield principles applicable to "rational" as opposed to "vindictive" anti-monopoly policy is a different matter. Thus, although the two views about competition may be alternative approaches, they should not be necessarily regarded as substitutes or mutually exclusive approaches because both may be useful in the analysis of market competition and in designing public policy, with each approach having its own strengths and limitations.

3.3 Assessment of Competition and Its Application to the Telephone Industry

From a public policy point of view, the assessment of competition in a certain market or industry is a key task that needs to be done to design adequate public policies toward businesses such as regulation and antitrust. However, views and practices vary with respect to the appropriate framework for assessment of market competition. Moreover, even though the same framework is applied, it is often the case that actual assessments are different from study to study. Thus, it is appropriate to discuss theoretical frameworks for competition analysis and review previous studies of competition in the telephone industry to draw implications for this dissertation research. Accordingly, in this section, I discuss major theoretical frameworks for assessment of competition, review academic literature on competition in the U.S. telephone markets, and seek some implications from these discussions for my empirical research.

3.3.1 Theoretical Frameworks for Assessment of Competition

In the field of industrial organization theory in economics, several theoretical frameworks for assessment of market competition have been proposed and used by scholars. Sometimes these frameworks are categorized into two major approaches: the structure-conduct-performance approach and price theory (Carlton & Perloff, 2000).⁴³ The structure-conduct-performance (SCP) approach holds that an industry's performance depends on the conduct of the firms in the industry, and the conduct is determined by the industry's structure. The second approach, price theory, analyzes the economic incentives facing individuals and firms to explain market phenomena (Carlton & Perloff, 2000). Three models of price theory became prominent since the 1970s: transaction cost economics,⁴⁴ game theory,⁴⁵ and the theory of contestable markets.

In this section, I discuss only the SCP paradigm among these approaches. The reasons for this treatment are twofold. First, despite many criticisms and weaknesses, the SCP paradigm has been the most widely accepted approach among economists in assessing the overall competitiveness of markets. Second, with respect to the price theory-based models, while the three models are prominent in modern economic analysis

⁴³ Tirole (1988, pp.1-4) also offers a concise review of the “two waves of interest for industrial organization”: the “Harvard tradition” (the structure-conduct-performance paradigm), which was developed by Harvard economists such as Edward Mason and Joe Bain, and the theoretical developments since the 1970s.

⁴⁴ For a discussion of transaction cost economics literature, see Williamson (1989).

⁴⁵ Tirole (1988) is an example of industrial organization theory text written mainly from the perspective of game theory.

of market competition, either they are more narrowly focused on internal organization (transaction cost economics)⁴⁶ or strategic behavior of market participants (game theory), or the model is not generally accepted as a useful approach to analysis of competition (contestability theory).

In addition, I also briefly discuss Michael Porter's "five-forces framework" as a prominent alternative to the structure-conduct-performance paradigm for analyzing industry competition. Since my focus is on theoretical frameworks that can be used to assess industry or market competition as a whole rather than strategic interactions among competitors, discussions about the SCP paradigm and the five-forces framework should suffice.

3.3.1.1 Structure-Conduct-Performance Paradigm

The "structure-conduct-performance" (SCP) paradigm, developed mainly by Edward Mason, Joe Bain, and their followers,⁴⁷ has been a fundamental paradigm in the research of industrial organization since the World War II. According to the traditional SCP paradigm, the structure of an industry or market determines to a large extent the conduct (or behavior) of the firms in the industry, which, in turn, determines the overall performance of the industry. Structure refers to the basic market environment within

⁴⁶ Williamson's 1975 book title, *Markets and hierarchies—analysis and antitrust implications: A study in the economics of internal organization*, shows this focus.

⁴⁷ Porter (1981) calls this the "Bain/Mason paradigm."

which firms operate; conduct refers to the behavior that these firms exhibit in their pursuit of profits within that environment or structure; and, performance refers to the outcome of the behavior that is exhibited, particularly with regard to the social desirability of that outcome (Kaserman & Mayo, 1995).

Each of the three categories contains several dimensions. According to Scherer and Ross (1990), structure includes such elements as numbers of sellers and buyers, product differentiation, barriers to entry, cost structures, vertical integration, and diversification; conduct includes pricing behavior, product strategy and advertising, research and innovation, plant investment, and legal tactics; and performance includes variables such as production and allocative efficiency, progress, full employment, and equity. The traditional SCP paradigm can be illustrated schematically as follows in Figure 3.3.

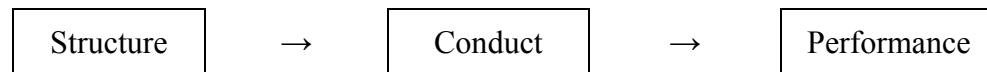


Figure 3.3: The traditional structure-conduct-performance paradigm⁴⁸

The essence of the traditional structure-conduct-performance paradigm is that market structure tends to influence strongly the behavior of the firms in the market and the performance of the market, with the causal link flows in one direction from structure

⁴⁸ In Figures 3.3 and 3.4, I omitted the two categories (basic conditions and public policy) that sometimes appear in the literature to simplify the point. Basic conditions refer to supply and demand conditions that determine market structure such as technology, demand elasticity, etc. Public policy, such as regulation and antitrust, affects each category in the figures (and vice versa).

to conduct and performance. Thus, the traditional SCP paradigm emphasizes the role of structural factors in facilitating collusion, elevating prices, and generating supra-normal profits (Green, 1987).

However, the traditional paradigm has been modified by theoretical and empirical developments. According to Kaserman and Mayo (1995), the modern version of the structure-conduct-performance paradigm is different from the “old school” paradigm in two respects. First, the old version tended to view industry structure as relatively one-dimensional, consisting primarily of the level of concentration in an industry, whereas the modern version sees market structure as distinctly multidimensional. Second, the old view considered the causation implied by the paradigm to be unidirectional, flowing from structure to conduct to performance, whereas the modern view considers the causation flows in both directions simultaneously.⁴⁹ Thus, the modern version of the structure-conduct-performance paradigm can be illustrated as shown in Figure 3.4.

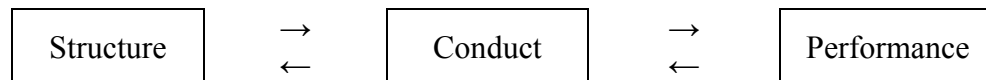


Figure 3.4: The modern version of the structure-conduct-performance paradigm

The modern view reflects the feedback effects shown by the arrows running from performance to conduct to structure. Through this modification, the modern structure-

⁴⁹ Shepherd (1997) states that “Mainstream researchers have always recognized this alternative causation, but logic and business experience have strongly suggested that the causation usually flows downward [from structure to conduct to performance]” (p. 6).

conduct-performance paradigm mitigates one of the crucial limitations that the old paradigm had. That is, as Porter (1981) notes, according to the old version, one could ignore conduct and look directly at industry structure in explaining performance because structure determines conduct, which in turn determines performance.

The structure-conduct-performance paradigm emphasized the importance of empirical studies of industries, and these studies usually involved cross-sectional data analysis at the industry level.⁵⁰ Despite the controversy about the relationships among structure, conduct, and performance, the SCP paradigm provides a useful framework for organizing industrial organization theory (Viscusi, Vernon, & Harrington, 2000). However, as I discuss later in this chapter, the previous studies of telecommunications industry based on the SCP paradigm seems to focus on the supply-side aspects of the market in assessing industry performance and competition, rather than considering both supply and demand sides.

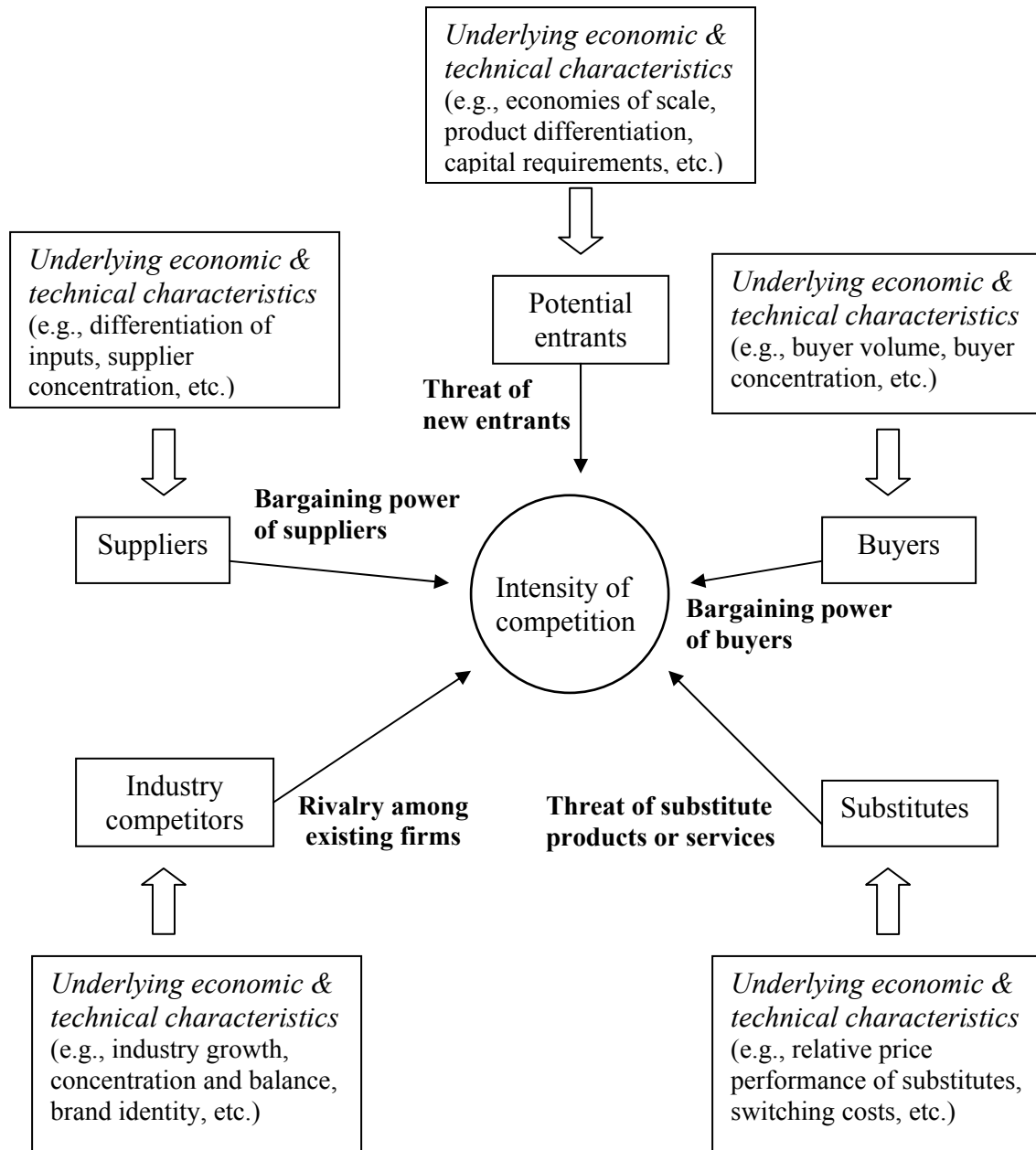
3.3.1.2 Five-Forces Framework

Porter (1980) presented an alternative framework for analyzing industry competition, which is called the “five-forces framework.”⁵¹ According to this framework, the state of competition in an industry depends on five basic competitive forces: threat of

⁵⁰ According to Schmalensee (1989), most of the cross-sectional studies based on the SCP paradigm focused on relations involving such key variables as profitability, concentration, and barriers to entry.

⁵¹ In his 1983 article, Porter termed his model as the “competitive strategy framework” (p. 177). However, in later writings Porter referred to his framework as the “five-forces framework.” See Porter (1985, 1998). I adopt the latter term to refer to Porter’s framework.

new entrants, threat of substitute products or services, bargaining power of buyers, bargaining power of suppliers, and rivalry among existing firms. Porter argues that all five competitive forces jointly determine the intensity of competition and profitability of an industry. The five forces determine industry profitability, measured by long run return on investment, because they influence the elements of return on investment such as the prices, costs, and required investment of firms in an industry (Porter, 1985). According to Porter (1985), the strength of each competitive force is a function of industry structure, which he refers to the underlying economic and technical characteristics of an industry. Thus, Porter's five-forces framework emphasizes the structural features of an industry as the determinants of the strength of each of the five forces and, hence, of the intensity of competition in the industry. Porter's framework can be illustrated schematically as shown in Figure 3.5.



Source: Adapted from Porter (1985, p. 6)

Figure 3.5: Porter's five-forces framework

Porter's five-forces framework provides a systematic way of thinking about how competitive forces work at the industry level and how these forces determine the profitability of an industry (Teece, Pisano, & Shuen, 1997). However, as Porter (1983) indicates, the five-forces framework is based on the structure-conduct-performance paradigm of industrial organization theory as a framework for analyzing industry competition. This is clear from the fact that Porter emphasized structural factors of an industry as determinants of competitive forces and a basis for competitive strategy (i.e., conduct) of a firm to "defend itself against these competitive forces or . . . influence them in its favor" (Porter, 1980, p. 4). In addition, it appears that Porter's model is of limited use when applied to assessing overall competition and performance of an industry, since it is designed primarily for business strategy purposes.

From this review of major theoretical frameworks for analyzing industry competition, we turn to a review of the literature on competition and its effects in the U.S. telephone industry.

3.3.2 A Review of Literature on Competition in Telephone Markets

The U.S. telephone industry, unlike that in most other countries, has a long history of privately owned and operated market structure. This has provided federal and state governments with a unique environment in which regulatory agencies had to deal with competition issues involving private companies. Thus, academic and practical efforts to assess market competition in the telephone industry are not new. However, these efforts have been greatly increased over the last two decades due to the dramatic

changes in the market and policy environments. As previously mentioned in chapter 1, the two major policy events in the past two decades are the divestiture of the Bell System in 1984 and the enactment of the Telecommunications Act of 1996.

Hence, in this section I review literature that looked at the effects of competition and deregulation revolving around these two main events in the telephone industry. Further, I discuss only the domestic portion of the industry, i.e., local and long distance markets.⁵²

3.3.2.1 Local Telephone Market

To one degree or another, local telephone service markets have been going through transition from monopoly to competition since the Telecommunications Act of 1996. Prior to the passage of the 1996 Act, the local service market was virtually a monopolistic structure in which the seven Regional Bell Operating Companies (RBOCs)⁵³ provided local service in each territory. Despite the significance of the divestiture,⁵⁴ some studies have shown that the breakup of the Bell System did not

⁵² Here I review studies on both local and long distance markets. This is done to see how previous studies evaluated the state and effects of competition in telephone markets including their frameworks for analysis. More effort is given to the local market, since the focus of my study is on local telephone competition.

⁵³ They were Ameritech, Bell Atlantic, BellSouth, NYNEX, Pacific Telesis, SBC, and US West, listed alphabetically. Currently there are only four RBOCs as a result of mergers. The remaining four are BellSouth, Qwest (merged US West), SBC (merged Ameritech and Pacific Telesis), and Verizon (formed by a merger between Bell Atlantic, which merged NYNEX, and GTE).

⁵⁴ For instance, a commentator calls the divestiture “the deal of the century” (Coll, 1986).

increase competition in the local telephone market.⁵⁵ In Selwyn's terms, the breakup of the Bell System "served only to create seven [geographic] monopolies where there had been but one" (Selwyn, 1991, p. 156).

Much of the research efforts in the local service markets since the divestiture of the Bell System until the passage of the 1996 Act have focused on the effects of the divestiture on efficiency improvement of the BOCs. For example, in his study of the telephone industry between 1960s and 1980s, Crandall (1991) argues that the divestiture along with some other factors improved the efficiency of the Bell companies, showing the increase in labor productivity and total factor productivity over the period.

Some scholars emphasize the cost savings in the provision of local exchange service resulting from the divestiture. Ying and Shin (1993) found that local exchange carriers realized immediate cost savings in responding to competitive pressures since the breakup, with the Baby Bells experiencing generally larger gains.⁵⁶ Similarly, Krouse et al. (1999) maintain that the divestiture and regulatory reform have resulted in savings of about 20 percent in operating cost of the Bell companies over the period of 1984 through 1993 relative to what would have occurred in the absence of these events. Specifically, they argue that the divestiture yielded cost savings of \$115.4 billion (14.2 percent) in the BOCs' provision of local services, and that state-level regulatory reform, such as the shift

⁵⁵ See, for example, Egan & Waverman (1991), S. L. Levin (1991), and Selwyn (1991). They all agree that there is little competition in the local exchange market, though they attribute the lack of competition to different reasons (regulatory barriers for Egan & Waverman; prices below cost for Levin; and economic and technological impediments for Selwyn).

⁵⁶ Shin and Ying (1992) even argue that breaking up the local exchange carriers (LECs) would likely produce considerable cost savings to society.

from rate-of-return regulation to various types of incentive regulation, yielded \$96.7 billion (11.9 percent) savings in the BOCs' operating cost, both measured in 1993 dollars, using the 1978-1993 period data for all 22 BOCs.

With the enactment of the Telecommunications Act of 1996, the major research focus moved from the efficiency improvement of the monopolies (BOCs) to a broader range of competition-related issues, such as the status of competition, evaluation of competition effects, and policy tools and obstacles in achieving competition in the local market.

The 1996 Act is designed to promote local telephone competition, both by eliminating state-imposed barriers to competition and by requiring incumbent local exchange carriers to cooperate with potential competitive entrants (Benjamin, Lichtman, & Shelanski, 2001). The Act removed entry barriers—at least legal and regulatory barriers—to the local telephone service market.⁵⁷ In addition, the 1996 Act introduced several other measures to foster competition in the local market. Among others, the Act mandated incumbent local exchange carriers to offer interconnection, unbundling of network elements, and resale.⁵⁸ However, whether these measures are effectively

⁵⁷ Section 253 of the Telecommunications Act of 1996 prohibits any state or local laws or regulations that prohibit the ability of any entity to provide any interstate or intrastate telecommunications service; it also gives the FCC preemptive power in case of violation from state or local governments. 47 U.S.C. § 253.

⁵⁸ Section 251(c) of the 1996 Act provides such obligations of incumbent local exchange carriers. An incumbent local exchange carrier (ILEC) is required to provide, for the facilities and equipment of any requesting carrier, interconnection with its own local network, which is necessary for a call to be completed from a competitor's customer to an ILEC's customer, and vice versa; an ILEC is also required to allow entrants to lease elements of the local network on an unbundled basis (i.e., à la carte) at any technically feasible point; and an ILEC must offer its local retail services to entrants at wholesale rates so that entrants can resell the services to their own customers. 47 U.S.C. § 251(c).

working and successful in bringing competition to the local market is not clear at this point. Scholars and experts continue to debate the status of competition in the local market and the success of the 1996 Act to promote competition in the market.

Some scholars argue that competition in the local market displays some progress. Kahn, Tardiff, and Weisman (1999) maintain that the local exchange markets for business customers in metropolitan areas are now irrevocably open to competition, but there is no remotely comparable evidence—i.e., of actual market penetration by competitive local exchange carriers (CLECs)—on the question of whether local residential markets are comparably open to competition. Hazlett (1999) finds that by one measure, market share, competitive entry appears to be positively correlated with the Telecommunications Act, and by another measure—stock market performance of CLECs—at least neutral. Crandall and Hazlett (2000) argue that despite the problems of regulation-intensive policy, competition in the local telephony is emerging as a result of the overall policy reforms initiated by the Telecommunications Act of 1996. Similarly, Ware (1998) observes that even though the telecommunications industry has not met the unrealistic expectations of some observers that the Act would immediately engender full competition in all telecommunications markets and lower all prices, the Act and ongoing regulatory, market, and technological trends have clearly stimulated substantial competition across historically distinct markets.

However, it seems that more scholars have found that local competition has not been successful since the enactment of the Telecommunications Act of 1996. For example, Economides (1999, 2002) argues that there has been limited entry of new competitors in the local exchange, both through leasing of unbundled network elements

and through resale by entrants of incumbent local exchange carriers (ILECs). Crandall and Hausman (2000) indicate that local competition has been slow to develop, as shown by the small market share of local competitors. E. S. Miller (2001) and Trebing (2002a) point to the enduring market power and dominance of the BOCs in the local telephone markets. Others agree that little competition has emerged in local telephone markets so far (Gabel, 2002; General Accounting Office, 2000b; Long, 1999).

Interestingly, however, many scholars appear to disagree on the reasons for the slow pace of competition development in the local market. One line of argument is to put the blame on regulators, federal and state, and regulatory policies as obstacles to fuller competition. Crandall and Hausman (2000) argue that the FCC's pricing policy⁵⁹ that requires the wholesale prices of network elements to be set below the true economic cost, which they assert reduces the incentive for entrants to invest in their own networks, is one of the two main reasons for the slow competition in the local market, along with the time and large capital resources needed to construct local telecommunications networks. According to the authors, this disincentive is directly contrary to the goals of the 1996 Act. In a similar but broader attack on statutory and regulatory mechanisms, several scholars argue that the 1996 Act and the FCC's implementation of it, such as mandatory

⁵⁹ The FCC's pricing methodology is referred to as the "Total Element Long Run Incremental Cost (TELRIC)." Under this pricing scheme, ILECs' prices for interconnection and unbundled network elements should be set to recover the forward-looking costs directly attributable to the specified element (TELRIC), plus a reasonable allocation of forward-looking joint and common costs. In addition, the FCC explicitly excludes three types of cost measures that must not be included in a TELRIC analysis: embedded (or historical) costs, opportunity costs, and universal service subsidies. For details, see FCC's *First Report and Order* regarding local competition (FCC, 1996, August).

unbundling and TELRIC methodology, have undermined competition in the local market (Crandall & Hazlett, 2000; Harris & Kraft, 1997; Hausman & Sidak, 1999; Sidak & Spulber, 1998).⁶⁰

On the other hand, there are some scholars who have somewhat opposing views of the reasons for the sluggish development of local competition. For example, Economides (1999) argues that the continuous legal challenges of the ILECs to the 1996 Telecommunications Act and long and difficult arbitration process of the interconnection agreements between ILECs and IXC's are the major reasons for the slow development of competition in the local market. E. S. Miller (2001) and Trebing (2002a) emphasize, as a major impediment to competition, the unsuccessful restraint of market power possessed by the BOCs. Similarly, Roycroft (1998) shows the ILEC's ability to control market entry with a profit squeeze, implying that continuing oversight of output and input prices may be necessary.⁶¹

Some scholars suggest that low residential local exchange prices may contribute to the unsuccessful competition in local residential markets. Kahn, Tardiff, and Weisman (1999) argue that there may well never be open competition in the local residential markets, so long as basic residential service is systematically underpriced or until some

⁶⁰ For a counterargument against the attack on TELRIC methodology, see, for example, Ford & Beard (2002).

⁶¹ L. J. White (2000) also suggests that continued regulatory control over prices and terms of buying or leasing components of the incumbents' networks is crucial and cannot be left to market forces.

alternative, competitively neutral method of subsidizing universal service is devised. Ros and McDermott (2000) join this view, maintaining that inefficient local exchange prices have an inhibiting impact on competition for residential customers.

Finally, several commentators suggest that competition should not be expected to occur so soon. That is, more time is needed to see competition in the local telephone market. For example, Katz (1997) states that competition will not come overnight,⁶² and it will not come evenly. He predicts that high-volume customers located in urban areas will see competition much sooner than will low-volume, rural customers. Zolnierrek, Eisner, and Burton (2001) support this idea by their empirical test, showing that competitors are more likely to enter highly populated urban areas, and new facilities-based entry is more likely to occur in BOC local service territories, with the exception of territories served by Ameritech. In addition, J. I. Klein (1999) points out the unrealistic expectations some might have about local competition, stating that no one who fully understands the economics or technical aspects of the telecommunications industry would have predicted that local telephone competition would blossom quickly. According to Klein, the race for local competition is “a long-distance run, not a sprint.”

Will, then, effective competition in the local telephone market emerge? While there may be some hope among observers, there are doubtful voices, as well. For example, Gabel (1991) argues that because of the economies of scale associated with local exchange service in residential market, the local telephone market is not expected to become contestable or competitive in the foreseeable future. Mansell (1993, 1997) argues

⁶² Litan and Noll (1998) seem to agree with Katz (1997), emphasizing that moving from monopoly to competition would not be easy.

that the “strategic” model of telecommunications development in which an oligopolistic market structure emerges is more likely than the “idealist” model that envisages the emergence of full competition in the market. Similarly, Trebing (1997, 1998, 2002b) casts doubt on the likelihood of the emergence of effective competition in the telephone market. Rather, he points to the factors conducive to market concentration and market power, such as inherent network economies and monopoly focal points, which lead to a dominant firm or (tight) oligopoly structure.⁶³

In summary, although there are some signs of initial competition in part of the local telephone market, especially in the large business market in urban areas, it is widely perceived that there is not really effective competition in the local service market so far. However, there are different views about the reasons and possible remedies for the slow development of local competition, as well as about the prospects of a vigorously competitive market of comparable firms.

3.3.2.2 Long Distance Market

The long distance telephone market has a longer history of deregulation and competition than the local service market in the United States.⁶⁴ Typically, the market

⁶³ Trebing proposes a structural separation (the separation of monopoly network operation and provision of competitive services) as a remedial measure for the market power. For a counterargument about structural separation, see, for example, Gabel (2002).

⁶⁴ The competition in the long distance telephone market began in 1969 when the FCC authorized MCI to provide “specialized” services, but it is fair to say that a meaningful competition started after the breakup of the Bell System in 1984.

share trend of AT&T, the dominant firm in the long distance market for decades until very recently, is often cited as an indicator of competition in the market. Indeed, the market share of AT&T has been continuously decreasing over the past two decades, and that of the largest three facilities-based long distance carriers has also been decreasing. For example, according to a recent FCC report (2003, August), AT&T's share of total toll service revenues among long distance carriers fell from 90.1% in 1984 to 37.4% in 2001.⁶⁵ In addition, the combined share of the three largest long distance carriers—AT&T, MCI, and Sprint—measured in total toll service revenues decreased from 97.3% in 1984 to 70.1% in 2001.

Does this market share trend show that the competition in the long distance market is effective? Based on the market performance measured by market share, one might argue that competition is in place in the long distance market. However, there seems to be no consensus at this point with respect to the degree of competition.

Some scholars claim that competition in the long distance market is not effective. For example, Trebing (1994) points out the persistence of high levels of concentration in the long distance market as the evidence of the failure of pervasive competition. While arguing that high concentration itself is not proof of a lack of competition, MacAvoy (1995, 1996) and MacAvoy and Williams (2002) contend that competition among AT&T and other long distance service providers has not emerged, pointing out the fact that

⁶⁵ These market share data are based on the revenues of long distance carriers only (i.e., those firms that identify themselves as primarily being long distance carriers). If local telephone companies that provide toll service included, the market shares of AT&T changed from 68.3% in 1984 to 34.2% in 2001. Other measures show a similar trend. For example, AT&T's shares of residential toll market in 2001 were 36.7% and 31.2%, measured by households and direct dial interLATA minutes, respectively. See, FCC (2003, August).

price-cost margin⁶⁶ in all major long distance service markets increased in the 1990s despite the decline of the concentration level in the market. MacAvoy's central argument is that a pattern of tacit collusion among the three large incumbent providers of long distance services (AT&T, MCI, and Sprint) eclipsed any competitive initiatives in the 1990s.⁶⁷

Some scholars also cast doubts on the effect of competition on long distance telephone rates. According to some studies, the overall reduction in interstate long distance prices after the divestiture of the Bell System is not the result of competition (Taylor & Taylor, 1993; Taylor & Zona, 1997). Rather, they assert, the resulted benefits of lower prices can be explained by the reduction in the carrier access charges paid by the long distance carriers to the local telephone companies.⁶⁸ In addition, Taylor and Zona found no evidence of effective competition in the interstate long distance market, after reviewing seven primary indicators of competition.⁶⁹

⁶⁶ MacAvoy and Williams (2002) argue that the competitiveness of a market should be determined primarily by market behavior, especially price behavior that is represented by price-cost margin. Price-cost margin is the difference between price (p) and marginal cost (MC) as fraction of price, $(p - MC)/p$, and it is also known as the "Lerner Index," which was developed by Lerner (1934) as a measure of monopoly power. See Carlton & Perloff (2000).

⁶⁷ The argument of tacit collusion was countered by others. See, for example, Kaserman & Mayo (1994).

⁶⁸ See, for example, Edelman (1997) who argues that the access charge reduction does not fully compensate for the decline of long distance rates. She asserts that the decline in AT&T's rates is mainly attributable to competition in the long distance market spurred by equal access, rather than price caps or access charge reduction.

⁶⁹ The indicators they analyzed are relative price performance, pricing behavior, productivity, quality, advertising, entry, and financial performance, which seem to be based on the structure-conduct-performance model.

On the other hand, some scholars find that competition in the long distance telephone market is effective and successful. For instance, Economides (1999, 2002) argues that competition in the long distance market has been a great success, based on the observations of market share, the number of competitors, and prices. According to him, the biggest benefits to consumers since the breakup of AT&T have come from the long distance market, which he argues was transformed from a monopoly to an effectively competitive market.

Similarly, Kaserman and Mayo (1994), after reviewing various competitive indicators of the long distance market following the structure-conduct-performance paradigm, assert that effective competition is viable and present in the long distance telecommunications industry, and that “the proposition—that competition for long distance services is a sustainable phenomenon—has now been established as an *uncontestable fact* [italics added]” (p. 109).

Some scholars seem to recognize a moderate degree of competition in the long distance market. For example, Crandall and Waverman (1995) characterize the market by “considerable competition.” (p. 163).⁷⁰ They conclude, after reviewing previous studies concerning competition in the long distance market and their own analysis, that competition in the interLATA market has been effective in reducing prices but the markets are not fully competitive so that further entry would be of real value. Hazlett (1999) cautiously agrees, indicating that competitive forces appear to be affecting a

⁷⁰ Similarly, Ward (1995) concludes, based on estimates of firm-specific long-run demand elasticities for AT&T and its rivals for long distance service marketed to households and small businesses during 1988-91, that the long distance market is “relatively competitive.”

reduction in quality-adjusted rates within the long distance sector, where output is increasing steadily. However, he adds that this result was not created or impacted by the Telecommunications Act of 1996, pointing out that the RBOCs' applications for long distance service were denied by the FCC at the time.⁷¹

In a similar reasoning, some authors point out unequal benefits from reductions in long distance rates among different customer classes. For example, Kahn, Tardiff, and Weisman (1999) find that, despite the remaining controversy over whether long distance rates in the aggregate have actually declined as much as the access charges which the long distance carriers pay the local telephone companies, business and the larger residential users of long distance services have greatly benefited from the competition of long distance companies. However, they add, small residential subscribers have not benefited to anything like the same degree. Crandall and Hausman (2000) take the same position as Kahn et al., by arguing that most of the "competitive" decline, which is represented by total rates reduction in long distance less the portion attributable to declining access charges, appears to be concentrated in business rates, not residential rates.

In summary, the long distance telephone market is generally regarded as more competitive than the local market. In addition, as McMaster (2002) observes, although there is still some debate over how competitive the long distance telephone market truly is, "it is clear that it is more competitive now than it was prior to divestiture" (p. 379). However, as discussed above, views and opinions of scholars and telecommunications

⁷¹ The first approval of RBOC applications for interLATA services was granted to Bell Atlantic (now Verizon) for service in New York in December 1999.

policy analysts about the extent of competition in the long distance market vary greatly—a claim of failure to establish competition on the one hand to a claim of effective competition on the other.⁷² Thus, it appears that whether the long distance telephone market is effectively competitive is still an open question that will only be answered by further research.⁷³

3.3.3 Implications for the Dissertation

With respect to the theoretical frameworks for analyzing industry competition, the structure-conduct-performance (SCP) model of economic theory of industrial organization has been the major paradigm over the last several decades. This appears to be well reflected in the existing literature on competition in the telephone industry. That is, most studies reviewed above seem to have applied the SCP paradigm, at least implicitly, in analyzing the status or effects of competition in telephone markets. While there is no doubt about the significant contributions made by the SCP paradigm and the studies based on it to the understanding and analysis of telecommunications competition,

⁷² The different views about the competition of the long distance market and market power of the RBOCs led to another controversial debate over the competitive effects of allowing RBOCs to enter in-region, interLATA long distance telephone market from which they have been restricted by the MFJ in 1982 until it was allowed in the Telecommunications Act of 1996, albeit conditional. Discussions about the effects of RBOC entry into the long distance market are reviewed later in chapter 4.

⁷³ Interestingly, state commissions view the long distance market as generally competitive. Among the forty-six states surveyed, ten states reported that they had analyzed the intraLATA toll market and nine of them concluded that the market was either “fully competitive” (five states) or “moderately competitive” (four states). In addition, all nine states that assessed the status of competition in the intrastate interLATA market determined that the market was either “fully competitive” (seven states) or “moderately competitive” (two states). See Rosenberg & Lee (2003).

there seem to be an important aspect that has been relatively neglected but which needs to be considered for future research. The fact that the SCP paradigm has been a major framework for analyzing telecommunications competition in the existing literature raises some concerns about how one should evaluate policy measures. In other words, much of the literature over the past two decades has focused on the supply side of the market, resulting in largely ignoring demand-side aspect of competition in the telephone market.

For example, most studies reviewed earlier have been done to determine the effectiveness of competition in the telephone industry, using supply-side indicators such as market share, the number of new competitors, entry barriers, production cost savings, rates, price-cost margin, productivity, and so forth. Given that most studies are based on the SCP paradigm, this should come as no surprise. However, even though such indicators imply substantial competition in the supply side of a certain market, there is no guarantee that consumers actually get the full benefits from the market. In other words, information on supply-side indicators, while necessary and useful, is not sufficient to depict a complete picture of competition in the telephone industry. Therefore, to properly determine the effectiveness of competition in telephone markets, future studies need to pay more attention to the consumers of the telecommunications services and their behavior in response to the development of competition in telephone markets, since consumers should be the focus of regulatory policies. Colton (1993) makes this same point in arguing that most analyses and regulatory decisions have been incomplete in that they concentrate on evaluating the effectiveness of competition only from the perspective of the firm. Colton argues that the consumer-side characteristics (such as the availability of information for consumers and the use of information by consumers) of the

telecommunications industry have been “too often ‘forgotten,’ or in any event underemphasized, in analysis of competition” (p. 775). This argument, then, is not new. The importance of the consumer’s perspective in economic analysis was highlighted more than two centuries ago by the “father” of economics. Adam Smith (1776/1993) emphasized, “Consumption is the sole end and purpose of all production; and the interest of the producer ought to be attended to, only so far as it may be necessary for promoting that of the consumer” (p. 376).

To summarize the point, competition is supposed to mean bringing benefits to the consumers with more choice opportunities, lower prices, better service quality,⁷⁴ new innovative services, and so forth. As asserted above, the existing literature does not pay sufficient attention to this basic issue. Evaluating competition only from the supply-side of a market will not account for all aspects of market competition. If competition does not go beyond the question of ‘who gets what and how much’ among the suppliers of the industry, it may mean little, or even nothing, to the customers. Thus, it is here argued that future research needs to incorporate the consumer’s perspective in analyzing regulatory reform and competition in the telecommunications industry by considering demand-side characteristics. Accordingly, this study attempts to provide a balanced view between the firm’s perspective and the consumer’s perspective to an analysis of competition in the telephone industry, by considering both supply-side characteristics (such as rates and

⁷⁴ Lower prices and better service qualities are based on the assumption that other things remain the same. If other factors are considered, they are not necessarily benefits to consumers. For instance, hypothetically a consumer may prefer lower price for a reasonably acceptable service to better quality if he has to pay more to get a better quality service.

investment in new technologies) and the demand-side characteristics (such as quality of service and customer satisfaction) of the market. It is contended that such an analysis would be more meaningful for public policy designed to promote the public interest.

CHAPTER 4

RBOC ENTRY INTO INTERLATA LONG DISTANCE TELEPHONE MARKETS

4.1 Introduction

Prior to the passage of the Telecommunications Act of 1996, the competitive landscape of the local and long distance telephone markets in the United States was established by the Modification of Final Judgment (MFJ) in 1982.¹ As a result of the MFJ, AT&T divested itself of its Bell Operating Companies (BOCs), vertically separating the Bell System. Since then, the seven Regional Bell Operating Companies (RBOCs) created by regrouping the 22 BOCs were prohibited by the MFJ from providing interLATA long distance service as well as from manufacturing telecommunications equipment and from providing information services.²

¹ It took effect in January 1984.

² The MFJ restrictions on information services were removed by the courts in 1991.

However, Section 271 of the 1996 Act³ provided relief to the RBOCs from the line-of-business restrictions established by the MFJ, which allows the RBOCs to enter the long distance market under certain conditions. That is, an RBOC may be authorized by the FCC to provide in-region interLATA services if and only if it demonstrates that the local market in the state for which the RBOC seeks approval from the FCC is open to competition, pursuant to Section 271 of the 1996 Telecommunications Act.

In this chapter, I discuss the framework and procedures under which the RBOCs can obtain the authority to enter the long distance telephone market. In addition, I discuss the status and progress of RBOC entry into interLATA markets since enactment of the 1996 Act. Furthermore, I review the existing literature on the potential and actual effects of RBOC provision of long distance service. Finally, I present a conceptual framework based on discussions of chapter 3 and this chapter as a basis for my empirical analysis in the next chapter.

4.2 Framework and Requirements for RBOC Entry into InterLATA Long Distance Telephone Markets

Section 271 of the Telecommunications Act of 1996 prescribes the process and substantive requirements for RBOC entry into interLATA long distance markets. As mentioned above, the 1996 Act replaced the MFJ as governing rules for a major part of the telecommunications industry. The strict line-of-business restrictions imposed by the

³ Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996), codified at 47 U.S.C. §§ 151 *et seq.*

MFJ on the RBOCs were replaced with relaxed provisions of the Act that ultimately allow RBOCs to enter the markets from which they were previously prohibited.⁴ G. W. Brock (2003) observes that “The essential point of the new law was that the BOCs would have freedom to enter the competitive services prohibited to them by the MFJ in exchange for opening their local markets to competition” (p. 255). The enactment of the 1996 Act also meant that the oversight power over the telecommunications industry was returned to the FCC from Judge Harold Greene of the U.S. District Court for the District of Columbia, who had essentially functioned as regulator of the industry for 14 years since the MFJ.⁵

However, an important feature of the special provisions of the 1996 Act concerning the RBOCs was that the law does not permit unrestricted entry into other markets for the RBOCs or deny the MFJ’s premise that the RBOCs, if not regulated, will be likely to monopolize allied markets (Krattenmaker, 1998). In other words, the Act chose “regulated entry” that subjected the RBOCs to detailed regulations for entry into competitive markets to prevent the RBOCs from engaging in anticompetitive behavior, while it removed the absolute barriers to entry that were imposed by the MFJ.

Among the relaxed provisions regarding the RBOCs’ line-of-business restrictions, the most important and meaningful measure was lifting restrictions on the RBOCs’

⁴ Sections 271-275 of the “Special Provisions Concerning Bell Operating Companies” of the Act serve this purpose, and these provisions apply only to Bell Operating Companies.

⁵ Some commentators even described Judge Harold Greene as the “Czar” of telecommunications (Hyman, DiNapoli, & Toole, 1997, p. 153). For an excellent and comprehensive account of regulation of telecommunications under the MFJ, see Kearney (1999).

provision of interLATA long distance service,⁶ which is conditioned on their meeting the requirements of the law. The general framework of Section 271 of the Telecommunications Act of 1996 can be summarized as follows:

- (1) No Bell Operating Company or its affiliate may provide in-region interLATA services⁷ unless it is approved to do so by the FCC on a state-by-state basis pursuant to Section 271 of the Act;
- (2) Section 271 lists four categories of interLATA services (i.e., in-region services, out-of-region services, incidental interLATA services, and termination for interLATA services)⁸ to which the section applies and permits RBOCs or their affiliates to provide those services without approval from the FCC except in-region services. That is, RBOCs and their affiliates were permitted to provide out-of-region services and incidental interLATA services after the date of enactment of the 1996 Act. In addition, Section 271 did not prohibit RBOCs and their affiliates from providing termination for interLATA services;

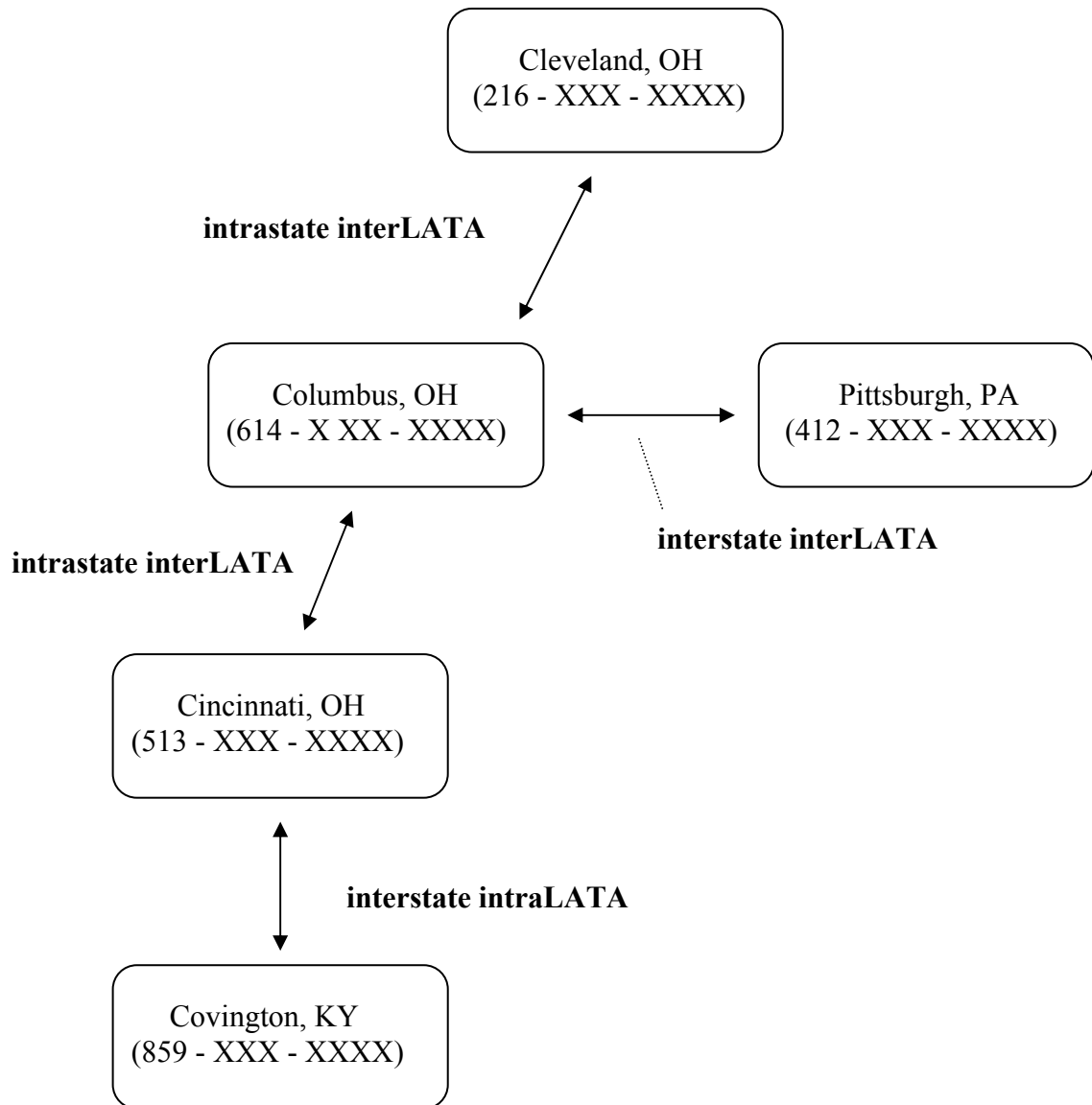
⁶ A commentator views this as “the big prize” that the RBOCs received from the 1996 Act (Chen, 1999, p. 1519).

⁷ In-region interLATA services refer to the interLATA services originating in any of the states in which a BOC or any of its affiliates was authorized to provide wireline telephone exchange service under the MFJ.

⁸ Out-of-region interLATA services refer to the interLATA services originating outside the states in which a BOC or any of its affiliates was authorized to provide wireline telephone exchange service under the MFJ; incidental interLATA services are the interLATA provision by a BOC or its affiliate of such services as audio and video programming, alarm monitoring services, two-way interactive video or Internet services over dedicated facilities to or for elementary and secondary schools, commercial mobile services, and certain other services listed in subsection (g) of section 271; and termination means the provision of termination as opposed to origination for interLATA services.

- (3) Section 271 sets out the substantive and procedural requirements for the RBOCs' provision of in-region interLATA services; and
- (4) Section 271 provides some protections for the RBOCs during the initial transition period after enactment of the Act. These include limitations on joint marketing of long distance services and resale of local services obtained from an RBOC by other telecommunications carriers (e.g., long distance service providers), limitations on state authority to impose intraLATA toll dialing parity on RBOCs, and authorization of RBOCs to continue offering any services permitted previously by the MFJ before enactment of the Act.

For a better understanding of the context, I present a schematic example that shows the relationships between different types of services involving the LATA concept in Figure 4.1.



Source: Author's construct

Figure 4.1: The relationships among intraLATA, interLATA, intrastate, and interstate services

Under Section 271 of the 1996 Act, SBC (Ameritech before it was merged with SBC) could not provide interLATA services between Columbus and Cleveland (an intrastate interLATA service) or between Columbus and Pittsburgh (an interstate interLATA service), if the calls are originated in Ohio (i.e., in-region interLATA services), until it received approval from the FCC in October 2003. As shown in Figure 4.1, sometimes a LATA may exceed the state boundary. The Cincinnati LATA⁹ covers Covington, Kentucky and some part of southeastern Indiana.

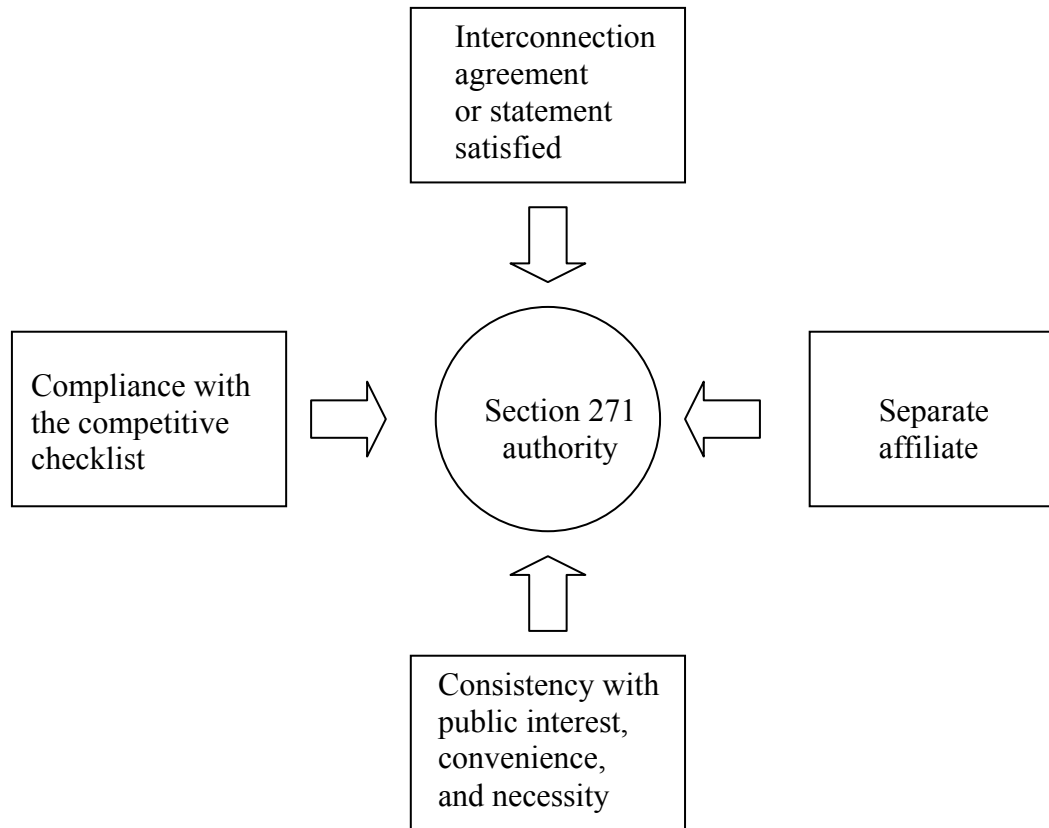
With this information, I turn to discussions of the substantive and procedural requirements that govern the RBOCs' applications for provision of in-region interLATA services. I then briefly discuss measures that are intended to establish a fair competitive environment between the RBOCs and the other telecommunications providers.

4.2.1 Substantive Requirements for RBOC Entry into In-region InterLATA Markets

For a Bell Operating Company or its affiliate to enter in-region interLATA markets, it has first to satisfy the conditions set out in Section 271 of the Telecommunications Act of 1996. The legal requirements of Section 271 contain both substantive and procedural conditions. In this subsection, I first discuss the substantive requirements for RBOC entry into interLATA markets in their own local service territories.

⁹ Cincinnati Bell serves this area. However, Cincinnati Bell was not subject to Section 271.

There are four substantive requirements that an RBOC must satisfy to get the FCC approval of interLATA entry in its own local service territory pursuant to Section 271 of the 1996 Act. They are (1) the petitioning BOC must provide access and interconnection to its network facilities, either through agreements with competing providers or through a state commission-approved statement of generally available terms and conditions in case there is no request for interconnections; (2) the BOC must meet the 14 items of the competitive checklist regarding access and interconnection set out in Section 271(c)(2)(B) of the Act; (3) the BOC must provide its interLATA services through a separate affiliate that satisfies certain structural and transactional requirements set forth in Section 272; and (4) the requested authorization should be consistent with the public interest, convenience, and necessity. Figure 4.2 shows schematically these four substantive requirements. Following the figure, I discuss these four substantive requirements and related issues in greater detail.



Source: Author's construct

Figure 4.2: Substantive requirements for RBOC Section 271 authority

4.2.1.1 Agreement or Statement

The first requirement is that the BOC in a state in which it seeks the FCC's approval for interLATA services (1) has entered into one or more binding agreements approved by the state regulatory commission with one or more unaffiliated competing providers of local exchange service, under which it provides access and interconnection to its network facilities ("Track A"),¹⁰ or (2) has not received a request for access and interconnection from a competitor during the period of 10 months after enactment of the 1996 Act and 3 months before the BOC's application for Section 271 authority, but has obtained approval from the state regulatory commission of a statement of the terms and conditions that the BOC generally offers to provide access and interconnection ("Track B").¹¹

In order for Track A conditions to be satisfied, the competing providers with which the BOC has entered into access and interconnection agreements should provide local telephone exchange service to residential and business subscribers either *exclusively* over their own telephone exchange facilities or *predominantly* over their *own* facilities in combination with the resale of another carrier's telecommunications services. Since the Telecommunications Act of 1996 provides three alternative ways of local market entry (i.e., facilities-based entry, unbundled network elements, and resale) for competitors, a

¹⁰ 47 U.S.C. § 271(c)(1)(A). Entry pursuant to this subsection is thus called "Track A."

¹¹ 47 U.S.C. § 271(c)(1)(B). Entry pursuant to this subsection is thus called "Track B."

question may arise as to whether the competitors providing service over leased facilities from an RBOC, i.e., unbundled network elements (UNEs),¹² meet the category of providers specified in Track A conditions.

Clearly, Section 271(c)(1)(A) excludes a competitor providing service solely based on resale of another carrier's telecommunications service. Whether or not the unbundled network elements are treated as the competitors' "own" facilities has an important implication for RBOC Section 271 entry and hence market competition. If, in fact, the FCC interprets the phrase "over their *own* [italics added] telephone exchange service facilities" that it requires the competitors to rely either exclusively or predominantly on the facilities they own, excluding any leased facilities on an unbundled basis from an RBOC, it may make the RBOCs much more difficult to get the FCC approval based on Track A because it takes significant time and investment to build a local exchange network. Furthermore, this interpretation may make the Section 271 process vulnerable to "gaming" by the competitors to prevent the RBOCs from entering long distance markets. However, the FCC interpreted the phrase that a competitor's use of UNEs to provide service qualifies Track A conditions, by treating those elements as the competitor's "own" facilities for the purpose of Track A. And this interpretation was backed by the legislative history of the Act (Sloan, 1998).

¹² Under the 1996 Act, incumbent local exchange carriers (ILECs) are required to provide, to any requesting telecommunications carrier, nondiscriminatory access to network elements on an unbundled basis at any technically feasible point on rates, terms, and conditions that are just, reasonable, and nondiscriminatory. The term 'network element' is defined as a facility or equipment used in the provision of a telecommunications service, and it includes features, functions, and capabilities provided by means of such facility or equipment—such as subscriber numbers, databases, signaling systems, etc. See 47 U.S.C. §§ 3(a) and 251(c).

Another issue related to Section 271(c)(1)(A) is the requirement that, to satisfy the Track A conditions for an RBOC application, the *competing providers* must provide telephone exchange service to residential *and* business subscribers. In its decision about the SBC's application for Section 271 entry in Oklahoma in June, 1997, the FCC concluded that SBC did not meet the requirements of Section 271(c)(1)(A) because the only competitor in the state at the time of application, Brooks Fiber, did not provide competing residential service (FCC, 1997, June 26).¹³ This decision was based on the fact that Brooks Fiber provided residential service by resale of SBC's local exchange service to four of its employees on a test basis free of charge in addition to serving twenty business customers predominantly over its own facilities. Moreover, Brooks Fiber was not accepting any request in Oklahoma for residential service at the time. The FCC concluded that, for the purposes of Section 271(c)(1)(A), "the *competing provider* must actually be in the market, and, therefore, beyond the testing phase" (FCC, 1997, June 26, ¶ 17). That is, the FCC interpreted the term "competing provider" in Section 271(c)(1)(A) to suggest that there must be "an actual commercial alternative to the BOC in order to satisfy Section 271(c)(1)(A)" (FCC, 1997, June 26, ¶ 14).

Section 271(c)(1)(B) (Track B) provides an alternative path for the RBOCs to apply for interLATA entry in their local service territories through a statement of generally available terms and conditions, approved by the relevant state regulatory commission, with regard to access and interconnection services offered to the

¹³ The FCC also concluded that the SBC may not pursue interLATA entry in Oklahoma under section 271(c)(1)(B) (i.e., Track B) because SBC has received "qualifying requests" for access and interconnection that, if implemented, would satisfy the requirements of section 271(c)(1)(A).

competitors. One issue relating to the requirements of Track B that has been debated in the early applications for Section 271 entry was that when a request for access and interconnection can be regarded as a “qualifying request” by which Track B is foreclosed as a path for the RBOCs to pursue under Section 271(c)(1)(B). The RBOCs argued in their Section 271 applications that only *operational* (i.e., already providing service) facilities-based competing providers may submit qualifying requests that preclude a BOC from proceeding under Track B (FCC, 1997, June 26). However, as the FCC points out, this interpretation of a qualifying request ignores the possibility of an incentive for a BOC to delay the provision of network facilities to prevent competitors from becoming operational. The Department of Justice (DOJ)’s comments noted that the result would be the Section 271(c)(1)(B) rewards “the BOC that failed to cooperate in implementing an agreement for access and interconnection and thereby prevented its competitor from becoming operational” (DOJ, 1997, May 16, p. 17).

On the other hand, opponents of the RBOCs’ Section 271 applications argued that *any* request for access and interconnection submitted by a potential competitor to a BOC is a qualifying request that precludes the BOC from pursuing Track B.¹⁴ This interpretation of a qualifying request is also subject to the same criticism of ignoring the potential incentive for strategic “gaming” of the negotiation process for interconnection agreements, but in this case by the potential competitors, not by the BOC. Because potential competitors can effectively preclude the BOC from proceeding under Track B by simply submitting a request for access and interconnection that, if implemented,

¹⁴ See discussions in FCC (1997, June 26).

would not meet the requirements of Section 271(c)(1)(A). Thus, the FCC properly concluded that a “qualifying request” under Section 271(c)(1)(B) is a request for access and interconnection that, if implemented, would satisfy the requirements of Section 271(c)(1)(A). In addition, the FCC determined that a request does not have to be made by an *operational* competing provider, but rather it can be made by a *potential* provider.

4.2.1.2 Compliance with the Competitive Checklist

The BOC must meet the requirements of the 14-point “competitive checklist” in order to obtain authority for in-region interLATA services, either through access and interconnection agreements or through a statement of generally available terms and conditions. Table 4.1 provides the list of 14 items that the BOC must satisfy.¹⁵

¹⁵ See 47 U.S.C. § 271(c)(2)(B).

Item Number	Requirements
1	Interconnection in accordance with the requirements of sections 251(c)(2) and 252(d)(1).
2	Nondiscriminatory access to network elements in accordance with the requirements of sections 251(c)(3) and 252(d)(1).
3	Nondiscriminatory access to the poles, ducts, conduits, and rights-of-way owned or controlled by the Bell operating company at just and reasonable rates in accordance with the requirements of section 224.
4	Local loop transmission from the central office to the customer's premises, unbundled from local switching or other services.
5	Local transport from the trunk side of a wireline local exchange carrier switch unbundled from switching or other services.
6	Local switching unbundled from transport, local loop transmission, or other services.
7	Nondiscriminatory access to 911 and E911 services, directory assistance services to allow the other carrier's customers to obtain telephone numbers, and operator call completion services.
8	White pages directory listings for customers of the other carrier's telephone exchange service.
9	Until the date by which telecommunications numbering administration guidelines, plan, or rules are established, nondiscriminatory access to telephone numbers for assignment to the other carrier's telephone exchange service customers. After that date, compliance with such guidelines, plan, or rules.
10	Nondiscriminatory access to databases and associated signaling necessary for call routing and completion.
11	Until the date by which the Commission [FCC] issues regulations pursuant to section 251 to require number portability, interim telecommunications number portability through remote call forwarding, direct inward dialing trunks, or other comparable arrangements, with as little impairment of functioning, quality, reliability, and convenience as possible. After that date, full compliance with such regulations.
12	Nondiscriminatory access to such services or information as are necessary to allow the requesting carrier to implement local dialing parity in accordance with the requirements of section 251(b)(3).
13	Reciprocal compensation arrangements in accordance with the requirements of section 252(d)(2).
14	Telecommunications services are available for resale in accordance with the requirements of sections 251(c)(4) and 252(d)(3).

Table 4.1: The 14-point competitive checklist

As the FCC (1997, August 19) points out, the competitive checklist prescribes certain, minimum access interconnection requirements that are necessary to open the local exchange market to competition. And the FCC may not limit or extend the terms set forth in the competitive checklist.¹⁶ I discuss each checklist item in the following.¹⁷

(1) Interconnection

The BOC must allow requesting telecommunications carriers to physically link their communications networks to its network for mutual exchange of traffic.¹⁸

Interconnection is necessary so that customers of one company can call customers served another company—i.e., calls between the BOC and competitive local exchange carriers (CLECs). The interconnection should be available at any technically feasible point within the BOC's network and the quality of interconnection should be at least equal to that provided by the BOC to itself or to any of its affiliates or other parties, on rates, terms, and conditions that are just, reasonable, and nondiscriminatory.

¹⁶ 47 U.S.C. § 271(d)(4).

¹⁷ The description of the 14 items heavily draws on the FCC's summary of 14-point competitive checklist (FCC, 1999, December 22).

¹⁸ 47 U.S.C. § 271(c)(2)(B)(i).

(2) Nondiscriminatory access to unbundled network elements

The BOC must provide, to any requesting telecommunications carrier, access to its network elements (e.g., loops, network interface devices,¹⁹ operations support systems,²⁰ etc.) at any technically feasible point on rates, terms, and conditions that are just, reasonable, and nondiscriminatory.²¹ One contentious issue relating to UNEs²² is the proper pricing method that is used to determine the prices for UNEs and interconnection provided by the ILECs to the competitors. Section 252(d)(1) of the Telecommunications Act of 1996 prescribes that determination of the “just and reasonable” rate for interconnection and UNEs “(A) shall be-- (i) based on the cost (determined without reference to a rate-of-return or other rate-based proceeding) of providing the interconnection or network element (whichever is applicable), and (ii) nondiscriminatory, and (B) may include a reasonable profit.”²³ In its *Local Competition Order* in 1996, the FCC adopted the “total element long run incremental cost” (TELRIC) methodology

¹⁹ The term ‘network interface devices’ (NID) is defined as any means of interconnecting the incumbent local exchange carrier’s loop distribution plant to the wiring at the customer premises. See FCC (2003, February 20).

²⁰ Operations support systems (OSS) consist of pre-ordering, ordering, provisioning, maintenance and repair, and billing functions supported by an incumbent local exchange carrier’s databases and information. See FCC (2003, February 20).

²¹ 47 U.S.C. § 271(c)(2)(B)(ii).

²² Another hotly debated policy issue relating to UNEs in the context of ILECs as a whole v. local competitors is the scope of UNEs that the ILECs must provide to competitors pursuant to 47 U.S.C. § 251(c)(3).

²³ 47 U.S.C. § 252(d)(1).

which is based on forward-looking economic cost (FCC, 1996, August 8). Under a TELRIC methodology, the prices for interconnection and UNEs provided by the ILECs to the competitors should be set to recover the forward-looking costs directly attributable to the specified element, plus a reasonable share of forward-looking joint and common costs.

A forward-looking economic cost methodology considers “what it would cost today to build and operate an efficient network (or expand an existing network) that can provide the same services as the incumbent’s existing network” (FCC, 2003, September 15, ¶ 30). This methodology assumes the most efficient technology currently available, given the ILECs’ existing wire center locations (FCC, 1996, August 8). Thus, according to the FCC, a forward-looking cost methodology closely approximates the costs that would occur in a competitive market, and it can give potential competitors efficient price signals in deciding whether to build their own networks or to buy the ILECs’ facilities (FCC, 2003, September 15).

The views of TELRIC and its forward-looking cost methodology vary. For example, Gabel & Rosenbaum (2000) agree with the FCC that TELRIC-based pricing allows efficient entry because competitors can obtain access to the ILECs’ networks at a price that reflects the social cost of making the resources available. They also present counter evidence against the large ILECs’ contention that the failure to compensate for their past investments, i.e., historical cost, may lead to a taking that is prohibited by the U.S. Constitution.²⁴ In contrast, some critics assert that the FCC’s forward-looking

²⁴ The takings clause of the Fifth Amendment of the U.S. Constitution states that, “nor shall private property be taken for public use, without just compensation.” U.S. Const. amend. V.

TELRIC methodology creates incentives for excessive unbundling requests by new entrants, discourages network investment by the ILECs, creates inefficiency in the market, and thereby harms consumer welfare (Sidak & Spulber, 1998).²⁵ However, the U.S. Supreme Court affirmed the FCC's TELRIC rules in *Verizon v. FCC* (2002),²⁶ by stating that the rules are consistent with the competitive purposes of the 1996 Act.²⁷

There are other methodologies that can be used for pricing of interconnection and UNEs, which were rejected by the FCC. One of them is historical cost or embedded cost. Historical cost or embedded cost refers to the cost that firms incurred in the past at the time an input or resource is purchased, which is not necessarily equal to the economic (current or future) cost of replacing the input or resource (Gabel, 1996). Historical costs are accounting costs recorded in the books of account. As the FCC (2003, September 15) points out, generally, historical costs have been used in the traditional rate-base/rate-of-return regulation.

Today historical costs are largely rejected by regulators and scholars because the use of it does not send a right signal to potential entrants for their investment decisions.

²⁵ In a similar fashion, Hausman & Sidak (1999) and Jorde, Sidak, & Teece (2000) argue that mandatory unbundling itself imposes social costs by distorting the incentives of both incumbents and new entrants. See, however, Braunstein (2003) and Phoenix Center for Advanced Legal & Economic Public Policy Studies (2003, July 9, 2003, September 17) for counter arguments based on empirical analysis.

²⁶ *Verizon Communications, Inc. v. FCC*, 535 U.S. 467 (2002). For a discussion of this case, see Spiwak (2002).

²⁷ In a previous case, the U.S. Supreme Court also upheld the FCC's jurisdiction to establish rules including the pricing methodology for interconnection and UNEs to implement local competition provisions of the Telecommunications Act of 1996, ruling against the argument of some critics and states that the FCC does not have jurisdiction to make rules governing local competition. See *AT&T v. Iowa Utilities Board*, 525 U.S. 366 (1999).

In addition, since historical costs rely on the accounting records of the companies, it causes the reliability and information asymmetry problems. In other words, when the accuracy of the accounting information is questionable and the capacity of regulators in detecting any misbehavior relating to cost data is limited, a pricing method based on historical cost would produce inefficient market outcome. Moreover, if the prices of interconnection and UNEs are based on historical costs incurred by the ILECs, the inefficiencies included in the incumbents' costs may be passed to competitors and thereby cause additional burden to the customers of competitive providers. These results are anticompetitive, inefficient, and therefore inconsistent with the policy objectives of the 1996 Telecommunications Act.

Several scholars advocated the so-called “efficient component pricing rule” (ECPR) as a pricing standard for interconnection and UNEs (Baumol & Sidak, 1994a, 1994b; Sidak & Spulber, 1998).²⁸ The efficient component pricing rule states that the price of an input should be equal to “the input’s direct per-unit incremental cost plus the opportunity cost to the input supplier of the sale of a unit of input” (Baumol & Sidak, 1994a, p. 178). According to this rule, the prices of interconnection and UNEs should include any foregone profits by the ILECs because of providing interconnection and access to UNEs to competitors. The proponents claim that the ECPR realizes the efficient market outcome that would occur in an ideally competitive or contestable market by

²⁸ Sidak & Spulber (1998) proposes another version of the ECPR, market-determined efficient component pricing rule (M-ECPR), which limits the opportunity cost component of the ECPR by considering the constraint that competitive alternatives to the bottleneck facility impose on the incumbent’s maximum feasible price for access to the facility.

ensuring only efficient entrants can be profitable. They also argue that the ECPR is generally applicable because “it assigns the supplier’s task to the firm that can do it most efficiently” (Baumol & Sidak, 1994a, p. 202).

However, the ECPR has been criticized on various grounds. Among others, some critics argue that if the prices of inputs (i.e., interconnection and access to UNEs) offered by the ILECs to competitors are above marginal costs and reflect the exercise of market power, then the ECPR will protect that market power by excluding rivals and prevent consumers from benefiting from competition (Economides, 2003; Economides & White, 1995, 1996). Similarly, the FCC (1996, August 8) rejected the ECPR as a pricing standard for interconnection and UNEs because it would discourage competition by relying on the ILECs’ existing retail prices that are not cost-based and may reflect monopoly rents. In addition, Gabel and Rosenbaum (2000) point out that the ECPR requires a significant amount of additional data compared to TELRIC because it needs to quantify the foregone revenue. With respect to the general availability of the ECPR, Tye (1994) challenges the claim of the advocates of the ECPR, arguing that different regulatory regimes and different factual circumstances require different rules for pricing access.

A third alternative to TELRIC is Ramsey pricing. Under Ramsey pricing, also known as “inverse elasticity rule,” prices are inversely proportional to the corresponding demand elasticities (Mitchell & Vogelsang, 1991). As Train (1991) points out, however, Ramsey pricing may be problematic in certain situations because of inequity issues involved in it. In the context of interconnection and UNEs, Ramsey pricing would place higher prices for the most critical bottleneck network elements than other parts of the

network, since the demand for bottleneck elements is relatively inelastic. This is precisely why the FCC did not adopt Ramsey pricing for interconnection and UNEs, because Ramsey pricing would discourage competition and therefore is not consistent with the pro-competitive spirit of the Telecommunications Act of 1996 (FCC, 1996, August 8).

(3) Nondiscriminatory access to poles, ducts, conduits, and rights-of-way

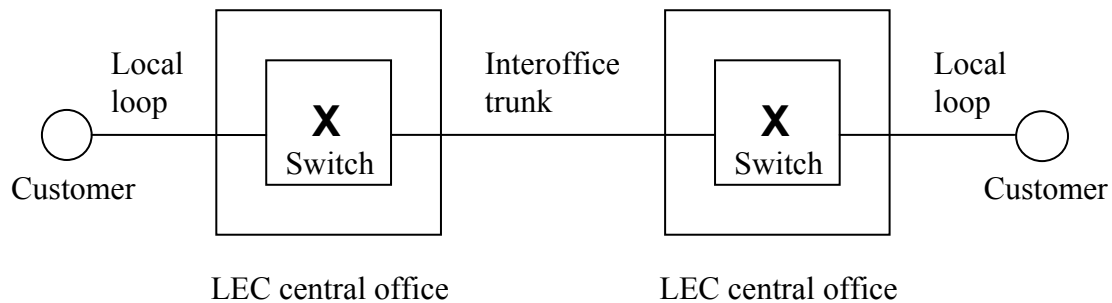
The BOC must demonstrate that competitors can obtain access to poles, ducts, conduits, and rights-of-way within reasonable time frames and on reasonable terms and conditions, with a minimum of administrative costs, and consistent with fair and efficient practices.²⁹ Nondiscriminatory access to the poles, ducts, conduits, and rights-of-way owned or controlled by the BOC at just reasonable rates ensures that competitors have an opportunity to deploy their own facilities to compete with the BOC. This obligation is part of the more general requirement, set out in Section 224 of the 1996 Act, which applies to any utility (C. H. Kennedy, 2001).

(4) Unbundled local loop transmission

As a precondition for RBOC interLATA market entry, Section 271(c)(2)(B)(iv) of the Telecommunications Act of 1996 requires the RBOCs to provide “local loop transmission from the central office to the customer’s premises, unbundled from local

²⁹ 47 U.S.C. § 271(c)(2)(B)(iii).

switching or other services.”³⁰ The FCC (1996, August 8) defined local loop as “a transmission facility between a distribution frame, or its equivalent, in an incumbent LEC central office, and the network interface device at the customer premises” (§ 380). For visual understanding, Figure 4.3 shows a simplified local telephone network structure that is relevant to discussions about checklist items (4), (5), and (6).



Source: Author’s construct

Figure 4.3: Local telephone network structure

To get the FCC approval of interLATA entry, the BOC must demonstrate that it has met the specific legal obligation to furnish loops on an unbundled basis and that it is currently doing so in the quantities that competitors reasonably demand and at an acceptable level of quality. Nondiscriminatory access to unbundled local loops ensures that competitors have nondiscriminatory access to the customer’s home or business when they have to rely on the BOC for this essential connection.

³⁰ 47 U.S.C. § 271(c)(2)(B)(iv).

(5) Unbundled local transport

The 1996 Act requires the RBOCs to offer local transport from the trunk side of a wireline local exchange carrier switch unbundled from switching or other services.³¹

Transport facilities are the trunks that connect different switches within the BOC's network or those switches with long distance carriers' facilities. The FCC interprets this requirement that the BOC should provide competitors with the transmission links on an unbundled basis that are dedicated to the use of that competitor as well as those shared with other carriers, including the BOC.

(6) Unbundled local switching

A switch connects loops to other loops, and connects loops to trunks for transporting a call to another central office or to a long-distance carrier. The 1996 Act requires that the BOC must provide local switching unbundled from transport, local loop transmission, or other services.³² Nondiscriminatory access to unbundled local switching is necessary for competitors to offer, and bill for, exchange access and the termination of local calls.

³¹ 47 U.S.C. § 271(c)(2)(B)(v).

³² 47 U.S.C. § 271(c)(2)(B)(vi).

(7) Nondiscriminatory access to 911 and E911 services, directory assistance services, and operator call completion services

The BOC must provide competitors with nondiscriminatory access to emergency 911 and wireless enhanced 911 services, directory assistance services, and operator call completion services.³³ This checklist item ensures that customers of competing providers have access to these services.

(8) White pages directory listings

White pages are the directory listings of telephone numbers of residential and business customers in a specific area. The BOC must provide competitors' customers with access to white pages directory listings.³⁴ That is, the BOC should not discriminate the customers of competitors compared to its own customers in white pages directory listings.

³³ 47 U.S.C. § 271(c)(2)(B)(vii).

³⁴ 47 U.S.C. § 271(c)(2)(B)(viii).

(9) Numbering administration

Prior to the Telecommunications Act of 1996, telephone numbers in the United States under the North American Numbering Plan (NANP)³⁵ were administered by AT&T until the divestiture of the Bell System. Bell Communications Research (Bellcore), which was created in 1984 at the divestiture, and the incumbent local exchange carriers assumed the task after the divestiture. Section 251(e)(1) of the Act, however, requires the FCC to “create or designate one or more impartial entities to administer telecommunications numbering and to make such numbers available on an equitable basis.”³⁶ Section 251(e)(1) further states that the FCC can delegate to state regulatory commissions or other entities all or any portion of its jurisdiction over numbering plan. In October 1997, the FCC established new rules for administration of North American Numbering Plan, designating Lockheed Martin IMS as the NANP Administrator (NANPA) and the National Exchange Carrier Association (NECA) as the Billing and Collection Agent for cost recovery relating to numbering administration

³⁵ The North American Numbering Plan (NANP) is the basic numbering plan permitting interoperable telecommunications service within the United States, Canada, Bermuda, and most of the Caribbean. The NANP began when, in the early 1940s, AT&T began to develop a numbering plan to ensure that the expansion of toll dialing would be guided by "principles in harmony with the ultimate incorporation of all networks into an integrated network of nation-wide scope." See FCC (1997, October 9).

³⁶ 47 U.S.C. § 251(e)(1).

activities (FCC, 1997, October 9).³⁷ Section 271(c)(2)(B)(ix) of the Act requires that, until the rules governing numbering administration were established, the RBOCs provide nondiscriminatory access to telephone numbers for assignment to competitors' customers, and that the RBOCs comply with the rules after the establishment.³⁸ This checklist item ensures that competing providers have the same access to new telephone numbers as the RBOCs.

(10) Nondiscriminatory access to databases and associated signaling

The BOC must demonstrate to the FCC that it provides competitors with the same access to the databases and associated signaling necessary for call routing and completion that it provides itself.³⁹ Access to call-related databases and associated signaling is necessary for competitors to transmit, route, complete, and bill for telephone calls.

³⁷ To address any potential neutrality concerns, the FCC required that the NECA establish a separate subsidiary to carry out the billing and collection function. Subsequently, the NECA incorporated the North American Billing and Collection, Inc. (NBANC) for that purpose in April 1998. In addition, the North American Numbering Plan administrative function was transferred from Lockheed to NeuStar in November 1999 to maintain neutrality of the administrator.

³⁸ 47 U.S.C. § 271(c)(2)(B)(ix).

³⁹ 47 U.S.C. § 271(c)(2)(B)(x).

(11) Number portability

According to the FCC, telephone number portability is “a service that provides residential and business telephone customers with the ability to retain, at the same location, their existing local telephone numbers when switching from one local telephone service provider to another.”⁴⁰ In the context of local competition, number portability is especially important to customers who want to change their local service provider from a BOC to a competitor, because without number portability customers would be reluctant to change their local telephone provider from a BOC to a competing carrier, considering the cost and inconvenience involved in the transfer. This means that lack of number portability can be a significant entry barrier to local competition. Thus, to be authorized for in-region interLATA services, the BOC must show that it provides number portability to competing carriers in a reasonable time frame.

Specifically, Section 271(c)(2)(B)(xi) of the 1996 Act requires that, until the time by which the FCC establishes regulations concerning number portability,⁴¹ the RBOCs provide interim number portability with as little impairment of functioning, quality, reliability, and convenience as possible, and that, after the establishment of the regulations, the RBOCs fully comply with the regulations.⁴²

⁴⁰ See FCC (2003, May 8).

⁴¹ The FCC established rules regarding long-term number portability implementation issues in August 1997 (FCC, 1997, August 18).

⁴² 47 U.S.C. § 271(c)(2)(B)(xi).

(12) Local dialing parity

Local dialing parity means that customers must be able to make local calls by dialing the same number of digits regardless of the provider of service. To receive authority to enter the interLATA market in their local service territory, the BOC must demonstrate that it provides local dialing parity to the customers of competing providers.⁴³

(13) Reciprocal compensation arrangements

Reciprocal compensation is an agreement between local service providers under which parties pay each other for completing calls originating from other providers. Section 271(c)(2)(B)(xiii) of the Act imposes a requirement on the BOC seeking in-region interLATA entry that the BOC must compensate other competing local service providers for the cost of transporting and terminating a local call from the BOC.⁴⁴ However, the Telecommunications Act of 1996 does not preclude arrangements that waive mutual payments, known as “bill-and-keep” arrangements.⁴⁵

⁴³ 47 U.S.C. § 271(c)(2)(B)(xii).

⁴⁴ 47 U.S.C. § 271(c)(2)(B)(xiii).

⁴⁵ 47 U.S.C. § 252(d)(2).

(14) Resale

Section 271(c)(2)(B)(xiv) of the 1996 Act requires the RBOCs to make their any retail telecommunications service available at wholesale rates to competing providers so that other carriers can resell the service to end users.⁴⁶ In doing so, the RBOCs cannot impose unreasonable or discriminatory conditions or limitations on the resale of telecommunications services. Resale is one of the three main market entry modes allowed by the Act, i.e., facilities-based entry (interconnection), unbundled network elements (UNEs)-based entry, and resale-based entry, by which potential local service competitors can enter the local market.

As discussed previously, however, while the RBOCs are required to offer their telecommunications services at wholesale rates for resale to competing providers, the presence of only resale-based competitors does not qualify for the Track A conditions set out in Section 271(c)(1)(A) for RBOC interLATA authority. This is because Section 271(c)(1)(A) of the Act requires that competing providers offer telephone exchange service either *exclusively* or *predominantly* over their *own* telephone exchange service facilities (including UNEs), although competitors may combine such telephone exchange service with the resale of the telecommunications services of another provider.

⁴⁶ 47 U.S.C. § 271(c)(2)(B)(xiv). In fact, this requirement for resale is imposed on all incumbent local exchange carriers by section 251(c)(4). See 47 U.S.C. § 251(c)(4).

4.2.1.3 Provision of InterLATA Services through a Separate Affiliate

The third substantive requirement for RBOC interLATA authority pursuant to Section 271 of the Telecommunications Act of 1996 is that the petitioning BOC must provide the interLATA services in the state where it requested Section 271 authority through a separate affiliate that satisfies the requirements set out in Section 272.⁴⁷

Section 272(a) requires an RBOC to establish a separate affiliate for origination of interLATA services in its local service territory that meets the structural and transactional requirements of Section 272(b).⁴⁸ The separate affiliate of an RBOC under Section 272 should (1) “operate independently from the Bell operating company”; (2) “maintain books, records, and accounts . . . [that are] separate” from those of the BOC; (3) “have separate officers, directors, and employees” from the BOC; (4) “may not obtain credit under any arrangement that would permit a creditor, upon default, to have recourse to the assets of the Bell operating company”; and (5) “conduct all transactions with the Bell operating company . . . on an arm’s length basis.”⁴⁹

However, the 1996 Act contains a sunset provision that allows the separate affiliate requirements of Section 272 for interLATA services to expire three years after a BOC is authorized to provide interLATA services pursuant to Section 271, unless the

⁴⁷ 47 U.S.C. § 271(d)(3)(B).

⁴⁸ 47 U.S.C. §§ 272(a)-(b).

⁴⁹ 47 U.S.C. § 272(b). Mandy (2000b) emphasizes that the structural requirements and separations safeguards are important in deterring sabotage by the RBOCs.

FCC extends such three-year period by rule or order.⁵⁰ As of December 31, 2003, the FCC did not extend such three-year period in the two applicable cases, letting the separate affiliate requirements of Section 272 sunset for Verizon in New York, effective December 23, 2002, and for SBC in Texas, effective June 30, 2003, respectively.

4.2.1.4 Consistency with the Public Interest, Convenience, and Necessity

The fourth substantive requirement for RBOC interLATA entry pursuant to Section 271 of the Telecommunications Act of 1996 is that “the requested authorization is consistent with the public interest, convenience, and necessity.”⁵¹ The concept of “public interest” is often vague and far from clear in most cases,⁵² and yet it has been used as a justification for many public policy and regulatory decisions. In the context of regulatory policy, the notion of public interest originated in the British common law and was imported into American legal usage in close connection with the development of public utility regulation.⁵³

⁵⁰ 47 U.S.C. § 272(f)(1).

⁵¹ 47 U.S.C. § 271(d)(3)(C).

⁵² See Mitnick (1980, chapter 4) for discussions about the concept of public interest.

⁵³ The first major court case in the United States involving the concepts of “public interest” and “public utility” was *Munn v. Illinois*, 94 U.S. 113 (1877). See chapter 2 of this dissertation for discussions about the case and public utility regulation.

According to Robinson (1989), the phrase “public interest, convenience, and necessity” first appears in the Transportation Act of 1920 at the federal level, which required a certificate of public interest, convenience, and necessity as a condition of constructing, acquiring, or abandoning any line of railroad. In the area of communications regulation, the phrase can be traced back to the 1920s during which a series of debates were held to develop a regulatory framework for the radio industry (Napoli, 2001). The result of the debates in the 1920s resulted in the Radio Act of 1927, which incorporated the phrase. Since the phrase “public interest, convenience, and necessity” was included in the Communications Act of 1934,⁵⁴ the *public interest* standard has been the guiding principle for the FCC in all aspects of communications regulation.

Although the public interest standard has been criticized by some critics as delegation of overbroad discretionary legislative power from Congress to administrative agencies including independent regulatory commissions,⁵⁵ the U.S. Supreme Court has long held that the FCC is given broad discretion by the standard under the

⁵⁴ In fact, the phrase “public interest, convenience, and necessity” appeared 11 times in the Communications Act of 1934 and 40 times in the Telecommunications Act of 1996 (Napoli, 2001). Sometimes the phrases “public interest” and “public interest, convenience, *or* necessity” were used instead of “public interest, convenience, *and* necessity.”

⁵⁵ This subject of “delegation doctrine” has been discussed among many scholars. See, for example, Aranson, Gellhorn, & Robinson (1982), Bressman (2000), and Schoenbrod (1985) for critical reviews of the delegation doctrine.

Communications Act of 1934.⁵⁶ However, this is not to say that the FCC's discretion in implementing the law is limitless. Rather, it has been widely held that while the public interest standard gives the FCC discretion to consider a broad range of factors in regulatory decision-makings, its interpretation is constrained by the purposes and context of regulatory legislation.⁵⁷

In applying the public interest standard to the Section 271 process, the U.S. Department of Justice (DOJ) suggested that the focus should be placed on *competition* in telecommunications markets. The DOJ, in its evaluation of SBC's application for 271 authority in Oklahoma, states that, to satisfy the public interest standard, the local market in the relevant state should be "fully and irreversibly open" to competition (DOJ, 1997, May 16, p. 41).⁵⁸ While the FCC gives "substantial weight" to the DOJ's recommendation as required by the Telecommunications Act of 1996, it emphasizes that the ultimate decisionmaking regarding whether an RBOC's Section 271 application is consistent with the public interest is vested with it (FCC, 1997, August 19).

The FCC (1997, August 19) states that its public interest analysis "should focus on the status of market-opening measures in the relevant local exchange market" (§ 385). In addition, the FCC also stated to take into consideration many other factors, including,

⁵⁶ See, for example, *FCC v. WNCN Listeners Guild*, 450 U.S. 582 (1981) that ruled that "The public interest standard of the Communications Act of 1934 . . . is a supple instrument for the exercise of discretion by the Federal Communications Commission, which is the expert body Congress has charged to carry out its legislative policy."

⁵⁷ For example, in *FCC v. RCA Communications, Inc.*, 346 U.S. 86, 90 (1953), the U.S. Supreme Court held that the public interest standard should "not to be too indefinite for fair enforcement."

⁵⁸ Schwartz (1997a) supports this standard, arguing that "By far the best test of whether the local market has been opened to competition is whether meaningful competition emerges" (§ 20).

but not limited to, an assessment of whether all procompetitive entry strategies (i.e., facilities-based, unbundled network elements, resale, and any combination of these methods of entry) are available to new entrants; an assessment of the effect of RBOC interLATA entry on competition in the long distance market; an assessment of whether conditions are such that the local market will remain open. In addition to promoting competition, Sloan (1998) suggests that the FCC should also pay attention to maintaining service quality and protecting telephone subscribers in its public interest analysis.

As a related issue, one might argue that the public interest standard is satisfied when an RBOC fully complies with the competitive checklist discussed earlier. However, as both the FCC (1997, August 19) and the DOJ⁵⁹ made it clear, the compliance with the competitive checklist alone is not sufficient for approval of Section 271 entry. Instead, the public interest standard should be considered as a separate requirement for RBOC entry into the in-region interLATA market under Section 271 of the Telecommunications Act of 1996.

4.2.2 Procedural Requirements for RBOC Entry into In-region InterLATA Markets

In addition to the substantive requirements discussed above, there are certain procedural requirements that must be followed in the Section 271 process under the Telecommunications Act of 1996. They are as follows.

⁵⁹ See Turetsky (1996), Deputy Assistant Attorney General at the time, who stresses the importance of public interest requirement in addition to the competitive checklist in the Section 271 process.

First, an RBOC or its affiliate seeking authorization to provide interLATA services in its local service territory should apply to the FCC on a state-by-state basis.⁶⁰

Second, before making any determination about the application filed by RBOCs or their affiliates, the FCC must consult with the Attorney General (Department of Justice) and the relevant state regulatory commission. The Department of Justice provides the FCC with “an evaluation of the application using any standard the Attorney General considers appropriate,” and the FCC must give “substantial weight” to the DOJ’s evaluation, although such evaluation does not have any preclusive effect on any FCC decision.⁶¹ In addition, before making its decision about the application, the FCC must consult with the relevant state regulatory commission to verify the compliance of the BOC with the requirements set forth in Section 271(c).⁶²

Third, the FCC must make a written determination approving or denying the Section 271 authority for each state, within 90 days after it received an application for RBOC interLATA entry.^{63, 64} These procedural requirements can be summarized schematically as shown in Figure 4.4.

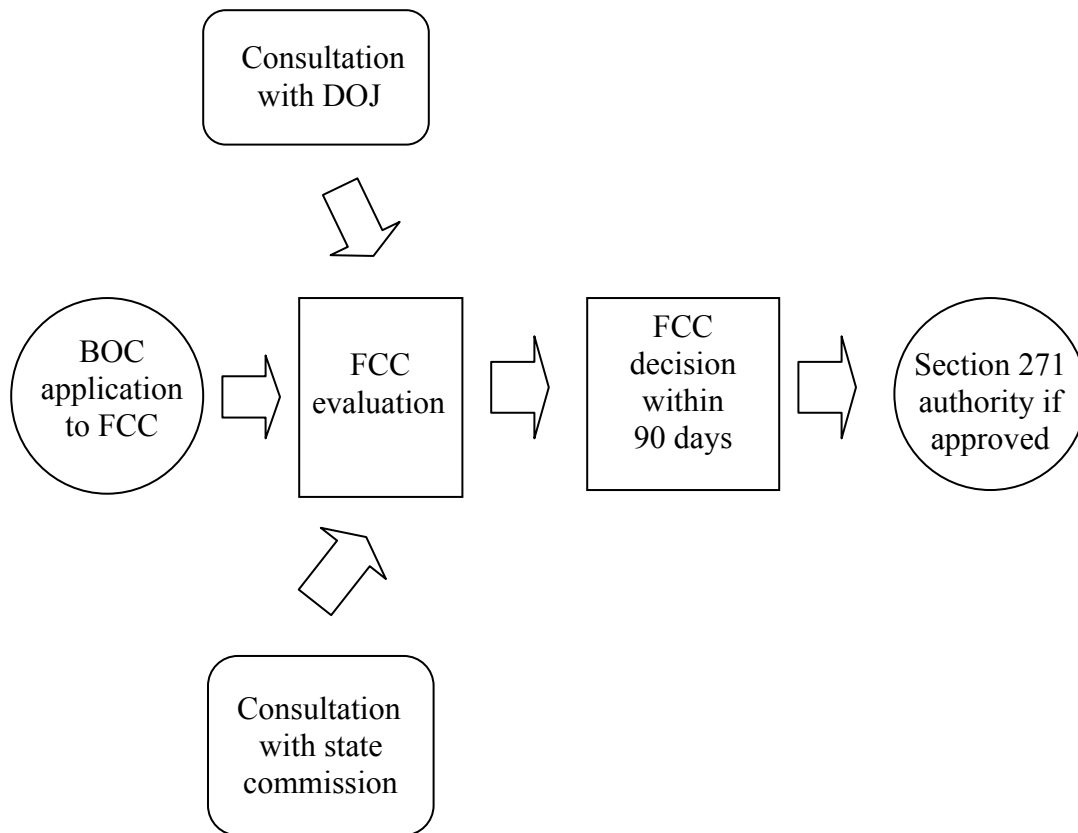
⁶⁰ 47 U.S.C. § 271(d)(1).

⁶¹ 47 U.S.C. § 271(d)(2)(A).

⁶² 47 U.S.C. § 271(d)(2)(B).

⁶³ 47 U.S.C. § 271(d)(3).

⁶⁴ In addition, the FCC should publish a brief description of the determination in the Federal Register within 10 days after issuing a written determination. See 47 U.S.C. § 271(d)(5).



Source: Author's construct

Figure 4.4: Procedural requirements for RBOC Section 271 authority

4.2.3 Measures for the RBOCs during the Transition Period

Since the Section 271 process occurred on a state-by-state basis instead of on a regional basis, the complete Section 271 approvals for all RBOCs took almost eight years after enactment of the Telecommunications Act of 1996. As Huber, Kellogg, and Thorne (1996) observe, the Act contains several provisions that are designed to protect the RBOCs during this transition period. There are three policy measures adopted in the Act as described below.

First, a telecommunications carrier that serves more than five percent of the nation's presubscribed access lines may not jointly market in a state its interLATA services with resold RBOC local service. This restriction applies until the RBOC gets the Section 271 authority to provide interLATA services in the state, or until three years after enactment of the 1996 Act.⁶⁵ This limitation to joint marketing appears to be targeted mainly toward the incumbent long distance carriers, such as AT&T, MCI, and Sprint.

Second, except for single-LATA states and states that have issued an order by December 19, 1995, which requires an RBOC to implement intraLATA toll dialing parity, a state may not require an RBOC to implement intraLATA toll dialing parity in that state until the RBOC has been authorized to provide interLATA services originating in that state, or until three years after enactment of the 1996 Act.⁶⁶ It is perhaps worth pointing

⁶⁵ 47 U.S.C. § 271(e)(1).

⁶⁶ 47 U.S.C. § 271(e)(2)(B).

out that this limitation to intraLATA *toll* dialing parity requirement should not be confused with *local* dialing parity that is included in the competitive checklist as a requirement for RBOC interLATA entry.⁶⁷

Third, the 1996 Act allows the RBOCs and their affiliates to engage in activities previously authorized by the MFJ court.⁶⁸

It seems that these provisions are intended to create a fair competition ground for all telecommunications carriers including the RBOCs. In other words, while the RBOCs' incentives for and abilities of discrimination against rival companies need to be properly controlled by conditioning the RBOCs' entrance into the competitive markets upon the opening of their local markets to competition, it is equally important to prevent other telecommunications carriers from taking advantage of conditions that may be created from imposing undue burdens on the RBOCs.

4.3 Status and Progress of RBOC InterLATA Entry

Since enactment of the Telecommunications Act of 1996, Section 271 authority to provide in-region interLATA services was one of the most contentious issues among the telecommunications carriers. Thus, the process was not as fast as some would have expected. As mentioned, it took almost eight years from enactment of the 1996 Act

⁶⁷ See 47 U.S.C. § 271(c)(2)(B)(xii).

⁶⁸ In July 1991, Judge Greene reluctantly lifted the restrictions on BOC provision of information services as a result of a ruling by the Court of Appeals (G. W. Brock, 1994).

(February 1996) to completion of the Section 271 approvals for all 49 jurisdictions (December 2003) served by the RBOCs for which the RBOCs are required to receive approvals from the FCC to provide interLATA long distance services under Section 271 of the Act. Table 4.2 shows the history of RBOC Section 271 applications (1997-2003).

State	Company	Status	Date Filed	Date Resolved
Michigan	Ameritech ¹⁾	Withdrawn	1/02/97	2/11/97
Oklahoma	SBC	Denied	4/11/97	6/26/97
Michigan	Ameritech ¹⁾	Denied	5/21/97	8/19/97
South Carolina	BellSouth	Denied	9/30/97	12/24/97
Louisiana	BellSouth	Denied	11/6/97	2/4/98
Louisiana	BellSouth	Denied	7/9/98	10/13/98
New York	Bell Atlantic ²⁾	Approved	9/29/99	12/22/99
Texas	SBC	Withdrawn	1/10/00	4/05/00
Texas	SBC	Approved	4/5/00	6/30/00
Massachusetts	Verizon	Withdrawn	9/22/00	12/18/00
Kansas, Oklahoma	SBC	Approved	10/26/00	1/22/01
Massachusetts	Verizon	Approved	1/16/01	4/16/01
Missouri	SBC	Withdrawn	4/4/01	6/7/01
Connecticut	Verizon	Approved	4/23/01	7/20/01
Pennsylvania	Verizon	Approved	6/21/01	9/19/01
Arkansas, Missouri	SBC	Approved	08/20/01	11/16/01
Georgia, Louisiana	Bellsouth	Withdrawn	10/02/01	12/20/01
Rhode Island	Verizon	Approved	11/26/01	2/24/02
New Jersey	Verizon	Withdrawn	12/20/01	3/20/02
Vermont	Verizon	Approved	1/17/02	4/17/02
Georgia, Louisiana	BellSouth	Approved	2/14/02	5/15/02
Maine	Verizon	Approved	3/21/02	6/19/02
New Jersey	Verizon	Approved	03/26/02	06/24/02
Colorado, Idaho, Iowa, Nebraska, North Dakota	Qwest	Withdrawn	06/13/02	09/10/02
Alabama, Kentucky, Mississippi, North Carolina, South Carolina	BellSouth	Approved	06/20/02	09/18/02
New Hampshire, Delaware	Verizon	Approved	06/27/02	09/25/02
Montana, Utah, Washington, Wyoming	Qwest	Withdrawn	07/12/02	09/10/02
Virginia	Verizon	Approved	08/01/02	10/30/02
Florida, Tennessee	BellSouth	Approved	09/20/02	12/19/02
California	SBC	Approved	09/20/02	12/19/02
Colorado, Idaho, Iowa, Montana, Nebraska, North Dakota, Utah, Washington, Wyoming	Qwest	Approved	09/30/02	12/23/02
District of Columbia, Maryland, West Virginia	Verizon	Approved	12/18/02	03/19/03
Nevada	SBC	Approved	1/14/03	04/14/03
New Mexico, Oregon, South Dakota	Qwest	Approved	1/15/03	04/15/03
Michigan	SBC	Withdrawn	1/15/03	04/16/03
Minnesota	Qwest	Approved	2/28/03	06/26/03
Michigan	SBC	Approved	6/19/03	9/17/03
Illinois, Indiana, Ohio, Wisconsin	SBC	Approved	7/17/03	10/15/03
Arizona	Qwest	Approved	9/4/03	12/03/03

Note: 1) Now part of SBC; 2) Now part of Verizon

Source: FCC (2003)

Table 4.2: History of RBOC Section 271 applications (1997-2003)

As shown in Table 4.2, the process has been slow for the first five years (1996-2000), but it has been relatively rapid in recent years. To see this more clearly, I broke down the Section 271 applications by year and types of resolution in Table 4.3.

Year	Total Number of Applications	Number of Approved Applications*	Number of Denied Applications	Number of Withdrawn Applications	Approval Rate (%)**
1997	4		3	1	0
1998	2		2		0
1999	1	1			100
2000	3	1 (2)		2	33.33
2001	9	7 (9)		2	77.78
2002	29	26 (35)		3	89.66
2003	15	14 (49)		1	93.33

Note: 1) Assignment of applications to each year is based on the date when the application reached a resolution by the FCC.

2) * Numbers in parentheses are the cumulative numbers of approved applications.

** Approval rate is calculated from dividing the total number of applications by the number of approved applications in the year.

Source: Author's construct based on FCC data

Table 4.3: The results of the Section 271 applications by resolution

As shown in Table 4.3, the first six applications for Section 271 authority to provide in-region interLATA services in four states (Michigan, Oklahoma, South Carolina, and Louisiana) were either denied by the FCC or withdrawn by the applicant itself. Since Ameritech's first application for Michigan was withdrawn by the company

because of its anticipated failure to get FCC approval,⁶⁹ it is fair to state that all six RBOC applications for Section 271 authority failed to satisfy the requirements set forth in Section 271 of the Act.

The first FCC approval of RBOC application for Section 271 authority was granted to Verizon to provide interLATA services in New York in December 1999. Still only two applications were approved by the FCC until almost five years (1996-2000) had passed since enactment of the Act as of year-end 2000, including SBC's application for Texas. However, the Section 271 process gained speed from 2001 by authorizing seven applications in that year, and it was even more accelerated in 2002 by granting 26 applications in that year alone, which exceeds the total number of approvals (9 approvals) given during the first six years after enactment of the 1996 Act (1996-2001). The Section 271 process was completed in December 2003, as the last approval was given to Qwest to provide interLATA services in Arizona.

There might be several alternative explanations for the apparently different paces over the eight years under which Section 271 authority was given to the RBOCs. One way of explaining the phenomenon is that it is a result of progression over time, since companies (and perhaps regulators) learned lessons and techniques to adjust their behavior so as to speed up the Section 271 process as they got more experienced over the

⁶⁹ Ameritech withdrew its application for section 271 authority in Michigan because the FCC determined that the interconnection agreement between Ameritech and AT&T upon which the application was based was invalid. See FCC (1997, February 7).

years.⁷⁰ This means that the relatively rapid authorizations of Section 271 applications in the last two to three years are expected results, because local markets have become more competitive and more open to new entrants through local competition measures and other regulation activities by the federal and state regulators in combination with the RBOCs' voluntary and involuntary cooperation with market opening measures, and with technological developments. This explanation might be called an "economic-technological perspective." One potential problem with this perspective is that it may ignore the role and influence of regulators and politicians in agenda setting and decisionmaking process.

An alternative way of viewing the differing speed of Section 271 approvals is that it is largely related to the change in political climate surrounding the FCC and its policy toward telecommunications competition and regulation in general. This explanation might be called a "political perspective." According to this view, the seemingly loosened Section 271 process during the recent three-year period (2001 - 2003) compared to that of the first five-year period (1996-2000) is likely to have been affected by the change of administration within the federal government—from a Democratic administration to a Republican administration—and the subsequent change of commission composition of the FCC, which occurred in 2001. There is a conventional wisdom held by the American public that a Republican government is more lenient to businesses—especially large

⁷⁰ For example, the FCC issued guidelines for performance measurements and reporting requirements with respect to the operations support systems (OSS) in April 1998. This led to third-party OSS tests and the widespread development of post-section 271 performance assurance plans in subsequent section 271 application processes. See FCC (1998, April 17).

businesses—than a Democratic government.⁷¹ Therefore, deregulatory policies are more likely to be taken under a Republican government.⁷² According to this perspective, the Section 271 process may be one such example. One potential problem with this view is that it does not take full account of economic and technological factors, and that it is inconsistent with a major deregulation experience in the late 1970s.⁷³

Thus, it is perhaps fair to say that both explanations, to some extent, contribute to our understanding of the progress of the Section 271 process over the last eight years. In other words, it is not so surprising to see more approvals in recent years rather than in early years of the Section 271 process because market competition in local markets has been slowly developed over the years due at least in part to its economic and technological characteristics, thus making the recent Section 271 applications more acceptable at the state and federal levels. At the same time, it would be perhaps unreasonable to assume that the change in the political environment including commission composition of the FCC—Republican commissioners being the majority—did not play a role in the process.⁷⁴

⁷¹ Of course, this is a very simplified statement because individuals may have different orientations toward businesses. However, it seems justifiable as far as the general public sentiment about the two political parties is concerned.

⁷² Recall that a sweeping deregulation movement was undertaken during the Reagan administration in the 1980s.

⁷³ For example, under the Carter administration (a Democratic one), the airline industry was fully deregulated in terms of economic regulation.

⁷⁴ Abel (1999) found that party affiliation in the state regulatory commissions influence the deregulation process in the local telephone industry. See also Cohen (1992) and Teske (1990) for the influence of political environment on regulatory decisionmaking at the state commissions.

4.4 Competitive Implications of RBOC Provision of Long Distance Telephone Service: Literature Review

As Sloan (1998) properly observes, Section 271 of the Telecommunications Act of 1996 should be regarded as a mechanism for allowing the RBOCs to enter the interLATA market in a way that promotes both long distance and local competition. However, with regard to the effects of RBOC entry into interLATA long distance market on competition in local and long distance markets, there is no consensus in the existing literature. Many analysts differ as to whether the RBOCs' entry into the long distance markets in their local service territory would bring more competition in the markets and more benefits to consumers.

On the one hand, proponents argue that the interexchange long distance market is not competitive so that allowing the RBOCs to enter the market would make the long distance market more competitive and efficient. In addition, they assert that RBOC entry into interLATA long distance markets would bring more benefits to consumers such as lower long distance prices and so-called one-stop shopping by integrating both local and long distance services.⁷⁵ Proponents also maintain that, through vertical integration, the RBOCs would be able to provide services at lower cost due to economies of scope using their existing network facilities. Therefore, from this perspective, RBOC entry into interLATA long distance markets should be allowed as quickly as possible (Brandon & Schmalensee, 1995; Crandall, 1989; Crandall & Hazlett, 2000; Hausman, Leonard, &

⁷⁵ Of course, the long distance carriers argue that they can provide one-stop shopping, too, if the RBOCs sell their local services to the long distance carriers at appropriate wholesale rates as required by the 1996 Act.

Sidak, 2002; Higgins & McDonald, 1995; Hinton, Zona, Schmalensee, & Taylor, 1998; Kahn, 1998; MacAvoy & Williams, 2002; Sappington & Weisman, 1996a; Sibley & Weisman, 1998a, 1998b; Weisman, 1995).

For example, Crandall and Hazlett (2000) assert that the entry of the RBOCs into long distance markets would set off a much more vigorous general round of long distance price reductions that could reach the average residential subscribers. They argue that the losses to consumers from barring Bell entry into long distance have been substantial. Hinton, Zona, Schmalensee, and Taylor (1998) also maintain that, in the absence of anti-competitive discrimination, allowing the local exchange carriers (such as RBOCs) to enter the long distance market to pursue integrated operations is the welfare-maximizing means of increasing competition in long distance markets. The authors, therefore, indicate that safeguards against anticompetitive conduct, which inhibit integrated firm entry, will lower the welfare gains that may be delivered from opening the long distance market to increased competition. In similar fashion, Weisman (1995) argues that preconditions for the RBOCs' interLATA entry likely contributes to higher long-distance prices and enhances the risk of discrimination by the RBOCs against their rivals.

From the opponents' point of view, on the other hand, as long as the RBOCs retain dominant position and significant market power in their own local service territory, which largely come from the RBOCs' control of local network facilities, the RBOCs have strong incentives to discriminate against competitors in a way that could leverage market power in the local service market into the long distance market to gain competitive advantage from vertical integration. In addition, opponents argue that the potential costs—such as access discrimination against competitors and potential harm to

long-term competition—would exceed the potential benefits—such as potential short-run price reduction and one-stop shopping—from RBOC entry into the long distance market. Thus, opponents worry a premature lifting of restrictions on RBOC entry into the interLATA service market without eliminating significant barriers to local competition (Economides, 1998, 1999, 2002; Hatfield, 1994; Economics and Technology & Hatfield Associates, 1994; Litan & Noll, 1998; Schwartz, 1997b, 2000; Selwyn, 2002; Selwyn, Golding, & Gately, 1998).

Schwartz (2000) argues that conditioning Bell entry into long distance markets on prior opening of local markets will advance local competition through improving incentives for the RBOCs to cooperate with competitors with regard to network sharing. He further argues that it will greatly reduce the need for later intrusive regulation to open local markets after RBOC entry, which weakens RBOC incentives to cooperate. Shiman and Rosenworcel (2001) have a similar view, saying that Section 271 of the 1996 Act is a reasonably effective incentive mechanism for opening local exchange market to competition. Mandy (2000a) also generally supports the idea of policy-induced countervailing incentives against the RBOCs' incentives to discriminate in the provision of exchange access services.⁷⁶ Beard, Kaserman, and Mayo (2001) find that the incentive for sabotage⁷⁷ by the RBOCs emerges in the presence of input (i.e., access service)⁷⁸

⁷⁶ See also Reiffen (1998), Reiffen & Ward (2002), concerning the RBOCs' incentive to discriminate.

⁷⁷ By 'sabotage,' the authors mean the non-price discrimination activities.

⁷⁸ In most cases, long distance carriers need to buy access services from local exchange carriers to originate and terminate their customers' calls. Hence, access service is an input for the final product of long distance service.

price regulation, and suggest a policy of conditioning vertical integration on the lack of a prospective threat of sabotage that is indicated by the competition in the local market, which appears to be close to the approach taken in the 1996 Telecommunications Act.

Economides (1999, 2002) goes one step further. He argues that the 1996 Act's provisions guarding against premature entry of RBOCs in the long distance market may be insufficient, indicating that once it starts providing long distance service, an incumbent local exchange carrier (ILEC) has the incentive and ability to decrease competition in local exchange markets through cross-subsidization, non-price discrimination, bundling, etc. Litan and Noll (1998) suggest that the FCC should adopt the "test of three," which means that the RBOCs should be allowed to enter long distance markets where at least half the local service consumers have two other predominantly facilities-based providers that do not heavily rely on the RBOCs for network facilities to provide local service.

Although the effects of RBOC entry into interLATA long distance markets has been the subject of debate for years,⁷⁹ only limited empirical research is available so far. The first identifiable research on this issue in the empirical literature is Hausman, Leonard, and Sidak (2002). In their study, the authors compared the first two states in which the RBOCs were given Section 271 relief (New York and Texas) with the

⁷⁹ This has been debated since the MFJ in 1982, which prohibited the RBOCs from providing interLATA services.

“control” states (Pennsylvania and California)⁸⁰ where Section 271 relief was not authorized during the study period: namely, New York - Pennsylvania and Texas - California.

Based on the comparisons of household data in the second half of 1999 and the second half of 2000 in each state, Hausman et al. claim that the average consumer in New York paid eight percent less on the monthly interLATA bill compared to Pennsylvania and 11.5 percent less in Texas compared to California. They also argue that competitive local exchange carriers (CLECs) gained substantially higher market shares in New York and Texas compared to Pennsylvania and California. In addition, with respect to the effects of Section 271 entry on local service rates, Hausman et al. find that the local bill of the average consumer in New York and Texas decreased relative to the control states, though this was not statistically significant at the conventional significance levels.

However, Selwyn (2002) directly challenges the study of Hausman et al. (2002). Selwyn criticizes the methodology and results of the study of Hausman et al. on various grounds. First, he argues that the model used in Hausman et al.’s study omitted a key explanatory variable, access charge levels, which he maintains is “the single most important explanatory variable affecting the price of long distance service.” (p. 28) Selwyn asserts that when the access charge levels were considered, the average net price of long distance calling in Texas actually increased after SBC’s entry into the market.

⁸⁰ Section 271 approvals were given in Pennsylvania in September 2001 and in California in December 2002.

Second, Selwyn also points out that Hausman et al. failed to consider other important factors that could affect price level and the nature of price changes, such as the size of the local calling areas, and the number and geography of LATAs.

Third, Selwyn attacks Hausman et al. for using the usage characteristics (e.g., calling patterns) of New York and Texas for Pennsylvania and California, respectively, instead of using those of the control states directly. According to him, if the usage characteristics of the control states were used, the results would have been significantly different.

Fourth, Selwyn asserts that the selection of the control states was arbitrary, arguing that if other states (e.g., Florida, Wisconsin, Missouri, or Kentucky) were used instead of Pennsylvania and California, the results would be the opposite—the price decreases in these non-Section 271 states were significantly greater than New York and Texas.

Finally, Selwyn argues that the choice of time period, which ends as of the second half of 2000, in Hausman et al.'s study was results-driven, since SBC increased its long distance rates in Texas in February 2001. According to Selwyn, the continuing decreases in residential long distance rates are the results of other factors, such as the structural separation of local and long distance carriers by the MFJ, the encouragement of competition, and access charge reform, which he emphasizes were achieved without RBOC entry into interLATA long distance markets.

Brown and Zimmerman (2002) examine the effects of Section 271 approvals on entry into the local exchange market, using a state-level panel data set. They find that Section 271 approvals increase the number of switch-based local competitors (excluding

resellers of RBOC services) before and during the year Section 271 authorization is given. However, they do not find statistically significant effects of Section 271 approval on local competitive entry during the following year after the approval. This study implies that the RBOCs may open their local networks to competitors *before* they gain the FCC approvals for long distance entry, but that they may not have the incentives to fully cooperate with the competitors *after* they received Section 271 approvals. Hence, post-Section 271 market monitoring and enforcement seem to be important to secure competition in the market. This interpretation is supported by other studies.

For example, in another study, Zimmerman (2003) finds that the RBOCs improve the quality of some of their interstate access services offered to the rival interexchange carriers (IXCs) before entering the interLATA market, but degrade the quality of these services immediately after the interLATA entry. Mini (2001) shows the importance of the preconditions set forth in Section 271. In his study of comparing RBOCs and GTE⁸¹ in their cooperation for sharing the local networks with AT&T as a local competitor, the author concludes that the RBOCs were more cooperative than GTE in the negotiations with AT&T, as evidenced in quicker agreements, less litigation, and more favorable access prices. Thus, the study suggests that the incentive mechanism of Section 271 plays an important role in inducing cooperation from the RBOCs to open their networks to competitors.

In the above discussion, I reviewed the existing literature on the effects of Section 271 entry on both local and long distance markets. The mixed results of the empirical

⁸¹ Section 271 applies only to the RBOCs and their affiliates. But GTE was not required to get the FCC approvals for long distance services.

literature suggest that it would be premature to draw a definitive conclusion at this point as to whether Section 271 entry improves market competition and increase consumer benefits. Thus, given the relatively short period of the RBOCs' participation in the long distance market and the lack of sufficient empirical evidence, the overall effects of RBOC interLATA entry is still an open question that has yet to be answered with more confidence by further empirical research.

4.5 Conceptual Framework for the Dissertation

From the discussions in chapters 3 and 4, I now construct the following framework for an empirical analysis of the competitive effects of RBOC entry into in-region interLATA telephone markets on competition in local markets.

First of all, my analysis is focused on the impact of RBOC interLATA market entry on *local* competition, considering the relative emphasis of the Telecommunications Act of 1996 on local competition.

Second, as discussed in chapter 3, among the economic models of competition, the dominant firm - competitive fringe (DF-CF) model appears to be the most appropriate model to analyze the current local telephone market. Thus, I develop an empirical model based on the dominant firm model for the analysis. Moreover, I examine the effects of RBOC interLATA entry on local competition relying on the DF-CF model by looking mainly at the performances of the RBOCs. However, in discussing the empirical results, I also consider the effective competition model as a goal for desirable policy outcomes in the local telephone market. In other words, I use the DF-CF model as an analytical tool in

conjunction with the effective competition model as a benchmark for competition assessment. If there are positive effects of RBOC interLATA entry on local competition, I regard that as a sign that the local market is moving toward an effectively competitive market, even though it may not be a perfect match with the textbook definition of effective competition.

Third, with respect to theoretical frameworks for competition analysis, I basically employ the structure-conduct-performance (SCP) paradigm. However, I focus on performance variables (e.g., rates, quality of service, broadband deployment, etc.) rather than structure (e.g., number of new entrants, entry barriers, etc.) or conduct variables (e.g., pricing behavior, advertising, etc.) due to my research interests.

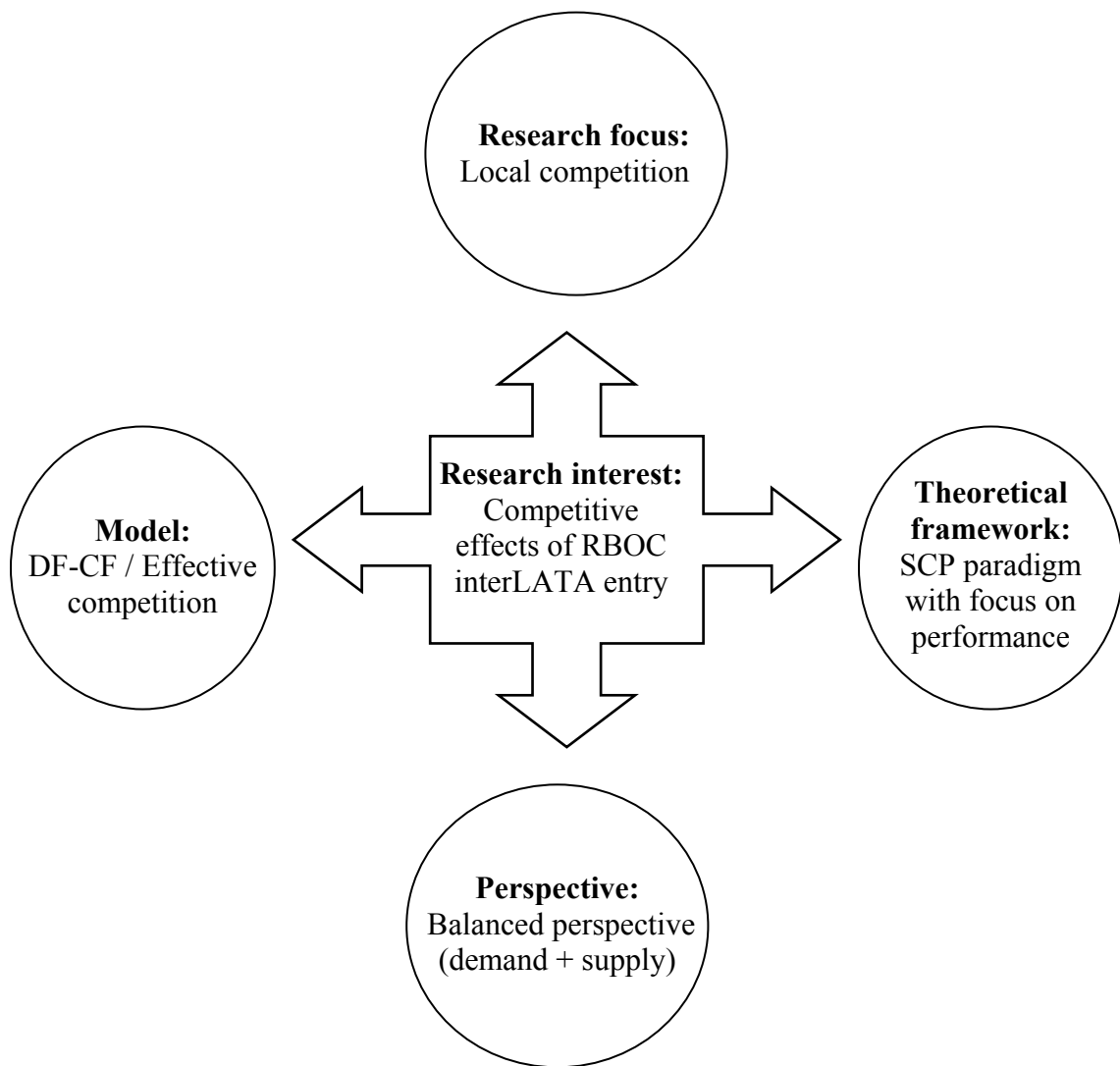
Finally, in applying the SCP paradigm, I take a rather different approach compared to the existing literature. As discussed in the literature reviews of chapters 3 and 4, the vast majority of the existing literature used predominantly *the firm's perspective*, relying on supply-side indicators to determine the effectiveness of the telecommunications industry. The indicators used in much of the previous research over the past two decades or so include, but are not limited to, market share, the number of competitors, production cost savings, labor productivity, total factor productivity, rates, price-cost margins and other concentration ratios (e.g., Herfindahl-Hirschman Index),⁸² entry barriers, investment, and so on. As a result, analyses based on the firm's perspective tend to pay less attention to the demand-side aspects of the telecommunications market.

⁸² Herfindahl-Hirschman Index (HHI) is defined formally as $HHI = \sum (s_1^2 + s_2^2 + \dots s_n^2)$, where s_i represents market share of firm i in the industry and $i = 1, \dots, n$.

With this in mind, I employ *the consumer's perspective* as well as the firm's perspective to properly capture the characteristics of the local telephone market. The demand-side indicators for analyzing competition in the local market from the consumer's perspective may include, but are not limited to, quality of service, customer satisfaction, consumer perception of the degree of market competition, consumer perception of the rate level, and so forth. This approach, then, is a combined perspective that incorporates both the supply-side firm-oriented indicators and the demand-side consumer-oriented indicators. It may be called a "balanced perspective" for competition analysis. In my analysis, I use three dimensions or aspects of local telephone competition to explore the effects of RBOC entry into interLATA markets. They are (1) local service rates, (2) quality of service (including customer satisfaction), and (3) investment in broadband technologies.⁸³

A schematic summary of the conceptual framework for my empirical analysis is provided in Figure 4.5.

⁸³ As explained in chapter 5, these categories are selected to correspond to the policy goals of the Telecommunications Act of 1996.



Source: Author's construct

Figure 4.5: Conceptual framework for the dissertation

CHAPTER 5

AN EMPIRICAL ANALYSIS OF THE IMPACT OF RBOC INTERLATA ENTRY ON COMPETITION IN LOCAL TELEPHONE MARKETS

5.1 Introduction

In this chapter, I analyze the impact of RBOC entry into long distance telephone market pursuant to Section 271 of the Telecommunications Act of 1996 on competition in the local telephone market. As discussed in chapter 3, previous studies relating to competition in the telecommunications industry based on the traditional structure-conduct-performance paradigm tend to look at the supply side or the firm's perspective of the market. Empirical studies on telecommunications competition addressing demand-side or the consumer's perspective characteristics are relatively rare.¹ In addition, little

¹ There are some studies that looked at quality of service issues. See, for example, Tardiff & Taylor (1993), Roycroft & Garcia-Murillo (2000), Clements (2001), Ai & Sappington (2002), Banerjee (2003), and Sappington (2003). Tardiff & Taylor (1993) and Ai & Sappington (2002) examined the relationship between quality of service and incentive regulation including price-cap regulation; Roycroft & Garcia-Murillo (2000), Clements (2001), and Banerjee (2003) took competition into account as well as regulatory regime to study quality of service; and Sappington (2003) is a review of the empirical literature relating to effects of incentive regulation on retail telephone service quality in the United States.

empirical research in the literature considers both the demand and supply perspectives of the market in assessing the status and effects of competition in the telecommunications industry.

Hence, in this chapter, I attempt to fill the void by providing an empirical analysis of the impact of RBOC entry into interLATA markets on local competition, employing both supply-side characteristics (local service *rates* and *investment* in new technologies) and demand-side characteristics (*quality* of service including customer satisfaction) of the market. I begin with the research question and hypotheses that govern my analysis. I then discuss the methodology including the approaches to the study and estimation methods for panel data. This is followed by an examination of the competitive effects of RBOC entry into interLATA markets on the three dimensions of residential local telephone competition, namely (1) residential local service rates, (2) quality of service, and (3) investment in new technologies. To do so, I create a panel data set consisting of 96 observations from 24 states over the 1999 - 2002 period. I estimate a series of regression equations to explore the relations between RBOC interLATA entry and the three dimensions of local residential markets. Next, as an alternative examination of the impact of RBOC interLATA entry on local telephone competition, I compare the performances of the RBOCs in the Section 271 year with those of one year before and one year after the Section 271 entry in terms of the three dimensions, based on a data set composed of those states where Section 271 entry for the RBOCs were granted by the FCC during the study period. I briefly summarize the main points of this chapter at the end.

5.2 Research Question and Hypotheses

As discussed in chapter 4, the Telecommunications Act of 1996 allowed the RBOCs to enter interLATA markets, provided the RBOCs meet certain preconditions set out in Section 271. A legitimate question arising from this policy pursuant to the 1996 Act is whether and to what extent RBOC interLATA entry promotes competition and realizes consumer (especially residential consumer) benefits in local and long distance telephone markets. However, as Benjamin, Lichtman, and Shelanski (2001) point out, “[local telephone competition] is the heart of the Act” (p. 716).² Thus, considering the emphasis of the 1996 Act placed on competition in local telephone markets, I investigate the effects of RBOC entry into the long distance market on local telephone competition. Through an analysis of the publicly available market data with focus on local telephone markets, I examine primarily the following research question: what effects does RBOC entry into in-region, interLATA service market have on competition in local telephone markets? In other words, the key research question of this study is whether allowing RBOC provision of in-region interLATA long distance market brings competitive effects to consumers, especially residential consumers of local telephone service.

The 1996 Act sets forth its overall policy goals in its preamble, which strongly suggests that increasing competition and reduced regulation will make markets more competitive and thereby bring benefits to all American telecommunications consumers.

The preamble of the Telecommunications Act of 1996 provides:

² See also Wallman (1998), who emphasizes that the breakthrough result of the 1996 Act was to be the introduction of a second competitor in the local exchange, not the “*n*th” choice in long distance service.

To *promote competition* and *reduce regulation* in order to secure *lower prices* and *higher quality services* for American telecommunications consumers and encourage the *rapid deployment of new telecommunications technologies*. [italics added]

Thus, to address the research question, I construct the following hypotheses for empirical analyses, which are specifically designed to investigate the expected policy outcomes of the 1996 Act in the context of the Section 271 that allows RBOC entry into interLATA long distance market.

H1: RBOC in-region, interLATA entry is likely to lower local telephone service rates, improve service quality, and encourage investment in broadband technologies.³

H2: In the states where Section 271 entry was allowed, the rates, service quality, and investment in broadband technologies after the RBOC in-region interLATA entry would be significantly different from those before the entry.

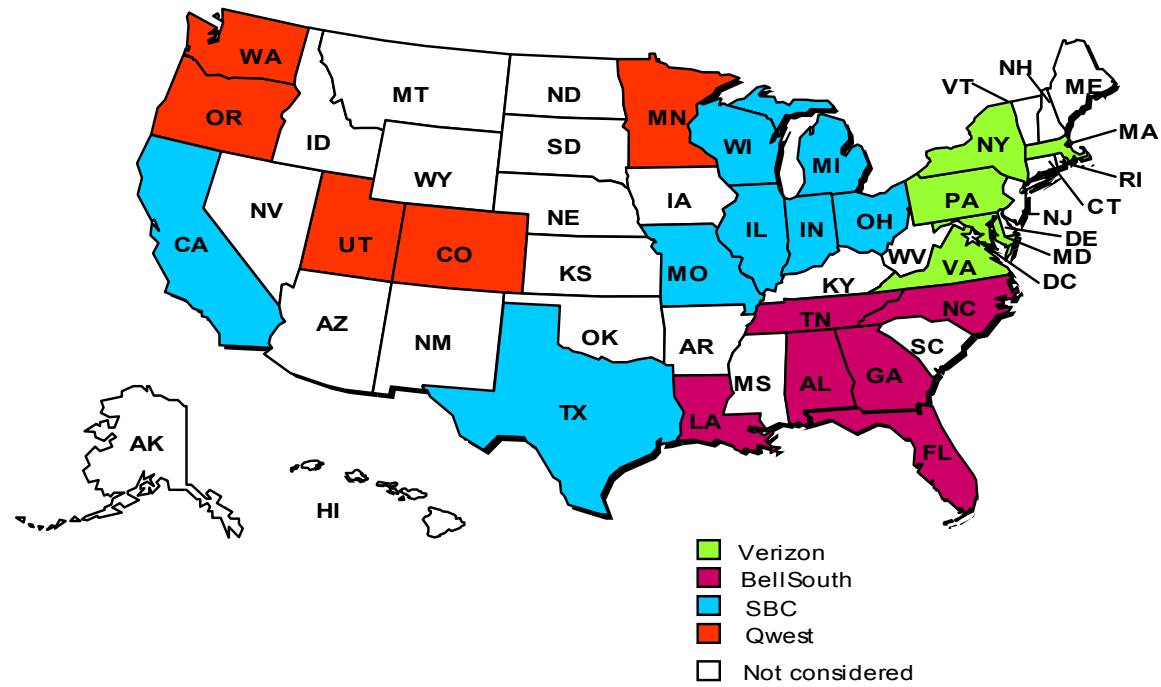
These hypotheses are examined in sections 5.4 and 5.5, respectively. Below, I briefly discuss the approaches and methods used in the analysis.

³ I use broadband technologies to represent the “new telecommunications technologies” stated in the 1996 Act, because currently the deployment of broadband telecommunications services and technologies are in the center of policy debate regarding new telecommunications services and technologies.

5.3 Methodology

5.3.1 Approaches to the Analysis

As the hypotheses stated above imply, I adopt two approaches to investigating the research question. First, I construct a panel data set consisting of observations from 24 states over the period 1999-2002. Due to data limitation, I selected 24 states that have all relevant information for my estimation model. However, it is believed that using (nearly) half the states can certainly produce informative results with respect to the effects of RBOC entry into long distance markets because of the geographic and company representation of the data. Figure 5.1 shows the states that are included in the data set and their affiliation with the RBOCs. Note that the 24 states in the data set come from all four RBOC service territories across the country.



Source: Author's construct

Figure 5.1: States in the sample and their affiliation with the RBOCs

Using this panel data set from 24 states, I test the first hypothesis. This empirical test is conducted to reveal the presence of the competitive effects of RBOC entry into long distance markets on local competition. As mentioned, I examine three dimensions of residential local telephone competition (i.e., residential local service rates, quality of service, and investment in new technologies) to see whether the policy goals set out in the Telecommunications Act of 1996 have been achieved so far.⁴

To test the second hypothesis, I compare data for pre-Section 271 year, Section 271 year, and post-Section 271-year performances of the RBOCs in the states in which Section 271 entry was allowed by the FCC during the study period. The number of states included in the data for this analysis is eight, except for two measures because of data availability.⁵ I use the hypothesis testing with dependent samples method.⁶ This approach is taken as an alternative examination of the competitive effects of RBOC interLATA entry on local markets. I discuss the results based on this approach in section 5.5.

⁴ Examining three dimensions of local telephone competition helps to reduce what Sappington & Weisman (1996a) call “the unidimensional yardstick pitfall” in measuring regulatory effects, which arises when the analyst measures the effects on only one dimension, leaving out other important dimensions.

⁵ Since data in at least one year before and one year after the Section 271 entry are necessary for the pre- and post-Section 271 analysis, only nine states where the RBOCs were permitted to enter the interLATA long distance market by the end of 2001 are eligible for consideration. They are New York, Texas, Kansas, Oklahoma, Massachusetts, Connecticut, Pennsylvania, Arkansas, and Missouri in order of FCC approval. Among these, Connecticut is dropped from all twelve measures because the RBOC (Verizon) that gained the FCC approval for interLATA market in the state in July 2001 was not the largest provider of local telephone service in terms of access lines throughout the study period. In Connecticut, the largest incumbent local exchange carrier during the period was Southern New England Telecommunications Corporation (SNET) that was merged into SBC in October 1998. In addition, Kansas and Oklahoma are dropped for the measure on “basic residential local service rates” because the FCC data do not have information for these two states. Furthermore, Arkansas is dropped from the measure on “high-speed lines” because data for years 2000 and 2001 are not available.

⁶ For information on this technique, see Mason, Lind, & Marchal (1999, pp. 368 - 373).

5.3.2 Panel Data Estimation

With respect to the data for my regression analysis, I rely on a panel data set. A panel, or longitudinal, data set is one that includes multiple observations on the same cross-sectional units (e.g., individuals, households, firms, cities, etc.) over a period of time. That is, panel data combine time series and cross sections. Although the use of panel data sets in social science research has its own limitations, such as selectivity bias, it provides several advantages compared to cross-sectional or time-series data (Baltagi, 1995; Greene, 2000; Hsiao, 2003; Pindyck & Rubinfeld, 1998). These are (1) panel data allow researchers to examine issues that could not be studied in either cross-sectional or time-series settings alone; (2) panel data sets usually provide an increased number of data points, increasing the degrees of freedom, reducing collinearity among the independent variables, and improving efficiency of parameter estimates; (3) incorporating information relating to both cross-section and time-series variables can substantially diminish the problems that arise when there is an omitted-variables problem; and (4) panel data allow researchers to construct and test more complicated behavioral models than purely cross-sectional or time-series data.

For a case of N observations over T time periods, the general model structure for panel data can be written as follows:

$$y_{it} = \beta' X_{it} + \epsilon_{it} \quad i = 1, 2, \dots, N \text{ and } t = 1, 2, \dots, T \quad (5.1)$$

where y is an $NT \times 1$ vector, X is an $NT \times k$ matrix on k explanatory variables, β is a $k \times 1$ vector, and ε is an $NT \times 1$ vector. The error term can be written as $\varepsilon_{it} = \mu_i + \lambda_t + e_{it}$, where μ_i represents the individual effect which is specific to the individual cross-sectional unit i but are constant over time, λ_t represents the time effect associated with t^{th} period, and e_{it} represents the remaining effect which is purely random across unit i and time t . Different assumptions about μ_i , λ_t , and e_{it} give rise to different models for estimating panel data because they create different error structures. In many cases, the model for panel data is often simplified to include only an individual effect μ_i , but not a time effect λ_t , because typically panel data have only a few observations in time t for unit i (Owsu-Gyapong, 1986). Since my data set has only four time periods, I follow this model.⁷ Then the above equation 5.1 can be rewritten as follows:

$$y_{it} = \beta' X_{it} + \mu_i + e_{it} \quad i = 1, 2, \dots, N \text{ and } t = 1, 2, \dots, T \quad (5.2)$$

There are two basic models that have been widely used by social scientists to analyze panel data: the fixed effects model and the random effects model. In the analysis of panel data, many studies have shown that if the true model is the fixed effects model, the OLS (ordinary least squares) estimates are biased and inconsistent, and that if the true model is the random effects model, the OLS estimates are unbiased and consistent but inefficient.

⁷ This model assumes that slope coefficients are constant, and the intercept varies over cross-sectional units (Hsiao, 2003).

Traditionally, these two basic models for panel data analysis are said to be different in their treatment of the individual effect. The fixed effects model treats μ_i as a fixed constant varying across individuals, thus taking each μ_i to be an unknown parameter to be estimated, while the random effects model treats μ_i as an individual specific disturbance (Greene, 2000). However, as some scholars emphasize, the key distinction between the two models is not whether the effect is fixed or random, rather it is whether the individual effect (μ_i) is correlated with the explanatory variables (X_{it}) (Johnson & DiNardo, 1997; Wooldrige, 2002).

With respect to the choice between the fixed effects model and the random effects model to estimate a panel data set, P. Kennedy (1998) notes that it depends on the context of data and for what the results are to be used. According to this view, when the researcher wishes to make inferences about the cross-sectional units in the study, the fixed effects model is more appropriate. In contrast, if the data are a random sample from a large population, and the researcher wants to make inferences about the population, then the random effects model is considered better.

As noted above, a crucial point of distinction between the two estimation methods is that the random effects model assumes that the time-invariant individual effect associated with each cross-sectional unit is uncorrelated with the explanatory variables. However, this is unlikely in most cases (Johnson & DiNardo, 1997; P. Kennedy, 1998). Thus, in general, the fixed effects model is preferred to the random effects model unless the researcher can be certain that he can measure all of the individual effects possibly correlated with the explanatory variables (Johnson & DiNardo, 1997).

Based on the two criteria above regarding the nature of data structure and my empirical test, I adopt the fixed effects model for the estimation of my data set. That is, my data set is not a randomly drawn sample from a large population, and the empirical test shows that the individual effects are correlated with the explanatory variables, which is a violation of the key assumption underlying the random effects model.

5.4 Competitive Effects of RBOC InterLATA Entry on Local Telephone Markets

In this section, using the first approach specified above, I empirically examine the impact of RBOC entry into interLATA market on competition in the local telephone market with regard to basic residential local service rates, quality of service, and investment in broadband technologies. Employing the fixed effects model, I estimate 12 equations based on the panel data set of 24 states and discuss the main findings.

5.4.1 The Empirical Model

To begin, I specify the empirical model to be tested. First of all, I assume that the objective of the RBOCs is profit maximization as standard economic theory suggests. In addition, I also assume that each RBOC in its service territory faces a dominant firm - competitive fringe market. In the original DF - CF model discussed in section 3.2.1.3, competitive fringe firms are assumed to take the market price as given by the dominant firm. However, here I assume that the dominant firm (each RBOC in the relevant state)

and competitive fringe firms (competitive local exchange carriers) can charge different prices for their residential local telephone services.⁸ Then, the aggregate market demand function can be written as follows:

$$D = g(P, W) \quad (5.3)$$

where D is the market demand, P is a vector of market prices charged by the dominant firm and the competitive fringe, and W is a vector of other factors that influence market demand.

As shown in Figure 3.1, the competitive fringe's aggregate supply curve is the horizontal summation of the individual fringe firm's supply curves. Assuming N fringe firms, the competitive fringe's supply function can be specified as follows:

$$S_F = \sum_{k=1}^N q_k(P, Z) \quad (5.4)$$

where S_F is the competitive fringe's supply function and q_k is the output of fringe firm k , and Z is a vector of other factors influencing the cost for all firms in the market. If $q_i = q_j = q$ for all $i \neq j$, then Equation (5.4) becomes

⁸ It is often characterized that a dominant firm provides a "pricing umbrella" for smaller firms such that competing firms can find buyers as long as they price at or below the level of the dominant firm. See Carlton & Perloff (2000, p. 111).

$$S_F = Nq(P, Z) \quad (5.4)'$$

Thus, the dominant firm's residual demand function is derived by subtracting the competitive fringe's supply function from the aggregate market demand. From (5.3) and (5.4), this is expressed as follows:

$$D_d = D - S_F = g(P, W) - \sum_{k=1}^N q_k(P, Z) \quad (5.5)$$

To put it differently, let Q_d be the dominant firm's output, Q be the total output in the market, and Q_F be the competitive fringe's aggregate output. Since Q_d corresponds to D_d , Q_F corresponds to S_F , and Q corresponds to D , then the dominant firm's output is derived as follows, based on the residual demand function facing the dominant firm.

$$Q_d = Q - Q_F = g(P, W) - \sum_{k=1}^N q_k(P, Z) \quad (5.6)$$

In addition, I define the cost function of the dominant firm, C_d , as follows:

$$C_d = C_d(Q_d, Z) \quad (5.7)$$

Thus, the profit maximizing dominant firm, i.e., an RBOC in each service territory, has the following objective function:

$$\text{Max } \Pi_d = PQ_d - C_d (Q_d, Z) \quad (5.8)$$

where Π_d is the profit function and PQ_d is the revenue of the dominant firm. I assume that an RBOC determines its price, quality of service, and the level of investment in broadband technologies to maximize its profits. Thus, an RBOC in each service territory faces the following profit maximization problem, restating equation (5.8) as:

$$\text{Max}_{P, QoS, I} \Pi_d = PQ_d - C_d (Q_d, Z) \quad (5.9)$$

where QoS represents local telephone quality of service, I represents the level of investment in broadband technologies, and PQ_d is the revenue of the dominant firm given $Q_d = Q_d (P, N, W, Z)$. Since the local telephone industry is still a regulated industry in many aspects, though the degree of regulation now may vary state by state, the regulatory environment should be taken into account in the model. Currently the incumbent local exchange carriers (ILECs), especially the RBOCs, are under state regulatory commissions' control of local service rates (except Nebraska)⁹ and quality of service.¹⁰

⁹ See Mueller (1993) for a case study of Nebraska. Abel & Clements (1998) trace the trend of state regulatory regimes for local exchange carriers from 1984 to 1998.

In addition, I assume that an improvement in quality of service incurs more cost. Thus, equation (5.9) can be expressed as follows:

$$\begin{aligned}
 & \text{Max } \Pi_d = PQ_d - C_d(Q_d, Z) \\
 & \text{s.t.: } \begin{aligned} & P, QoS, I \\ & P \leq \Psi(R) \\ & QoS \geq \Phi(R) \\ & \frac{\partial C_d}{\partial QoS} > 0 \end{aligned}
 \end{aligned} \tag{5.10}$$

where $\Psi(R)$ and $\Phi(R)$ are functions of regulatory environment. They represent the regulatory constraints on the RBOCs imposed by state regulatory commissions. In addition, since my research question focuses on the impact of Section 271 entry of the RBOCs into the interLATA long distance market, the study of the RBOCs' profit maximizing decisions about price, quality of service, and the level of investment in broadband technologies needs to incorporate the factor of Section 271 entry.

With the information discussed above, the choice of the dominant firm in the local telephone market, i.e., an RBOC in each state, for local service rates, quality of service, and broadband investment to maximize profits can be expressed as follows:

$$P_d = \Gamma(N, R, S, W, Z) \tag{5.11}$$

$$QoS^d = \Theta(N, R, S, W, Z) \tag{5.12}$$

$$I_d = \Omega(N, R, S, W, Z) \tag{5.13}$$

¹⁰ Pérez-Chavolla (2003) shows all 51 jurisdictions in the United States imposed at least some aspects of quality-of-service standards on the retail telephone service providers, while the contents of service standards vary across the jurisdictions.

where S represents the status of Section 271 entry for the RBOCs in their service territories. Equations (5.11), (5.12), and (5.13) suggest that the local service rates, local telephone quality-of-service, and investment in broadband technologies of an RBOC in each state can be estimated as a function of the number of competitive fringe firms (N),¹¹ a vector of regulatory environment imposed by the state commission (R), the status of RBOC Section 271 entry in the state (S), a vector of demand conditions (W), and a vector of cost conditions (Z). With the empirical model established, I now proceed to the estimation of the impact of RBOC interLATA entry on competition in the local telephone market in terms of three dimensions: price (residential local service rates), quality of service, and investment in broadband technologies.

5.4.2 Data

To conduct this analysis of the competitive effects of RBOC interLATA entry on local telephone markets, I gathered the data at the state level because local telephone competition is a matter of intrastate jurisdiction and many of the variables in my model are measured and collected at the state level. In addition, for most of the dependent

¹¹ Interpreted more broadly, this could include both the number of competitors and their aggregate market share. In the subsequent analysis, I include both factors in the regression equations.

variables in the regression equations except one variable¹² (11 out of 12 equations), I limit the data scope to the corresponding RBOC in the state due to data limitations and my research interests.

My main sources of data are the FCC's Industry Analysis Reports and Automated Reporting Management Information System (ARMIS) database. The Wireline Competition Bureau's Industry Analysis and Technology Division of the FCC collects and publishes data and various reports on the telephone industry including deployment of broadband technologies and services. Much of the data for my analysis were gathered from several Industry Analysis Reports. The FCC's ARMIS is a database initiated in 1987, which currently consists of ten public reports (43-01, 43-02, 43-03, 43-04, 43-05, 43-06, 43-07, 43-08, 495A, and 495B) and contains rich information on financial and operational data, service quality, network infrastructure, and others.¹³ Data on quality-of-service variables including consumer satisfaction were collected from ARMIS. The FCC's web site also provides other information such the status of Section 271 applications from the RBOCs. In addition, I gathered some information on local service rates through personal contact with the FCC personnel.

¹² The exception is the "high-speed lines" dependent variable. The FCC started to collect data on high-speed lines from 1999 by state and by technology (ADSL, Coaxial Cable, and Other), but the data for 1999 is incomplete such that high-speed lines by state were recorded by range for most states. This means that it is impossible to get exact numbers of the high-speed lines provided by local telephone companies (especially the RBOCs)—mostly ADSL—differentiated from those provided by cable TV companies—coaxial cable—or other types of companies (e.g., satellite). Thus, I use the total number of high-speed lines regardless of technology type, instead of ADSL lines only.

¹³ For more information on ARMIS, see the FCC web site (<http://www.fcc.gov/wcb/armis/>).

All data for the explanatory variables were collected at the state level. For demographic variables, I relied on the Bureau of the Census within the U.S. Department of Commerce (DOC), the Bureau of Economic Analysis (BEA) also within the DOC, and the Bureau of Labor Statistics (BLS) within the U.S. Department of Labor, for data on land area by state, population and per capita income, and wage, respectively.

For data on regulatory regimes imposed on the RBOCs by the state regulatory commissions, I used the information from the State Telephone Regulation Report published by Warren Communications News, Inc. Each year the State Telephone Regulation Report surveys regulatory regimes for the rate regulation of local service providers in the states and publishes the data. From this data, I gathered information on regulatory policies of state public utility commissions for the RBOCs, which includes whether a state commission uses rate-of-return regulation or price-cap regulation and whether a state commission imposed a freeze on basic local service rates of the RBOCs.

I collected data for the time period 1999 to 2002 on a yearly basis. The reasons I chose this four-year period are threefold. First, this period covers all Section 271 entries with at least one year before and at least one year after the Section 271 entry for the states in the sample.¹⁴ Second, currently it is the longest possible period with all data available for the empirical model specified above in section 5.4.1. Third, I gathered yearly data because much of the necessary data were not available on a shorter period basis, such as quarterly. As noted earlier, the cross-sections of the data include 24 states. Thus, a panel

¹⁴ For New York, Verizon (then Bell Atlantic) obtained the FCC approval for the provision of interLATA long distance service on December 22, 1999. However, the actual service provision began in January 2000. Therefore, the condition of one year before and one year after Section 271 is satisfied.

data set consisting of 24 states and four years from 1999 to 2002 is constructed for the empirical analysis, which forms a total of 96 observations. Although it may not be as long or rich as one would hope to trace the full trend in local telephone competition since passage of the Telecommunications Act of 1996, it certainly provides an opportunity for an empirical analysis of the impact of RBOC interLATA entry on local markets.

5.4.3 Description of Variables

A summary of variables and their definitions, along with the source of each variable, used in this empirical analysis is provided in Table 5.1. Following the table, I describe each variable in the empirical analysis in greater detail. For a better understanding, I group each variable according to the category specified in the empirical model derived in section 5.4.1.

Variable ¹⁾	Definition	Source
Price Basic residential local service rates (LOCRATE)	The relevant RBOC's basic local telephone service rates for residential customers in state i in year t, measured by monthly flat rates excluding touch-tone service, surcharges, 911 service, and taxes	[a]
Quality of service Number of residential consumer complaints (CONCOMP)	Complaints pertaining to the relevant RBOC service quality filed with state or federal regulatory authorities from residential consumers per 1,000 residential access lines in state i in year t	[b]
Percent of residential consumers dissatisfied with installation (DISINSTALL)	The percentage of residential consumers surveyed who are dissatisfied with the carrier's (the relevant RBOC) installation service in state i in year t	[c]
Percent of residential consumers dissatisfied with repair (DISREPAIR)	The percentage of residential consumers surveyed who are dissatisfied with the carrier's (the relevant RBOC) repair service in state i in year t	[c]
Percent of residential consumers dissatisfied with business office (DISBUSOFF)	The percentage of residential consumers surveyed who are dissatisfied with the carrier's (the relevant RBOC) business office service in state i in year t	[c]
Percent of installation commitments met (INSTALLCOM)	Number of installation orders completed by commitment date divided by the total number of installation orders for an RBOC in state i in year t	[b]
Average installation intervals (INSTALLINT)	The average interval, expressed in business days, between the date service order was placed and the date the service order was completed for an RBOC in state i in year t	[b]
Number of total consumer trouble reports (TCTR)	The total number of initial and repeat complaints concerning service quality made by consumers to the relevant RBOC per 1,000 residential access lines in state i in year t	[b]
Percent of consumer repeat trouble reports (CRTR)	The number of consumer trouble reports concerning service quality that are received within thirty days after the resolution of an initial trouble report on the same line divided by the total number of consumer trouble reports for an RBOC in state i in year t	[b]
Average out-of-service repair intervals (REPINT)	The average interval, expressed in hours measured on a running clock, between the time a trouble report is received and the time the trouble report is cleared for an RBOC in state i in year t	[b]
Investment in broadband technologies Total number of high-speed lines (HSLINE)	The number of total high-speed lines per 1,000 end-user switched access lines served by local exchange carriers (LECs) in state i in year t	[d], [e]
Percent of sheath kilometers of fiber (FIBER)	The percentage of sheath kilometers of fiber optic cables to the total sheath kilometers of all loop and interoffice cables for an RBOC in state i in year t	[f]

Continued

Table 5.1: Definition and data source of variables for the analysis of competitive effects of RBOC interLATA entry on local markets

Table 5.1 (continued)

Variable	Definition	Source
Competition RBOC entry into in-region interLATA service market (SEC271ENTRY)	A binary variable that is equal to 1 if the relevant RBOC obtained approval from the FCC to provide in-region interLATA long distance service and actually launched the service in state <i>i</i> in year <i>t</i> and 0 otherwise	[g]
CLEC share of end-user switched access lines (MSCLEC)	Market shares of CLECs measured by end-user switched access lines in state <i>i</i> in year <i>t</i>	[e]
Number of reporting CLECs (RCLEC)	Number of CLECs that report market data to the FCC in state <i>i</i> in year <i>t</i>	[e]
Mobile wireless service subscription rate (WIRELESS)	Number of mobile wireless telephone service subscribers divided by the population in state <i>i</i> in year <i>t</i>	[e]
Number of providers of high-speed lines ²⁾ (HSPROVIDER)	Number of providers of high-speed (over 200 kbps in at least one direction) lines, regardless of technology, in state <i>i</i> in year <i>t</i>	[d], [h]
Demand conditions Population (POPULATION)	Size of population in state <i>i</i> in year <i>t</i>	[i]
Per capita income (INCOME)	Per capita personal income in state <i>i</i> in year <i>t</i>	[i]
Cost conditions Average wage rate (WAGE)	Average hourly earnings for the manufacturing sector in state <i>i</i> in year <i>t</i>	[j]
Population density (POPDENSITY)	Population divided by land area in state <i>i</i> in year <i>t</i>	[i], [k]
Regulatory environment Regulatory regime (ROR)	A binary variable equal to 1 if rate-of-return regulation is applied to the RBOC for basic telephone service in state <i>i</i> in year <i>t</i> and 0 otherwise	[l]
Freeze on basic local service rates (RATEFREEZE)	A binary variable equal to 1 if a rate freeze on basic local service of the RBOC is placed in state <i>i</i> in year <i>t</i> and 0 otherwise	[l]

Note: 1) Labels for variables are in parentheses; 2) This variable is used only for estimation of the two equations of investment in broadband technologies (HSLINE and FIBER); [a] FCC, 1999-2002, *Raw Data from the Industry Analysis Division's Urban Rates Survey*; [b] FCC, 2003, *ARMIS 43-05 Report*; [c] FCC, 2003, *ARMIS 43-06 Report*; [d] FCC, 2000-2003, *High-Speed Services for Internet Access*; [e] FCC, 2000-2003, *Local Telephone Competition*; [f] FCC, 2003, *ARMIS 43-07 Report*; [g] FCC, 2003, *RBOC Applications to Provide In-region, InterLATA Services Under § 271*; [h] FCC, 2000, *Deployment of Advanced Telecommunications Capability: Second Report*, FCC 00-290; [i] BEA, 2003, *Regional Economic Accounts* [Data file]; [j] BLS, 2003, *Employment, hours, and earnings from the Current Employment Statistics survey (State and metro area)* [Data file]; [k] U.S. Census Bureau, 2003, *State and County QuickFacts* [Data file]; [l] Warren Communications News, 1999-2002, *State Telephone Regulation Report*

Dependent Variables

As mentioned previously, I chose dependent variables from the three dimensions of the local telephone market—basic residential local telephone service rates, quality of service, and investment in broadband technologies. Price and quality of service are primary concerns for residential consumers of telephone services. In addition, many scholars and experts agree that if competition in the local telephone market is to be successful, it is necessary for network competition or facilities competition to be in place eventually. Hence, it makes sense to include investment in broadband technologies as a category for dependent variables. These three categories for dependent variables correspond to the three policy goals of the Telecommunications Act of 1996 by promoting competition and reducing regulation: lower prices, higher quality services, and the rapid deployment of new telecommunications technologies.

- Residential basic local telephone service rates

Prices of telephone services play a large role in determining consumers' preference for individual services. While competition may take different forms, such as price, quantity, and product differentiation, it appears reasonable to state that price is the basic form of competition in the telecommunications industry, especially given the close substitutability between telephone services by different providers. In addition, I am interested in investigating the effects of RBOC interLATA entry on residential consumers. Thus, I adopt residential local telephone service rates as a dependent variable

for measuring competitive effects of Section 271 entry on price level. LOCRATE is the relevant RBOC's basic local telephone service rates for residential consumers in state i in year t . I use only the monthly flat rates (unlimited charge) excluding touch-tone service, surcharges, 911 service, and taxes.¹⁵ I exclude these extra charges because they are either outside the control of each RBOC or not easily comparable across the states. The unlimited charge is chosen instead of the measured charge because generally the unlimited charge is preferred by consumers.¹⁶ I calculate LOCRATE by deriving the average of the highest and the lowest rates in the sample cities served by the RBOCs in each state, which can be found in the FCC data.¹⁷ A decrease in LOCRATE is considered as the effect of competition induced by Section 271 entry.

¹⁵ In Illinois and Wisconsin during 1999-2000, the flat rate system was not available. Therefore, for those two years, adjustments were made to get consistent rates data as follows: 1) For Illinois, the monthly unlimited charge for 2001 was used for 1999 and 2000 based on two facts. First, during the period (1999 - 2001) rate freeze on basic residential service was in place. Second, monthly measured charge during the period did not change. Therefore, it is reasonable to assume that the same monthly unlimited charge as that of 2001 would most likely have been in place if unlimited service was in fact available in 1999 and 2000; 2) For Wisconsin, monthly unlimited charge for 2001 was used for 2000, because the monthly measured charge did not change from 2000 to 2001. This follows the same logic as in the case of Illinois for 1999 and 2000. For 1999, the difference in measured charges between 1999 and 2000 ($\$6.49 - \$6.28 = \$0.21$ for both cities included in the FCC rate survey, Milwaukee and Racine) was added to the amount of unlimited charges for 2001 that is assumed to be the same in 2000. This is based on the comparison of data between 2001 and 2002. According to the FCC data, the difference in unlimited charges between 2001 ($\$26.23$) and 2002 ($\26.52) is exactly the same as the difference in measured charges between 2001 ($\$6.28$) and 2002 ($\6.57), which is $\$0.29$. Therefore, it is highly likely that the same logic would have been applied from 1999 to 2000.

¹⁶ This is especially true during the study period because of the use of the dial-up Internet connection.

¹⁷ The FCC conducts a survey of local telephone rates in 95 sample cities across the states as of October 15 each year. The number of sample cities included in the survey varies from state to state.

- Quality of service

While the major paradigm of economic industrial organization theory, which is often referred to as the structure-conduct-performance (SCP) paradigm, does not exclude quality of service as a performance indicator, it appears that the service quality issue has not been given much attention from previous research.¹⁸ It seems fair to say that only since the widespread introduction of price-cap regulation to the U.S. telephone industry, has the quality of service issue drawn serious attention of academic researchers.

I consider quality of service as one of the two main factors that affect consumers' choice among the different-but-substitutable telephone services. In particular, given the fact that much of the previous research focused on other indicators, such as price, productivity, and cost, most of which are variables drawn from the *supply-side* (firm) point of view, quality of service should be considered as an important indicator or criterion for measuring competitive effects from the *demand-side* (consumer) point of view.

In terms of service type, quality of service is a more intriguing issue in the local telephone market than in the long distance market. The main reason for this can be drawn from the market power of the RBOCs in their local service markets. Some economic theorists suggested that since they have a near monopoly position in their local

¹⁸ As early as 1970, Kahn (1970/1988) points out the limited attention to quality of service relative to price in public utility regulation.

service territory, the RBOCs have incentives to use that market power to help compete in the long distance market.¹⁹ One of the potential consequences is negative effects on service quality in the local telephone market.

Among various aspects of quality of service, I chose the following variables as dependent variables for the local service market. CONCOMP is the number of complaints regarding service quality that are filed with the state or federal regulatory authorities from residential consumers per 1,000 residential access lines for an RBOC in state i in year t . This is calculated from the total number of residential consumer complaints divided by the number of total residential access lines in thousands operated by the RBOC in the state in that year. A decrease in CONCOMP is regarded as an improvement in quality of service.

There are three dependent variables that are related to consumer satisfaction: DISINSTALL is the percentage of residential consumers surveyed by the RBOC who are dissatisfied with the carrier's installation service in state i in year t ; DISREPAIR is the percentage of residential consumers surveyed by the RBOC who are dissatisfied with the repair service in state i in year t ; DISBUSOFF is the percentage of residential consumers surveyed by the RBOC who are dissatisfied with the business office service in state i in year t . These variables are important in that they, to some extent, reflect the residential consumers' perception of competition in the local telephone market. Improvement in service quality would be associated with a decrease in each of the three consumer satisfaction variables.

¹⁹ See, for example, Economides (1999) and Selwyn (2002).

INSTALLCOM is the percent of installation commitments met, which is derived by dividing the number of installation orders completed by commitment date for an RBOC by the total number of installation orders for the RBOC in state i in year t . An increase in INSTALLCOM is interpreted as improvement in quality of service.

INSTALLINT is the average interval, expressed in business days, between the date service order was placed and the date the service order was completed for the relevant RBOC in state i in year t . Improved quality of service is associated with a decrease in the value of INSTALLINT.

TCTR is the total number of initial and repeat complaints concerning service quality made by consumers or end users to the relevant RBOC per 1,000 residential access lines in state i in year t . I obtain this value by dividing the total number of consumer trouble reports, initial and repeat, by the number of total residential access lines, in thousands, for the RBOC in state i in year t . Since the more the trouble reports exist, the poorer the service quality is, a lower value in TCTR represents a better quality of service. CRTR is the percent of consumer repeat trouble reports. I calculate this value from the number of consumer trouble reports concerning service quality that are received within thirty days after the resolution of an initial trouble report on the same line divided by the total number of consumer trouble reports for the same RBOC in state i in year t . A lower value in CRTR is interpreted as improvement in service quality. REPINT is the average interval, expressed in hours measured on a running clock, between the time a trouble report (out-of-service) is received by the relevant RBOC and the time the trouble report is cleared in state i in year t . Improvement in quality of service is associated with a lower value in REPINT.

- Investment in broadband technologies²⁰

The third category of dependent variables is investment in new telecommunications technologies. A question arising here is, “Just what might be regarded as ‘new’ technologies?” Although the Telecommunications Act of 1996 does not specify new telecommunications technologies, it seems appropriate to assume that the term “new telecommunications technologies” should be interpreted flexibly considering the evolving nature of these technologies. Given that the deployment of advanced telecommunications capability is one of the major policy issues at present, I use broadband technologies to represent new telecommunications technologies in this empirical analysis. I chose the following two variables as dependent variables to study the effects of RBOC interLATA entry on investment in broadband telecommunications technologies.

HSLINE is the number of total high-speed lines²¹ per 1,000 end-user switched access lines served by local exchange carriers (LECs) in state *i* in year *t*. Note that, unlike in CONCOMP and TCTR in which the number of total residential access lines operated

²⁰ Broadband technologies may not be explained solely in the context of local telecommunications market. Rather, it may be regarded as a concept that covers both local and long distance markets because investment in broadband technologies, such as fiber optic cable, could be used for both communications needs. I examine this category of dependent variables because the deployment of advanced technologies is one of the three major goals stated in the preamble of the Telecommunications Act of 1996 and I am interested in the effects, if any, of section 271 entry on encouragement of broadband investment.

²¹ The FCC uses the terms “high-speed” and “broadband” (or “advanced”) differently. According to FCC (2000, August 23), “high-speed” refers to the capability of sending information over 200 kbps in *at least one* direction, whereas “advanced” or “broadband” means the transmission speed in excess of 200 kbps in *both* (downstream and upstream) directions. However, practically the two terms are often used interchangeably, and I so use them.

by the relevant RBOC was used to derive the value, here total end-user switched access lines, residential and business, operated by all local exchange carriers reporting to the FCC was used. Since the FCC data about the number of total high-speed lines are not broken down by individual company, the number of total end-user switched access lines operated by all LECs is used correspondingly. I derive the value of HSLINE by dividing the number of total high-speed lines, regardless of technology such as ADSL or coaxial cable, by the number of total end-user switched access lines, in thousands, in state i in year t . A higher value of HSLINE represents an improvement in investment in broadband technologies, since more high-speed lines mean more investment by companies. FIBER is the percentage of sheath kilometers of fiber optic cables to the total sheath kilometers of all loop and interoffice cables for an RBOC in state i in year t . Since fiber optic cable is used for the transmission of broadband services, it is likely that, if the RBOC puts more investment in broadband technologies, the percentage of fiber optic cable will be increased. Thus, as is the case in HSLINE, a higher value of FIBER is associated with improvement in investment in broadband technologies.²²

Explanatory Variables

Explanatory variables should be chosen on the grounds that they can explain the change of the given dependent variables in the analysis. I consider the following

²² Although I am interested in fiber investment for residential services, it is possible that the regression results may actually reflect some of the effects of section 271 entry on the RBOCs' investment in fiber for business services. This is because fiber optic cables can be used for both residential and business services.

explanatory variables to investigate the extent of competitive effects of RBOC interLATA entry on price, quality of service, and investment in broadband telecommunications technologies in the local markets. For ease of discussion, I group the explanatory variables into four different categories: competition, demand conditions, cost conditions, and regulatory environment.

- Competition

I consider several variables that I think are related to the competitive environment in which the RBOCs operate. First, SEC271ENTRY is the key explanatory variable of interest for the empirical analysis. It is defined as a binary variable that equals 1 if the relevant RBOC gained approval from the FCC to provide in-region, interLATA long distance service and actually launched the service in state i in year t and 0 otherwise. The cutoff point in time to determine the value of this binary variable is October 15 of each year. This time was selected because one of the key dependent variables (LOCRATE) is composed of observations as of October 15 of each year. Thus, I treat the cases in which the RBOC launched interLATA service on or after October 15 of each year as if the interLATA entry occurred in the immediately following year.²³ In addition, I chose the

²³ In my data set, Pennsylvania (service launched on October 23, 2001), Missouri (December 7, 2001), Florida (December 30, 2002), Tennessee (December 30, 2002), and California (December 31, 2002) fall under this group.

actual date on which the RBOC launched interLATA service instead of the approval date from the FCC.²⁴ This is because the impact of Section 271 entry becomes more real when the RBOC actually provides interLATA long distance service. In some cases, such as Connecticut, the interval between the approval date and the service launch date exceeds three months.

MSCLEC is market share of the competitive local exchange carriers (CLECs) measured by end-user switched access lines in state i in year t . Market share is one of the key factors that determine market structure. Competition makes sense only when new competitors hold meaningful market shares in the industry. In studying the effects of RBOC interLATA entry on competition in local telephone markets, the change of market shares among competitors can tell us how competition develops, and it may reflect companies' behavior in the market, and in turn it may affect dependent variables listed above. RCLEC is the number of CLECs reporting to the FCC in state i in year t .²⁵ Even though maximizing the number of competitors is not necessarily the same as maximizing social welfare,²⁶ the standard economic theory tells us that the number of competitors in an industry is an important factor in determining the competitiveness of the industry.²⁷

²⁴ In my sample, only Pennsylvania (gained approval on September 19, 2001; service launched on October 23, 2001) is such a case in which the value of the SEC271ENTRY is given as 0, instead of 1, for year 2001.

²⁵ CLECS with 10,000 or more access lines in a state are required to report to the FCC.

²⁶ Sappington and Weisman (1996a) point out this (p. 258).

²⁷ See, for example, Shepherd (1997).

Thus, the number of competitive local exchange carriers (CLECs) that report market data to the FCC in each state is considered as an explanatory variable. In addition, this variable is expected to complement the MSCLEC variable.

WIRELESS is the mobile wireless service subscription rate in state i in year t . I derive this value by dividing the number of mobile wireless telephone subscribers by the population in state i in year t . Mobile wireless service has been rapidly spreading over the United States in recent years. An industry study estimated that 53 percent of the U.S. population subscribed to mobile wireless telephone service as of December 2002, based on its survey of 44 major metropolitan areas (Telephia, 2003). While there may be different views about whether wireless service is a substitute or complement for wireline service, an FCC report indicates that there is growing evidence that consumers are substituting wireless service for traditional wireline communications (FCC, 2003, July 14). In this context, if the number of mobile wireless service subscribers increases significantly, it is likely to affect the competitive landscape for local markets. In fact, one survey (Rosenberg & Lee, 2003) finds that many state regulatory commissions consider wireless services as a factor in assessing the status of competition in telephone markets—14 states of 33 states that have conducted competition analyses since passage of the Telecommunications Act of 1996. Thus, it is appropriate to include the wireless service subscription rate as an explanatory variable in analyzing the impact of RBOC entry into interLATA service market on local telephone competition.

HSPROVIDER is number of providers of high-speed (over 200 kbps in at least one direction) lines in state i in year t , regardless of technology type (e.g., ADSL, coaxial cable, etc.). This variable is used only for estimation of the two equations (HSLINE and FIBER)

that are related to investment in broadband technologies. It is included to account for any potential competitive forces from companies, such as cable TV, CLECs, satellite, and so forth, other than incumbent local exchange carriers (ILECs) in deployment of broadband technologies.

- Demand conditions

To properly capture the competitive effects of RBOC entry into interLATA long distance market, it is important to control variation in demand conditions across the states. This is because demand conditions in a certain local telephone market will affect the industry structure and conditions for competitive entry. Among potential demand conditions, I chose population and per capita income as explanatory variables for the analysis. POPULATION is the midyear estimates of the number of persons in state i in year t . A higher level of population is likely to provide more incentive for competitors to enter the market than a lower level of population. In addition, I include INCOME variable to control for differences in per capita income in states. INCOME is per capita personal income, measured in dollars, in state i in year t . A higher level of per capita income is likely to be a condition for a higher demand for telecommunications service in general and local telephone service in particular.

- Cost conditions

Basic economic theory tells us that supply conditions, together with demand conditions, determine the market equilibrium. From a producer's perspective, production cost is a central element in considering the level of output. Cost conditions, therefore, should be taken into consideration in the study of competition in local telephone markets. However, direct cost data from the RBOCs are not available. Even if these data were available, it would not be an easy task to calculate the marginal cost of providing local telephone service or installing broadband equipments and facilities. Alternatively, I use other cost conditions for the analysis.

WAGE is average wage rate, measured by average hourly earnings for the manufacturing sector, in state i in year t . I use wage data for the manufacturing sector because of data limitation. Presumably, it would be more appropriate to use average wage rate in the telecommunications sector. However, the Bureau of Labor Statistics database does not contain consistent data for all states. Wage data for the telecommunications sector were available for only very few states. Thus, I adopt wage data for the manufacturing sector as a proxy for data for the telecommunications sector.

POPDENSITY is another cost variable considered in the analysis. POPDENSITY is population density in state i in year t , which is derived by dividing population by land area for each state in a given year. By economic theory, a higher level of population density is associated with a lower production cost because it would be less expensive to build a telecommunications network in a densely populated area than in a sparsely populated area.

- Regulatory environment

Regulatory regimes for the RBOCs in states are not the same, though nowadays the majority of the states have adopted some form of incentive regulation (often price-cap regulation) for basic local telephone service. There have been many studies, theoretical and empirical, as to the effects of regulatory regime on competitive outcomes in the telecommunications industry especially since the late 1980s. While results of the studies may vary, it seems certain that regulatory regimes play an important role in shaping the competitive landscape in the local telephone market. Thus, I employ two explanatory variables that reflect the regulatory environment in each state.

ROR is a binary variable to distinguish the states that adopted rate-of-return regulation from those states where price cap or other forms of incentive regulation²⁸ was adopted for RBOCs. The value of ROR is determined such that it is equal to 1 if rate-of-return regulation is adopted for regulation of the RBOC's basic local telephone service in state *i* in year *t* and 0 otherwise. The reasons I assigned values in this way are twofold. First, price-cap regulation is more often combined with some other forms of incentive regulation such as profit sharing than rate-of-return regulation is. Therefore, it is easier to identify whether a state regulatory regime for basic local telephone service provided by an RBOC is rate-of-return regulation or not than to choose arbitrarily one form of the incentive regulation and identify each state's regulatory regime. Second, as explained

²⁸ Sometimes, various forms of incentive regulation including price caps are called 'alternative regulation' in comparison to the traditional rate base, rate-of-return regulation. For discussions about different forms of incentive regulation, see Sappington & Weisman (1996a).

below, I consider a freeze on basic local service rates as a separate explanatory variable. To do so, rate-of-return regulation is better than price cap or incentive regulation to capture the subtle difference that might exist between states with rate freeze and states with no such regime by allowing rate freeze to be included as a separate variable.

RATEFREEZE is another binary variable that captures any effects that it may have on the dependent variables. The value of this variable is assigned such that it is equal to 1 if a state regulatory commission imposed a freeze on basic residential local service rates of the RBOC in the state in a given year and 0 otherwise. Some of the states that introduced price cap or similar incentive programs also imposed a freeze on basic local telephone service rates for a certain period of time (usually a few years) to protect consumers from any potential sudden rate increase. For example, in Illinois, price-cap regulation was introduced in 1995 for regulation of Ameritech (now a part of SBC) that was accompanied by a freeze on basic residential service rates during the period through 1999 (later extended to 2002).²⁹ Since a rate freeze for basic residential local service may alter the company's behavior and business strategy that may not be the same as one under an incentive plan without rate freeze, it is reasonable to include RATEFREEZE as a separate explanatory variable in addition to ROR.³⁰

²⁹ See Abel & Clements (1998, p. 38).

³⁰ Including the RATEFREEZE variable may also reduce what Sappington & Weisman (1996a) call "the mandated v. motivated pitfall" in measuring regulatory effects, which refers to the failure of isolating motivated effects from mandated effects.

Now that the dependent variables and explanatory variables used in the analysis were set and explained above, I then proceed to the next step of the analysis, estimation of the regression equations.

5.4.4 Estimation and Discussion of Results

Since I constructed the empirical model for analyzing the impact of RBOC entry into the interLATA long distance market as a linear function of the relevant explanatory variables, it is necessary to examine whether the assumptions of the standard linear regression model are met.³¹ Although a minor violation of the assumptions may not be a problem in inferences based on the regression analysis, a major violation of the underlying assumptions of the linear regression model may result in serious distortions of the research conclusions from the analysis.³² Thus, I conducted regression diagnostics³³ for each regression equation. It is often useful to investigate the pattern of residuals and data structure to identify any violations of the assumptions.

³¹ For the standard regression assumptions, see Chatterjee, Hadi, & Price (2000, pp. 85-88).

³² As Gujarati (1995) points out, these assumptions therefore “provide a checklist for guiding our research and for evaluating the research of others” (p. 69).

³³ I largely relied on the following four textbooks for regression diagnostics: Allison (1999), Chatterjee, Hadi, & Price (2000), Cohen, Cohen, West, & Aiken (2003), and Fox (1997).

The results of my regression diagnostics revealed that the ‘linearity’ assumption³⁴ and the ‘homoskedasticity’ assumption³⁵ were most often violated. In addition, in some cases, outliers and nonnormality were detected. Often times, these violations can be corrected by transforming the variables.³⁶ I included the transformed variables in the regression equations for a more robust analysis.

Reflecting the necessary transformation of variables, the regression equations can be expressed as follows. For convenience, I group the equations according to the three categories of the dependent variables: price, quality of service, and investment in broadband technologies.

- Price

Basic residential local service rates:

$$\text{LOCRATE}_{it} = \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \beta_5 \text{WIRELESS}_{it} + \beta_6 \text{POPULATION}_{it} + \beta_7 \text{INCOME}_{it} +$$

³⁴ This assumption states that the regression model is “linear” in the parameters, namely, $Y = \beta_0 + \beta_1 X_1 + \dots + \beta_k X_k + \epsilon$, where Y is the dependent variable, $X_1 \dots X_k$ are the explanatory variables, and $\beta_0 \dots \beta_k$ are the parameters.

³⁵ The homoskedasticity assumption requires that the errors ($\epsilon_1, \epsilon_2, \dots, \epsilon_n$) in the linear regression model have the same variance σ^2 . If this assumption is violated, we call it the “heteroskedasticity” problem.

³⁶ As a general guide for transformation of variables, Mosteller and Tukey’s “bulging rule” is often used. See Fox (1997, p. 71).

$$\beta_8 \text{SQINCOME}_{it} + \beta_9 \text{WAGE}_{it} + \beta_{10} \text{POPDENSITY}_{it} + \beta_{11} \text{ROR}_{it} + \\ \beta_{12} \text{RATEFREEZE}_{it} + \epsilon_{it} \quad (5.14)$$

- Quality of service

Log of number of residential consumer complaints:

$$\text{LNCONCOMP}_{it} = \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\ \beta_5 \text{WIRELESS}_{it} + \beta_6 \text{POPULATION}_{it} + \beta_7 \text{SQPOPULATION}_{it} \\ + \beta_8 \text{INCOME}_{it} + \beta_9 \text{SQINCOME}_{it} + \beta_{10} \text{WAGE}_{it} + \\ \beta_{11} \text{POPDENSITY}_{it} + \beta_{12} \text{SQPOPDENSITY}_{it} + \beta_{13} \text{ROR}_{it} + \\ \beta_{14} \text{RATEFREEZE}_{it} + \epsilon_{it} \quad (5.15)$$

Percent of residential consumers dissatisfied with installation:

$$\text{DISINSTALL}_{it} = \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\ \beta_5 \text{SQRCLEC}_{it} + \beta_6 \text{WIRELESS}_{it} + \beta_7 \text{POPULATION}_{it} + \\ \beta_8 \text{SQPOPULATION}_{it} + \beta_9 \text{INCOME}_{it} + \beta_{10} \text{SQINCOME}_{it} + \\ \beta_{11} \text{WAGE}_{it} + \beta_{12} \text{SQWAGE}_{it} + \beta_{13} \text{POPDENSITY}_{it} + \beta_{14} \text{ROR}_{it} \\ + \beta_{15} \text{RATEFREEZE}_{it} + \epsilon_{it} \quad (5.16)$$

Percent of residential consumers dissatisfied with repair:

$$\text{DISREPAIR}_{it} = \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\ \beta_5 \text{SQRCLEC}_{it} + \beta_6 \text{WIRELESS}_{it} + \beta_7 \text{POPULATION}_{it} +$$

$$\begin{aligned}
& \beta_8 \text{SQPOPULATION}_{it} + \beta_9 \text{INCOME}_{it} + \beta_{10} \text{SQINCOME}_{it} + \\
& \beta_{11} \text{WAGE}_{it} + \beta_{12} \text{POPDENSITY}_{it} + \beta_{13} \text{SQPOPDENSITY}_{it} \\
& + \beta_{14} \text{ROR}_{it} + \beta_{15} \text{RATEFREEZE}_{it} + \epsilon_{it}
\end{aligned} \tag{5.17}$$

Percent of residential consumers dissatisfied with business office:

$$\begin{aligned}
\text{DISBUSOFF}_{it} = & \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\
& \beta_5 \text{SQRCLEC}_{it} + \beta_6 \text{WIRELESS}_{it} + \beta_7 \text{POPULATION}_{it} + \\
& \beta_8 \text{SQPOPULATION}_{it} + \beta_9 \text{INCOME}_{it} + \beta_{10} \text{SQINCOME}_{it} + \\
& \beta_{11} \text{WAGE}_{it} + \beta_{12} \text{POPDENSITY}_{it} + \beta_{13} \text{SQPOPDENSITY}_{it} \\
& + \beta_{14} \text{ROR}_{it} + \beta_{15} \text{RATEFREEZE}_{it} + \epsilon_{it}
\end{aligned} \tag{5.18}$$

Percent of installation commitments met:

$$\begin{aligned}
\text{INSTALLCOM}_{it} = & \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\
& \beta_5 \text{WIRELESS}_{it} + \beta_6 \text{SQWIRELESS}_{it} + \beta_7 \text{POPULATION}_{it} + \\
& \beta_8 \text{INCOME}_{it} + \beta_9 \text{SQINCOME}_{it} + \beta_{10} \text{WAGE}_{it} + \\
& \beta_{11} \text{POPDENSITY}_{it} + \beta_{12} \text{ROR}_{it} + \beta_{13} \text{RATEFREEZE}_{it} \\
& + \epsilon_{it}
\end{aligned} \tag{5.19}$$

Average installation intervals:

$$\begin{aligned}
\text{INSTALLINT}_{it} = & \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\
& \beta_5 \text{WIRELESS}_{it} + \beta_6 \text{POPULATION}_{it} + \beta_7 \text{SQPOPULATION}_{it}
\end{aligned}$$

$$\begin{aligned}
& + \beta_8 \text{INCOME}_{it} + \beta_9 \text{SQINCOME}_{it} + \beta_{10} \text{WAGE}_{it} + \\
& \beta_{11} \text{POPDENSITY}_{it} + \beta_{12} \text{ROR}_{it} + \beta_{13} \text{RATEFREEZE}_{it} + \epsilon_{it} \quad (5.20)
\end{aligned}$$

Total consumer trouble reports:

$$\begin{aligned}
\text{TCTR}_{it} = & \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\
& \beta_5 \text{SQRCLEC}_{it} + \beta_6 \text{WIRELESS}_{it} + \beta_7 \text{POPULATION}_{it} + \\
& \beta_8 \text{SQPOPULATION}_{it} + \beta_9 \text{INCOME}_{it} + \beta_{10} \text{WAGE}_{it} + \beta_{11} \text{SQWAGE}_{it} \\
& + \beta_{12} \text{POPDENSITY}_{it} + \beta_{13} \text{SQPOPENSITY}_{it} + \beta_{14} \text{ROR}_{it} + \\
& \beta_{15} \text{RATEFREEZE}_{it} + \epsilon_{it} \quad (5.21)
\end{aligned}$$

Percent of consumer repeat trouble reports:

$$\begin{aligned}
\text{CRTR}_{it} = & \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\
& \beta_5 \text{WIRELESS}_{it} + \beta_6 \text{SQWIRELESS}_{it} + \beta_7 \text{POPULATION}_{it} + \\
& \beta_8 \text{INCOME}_{it} + \beta_9 \text{WAGE}_{it} + \beta_{10} \text{POPDENSITY}_{it} + \beta_{11} \text{ROR}_{it} + \\
& \beta_{12} \text{RATEFREEZE}_{it} + \epsilon_{it} \quad (5.22)
\end{aligned}$$

Log of average out-of-service repair intervals:

$$\begin{aligned}
\text{LNREPINT}_{it} = & \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\
& \beta_5 \text{WIRELESS}_{it} + \beta_6 \text{POPULATION}_{it} + \beta_7 \text{SQPOPULATION}_{it} + \\
& \beta_8 \text{POPULATION25}_{it} + \beta_9 \text{INCOME}_{it} + \beta_{10} \text{WAGE}_{it} + \\
& \beta_{11} \text{SQWAGE}_{it} + \beta_{12} \text{POPDENSITY}_{it} + \beta_{13} \text{ROR}_{it} + \\
& \beta_{14} \text{RATEFREEZE}_{it} + \epsilon_{it} \quad (5.23)
\end{aligned}$$

- Investment in broadband technologies

Total number of high-speed lines:

$$\begin{aligned}
 \text{HSLINE}_{it} = & \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\
 & \beta_5 \text{SQRCLEC}_{it} + \beta_6 \text{WIRELESS}_{it} + \beta_7 \text{POPULATION}_{it} + \\
 & \beta_8 \text{SQPOPULATION}_{it} + \beta_9 \text{INCOME}_{it} + \beta_{10} \text{WAGE}_{it} + \\
 & \beta_{11} \text{SQWAGE}_{it} + \beta_{12} \text{POPDENSITY}_{it} + \beta_{13} \text{ROR}_{it} + \\
 & \beta_{14} \text{RATEFREEZE}_{it} + \varepsilon_{it} \quad (5.24)
 \end{aligned}$$

Percent of sheath kilometers of fiber:

$$\begin{aligned}
 \text{FIBER}_{it} = & \beta_1 + \beta_2 \text{SEC271ENTRY}_{it} + \beta_3 \text{MSCLEC}_{it} + \beta_4 \text{RCLEC}_{it} + \\
 & \beta_5 \text{WIRELESS}_{it} + \beta_6 \text{POPULATION}_{it} + \beta_7 \text{SQPOPULATION}_{it} + \\
 & \beta_8 \text{INCOME}_{it} + \beta_9 \text{SQINCOME}_{it} + \beta_{10} \text{WAGE}_{it} + \beta_{11} \text{SQWAGE}_{it} + \\
 & \beta_{12} \text{POPDENSITY}_{it} + \beta_{13} \text{SQPOPDENSITY}_{it} + \beta_{14} \text{ROR}_{it} + \\
 & \beta_{15} \text{RATEFREEZE}_{it} + \varepsilon_{it} \quad (5.25)
 \end{aligned}$$

where i = state, t = year, and ε_{it} = disturbance term ($\varepsilon_{it} \sim \text{i.i.d. } N(0, \sigma^2)$). The descriptive statistics for the variables used in the analysis are provided in Table 5.2.

Variable	Mean	Std. Dev.	Minimum	Maximum
LOCRATE	13.9393	3.3857	9.93	26.52
CONCOMP	0.3718	0.4066	0.0199	2.3793
LNCONCOMP ¹⁾	-1.4948	1.0829	-3.9170	0.8668
DISINSTALL	8.6393	3.5928	3.26	18.08
DISREPAIR	14.4665	4.5821	6.40	29.71
DISBUSOFF	8.4441	3.9171	1.40	16.43
INSTALLCOM	98.8679	0.7716	95.70	99.98
INSTALLINT	1.3323	0.5422	0.40	2.50
TCTR	296.4045	86.6214	131.7662	522.2009
CRTR	18.7195	4.1822	12.09	30.18
REPINT	23.5760	9.4928	11.9	78.6
LNREPINT ¹⁾	3.1001	0.3329	2.4765	4.3644
HSLINE	53.9078	37.5616	5.4865	150.8582
FIBER	0.1161	0.0271	0.0728	0.1952
SEC271ENTRY	0.1458	0.3548	0	1
MSCLEC	9.0271	5.0351	1.79	24.85
RCLEC	11.5625	5.7707	2	29
SQRCLEC ²⁾	166.6458	165.4027	4	841
WIRELESS	0.3884	0.0790	0.2182	0.5330
SQWIRELESS ²⁾	0.1570	0.0610	0.0476	0.2841
HSPROVIDER	18.7604	7.5974	5	43
POPULATION	9372970.9271	7111502.4368	2203482	35116033
SQPOPULATION ²⁾	1.38e+14	2.45e+14	4.86e+12	1.23e+15
POPULATION25 ³⁾	6.14e+17	1.41e+18	7.21e+15	7.31e+18
INCOME	29439.2708	3712.1590	22203	39244
SQINCOME ²⁾	8.80e+08	2.24e+08	4.93e+08	1.54e+09
WAGE	14.7348	1.6535	11.83	20.31
SQWAGE ²⁾	219.8195	51.3304	139.9489	412.4961
POPDENSITY	197.8125	177.0096	27	820
SQPOPDENSITY ²⁾	70135.79	140017.4	729	672400
ROR	0.0729	0.2614	0	1
RATEFREEZE	0.2917	0.4569	0	1

Note: N = 96; 1) logarithmic transformation of original variables; 2) quadratic transformation of original; 3) transformation of the original variable to the power of 2.5

Table 5.2: Descriptive statistics for the analysis of the impact of RBOC interLATA entry on local competition

As discussed in section 5.3, I use the fixed-effects model for the analysis of the competitive effects of RBOC interLATA entry on local telephone markets. Below, I present the regression results for the analysis. For the sake of exposition (as was the case in describing the regression equations), I group the regression results in three separate tables according to the three categories of the dependent variables.

Table 5.3 presents the regression results for basic residential local service rates.

Explanatory Variables	Dependent Variable
	Equation (A): Basic residential local service rates
Section 271 entry (RBOC entry = 1)	0.1210 (0.367)
Market share of CLECs	0.0219 (0.151)
Number of reporting CLECs	0.0111 (0.612)
Wireless subscription rate	0.7406 (0.575)
Population	-2.35E-07 (0.330)
Per capita income	-0.0005 (0.107)
Squared per capita income	6.33E-09 (0.197)
Average wage rate per hour	0.0309 (0.838)
Population density	0.0140 (0.522)
Rate of return regulation (Rate of return = 1)	-0.2400 (0.403)
Rate freeze (Freeze on Basic local service rates = 1)	-0.0354 (0.806)
Constant	22.1423*** (0.003)
R^2	0.1389

Note: N = 96; P-values in parentheses; *** significant at the 1 percent level

Table 5.3: Regression results for basic residential local service rates

The results of the multiple regression analysis in Table 5.3 show no statistically significant coefficient for explanatory variables. Only the constant term is significantly different from zero at the one percent level. Overall, approximately 14 percent of the total variation in basic residential local service rates is explained by the independent variables. The coefficient for the focal variable of interest, *Section 271 entry*, is not statistically significant, meaning that the RBOC entry into interLATA long distance market did not have a significant effect on basic residential local service rates.

Next, the regression results for residential local telephone quality-of-service are provided in Table 5.4. There are twelve equations in the category of quality-of-service dependent variables. Coefficients of determination (R^2) for the equations in this category vary from 0.2017 to 0.5275, suggesting moderate levels of explanatory power of the models.

Explanatory Variables	Dependent Variables		
	Equation (B): Log of number of residential consumer complaints	Equation (C): Percent of consumers dissatisfied with installation	Equation (D): Percent of consumers dissatisfied with repair
Section 271 entry (RBOC entry = 1)	-0.1999 (0.368)	-0.4529 (0.678)	-0.7469 (0.658)
Market share of CLECs	-0.0064 (0.806)	-0.0821 (0.523)	0.0071 (0.971)
Number of reporting CLECs	0.0221 (0.533)	-0.0371 (0.915)	0.5293 (0.336)
Squared number of reporting CLECs	N/A	-0.0032 (0.809)	-0.0205 (0.340)
Wireless subscription rate	-3.9407* (0.069)	-23.6521** (0.030)	-28.9278* (0.083)
Population	-6.88E-07 (0.623)	7.12E-06 (0.335)	2.07E-05 (0.124)
Squared population	1.15E-14 (0.548)	-9.47E-14 (0.349)	-2.87E-13* (0.092)
Per capita income	0.0017*** (0.003)	0.0066** (0.017)	0.0088** (0.044)
Squared per capita income	-2.33E-08** (0.010)	-7.78E-08* (0.063)	-1.22E-07* (0.075)
Average wage rate per hour	0.7585*** (0.003)	-6.4651 (0.287)	-3.0146 (0.116)
Squared average wage rate per hour	N/A	0.1863 (0.288)	N/A
Population density	-0.0224 (0.792)	-0.0160 (0.935)	-0.8053 (0.245)
Squared population density	0.0001 (0.482)	N/A	0.0010* (0.093)
Rate of return regulation (Rate of return = 1)	0.9907* (0.055)	0.9152 (0.693)	0.8373 (0.832)
Rate freeze (Freeze on basic local service rates = 1)	-0.1731 (0.468)	-0.6148 (0.602)	0.1222 (0.946)
Constant	-13.1801 (0.278)	-101.4525 (0.113)	-149.0525 (0.115)
R ²	0.5275	0.2017	0.2307

Note: N = 96; P-values in parentheses; *** significant at the 1 percent level;
 ** significant at the 5 percent level; * significant at the 10 percent level

Continued

Table 5.4: Regression results for residential local telephone quality-of-service

Table 5.4 (continued)

Explanatory Variables	Dependent Variables		
	Equation (E): Percent of consumers dissatisfied with business office	Equation (F): Percent of installation commitments met	Equation (G): Average installation intervals
Section 271 entry (RBOC entry = 1)	-1.7731** (0.020)	-1.3016*** (0.000)	0.2043 (0.183)
Market share of CLECs	0.0111 (0.899)	0.0686* (0.089)	-0.0202 (0.263)
Number of reporting CLECs	0.1390 (0.566)	-0.0843 (0.164)	-0.0054 (0.827)
Squared number of reporting CLECs	-0.0069 (0.466)	N/A	N/A
Wireless subscription rate	-3.4939 (0.630)	6.8211 (0.644)	-1.7641 (0.240)
Squared wireless subscription rate	N/A	-6.6741 (0.711)	N/A
Population	9.49E-06 (0.110)	1.72E-07 (0.787)	1.27E-06 (0.128)
Squared population	-1.54E-13** (0.041)	N/A	-1.04E-14 (0.400)
Per capita income	0.0057*** (0.004)	0.0007 (0.480)	-0.0002 (0.583)
Squared per capita income	-7.75E-08** (0.011)	-7.51E-09 (0.581)	4.17E-09 (0.463)
Average wage rate per hour	-0.9503 (0.258)	-0.0967 (0.813)	-0.0650 (0.704)
Population density	-0.0231 (0.939)	-0.0963 (0.120)	-0.0552** (0.043)
Squared population density	2.94E-05 (0.909)	N/A	N/A
Rate of return regulation (Rate of return = 1)	1.7387 (0.319)	1.0063 (0.185)	-0.2814 (0.391)
Rate freeze (Freeze on basic local service rates = 1)	-0.0138 (0.986)	-0.3932 (0.302)	-0.0675 (0.681)
Constant	-141.7155*** (0.001)	103.864*** (0.000)	5.9726 (0.478)
R ²	0.4817	0.3346	0.3444

Note: N = 96; P-values in parentheses; *** significant at the 1 percent level;
 ** significant at the 5 percent level; * significant at the 10 percent level

Continued

Table 5.4 (continued)

Explanatory Variables	Dependent Variables		
	Equation (H): Total consumer trouble reports	Equation (I): Consumer repeat trouble reports	Equation (J): Log of average out-of-service repair intervals
Section 271 entry (RBOC entry = 1)	28.5200 (0.103)	-0.6130 (0.639)	0.1563 (0.171)
Market share of CLECs	-2.8386 (0.136)	-0.0673 (0.630)	-0.0170 (0.176)
Number of reporting CLECs	-6.0168 (0.272)	0.1953 (0.341)	0.0369** (0.036)
Squared number of reporting CLECs	0.2906 (0.188)	N/A	N/A
Wireless subscription rate	23.8663 (0.884)	160.5366*** (0.002)	-0.9666 (0.362)
Squared wireless subscription rate	N/A	-222.6125*** (0.001)	N/A
Population	-0.0002* (0.078)	-4.63E-07 (0.844)	-3.61e-06** (0.012)
Squared population	3.18E-12* (0.074)	N/A	2.04e-13** (0.017)
(Population) ^{2.5}	N/A	N/A	-2.13e-17** (0.020)
Per capita income	0.0062 (0.529)	0.0005 (0.537)	0.0001 (0.288)
Average wage rate per hour	-69.1732 (0.468)	-2.3050 (0.124)	-0.1710 (0.787)
Squared average wage rate per hour	0.6933 (0.801)	N/A	0.0008 (0.965)
Population density	10.9888 (0.125)	0.3453 (0.117)	0.0277 (0.103)
Squared population density	-0.0076 (0.175)	N/A	N/A
Rate of return regulation (Rate of return = 1)	36.9505 (0.359)	2.5504 (0.342)	0.0460 (0.843)
Rate freeze (Freeze on basic local service rates = 1)	-29.5674 (0.121)	-0.5693 (0.686)	0.0967 (0.430)
Constant	1269.5290 (0.138)	-54.9065 (0.193)	16.8356** (0.013)
R ²	0.4769	0.3073	0.4395

Note: N = 96; P-values in parentheses; *** significant at the 1 percent level;

** significant at the 5 percent level; * significant at the 10 percent level

In Equation (B), although the RBOC entry into the interLATA market is associated with a lower level of residential consumer complaints with the local telephone service, the coefficient for *Section 271 entry* is again not statistically significant. However, among the competition-related variables, the coefficient for *wireless subscription rate* is statistically significant at the 10 percent level. That is, a higher level of mobile wireless service subscription rate is associated with a decrease in residential consumer complaints. This may occur because an RBOC in a state may have an incentive to improve quality of service to keep its customers in response to competition from wireless service providers.

Among the demand conditions, the coefficients for both *per capita income* and *squared per capita income* are statistically significant at the one percent level and at the five percent level, respectively. On average, a one-dollar increase in per capita income in a state would result in a 0.17 percent increase in residential consumer complaints. In contrast, the squared per capita income in a state is negatively associated with residential consumer complaints. One may reason that up to a certain point income increase imposes more workload and possibly a cost increase on the RBOC due to the increased service demand which in turn leads to an increase in consumer complaints, but after that income increases may contribute to the lower cost of service provision that leads to a more efficient operation of the network and a decrease in consumer complaints.

Among the cost conditions, the coefficient for *average wage rate per hour* is statistically significant at the one percent level and it is positively associated with residential consumer complaints about the quality of service. This is not surprising given that a higher level of wage rate causes an increase in the cost of providing local telephone

service. From the company's point of view, it may have an incentive to lower the quality of service instead of increasing production cost keeping the same quality of service.

For the regulatory environment, the coefficient for *rate of return* is significant at the 10 percent level. It suggests that states where rate-of-return regulation is adopted for the RBOC experience more residential consumer complaints by 99.07 percent than those states where non-rate-of-return regulation (i.e., incentive regulation) mechanisms are applied.

In Equation (C), again, the coefficient for *Section 271 entry* is not statistically significant, although it is negatively associated with the lower level of consumer dissatisfaction with installation service. *Wireless subscription rate* is associated with decreased *percent of consumers dissatisfied with installation*, meaning a higher wireless subscription rate is likely to improve installation service provided by the RBOCs. In addition, the coefficients for *per capita income* and *squared per capita income* are also significant at the five percent and at the 10 percent level, respectively. The reasoning for *wireless subscription rate*, *per capita income* and *squared per capita income* may be the same as in Equation (B) above.

In Equation (D), there are five significant coefficients for explanatory variables. However, the coefficient for *Section 271 entry* is not significant, suggesting that RBOC interLATA entry is not associated with change in *percent of consumers dissatisfied with repair*. Among the competition-related variables, the coefficient for *wireless subscription rate* is again significant at the 10 percent level. It suggests that a higher wireless subscription rate is associated with a lower level of residential consumer dissatisfaction

with repair service. Among the demand conditions, the coefficients for *squared population*, *per capita income*, and *squared per capita income* are significant at the 10 percent level, at the five percent level, and at the 10 percent level, respectively. Results suggest that a higher level of per capita income is likely to lead to a higher level of consumers' dissatisfaction with repair. An explanation for this may be that a higher level of per capita income would increase demand for telephone service, and in turn that increased demand would probably lower the quality of repair service because the amount of resources allocated to repair service would be reduced while the capacity of the telephone company remains the same in the short term. However, *squared population* and *squared per capita income* are negatively associated with the residential consumers' dissatisfaction level with repair service, implying that if population and per capita income exceed a certain point, it is likely to improve the quality of repair service because the increased demand after a certain point may lower the company's cost of service.

For the cost conditions, the coefficient for *squared population density* is statistically significant at the 10 percent level. Note that *squared population density* is positively associated with *percent of consumers dissatisfied with repair*, while *population density* is negatively associated with *percent of consumers dissatisfied with repair*, even though the coefficient for *population density* is not significant. This implies that a higher level of population density contributes to a lower production cost and hence a more efficient operation of the telephone network, but beyond a certain point the relationship reverses and it increases the residential consumers' dissatisfaction rate.

In Equation (E), the most interesting fact is that the coefficient for *Section 271 entry* is statistically significant at the five percent level. It suggests that the *percent of*

consumers dissatisfied with business office for an RBOC in a state with Section 271 entry allowed decreases by approximately 2 percent, on average, compared to a state where Section 271 entry was not allowed. One possible explanation for this may be that once the RBOC is allowed to provide interLATA long distance service, it has incentives to improve business office service so that it can attract its local telephone consumers to long distance services.

Among the demand conditions, the coefficients for *squared population*, *per capita income*, and *squared per capita income* are statistically significant at the five percent level, at the one percent level, and at the five percent level, respectively. The variable *squared population* is negatively associated with the dependent variable *percent of consumers dissatisfied with business office*. While *per capita income* is positively associated with *percent of consumers dissatisfied with business office*, *squared per capita income* is negatively associated with the dependent variable. This is consistent with other findings in the previous three equations (B), (C), and (D).

In Equation (F), *percent of installation commitments met* is an important measure for quality of service because installation is the first major step of local telephone service from which a customer may form his perception of the quality of service provided by an RBOC. The results show that the coefficient for *Section 271 entry* is statistically significant at the one percent level. Interestingly, however, the sign is negative. This means that the installation commitments rate is lower by approximately 1.30 percent in a state where an RBOC launched interLATA service, on average, relative to a state in which Section 271 entry was not granted. This is deterioration in quality of service for

residential local telephone service. This result is not consistent with the finding in Equation (E), which suggested a positive impact of RBOC interLATA entry on local telephone quality of service.

Another competition-related variable, *market share of CLECs*, also reveals a statistically significant effect on *percent of installation commitments met*. It implies that, on average, a one percent increase in the market share of the CLECs in end-user switched access lines within a state increases the installation commitments rate of the relevant RBOC in the same state by 0.07 percent. This may be interpreted as a positive effect of market competition. In response to the fringe competition from the CLECs, an RBOC has an incentive to improve service quality.

In Equation (G), only one coefficient for the variable *population density* is statistically significant. The negative sign is the same as expected, meaning that a higher population density level is likely to reduce *average installation intervals*. This is because in a more dense area it takes less time to install telephone network than in a remote or sparse area. The variable of interest, *Section 271 entry*, does not show a statistically significant effect on the *average installation intervals* for an RBOC.

In Equation (H), the coefficient for *Section 271 entry* is not significant, suggesting that RBOC interLATA entry does not have a significant effect on *total consumer trouble reports* of residential local telephone service. The coefficients for both *population* and *squared population* are statistically significant at the 10 percent level, although the directions of relationship with *total consumer trouble reports* are different.

In Equation (I), while *Section 271 entry* is negatively associated with the dependent variable (*consumer repeat trouble reports*), its coefficient is not statistically

significant. There are two significant coefficients in this equation. The coefficients for *wireless subscription rate* and *squared wireless subscription rate* are statistically significant at the one percent level with opposite signs, showing strong correlations with *consumer repeat trouble reports*. This result is different from those of several other equations, such as equations (B), (C), and (D). Unlike in these equations, *wireless subscription rate* is positively related with the dependent variable, and *squared wireless subscription rate* is negatively associated with the dependent variable. This could be interpreted that beyond a certain level of wireless subscription rate, the percent of consumer repeat trouble reports for the residential local telephone service provided by an RBOC is likely to decrease. This may be because an RBOC takes the competitive threat from wireless service providers seriously as a substantial number of people use wireless service for their communications needs, so that the RBOC would better respond to consumer trouble reports.

In Equation (J), again, *Section 271 entry* does not show a statistically significant effect on the log value of *average out-of-service repair intervals* for an RBOC. Among the competition-related variables, the coefficient for *number of reporting CLECs* is statistically significant at the five percent level. It suggests that, on average, one additional reporting CLEC would be resulted in a 3.69 percent increase in *average out-of-service repair intervals* for an RBOC in the same state. Of the demand conditions, the three population-related variables—*population*, *squared population*, and $(population)^{2.5}$ —are significant at the five percent level. However, the signs of these variables are different, reflecting the nonlinear nature of the relationship with the dependent variable.

Finally, the regression results for investment in broadband technologies are presented below in Table 5.5. As shown in the table, the overall goodness of fit, represented by R^2 , is very good in both equations, both of which showing over 90 percent of explanatory power by the models.

Explanatory Variables	Dependent Variables	
	Equation (K): High-speed lines	Equation (L): Fiber
Section 271 entry (RBOC entry = 1)	16.3944*** (0.001)	-0.0008 (0.551)
Market share of CLECs	0.7180 (0.162)	0.0005*** (0.002)
Number of reporting CLECs	0.6310 (0.374)	2.45E-05 (0.913)
Wireless subscription rate	266.0404*** (0.000)	0.0675*** (0.000)
Providers of high-speed lines	0.9876** (0.012)	3.43E-06 (0.977)
Population	-7.43E-06 (0.779)	7.89E-09 (0.382)
Squared population	1.58E-14 (0.967)	-1.24E-16 (0.314)
Per capita income	-0.0088*** (0.001)	1.21E-05*** (0.001)
Squared per capita income	N/A	-2.14E-10*** (0.000)
Average wage rate per hour	45.6451* (0.074)	0.0010 (0.902)
Squared average wage rate per hour	-0.4566 (0.534)	1.04E-07 (1.000)
Population density	1.2038* (0.086)	0.0004 (0.507)
Squared population density	N/A	2.01E-08 (0.965)
Rate of return regulation (Rate of return = 1)	10.1696 (0.283)	0.0052 (0.106)
Rate freeze (Freeze on basic local service rates = 1)	8.9912* (0.074)	-0.0011 (0.472)
Constant	-571.0833*** (0.007)	-0.2263*** (0.007)
R ²	0.9576	0.9256

Note: N = 96; P-values in parentheses; *** significant at the 1 percent level;
 ** significant at the 5 percent level; * significant at the 10 percent level

Table 5.5: Regression results for investment in broadband technologies

In Equation (K), results show that the coefficient for *Section 271 entry* is statistically significant at the one percent level. Indeed, it reveals a strong correlation between the total number of *high-speed lines* and RBOC interLATA entry. On average, a state, where an RBOC gained the FCC approval for interLATA entry and actually launched interLATA service, has approximately 16 more high-speed lines deployed by the companies (e.g., RBOCs, other ILECs, CLECs, cable TV companies, etc.) per 1,000 end-user switched access lines served by local exchange carriers than a state where RBOC interLATA entry did not occur.³⁷

Among other competition-related variables, the coefficients for *wireless subscription rate* and *providers of high-speed lines* are statistically significant at the one percent level and at the five percent level, respectively, both of which are positively associated with the total number of *high-speed lines*. In particular, *wireless subscription rate* shows a strong positive relationship with the deployment of high-speed lines. The positive relationship between the number of *providers of high-speed lines* and the deployment of high-speed lines is expected. This result is consistent with the GAO (2000a) finding that the deployment of high-speed lines substantially increased recently due to the competition among the ILECs, CLECs, and cable companies.

Among the demand and cost conditions, the coefficients for *per capita income*, *average wage rate per hour*, and *population density* are statistically significant at the one

³⁷ However, a study by GAO (2000a) shows that the demand for high-speed lines surged in the late 1990s due to the need for high-speed Internet access. For example, the number of Digital Subscriber Lines (DSL) increased from 39,000 lines at the end of 1998 to 504,110 lines in year-end 1999. Therefore, given the time period of the study (1999-2002), it is possible that the significance of the effect of RBOC interLATA entry on the total number of high-speed lines may be weakened a little bit by the circumstances.

percent level, at the 10 percent level, and at the 10 percent level, respectively. *Per capita income* is negatively associated with *high-speed lines*, which is in contrast to the usual expectation. *Average wage rate per hour* is positively associated with *high-speed lines*, which is also in opposite to the expectation. *Population density* is positively associated with *high-speed lines*, and this is consistent with the theoretical expectation because a higher density means a lower deployment cost.

With respect to the regulatory environment, the coefficient for *rate freeze* is statistically significant at the 10 percent level. It suggests that, on average, a state with the freeze on basic residential local service rates of the RBOC has approximately 9 more *high-speed lines* per 1,000 end-user switched access lines served by the LECs than a state in which there is no freeze on basic residential local service rates.

In Equation (L), the variable *Section 271 entry* does not show a statistically significant effect on the percent of *fiber* optic cables to the total loop and interoffice cables for the RBOCs. Among the competition-related variables, the coefficients for both *market share of CLECs* and *wireless subscription rate* are significant at the one percent level. Both of them also have positive relationships with *fiber*. This could be interpreted in two ways. On the one hand, one might reason that more competition from other companies such as the CLECs and wireless providers presents an incentive for an RBOC to invest in fiber optic cables. On the other hand, it can be thought that a more widespread wireless service and the presence of the CLECs provide a market for an RBOC's fiber facilities. Or it might be both in reality. With respect to the demand and cost conditions, only the coefficients for *per capita income* and *squared per capita*

income are statistically significant at the one percent level. Their signs are opposite, however. This result is consistent with several other equations, i.e., equations (B), (C), (D), and (E).

5.5 An Alternative Examination of the Impact of RBOC InterLATA Entry

In this section, I examine the competitive effects of RBOC interLATA entry on local telephone markets using an alternative method. I compare the performances of the RBOCs in the *Section 271 year* with those in the *pre-Section 271 year* and the *post-Section 271 year* in terms of the twelve measures used as dependent variables in the regression analysis.³⁸ The pre-Section 271 year is defined as one year before the Section 271 year; the Section 271 year is defined as the year when an RBOC actually launched the interLATA service after gaining the Section 271 approval from the FCC³⁹; and the post-Section 271 year is defined as one year after the Section 271 year. This is done by investigating the performances of the RBOCs in the states where Section 271 entry was granted by the FCC during the study period. A small data set is created for this purpose, which is composed of observations from eight states except for two measures due to data

³⁸ Of the twelve measures, “high-speed lines” is an exception. The measure looks at the total number of high-speed lines deployed during the three-year period, regardless of the type of technology or provider.

³⁹ Note that, unlike in the regression analysis, the cutoff point in time in this analysis is December 31 of each year. Thus, if an RBOC began to provide interLATA long distance service in a state on or before December 31 in a given year, that year is treated as the Section 271 year. This is done to include more states in the data set.

limitations.⁴⁰ Thus, I examine the twelve measures for the RBOCs in the pre-Section 271 year, the Section 271 year, and the post-Section 271 year. Due to the design, data for each state may come from different years. For example, data for New York and Texas on each measure are observations in years 1999, 2000, and 2001, while data for Massachusetts and Pennsylvania on each measure are observations in years 2000, 2001, and 2002.

This approach is an example of the one-group pretest-posttest design⁴¹ that fits into the quasi-experimental designs without control groups (Shadish, Cook, & Campbell, 2002). According to Shadish et al., the main weakness of this design is the potential threats to internal validity, such as maturation or history.⁴² However, simple pre-post designs can often be improved by obtaining multiple measures of the outcome that span the pretest to posttest periods (Rossi, Lipsey, & Freeman, 2004). Therefore, I include the Section 271 year in addition to the pre-Section 271 year and the post-Section 271 year.

This approach is designed to be a complementary test to the regression analysis, although it is not as rigorous as the regression analysis. Below, I present three sets of the means and the 95 percent confidence intervals for the twelve measures of the RBOC performances over a three-year period in Table 5.6.

⁴⁰ See note 5 above. Also note that three states included in this data set (Arkansas, Kansas, and Oklahoma) were not included in the data set for the regression analysis. In addition, the small sample size may reduce the power of the test, making it more difficult to reject the null hypothesis (in this case, no difference in performances between pre-section 271 year, section 271 year, and post-section 271 year).

⁴¹ This design is also called as the “simple pre-post design” or “before-and-after study” (Rossi, Lipsey, & Freeman, 2004, p. 290).

⁴² Maturation is defined as natural changes over time that occur even in the absence of treatment, and history refers to all events that occur concurrently with treatment that could cause the observed effect (Shadish, et al., 2002, pp. 55-57).

Measure	Pre-Section 271 Year		Section 271 Year		Post-Section 271 Year
Basic residential local service rates	13.940 (10.206-17.674)	N	13.885 (10.159-17.611)	N	14.180 (10.082-18.278)
Number of residential consumer complaints	0.215 (-0.105-0.535)	N	0.150 (-0.068-0.368)	N	0.139 (-0.018-0.295)
Percent of consumers dissatisfied with installation	5.240 (4.249-6.231)	Y	6.091 (4.705-7.478)	N	6.387 (4.612-8.163)
Percent of consumers dissatisfied with repair	9.986 (7.725-12.248)	Y	11.534 (9.226-13.841)	N	11.292 (8.766-13.819)
Percent of consumers dissatisfied with business office	7.001 (6.250-7.752)	N	7.227 (5.734-8.721)	N	7.402 (6.066-8.739)
Percent of installation commitments met	98.760 (98.485-99.035)	N	98.906 (98.318-99.495)	N	98.969 (98.747-99.191)
Average installation intervals	0.900 (0.625-1.175)	N	1.450 (0.931-1.969)	N	1.450 (1.090-1.810)
Total consumer trouble reports	269.393 (228.385-310.401)	N	286.037 (228.679-343.394)	N	279.077 (225.244-332.911)
Consumer repeat trouble reports	14.601 (13.124-16.078)	N	15.164 (13.846-16.482)	Y	14.444 (13.028-15.859)
Average out-of-service repair intervals	20.612 (17.778-23.447)	N	20.238 (17.156-23.319)	N	21.587 (17.571-25.604)
High-speed lines	32.439 (14.215-50.663)	Y	60.549 (36.425-84.674)	Y	97.289 (67.309-127.268)
Fiber	0.114 (0.079-0.148)	Y	0.124 (0.096-0.152)	Y	0.128 (0.099-0.157)

Note: 95 percent confidence intervals in parentheses; Y = statistically significant at the 5 percent level; N = statistically not significant at the 5 percent level

Table 5.6: Performances of the RBOCs in pre-Section 271 year, Section 271 year, and post-Section 271 year

The results in the Table 5.6 show mixed indications. First, let us compare the pre-Section 271 year and the Section 271 year. For the price measure, *basic residential local service rates* show an improvement from the perspective of consumers. Of the nine quality-of-service measures, three measures (*number of residential consumer complaints*, *percent of installation commitments met*, and *average out-of-service repair intervals*) show improvements and six measures (*percent of consumers dissatisfied with installation*, *percent of consumers dissatisfied with repair*, *percent of consumers dissatisfied with business office*, *average installation intervals*, *total consumer trouble reports*, and *consumer repeat trouble reports*) show deteriorations. The two measures in the category of investment in broadband technologies (*high-speed lines* and *fiber*) show improvements. To examine the statistical significance of the results, I conducted the hypothesis testing with dependent samples,⁴³ which is based on a two-tailed t-test at the significance level of 0.05, per each measure. The null hypothesis for each measure is that there is no mean difference between the observations in the pre-Section 271 year and the observations in the Section 271 year. Test results show that only four of the twelve measures (*percent of consumers dissatisfied with installation*, $t = -3.5842$; *percent of consumers dissatisfied with repair*, $t = -2.8292$; *high-speed lines*, $t = -4.8964$; and *fiber*, $t = -2.4995$) have different means that are statistically significant between the pre-Section 271 year and the Section 271 year.

⁴³ According to Mason, et al. (1999, p. 371), there are two types of dependent samples: (1) those characterized by a measurement, an intervention of some type, and then another measurement; and (2) a matching or pairing of the observations. My analysis here is an example of the first case.

Second, let us compare the Section 271 year and the post-Section 271 year. In the price category, *basic residential local service rates* show a deterioration from the consumer's point of view because the level of rates increased. In the quality-of-service category, five measures (*number of residential consumer complaints*, *percent of consumers dissatisfied with repair*, *percent of installation commitments met*, *total consumer trouble reports*, and *consumer repeat trouble reports*) show improvements, while three measures (*percent of consumers dissatisfied with installation*, *percent of consumers dissatisfied with business office*, and *average out-of-service repair intervals*) indicate deteriorations. One quality-of-service measure (*average installation intervals*) reveals no change in the mean. As in the comparison between the pre-Section 271 year and the Section 271 year, both of the two measures in the category of investment in broadband technologies (*high-speed lines* and *fiber*) show improvements. Again, however, the results for only three (*consumer repeat trouble reports*, $t = 3.2125$; *high-speed lines*, $t = -4.8964$; and *fiber*, $t = -9.5198$) of the twelve measures are statistically significant, which suggests that the mean difference between the Section 271 year and the post-Section 271 year is statistically meaningful for these three measures.

Taken together, four (*number of residential consumer complaints*, *percent of installation commitments met*, *high-speed lines* and *fiber*) of the twelve measures imply consistent improvements in the RBOC performances over the three-year period. However, the results for only *high-speed lines* and *fiber* are statistically significant during the period. Since my data set is limited to the three-year period, it is difficult to draw a definitive conclusion about these two measures.

On the other hand, the performances of the RBOCs for two measures (*percent of consumers dissatisfied with installation, percent of consumers dissatisfied with business office*) appear to have been deteriorated consistently during the three-year period. However, none of the mean differences in the two measures between the Section 271 year and the post-Section 271 year is statistically significant.

The remaining six measures show mixed performances during the period, either an improvement from the pre-Section 271 year to the Section 271 year and then deterioration from the Section 271 year to the post-Section 271 year, or vice versa. Among these, three measures (*percent of consumers dissatisfied with repair, total consumer trouble reports, and consumer repeat trouble reports*) show improvements after Section 271 entry. However, only the results for *consumer repeat trouble reports* are statistically significant as mentioned above.

5.6 Summary

The empirical analyses discussed above show mixed results about the impact of RBOC interLATA entry on local telephone and broadband technologies markets. Table 5.7 presents a summary of the empirical results.

Dependent Variable / Measure	Section 271 Entry					
	Regression		Hypothesis Testing with Dependent Samples			
	Statistical Significance	Sign / Effect	Pre-Section 271 Year ⇒ Section 271 Year		Section 271 Year ⇒ Post-Section 271 Year	
			Statistical Significance	Sign / Effect	Statistical Significance	Sign / Effect
Basic residential local service rates	No		No		No	
Number of residential consumer complaints	No		No		No	
Percent of residential consumers dissatisfied with installation	No		Yes	+ (D)	No	
Percent of residential consumers dissatisfied with repair	No		Yes	+ (D)	No	
Percent of residential consumers dissatisfied with business office	Yes	– (I)	No		No	
Percent of installation commitments met	Yes	– (D)	No		No	
Average installation intervals	No		No		No	
Number of total consumer trouble reports	No		No		No	
Percent of consumer repeat trouble reports	No		No		Yes	– (I)
Average out-of-service repair intervals	No		No		No	
Total number of high-speed lines	Yes	+ (I)	Yes	+ (I)	Yes	+ (I)
Percent of sheath kilometers of fiber	No		Yes	+ (I)	Yes	+ (I)

Note: I = improved; D = deteriorated

Table 5.7: Summary of empirical results

As shown in Table 5.7, in the regression analysis, the coefficient for the variable *Section 271 entry* is statistically significant only in three equations. That is, *Section 271 entry* of the RBOCs appears to have a statistically significant effect on *percent of residential consumers dissatisfied with business office*, *percent of installation commitments met*, and *total number of high-speed lines*. The effects on *percent of residential consumers dissatisfied with business office* and *total number of high-speed lines* indicate improvements, while the effect on *percent of installation commitments met* indicates a deterioration.

In the second analysis, the performances of the RBOCs in the states where *Section 271 entry* was allowed reveal significantly different means for the four measures (*percent of residential consumers dissatisfied with installation*, *percent of residential consumers dissatisfied with repair*, *total number of high-speed lines*, and *percent of sheath kilometers of fiber*) between the pre-*Section 271* year and the *Section 271* year. While the two quality-of-service measures show deteriorations during this period, the two measures of investment in broadband technologies indicate improvements during the same period. Between the *Section 271* year and the post-*Section 271* year, three measures (*percent of consumer repeat trouble reports*, *total number of high-speed lines*, and *percent of sheath kilometers of fiber*) show significantly different means in the performances of the RBOCs during the period, indicating improvements.

In summary, it is difficult to make a definitive judgment about the impact of RBOC interLATA entry on local competition, given the mixed results of empirical analyses. Thus, the full effects that the Telecommunications Act of 1996 anticipated remain to be seen in the future.

CHAPTER 6

CONCLUSION

The line-of-business restrictions *imposed* on the Regional Bell Operating Companies (RBOCs) by the Modification of Final Judgment (MFJ) in 1982 were controversial. But the *removal* of such restrictions and, if so, whether to impose preconditions for RBOC entry into competitive markets such as interLATA long distance markets were even more contentious during the passage of the Telecommunications Act of 1996. Once the issue of conditioning RBOC interLATA market entry on their opening of local networks to competition was settled by Section 271 of the 1996 Act, several questions arose immediately faced the telecommunications industry and its regulators. A most important question, of course, was whether Section 271 would achieve the core policy goals of the Act: increase competition in *all* telecommunications markets and bring benefits to the American telecommunications consumers. Different views and claims about the potential benefits and harms resulting from RBOC interLATA entry made each Section 271 application highly controversial. In this dissertation, I have provided evidence regarding the competitive effects of RBOC entry into interLATA markets on local telephone markets to help answer the question.

In doing so, I have developed a framework for analyzing the competitive effects of Section 271 entry on local markets that incorporates the consumer's perspective as well as the firm's perspective by considering both demand-side and supply-side aspects of the market. The findings of this research provide a preliminary assessment of the effects of RBOC entry into long distance markets on local competition. In addition, this study should also help regulators and policymakers develop future courses of action to improve regulation of the telecommunications industry by informing them of what aspects of the industry may need more attention, such as potential deterioration of quality of service after Section 271 entry and the need for encouragement of innovative pricing plans.

6.1 Summary of Research Findings

To explore the effects of RBOC entry into interLATA long distance markets pursuant to Section 271 of the Telecommunications Act of 1996 on competition in local markets, I conducted an empirical analysis using two different approaches: a regression analysis and a hypothesis testing with dependent samples. Below I summarize the main findings of this research.

6.1.1 Results from the Regression Analysis

The first approach to the analysis of data was a regression analysis employing a fixed effects model. I gathered data at the state level to construct a panel data set

consisting of 96 observations from 24 states over the four-year period (1999-2002). To employ a balanced perspective and to see if RBOC interLATA entry in their local service territories achieves the envisioned policy goals of the Telecommunications Act of 1996, I examined the three different dimensions of local telephone markets: basic residential local service rates, quality of service, and investment in broadband technologies.

- The effects on basic residential local service rates

In terms of local service rates, my study does not provide empirical evidence to support the argument that allowing the RBOCs to enter the long distance market would bring benefits to the consumers, especially residential consumers, in the form of lower service rates in local telephone markets. Regression results suggest that there is no statistically significant effect of RBOC interLATA entry on basic residential local service rates. This finding is consistent with a recent empirical study by Hausman, Leonard, and Sidak (2002) who found no significant change in the local bill of the average consumer in states where RBOC interLATA entry was allowed (New York and Texas) compared to those bills in states where RBOC interLATA entry did not occur (Pennsylvania and California) during the study period (1999 - 2000).¹

One might argue that basic residential local service rates are largely set by other factors such as regulatory regimes (e.g. price caps or rate freezes), not competition.

¹ Hausman et al. also claimed that the average consumer in New York and Texas saved on the monthly bill for interLATA services compared to Pennsylvania and California. However, Selwyn (2002) strongly criticized the study. See my discussions in section 4.4.

However, considering that price caps or rate freeze are usually considered regulatory devices to protect consumers by preventing sudden price increase, it is, at least theoretically, entirely possible for the providers to take the initiative to lower prices even under the current regulatory regimes. In addition, empirical evidence from this research indicates that neither price caps nor rate freezes have a statistically significant effect on lowering basic residential local service rates at least during the study period.^{2, 3}

- The effects on quality of service

In terms of local telephone quality-of-service provided by the RBOCs, regression results suggest that Section 271 entry by the RBOCs does have statistically significant effects on two of the nine quality-of-service variables examined in this study. One is the effect of RBOC interLATA entry on consumer dissatisfaction with the business office. That is, RBOC entry into interLATA service markets in their local service territories is likely to *decrease* the percent of residential consumers who are dissatisfied with business office service offered by the RBOC in a given state. This means that one measure of quality of service *improves* when the RBOC is allowed to enter the interLATA long distance market.

² Ai & Sappington (2002) also find that residential local service rates do not vary systematically under incentive regulation relative to rate-of-return regulation.

³ Of course, price caps and rate freezes will prevent rates from increasing beyond the caps or the frozen level.

The other is the effect of Section 271 entry on percent of installation commitments met. Empirical results tell us that when an RBOC is allowed to provide in-region interLATA service, it is likely to lead to a *decrease* in percent of the installation orders from consumers that are completed by the commitment date set by the RBOC. In other words, RBOC entry into interLATA markets is associated with *deteriorated* installation service quality offered by the RBOC.

Of the nine quality-of-service measures studied in this dissertation, only two measures show statistically significant effects of RBOC interLATA entry, while the remaining seven measures do not have statistically significant effects of RBOC interLATA entry. However, as discussed above, the directions of the effects of RBOC interLATA entry are not the same in the two quality-of-service measures. That is, on the one hand, empirical evidence from the regression analysis indicates that RBOC entry into interLATA long distance markets reduces residential consumers' dissatisfaction with the RBOC's business office service, i.e., improves one dimension of quality-of-service. On the other hand, my results suggest that RBOC interLATA entry worsens another dimension of quality-of-service, percent of installation commitments met. Thus, it is hard to draw a definitive conclusion about the effects of Section 271 entry by the RBOCs on local telephone quality-of-service, given these mixed results of empirical evidence.

- The effects on investment in broadband technologies

Regression results lend some support to an argument that allowing the RBOCs to enter interLATA long distance markets will help stimulate investment in broadband

technologies, at least by one measure. The empirical analysis undertaken in this dissertation provides some evidence that RBOC interLATA entry increases deployment of high-speed lines by all high-speed service providers, including cable TV companies. This result is consistent with the study of Bittlingmayer and Hazlett (2002) who found that Section 271 entry by the RBOCs would spur investment in broadband networks.⁴ However, empirical evidence does not support a similar argument that RBOC interLATA entry is likely to lead to more investment by the RBOCs in fiber optic cables, which could be used for both local and long distance broadband communications needs. Hence, the effects of Section 271 entry by the RBOCs on investment in broadband technologies are also mixed.

- Overall assessment

Overall, these empirical results show mixed indications about the effects of RBOC entry into interLATA markets. Thus, the first hypothesis⁵ in my study is supported in part—percent of residential consumers dissatisfied with business office and number of high-speed lines—and is not supported in part—local service rates, eight measures of quality-of-service, and percent of fiber—by empirical evidence. In fact (as

⁴ See also Prieger (2003) and Woroch (2000) about the effect of competition on investment in new technologies. Prieger (2003) found that in the regions where the RBOCs are present the availability of broadband Internet access increases. Woroch (2000) found that competition between ILECs and CLECs increases investment in digital infrastructure.

⁵ It states that RBOC interLATA entry is likely to lower local telephone service rates, improve service quality, and encourage investment in broadband technologies.

mentioned), one measure of quality-of-service, installation commitments met, even showed deterioration when RBOC interLATA entry was allowed, which is contrary to the hypothesis. Therefore, it can be best argued, based on these empirical results, that although RBOC entry into interLATA long distance markets would bring some benefits by some measures in the areas of quality-of-service and investment in broadband technologies, there is little evidence that it would improve local telephone quality-of-service or encourage broadband investment in all aspects. In addition, empirical evidence does not support the theory that RBOC interLATA entry lowers basic residential local service rates.

6.1.2 Results from the Alternative Examination

The second approach used in this dissertation to investigate the competitive effects of RBOC interLATA entry on local markets was the method of hypothesis testing with dependent samples. I gathered data for the states in which the FCC granted RBOC Section 271 authority during the period 1999-2002. To compare performance in the Section 271 year with that one year before Section 271 entry and one year after Section 271 entry, I constructed a three-year data set.⁶ As in the first approach, I examined the three dimensions of local telephone markets: basic residential local service rates, quality of service, and investment in broadband technologies.

⁶ As explained in chapter 5, due to data limitations, the number of states included in the data for this analysis varies from six to eight depending on the measure.

In the case of between the pre-Section 271 year and Section 271 year, the results tell us that only four of the twelve measures show statistically significant differences at the five percent level. Two of them—percent of residential consumers dissatisfied with installation and percent of residential consumers dissatisfied with repair—indicate deteriorations, whereas the other two—total number of high-speed lines and percent of sheath kilometers of fiber—show improvements during this period.

In comparing the Section 271 year and the post-Section 271 year, only three of the twelve measures show different performances that are statistically significant at the five percent level. All these three measures—percent of consumer repeat trouble reports, total number of high-speed lines, and percent of sheath kilometers of fiber—indicate improvements during the period.

Thus, the second hypothesis⁷ tested in my study is only partly supported by empirical evidence. The empirical results show that there is no meaningful difference in terms of basic residential local service rates over the three-year period (pre-Section 271 year, Section 271 year, and post-Section 271 year).

In terms of local telephone quality of service, two measures—percent of residential consumers dissatisfied with installation and percent of residential consumers dissatisfied with repair—show statistically significant deteriorations between the pre-Section 271 year and Section 271 year, and one measure—percent of consumer repeat

⁷ It states that in the states where Section 271 entry was allowed, the rates, service quality, and investment in broadband technologies after the RBOC in-region interLATA entry are significantly different from those before the entry.

trouble reports—indicates a statistically significant improvement between the Section 271 year and post-Section 271 year. However, the remaining six quality-of-service measures do not show meaningful differences over the three-year period.

In terms of investment in broadband technologies, the two measures in this category—total number of high-speed lines and percent of sheath kilometers of fiber—show consistent improvements that are statistically significant over the three-year period. However, the fact that there are significant differences between the *pre*-Section 271 year and Section 271 year may be interpreted as a factor that weakens our confidence that RBOC Section 271 entry played a major role in encouraging investment in broadband technologies, which is represented in the measures between the Section 271 year and *post*-Section 271 year.

6.1.3 A Summarizing Thought

By passing the Telecommunications Act of 1996, the U.S. Congress clearly envisioned a desirable state of market competition in the telecommunications industry. Congress wanted to see lower rates, improved service quality, and expanded investment in new technologies. After eight years since enactment of the Act, despite some progress made so far, it appears that the hope for a competitive local telephone market for residential consumers has not been fully realized yet. Evidence from this research seems to make this point. This dissertation examines one of the major policies set out in the Act that are designed to achieve local competition. The two approaches adopted in this research indicate that RBOC entry into interLATA long distance market has brought

mixed results, at best, to the residential customers of local telephone and broadband markets. Among the three main categories of consumer benefits Congress intended to achieve by allowing the RBOCs to enter the long distance market, the empirical results from this research suggest that (1) there has not been much success in lowering residential local service rates; (2) results appear to be mixed in local telephone quality of service with some improvements and with some deteriorations; and (3) encouragement of investment in broadband technologies seems to show some success. Thus, evidence from my study does not support the argument that RBOC entry into interLATA markets would generally enhance consumer benefits in all aspects as envisioned by the Telecommunications Act of 1996.

6.2 Some Policy Implications of the Research

The overriding policy goal of the Telecommunications Act of 1996 is to increase competition in all segments of the telecommunications industry for the benefit of consumers. In particular, one of the major features of the Act was opening local telephone markets to competition. To that end, the Act establishes several important tools and measures that are intended to create a competitive environment in telephone markets including interconnection, unbundled network elements, and resale. In addition, the Act contains special provisions that impose unique requirements on the RBOCs as preconditions for their entry into interLATA long distance markets from which they were previously prohibited by the 1982 Modification of Final Judgment. The FCC, the

Department of Justice, and state regulatory commissions were given an important task by Congress in implementing the provisions to make the policy goals of the Act a reality.

This dissertation examines the effects of RBOC interLATA entry on competition in local telephone markets. From this study, the following policy implications can be drawn. First, in this dissertation, I provide insights on how to assess and analyze competition in telecommunications markets. That is, I suggest a framework that incorporates the consumer's perspective as well as the firm's perspective in the analysis of telecommunications competition. The existing literature and practice by regulators often pay less attention to aspects that may be important to consumers, such as quality of service.⁸ To capture fuller aspects of competition in local telephone markets, regulators and policymakers should apply a balanced perspective that considers both consumer-oriented demand-side characteristics and firm-oriented supply-side characteristics when they assess or analyze the status and effects of telecommunications competition.

Second, this dissertation provides empirical evidence about the effects of RBOC entry into interLATA markets on local telephone markets. It offers an empirical evaluation of realized outcomes of a major policy set forth in Section 271 of the Telecommunications Act of 1996. So far, little empirical research about the impact of RBOC interLATA market entry that focused on local markets has been available to practitioners. This study can provide a useful reference to regulators and policymakers for that purpose.

⁸ A survey report by Rosenberg & Lee (2003) shows the tendency that state regulators rely more on firm-oriented supply-side characteristics, such as the number of competitors and market share, and less on consumer-oriented demand-side characteristics, such as quality of service and consumer satisfaction.

Third, I also provide some guidance to regulators and policymakers about the areas that need more attention to enhance competitive conditions in local telephone markets. As discussed earlier, empirical evidence from this dissertation suggests that allowing RBOC entry into long distance markets does not affect basic residential local service rates charged by the RBOCs. This could indicate to regulators that they need to encourage price competition for residential services between the RBOCs and competitors. Although it can be done by different means, one option may be giving more pricing flexibility to the RBOCs so that they can respond more quickly to market competition. In fact, some states have already begun to apply more flexible regulatory plans for large incumbent local exchange carriers (ILECs) including the RBOCs than those of typical price cap plans. In New York, for example, Verizon was given pricing flexibility on almost all retail services including basic residential local service, except for lifeline, 911-related, and certain non-recurring charges for a two-year term beginning March 1, 2002.⁹ Under the new regulatory plan, the *Verizon Incentive Plan*, Verizon is allowed to raise or lower prices, but increases in the monthly basic service charges are limited to no more than \$1.85 in the first year and \$0.65 in the second year for customer's first line. In addition, overall revenue increases in each year cannot exceed 3%, i.e., a revenue cap is imposed.

⁹ See New York State Public Service Commission (2002, February 26).

Another option may be that regulators can promote more innovative pricing plans by companies such as so-called “all-distance plans” under which customers pay a single flat rate charge per month for unlimited use of bundles or packages of services (e.g., a combination of local and long distance services).

In addition, empirical results of this dissertation indicate that some aspects of quality of service are adversely affected by the RBOCs’ interLATA market entry. This implies that regulators need to make sure that the quality of the RBOCs’ local telephone service does not deteriorate after Section 271 entry. Close market monitoring to prevent and detect service deterioration by the RBOCs becomes more important, given the completion of all the applicable Section 271 processes.¹⁰

These policy implications drawn from this dissertation should help regulators and policymakers improve regulation and plan future courses of action aimed at facilitating competition in the local telephone market.

6.3 Directions for Future Research

This dissertation contributes to the existing literature on telecommunications competition and to the policy community by presenting timely empirical evidence about the effects of RBOC entry into interLATA markets on competition in local telephone markets. Instead of focusing on one aspect of the market, this dissertation utilized three

¹⁰ The necessity for post-Section 271 entry monitoring was well emphasized by then Bell Atlantic’s (now Verizon) violation of Section 271 requirements right after its entry into New York long distance market in December 1999, which resulted in a \$3 million payment under a Consent Decree between the FCC and Bell Atlantic. See FCC (2000, March 9).

dimensions of the local telephone and broadband markets. It looked at various measures of the local telephone and broadband markets, employing two different approaches. However, this research has its own limitations. They may provide some guidance and insights to enrich future research of telecommunications competition.

First, my research is limited to the effects of RBOC interLATA entry on *local* competition. Although it is true that one may have more difficulty in obtaining relevant data for long distance markets given the relaxed regulations in the sector, future research can extend the scope of analysis into the long distance market to capture a complete picture of the effects of RBOC interLATA entry on telecommunications competition. By doing so, one could provide more empirical evidence to determine whether or not allowing the RBOCs to enter the long distance market is a successful policy in light of bringing benefits to consumers in local *and* long distance markets, which Section 271 of the Telecommunications Act of 1996 envisions.

Second, this dissertation could not look directly at the effects of Section 271 entry on the RBOCs' behavior about investment in broadband technologies due to data limitations. It is perhaps more desirable and useful to distinguish the RBOCs from other providers of high-speed lines, especially cable TV operators, in investigating the impact of RBOC interLATA entry on deployment of broadband technologies. This is because currently the RBOCs and cable TV operators are the two major categories of players in deployment of high-speed lines to residential customers.¹¹ Future research using more

¹¹ According to FCC (2003, December), approximately 33 percent of total high-speed lines are asymmetric digital subscriber lines (ADSL), about 85 percent of which is provided by the RBOCs, and approximately 58 percent of total high-speed lines are coaxial cable, most of which is provided by cable TV operators.

disaggregated data would certainly be beneficial in examining the RBOCs' behavior and incentive changes affected by RBOC Section 271 entry.

Third, on the topics of local competition and broadband deployment, there is much controversy about the role of unbundled network elements (UNEs) and the appropriate pricing methodology for them. In particular, the scope of UNEs that the ILECs, including the RBOCs, must provide to competitors and the associated price level are likely to have a significant effect on the incentives and behaviors of the ILECs and competing providers in terms of service rates and investment in network facilities. Since the available data for UNE rates are relatively new, it would be an interesting topic for future researchers to explore the effects of the UNE factors on competition in local and broadband markets.

Fourth, policy analysts and researchers as well as practitioners ideally should consider a broader context of local competition. What this means is that the rapidly changing competitive landscape in local telephone markets requires us to extend the scope of factors to take into account in analyzing the extent and future development of competition in local telephone markets. Competitive entry into local exchange markets can come from several different sources.¹² Wireless service providers, cable TV companies, interexchange carriers (IXCs), ILECs outside their territories, and electric power companies are all potential competitors to the currently dominant RBOCs in local telephone markets. Recently, voice service using the Internet, often called "Voice over

¹² See Faulhaber (2003), Teece (1995), and Vogelsang & Woroch (1998) for discussions about potential competitors to the ILECs.

Internet Protocol (VoIP)” or “Internet telephony” or “IP telephony,”¹³ is emerging as a potentially viable competing service mode to the traditional telephone service based on public switched telephone network (PSTN). Therefore, analysis of local telephone competition can provide richer information, better understanding, and more insights to policymakers and analysts by examining the issue in this broader context.

Finally, while this dissertation provides preliminary empirical evidence of the competitive effects of RBOC in-region interLATA entry on local telephone markets in terms of three selected dimensions, given the short history of the RBOC provision of interLATA services and the limitations of this study, further empirical research with richer data is clearly necessary. Surely, more time is needed to draw a definitive conclusion about the success or failure of this core policy set forth in the Telecommunications Act of 1996.

¹³ For a comprehensive introduction to Internet telephony, see McKnight, Lehr, & Clark (2001).

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