

The German Telecommunications Reform – Where did it Come from, Where is it, and Where is it Going?

By Ingo Vogelsang, Boston University^{*)}

**Presentation at Verein für Socialpolitik Annual Meetings
Innsbruck, September 19, 2002**

Abstract

German telecommunications reform came late because of high institutional constraints, powerful beneficiaries and reasonable functioning of the old system. It finally occurred because (1) the beneficiaries had less to lose, (2) Germany was falling behind, (3) reform was proven to work abroad and (4) the EC exerted pressure. The reform, particularly separation of posts from telecommunications, privatization of Deutsche Telekom and the creation of the RegTP, brought radical changes and the formation of new beneficiaries. The current sector crisis should spur research in the stability of competition in network industries and a reevaluation of the current reforms. Further reforms are required by new EC rules that will provide a more unified framework for the entire telecommunications sector. In the long run, privatization and liberalization will be completed, while some kinds of telecommunications-specific regulation will continue. Dominant firm regulation of end-user services is likely to be abolished down the road, while bottleneck regulation may persist. The remaining amount of dominant firm regulation and the pace of deregulation will depend heavily on market boundaries between (a) wireless and fixed networks, (b) high and low capacity subscriber access and (c) high-density and low-density networks. Assessing the interaction between market boundaries and market power requires economic research of intermodal competition and market power.

1. Introduction

Although telecommunications reform has become a worldwide phenomenon, the powerful changes in the German telecommunications sector over the last five years have surprised many observers, including myself. The optimistic view of the development is that Germany made up a 20-year head start of the U.S. and a 10-year head start of the UK. Considering the gloomy situation the telecommunications industry currently experiences worldwide and in Germany, the pessimistic view is that the reforms have brought us into the same mess as all the others. A realistic view probably is that the benefits from reform exceed the costs of the current crisis and that the reforms mostly followed EC directives.

While I have some knowledge of the German telecommunications reform, I can neither claim expertise as an economic historian nor as a forecaster. On the contrary, fifteen years ago I predicted that the German Bundespost would never be privatized (Vogelsang,

^{*)} The author would like to thank Dominik Böllhoff, Andreas Neumann and Karl-Heinz Neumann for helpful comments on a previous version.

1988). The first and the third questions in the title of my paper may therefore lead onto slippery grounds. In order to provide for a more stable basis, let me first discuss explanatory variables for answering these questions. This discussion will be followed by attempts to answer the three questions in the title. There will be no systematic welfare evaluation of the reforms, although some evaluations will sneak in with the descriptions and analyses.

Sector reform can be measured along the three variables privatization, deregulation and liberalization. Privatization refers to the degree of state ownership, deregulation to the degree of state supervision of the sector and liberalization to the openness to and actual amount of competition. The three variables are conceptually distinct but overlap empirically in many respects. Over the last 15 years, the telecommunications reform in Germany has been almost monotonically increasing in privatization and liberalization, but not necessarily in deregulation. In fact, one can argue that sector-specific regulation has increased for some period, but may be culminating at this time.

Sector reforms, meaning that the sector governance changes within the legal and constitutional framework of a country, can be explained by a variety of factors, not all of which need to be sector specific.¹ However, if reforms occur in the same sector throughout the world then the sector specific explanatory factors have to be strong and/or closely interrelated with the non-sector specific factors. We will therefore first characterize sector specific factors (and such interrelations) with a claim to worldwide validity and then look for factors that would explain differences between reforms in different countries and could therefore provide leads for the specific reforms in Germany.

Prime candidates for a worldwide explanation are (Vogelsang and Mitchell, 1997)

- Technical changes in the sector, in particular, through digitization (implying convergence of media), cellular technology, fiber optics, and progress in computer technology.
- Demand changes, such as expansion and diversification of demand, an increase in dependence of the rest of the economy on the telecommunications sector and, in particular, the globalization of telecommunications
- Changes in governance technologies, such as new organizational setups, property rights and incentives. Some of these have been developed in the course of telecommunications reforms and may therefore not have been causes but rather facilitating factors. They include price caps, interconnection regulation, spectrum auctions, and proxy cost models.

The combination of all these developments called for competition as the preferred mode of market organization, because it presumably best copes with technical and demand changes and because those changes themselves destroyed natural monopoly properties. The technical and demand changes reduced the importance of economies of scale and of sunk costs (through persistent technical change that creates obsolescence) in all parts of the telecommunications network, with some exception in the local loop. Through full

¹ See Ménard and Shirley (forthcoming) and Vogelsang (forthcoming).

subscriber penetration network externalities for “plain old telephone services” (POTS) have become negligible. Globalization of telecommunications means that restrictive telecommunications regimes can be bypassed by channeling communication through other countries. All these changes and emerging competition further disadvantaged public enterprises over private telecommunications carriers, because the former adapt poorly to competition and changing market conditions. The advances in regulation and the necessity for interconnection and for a transition period to full competition made regulation replace similar functions under public enterprises.² Convergence of media and technologies implied a merger of markets, which calls for harmonization of conflicting regulation, liberalization and privatization policies in different parts of the telecommunications sector.

In the presence of these forceful worldwide explanations, why did telecommunications reforms occur at different times and pace and in different forms in different countries? One simple explanation would be that the strength of the underlying reasons for reform differed between countries. However, there are additional country specific explanations relevant for telecommunications reform. Prime among those are

- The original state of sector governance, in particular, whether the dominant supplier was a private enterprise or public enterprise and the type of regulatory tradition that came with it
- The country’s state of telecommunications sector reform relative to its peers; in particular, successful reforms in a comparable country (cross-country learning and herding)
- A sector crisis
- A change in the composition of potential winners and losers

The original sector governance is particularly important, because certain types of governance are more conducive to change than others. Any sector reform has to overcome resistance against change from existing institutions. The forces of change have to be sufficiently powerful. This holds, in particular, for public administrations, based on constitutional privileges, public ownership, civil servant status of employees and monopoly provision of services. In contrast, in competitive markets many changes occur automatically because market forces put resisters aside. Regulated private enterprises are somewhere in between. They have to respond to markets, and regulatory commissions can be set up to allow for or even promote change, as done by the U.S. Federal Communications Commission (FCC).

Country specific but non sector-specific explanations include

- The country’s institutional endowment, which includes legislative and executive institutions, judicial institutions, custom and informal norms, ruling interests and ideologies in a country and its administrative capabilities (Levy and Spiller, 1996)
- Wealth, population density, metropolitan centers, country size
- An economic or governmental crisis (inflation, unemployment, budget deficits)

² See Bortolotti et al. (2002), who explain performance improvements from privatization to a large extent by regulatory changes.

- A change in government with or without a change in ruling ideology

In the following sections the past and present German telecommunications reforms will be discussed in terms of the country specific explanations, based on the observation that technical and demand changes plus new types of regulation have, over the past 25 years, generally favored privatization, competition and sector specific regulation. Assessments of future reforms, however, require both the general and the country specific explanations, because we simultaneously have to predict the worldwide trends. Section 2 concerns reforms before the currently valid German Telecommunications Law (Telekommunikationsgesetz = TKG) of 1996. The following Section 3 deals with the current state as described by experience with the TKG and its application by the German regulator (Regulierungsbehörde für Post und Telekommunikation = RegTP). Section 4 on future reforms, starts with near term adaptations of the TKG and ends with speculations about long-term developments. The paper concludes in Section 5 with an assessment of the German reform efforts.

2. Where did the German telecommunications reform come from?

2.1 The route to Postreforms 1 and 2

The roots to German telecommunications reforms go back to very feeble beginnings in the 1960s. After the German Bundespost, which owned the telephone network, had incurred some deficits in the early 1960s, the federal government had installed an expert commission for the German Bundespost (Sachverständigen-Kommission für die Deutsche Bundespost) to look for solutions. This commission recommended, among others, that the Bundespost should become more independent and that its sovereign tasks should be separated from its commercial tasks. Time was not ripe then and only minor organizational changes were implemented within the existing legal framework. A similar fate awaited a second commission report in 1970 (Kommission Deutsche Bundespost), which again led to minimal improvements. A third commission (Kommission für den Ausbau des technischen Kommunikationssystems = KtK) reported in 1975 about the requirements for modern communications networks. This commission had two major effects. First, based on the rather low telephone penetration of 54% of households in 1975 it, for the first time in Germany, formulated a full-penetration or universal service objective. Indeed, the Bundespost invested heavily, possibly in order to foreclose sector reforms, and penetration rose to above 90% during the 1980s. Second, the commission had to deal with the fact that, for historical reasons, broadcasting contents issues were fully monopolized by the German Länder, while the communications network was provided by the Bundespost. The KtK recommended the establishment of a cable TV system with many channels. This was started in 1984 in the form of pilot projects. The inability of the Länder to provide programming for so many channels triggered private participation (Witte, 1999a). These projects later emerged into a nationwide system of private cable TV program providers with vertically separated cable networks, which, however, were largely owned by the Bundespost with only pockets of private ownership of infrastructure. This opening to private providers broke the ice and softened the antiprivatization/anticompetition positions (Witte, 1999a).

A silver lining toward liberalization came from the Bundespost's absence in equipment manufacture and from the traditionally liberal handling of PBXs³ and of private networks owned by energy and transportation companies, which facilitated the spread of private networks in general. Absence of the Bundespost from equipment manufacturing meant that its direct interest in selling equipment to end users was less pronounced than, for example, AT&T's interest in the U.S. under vertical integration. Nevertheless, the Bundespost insisted on a uniform technology (Einheitstechnik) for the integrity of its network and consequently coordinated the equipment suppliers in a cartel-like club. This worked fairly well during times of slow technical change but when technical change accelerated during the 1970s it caused some backwardness compared to the most advanced telecommunications nations, such as the U.S., Finland and Sweden.⁴

A first official major telecommunications reform proposal came from the German Monopoly Commission in 1981 (Monopolkommission, 1981). It concentrated on liberalization of the telecommunications equipment market and was based on a report by Knieps, Müller and von Weizsäcker (1981), from which it differed by the then radical proposition that the Deutsche Bundespost should get out of the final equipment business, while Knieps, Müller and von Weizsäcker had more realistically suggested to allow for competition in this segment but permit the Bundespost to participate. In spite of forceful and persuasive arguments by the Commission, little happened on the political front for the next few years, until the EC published its Greenbook in 1987.

In its Postreform 1 in 1989, the German legislator largely followed the suggestions of the *Witte Kommission* (Government Commission, 1988). In particular, no competition in the telephone network was allowed. Rather, the infrastructure responsibility remained with the state. The implicit universal service policy was based on a network monopoly providing for financing and cross subsidization. The market was opened for all services but telephony, which, however, made up 85% of telecommunications revenues at the time (Witte, 1999c). A differentiation was introduced between monopoly services (telephony), mandatory services (those that Deutsche Telekom had to offer on a universal basis) and free services (that Deutsche Telekom had freedom to discontinue). Significant for future reforms was the organizational separation of posts, bank and telecoms and the separation of entrepreneurial and regulatory functions. However, there was no change in the legal status of the enterprises. All this was in line with, but did not go beyond EC policy. Shortly after the Postreform 1 was passed, mobile competition was for the first time allowed through a private entrant, who began digital services at the same time as Deutsche Telekom in 1991. Also, the Postal Ministry used a liberal interpretation of the law to allow extensions of corporate networks (Witte, 1999c).

Postreform 2 followed in 1994. As a major breakthrough, it brought a constitutional change, allowing for privatization of Deutsche Telekom (as well as the postal and banking services of the Deutsche Bundespost). The key was the creation of a fund that allowed the firm to use public servants as regular employees, while those employees

³ A PBX or private branch exchange is a switch that allows for separate internal private networks on the premises of a business subscriber who is connected to the public network by a trunk line.

⁴ See Müller and Vogelsang (1979, p.230).

would keep their privileges for pensions and in case of layoffs. Now the state no longer has to provide telecommunications itself but only has to assure that it is provided adequately. In a way, universal service is now backed by the constitution. Partial liberalization and privatization of Deutsche Telekom occurred in 1996, while major further liberalization and regulatory reform followed in the form of the TKG that was passed in 1996, based on the EC liberalization package that called for the establishment of national regulators and the opening of voice markets by the beginning of 1998.

2.2 Why did it happen and why so late?

Before the Postreform 1 German telecommunications policy was characterized as the most conservative in Europe (von Weizsäcker and Wieland, 1988). After the introduction of telephony in 1878 the German telephone sector for more than a hundred years had been monopolized by the German Bundespost, which was a classical PTT (postal, telephone and telegraph entity) run as part of the German government.⁵ When I started working on regulation issues in the mid 1970s (inspired by C.C. von Weizsäcker and in collaboration with J. Müller), there were no obvious signs of telecommunications reform, although there were some obvious problems, such as the notorious cross subsidization of postal by telephone services.

At that time, the U.S. had already ventured into telecommunications competition. Why was Germany such a laggard? In Germany, the cards were stacked heavily against telecommunications reform. The role of the Bundespost as a public administration was demanded by the constitution. Its employees enjoyed civil service status, providing for unusually high incumbency burdens or stranded costs. There existed no regulatory tradition with the necessary institutions. The German public sector economics tradition was dominated by “Gemeinwirtschaftslehre”, a school that favored public ownership of utilities. And last, the German telecommunications sector, although pricey, worked reasonably well for a long time. So, there was a lack of problem perception in the public.

In Germany, the hurdles on the way to telecommunications reforms were particularly high with respect to privatization and deregulation and moderately high for liberalization (although that varied by area). Privatization was hard because the status of the Bundespost was enshrined in the German constitution. Constitutional changes are always difficult because they require 2/3 parliamentary majorities and therefore the collaboration of both big parties. In this particular case, the change was further aggravated by the fact that employees were civil servants with full employment privileges. The latter was particularly important because the postal division was so heavily subsidized by the telephone division and would therefore have particularly suffered under privatization. Deregulation was hard because regulation had been done by the postal ministry, which

⁵At the very beginning, there were others trying to establish telephone networks in Germany, but they did not survive as independent entities. See Noam (1992).

was both the managing owner and the regulator of the Bundespost.⁶ Liberalization was hard, because the relevant telecommunications law, the Fernmeldeanlagenengesetz (FAG) of 1928 provided almost unlimited monopoly privileges to the Bundespost. Again, cross subsidization of mail by telephony made liberalization more difficult. The Postal Administration Law (Postverwaltungsgesetz) of 1953 made sure that the Bundespost was administrated to follow the general policies of the government with special emphasis on transportation, economic, fiscal and social policies. The Bundespost therefore was to follow general political rather than sector specific goals. However, the pursuit of outside goals was limited by the balanced budget requirement, although this did not limit cross-subsidization between telecommunications and postal services.

What finally enabled telecommunications reform through liberalization (Postreform 1) and privatization (Postreform 2)? At least five areas had changed.

1. The German telecommunications sector lost its edge.
2. Reforms abroad proved successful and provided a worldwide pull.
3. German economists lost faith in Gemeinwirtschaftslehre.
4. The public attitude changed, as cable TV and corporate data networks demonstrated the feasibility of private and competitive supply.
5. The EC required change as part of its liberalization campaign in services.

Who gained and who lost? From an interest group perspective, one could argue that the old forces representing the subsidized user groups, the unions and the privileged suppliers all lost through the reforms. However, as interest groups they had won already by holding out so long and the employees were largely compensated or could maintain their privileges. In addition, consumer and producer losses were limited, because the environment had changed so much. Suddenly, many of them stood to gain from institutional changes rather than from the status quo. Winners of the first two reforms included the state and quite a few of the employees and suppliers who stood to benefit from the expansionary behavior of the privatized Deutsche Telekom and its emerging competitors.⁷ Privatization would have been a real surprise as seen from the perspective of the mid-1980s but evolved quite naturally from the Postreform 1 and from large-scale privatizations after German unification. It was largely made possible by a scheme that put the civil servant compensations outside the privatized firms and into a special entity (fund) so that those employees did not lose their privileges, while the privatized firms had to make well-defined contributions only.

By the mid-1990s, Germany stood in terms of privatization close to where the UK was 10 years earlier. In terms of regulation, it had not yet reached the British advances of the mid 1980s, and, in terms of liberalization, it was partially ahead and partially behind the UK's state of that time. Thus, overall, Germany was clearly behind in regulatory reform at least by ten years relative to the UK. It also lagged behind the US in liberalization by about 20

⁶ Originally, public enterprise was simply viewed as a substitute for regulation (Neumann, 1984). It was only when public enterprises received some independence from the government that regulation emerged as something separate from public ownership.

⁷ See Galal et al. (1994) for a demonstration of such almost universal gains from British Telecom's privatization.

years and in regulatory reform by about 10 years,⁸ while the U.S. itself lagged technical and demand-side developments by about 10-20 years (Faulhaber 1995).

While German telecommunications reform had stagnated until the second half of the 1980s, it accelerated through Postreform 1 and 2 and culminated in the TKG and its implementation. Reforms 1 and 2 had freed institutional constraints, creating a clean slate and openness for future reforms.

3. Where is the German telecommunications reform at this time?

3.1 Progressive features of the TKG

The TKG and its implementation through the RegTP, the administrative courts⁹ and the Monopoly Commission (Monopolkommission) represent the current state of German telecommunications reform, also known as Postreform 3. It is doubtful that the TKG would have been enacted in 1996 and would have contained the current liberalization and regulation features but for the EC stipulations requiring legislation by 1996 that would create national regulatory authorities (NRAs) and, by January 1998, would liberalize voice competition and any other remaining monopolistic market.¹⁰

The TKG was triggered by EC requirements but, at that time, the German reform effort had gained its own momentum. Crucially, privatization provided an almost clean slate (not quite, because of the old workforce and subsidized rate structures). The TKG provided at least two very major regulatory reforms and many minor ones. *First* and most significant is the creation of the RegTP to replace the BMPT. For the first time, Germany received a fairly independent regulatory institution that can to some extent develop regulatory policy and make decisions in an adversary context. As an example of the importance of the institutional endowment for telecommunications reform, this model did not quite follow the American or British tradition because the Federal Cartel Office (Bundeskartellamt = BKartA) existed as a role model. The RegTP therefore is not as independent from the executive branch as the FCC and does not have as much discretionary power as the British regulator, OfTel. Rather, the RegTP belongs to the Economics Ministry (BMW_i), although it is not an integral part of it. The ministry can provide directions only under terms specified in the TKG. The RegTP is run by a president and two vice presidents and makes adversary decisions in Decision Chambers (Beschlusskammern), which interestingly are not headed by the President or Vice Presidents of the RegTP.¹¹ In spite of these traits of the BKartA, the setup and the

⁸ Since US telecommunications was always private, it makes little sense to compare “privatization” across the two countries.

⁹ The vast majority of RegTP decisions are challenged before administrative courts. The number of such challenges should decrease over time, as the limits of the TKG are explored. However, further reforms could trigger new challenges.

¹⁰ For the context, see Kress (1997).

¹¹ For an analysis of the relationship between RegTP, BMW_i and BKartA see Böllhoff (2002a). He also points out the roots of the former postal ministry (BMPT) that provided the personnel of the RegTP. In this sense, the RegTP merges properties of the BKartA and the former BMPT. Many observers were surprised, how quickly the RegTP employees gained their independence from their former colleagues in the Deutsche Telekom and took a strongly pro-competitive position.

boldness of some of its decisions have set the RegTP apart. The RegTP's functions include dominant carrier regulation, licensing, some standard setting, universal service policy, allocation of spectrum frequencies and telephone numbers.

The *second* major regulatory reform, required by EC rules, has been the opening of voice telephony for competition with liberal licensing of new entrants including the absence of right-of-way fees. It was spurred by low regulated interconnection charges, which surprised many, since the regulators largely came from the old BMPT. It represented a sudden and full opening of markets for telephony.

As a probable long-term benefit, the TKG contains procompetitive universal service rules, which are so cumbersome to administer that they would appear to be quite unworkable. The latter might have been intended. In contrast to the U.S., German universal service obligations do not stand in the way of further liberalization and deregulation (Elixmann, Kulenkampff, Schimmel and Schwab, 2001).

Reforms that the RegTP implemented, based on the TKG, include

- Unbundled local loops and line sharing. While line sharing still has to take off, 623,000 loops were unbundled by the end of 2001, a 94% increase over the previous year (RegTP, 2001) and more than 30% of all main distribution frames and 58% of all customers were reachable by entrants.
- Call-by-call and preselection (not yet local), number portability (in the fixed network)
- Third party billing
- Creation of national-wide competition, based on few points of interconnection and low interconnection charges.

Based on favorable input regulation, the initial emphasis was on price and service competition. This led to large price reductions in long distance and international, but not in local telephony. Price caps were not binding until end of 2001, when new adjusted price caps were set.

3.2 Outcomes

The opening of competition in voice telephony in 1998 started with a big bang. Prices, in particular for long distance and international services, fell dramatically and so did Deutsche Telekom's market share in these areas. Although not quite as dramatically, this trend continued for another two years and was accompanied by high volume growth. In spite of flexibility provided by price caps, Deutsche Telekom did not rebalance its tariffs. Initially, the emphasis was fully on service competition but competitive infrastructures in long-distance and city networks followed quickly. Mobile penetration got a big push in 2000 and DSL in 2000/2001 (over 95% of which was supplied by Deutsche Telekom). In 1999, Germany held the biggest auction ever for UMTS spectrum. At the end of 2000 the only dark spot in the German telecommunications sky seemed to be the low rate of competition in local telephone markets along with a lack of price changes there. The market share of Deutsche Telekom in local fixed line at the end of 2001 stood at 97% (RegTP, 2001). 2001 and 2002 then darkened the telecommunications skies overall.

There was stagnation in market share development of new competitors (in aggregate). None of the competitors of DT in the fixed line market was viewed as financially safe. At the end of 2001, the German Monopoly Commission found that competition was not yet “structurally assured” (Monopolkommission, 2001).

Regulation has become more complicated. As Deutsche Telekom’s market power lessens in some markets and remains in others, the problems of bundling and monopoly leveraging have gained importance. Rebalancing could increase these problems, because it would make Deutsche Telekom increase monthly rentals (where it faces little competition) and reduce usage charges (Arnbak and Vrijmoet, 2002).

The strong long-distance competition and weak local competition are both to some extent explained by the lack of rebalancing in early 1998. Increasing connection and monthly charges could have strengthened DT financially and would have made it an aggressive competitor in long distance services, while it would, in this case, have permitted more local competition. Probably, the competitive results in long distance would have been less dramatic than they actually turned out. Instead, Deutsche Telekom resorted to soft rebalancing, limited to larger users. Since the basic monthly charges continue to be below average long-run incremental costs and below the price of unbundled local loops, they are anticompetitive at its time. For the future, when the number of copper lines is shrinking, the question arises if the long-run incremental costs should remain relevant, both for loop unbundling and as the basis for criticizing monthly charges.

The sudden boost in mobile penetration in 2000 (by 100%), which happened shortly after the number of competitors increased to four, suggests that mobile providers were holding back during time of duopoly.¹² Although the 2000 UMTS auctions were a high point in German telecommunications reform at the time, their economic assessment needs to be revisited. The large payments were supposed to act as lumpsum taxes with no allocative impacts, but that turned out not to be so. At low payments six competitors could have been viable but after the huge actual license payments the future of some of the competitors is in doubt (not necessarily only because of the license payments).

The TKG provides for ex ante price regulation of voice telephony and ex post regulation for data and other services supplied by a dominant firm. It includes two provisions that can lead to deregulation. *First*, the RegTP has to abandon price regulation for a market that is no longer dominated. When the RegTP deregulated the input market of international transport and the end-user telephone market between Germany and Turkey, this raised questions about a checkered and piecemeal approach to deregulation. After the RegTP declined to deregulate additional narrowly defined markets, however, such approach appears less likely. *Second*, the Monopoly Commission can determine in its biannual report about the state of competition in telecommunications that a telecommunications market is workably competitive and can suggest to the legislator that regulatory instruments related to this market be permanently revoked. In the past, both the RegTP and the Monopoly Commission have viewed the danger of Type I errors as

¹² In some sense already foreseen by Kruse (1992), who also criticized the slow and sequential issuance of 1800 MHz licenses.

more important than the danger of Type II errors and have therefore largely refrained from deregulation. This may be explained by the greater uncertainty from changing the regulatory regime and from the virtual irreversibility of deregulation.

3.3 The current crisis of the telecommunications sector

2001/2002 have seen an unprecedented crisis of the telecommunications sector, far beyond the economic recession going along with it. This is part of a worldwide phenomenon, which has hit the German telecommunications sector very hard, although possibly not as hard as, for example, the U.S. The main features of the crisis are that almost all firms in the market are making losses, including Deutsche Telekom. Losses of Deutsche Telekom in the German market are much less pronounced though than those of its competitors. There exist excess capacities in long-distance networks, due to large capacity expansions of competitors that were not (or no longer) matched by increases in demand. Prices have fallen and prices charged by Deutsche Telekom have come closer to those of its competitors, indicating (a) a relative reduction in its goodwill and/or (b) a trend towards commoditization of telecommunications services. Is this crisis a one-time aberration or is it somehow systemic for competition in the telecommunications sector or for the combination of competition and regulation that we experience in most advanced countries today? Specifically, has liberal interconnection policy implied excessive network investments downstream instead of just preventing duplicative investments upstream?

Unique crisis or cyclical phenomenon?

The telecommunications sector crisis caught most experts by surprise. So far, the telecommunications sector had, if anything, been less cyclical than the economy as a whole. About 20 years of experience in the US with long-distance competition also has not hinted at excessive cycles. It is therefore most likely that the crisis is the result of a one-time or at least rare bubble. Part of it may have to do with overly optimistic growth projections, some of it with an underestimation of the increase in competitive effects. For example, at the beginning of competition, the superior goodwill of incumbents allows them to continue charging high prices without losing too much market share. They can therefore pursue a fat cat strategy, which is also helped by comparatively small capacities of new competitors. In later stages, the goodwill advantage of incumbents vanishes along with the buildup of excess capacities, leading to aggressive top dog behavior of the incumbent.

Excessive investment and ruinous competition

Whether competition would make the telecommunications industry more cyclical or subject to overshooting is obviously fundamental for the whole concept of liberalization, privatization and deregulation in the telecommunications sector. Proponents of an affirmative answer would argue that such a crisis could not have happened under state-owned or fully regulated vertically integrated monopoly. They would therefore question the whole reform process. Such proponents appear to be rare but their point is worth

some analysis.¹³ My early work with Jürgen Müller on government regulation in general (Müller and Vogelsang, 1979) contained fairly extensive references to the notion of “ruinous competition” as a justification for regulation. While we saw this argument largely as a disguise of interest group policies, we acknowledged that there might be information imperfections at work that could lead to types of competition that would not be in the public interest. Competition being associated with over investment is, of course, a very old hat and, for example, known to students of economic principles from the hog cycle or cobweb model. The interesting feature would be for such a phenomenon to appear in a sophisticated oligopolistic industry, for which, until recently, the danger was more seen in under investment.

Why might a regulated or state-owned vertically integrated monopoly be less prone to investment biases than a competitive telecommunications sector and could this potential advantage compensate other disadvantages of the monopolistic industry structure?

- Worldwide, one reason for privatization of public enterprises has been to increase access to capital markets and thereby increase investments. The bias under public ownership was hence seen as leading to too little investment. To the extent that this was true for Deutsche Telekom, continued public ownership (and monopoly) would likely have reduced expansion of the sector.
- Clearly, a monopolist can use a planning process for investment that takes total demand and supply in the industry into consideration. This would help align capacity and demand to the extent that the underlying predictions are correct. Under competition, investments by the individual competitors have to be coordinated. Each competitor not only has to consider total demand growth but also the perceived supply growth due to other competitors. This coordination is hampered by lack of information about other firms’ investment projects and the probability of their implementation.
- In contrast, information incentives may be stronger under competition, and more people will be informed.
- In addition, the monopolist faces less market risks and may therefore face lower capital costs than competitors. This could lead to higher investments, but not necessarily to excess capacity (because it would go along with lower costs and lower prices).
- Furthermore, the monopolist makes a unified decision that may be informed by a number of internal decision makers, but nevertheless applies to an aggregate. In contrast, the competitors make individually differing decisions that are driven by differing risk attitudes and states of information. In this case, there can be biases, such as the winner’s curse phenomena or herding. However, that need not happen, and a single monopolist may be misguided by hierarchical imperfections within its organization. While there is no a priori indication that biases among competitors would differ from the biases a monopolist may have, there could still emerge systematic differences through the aggregation of investment decisions in the market.

¹³ After the debacle in the Californian electricity sector in 2000/2001 there have been many analysts questioning the electricity sector reform process. The issues and problems in the two sectors are not so dissimilar that similar conclusions could not be drawn for telecommunications.

- Last, the monopolist has different information sources from the competitors, who use prices as additional statistics to inform their decisions. This can be done in a primitive way, for example by extrapolating current market prices, or through sophisticated economic analysis.

It may be that, as a result of these factors, monopoly is less prone to excess investment or investment cycles than a competitively organized sector (including oligopolies or dominant firm/competitive fringe market structures). In this case, adjusted for the usual monopolistic pricing distortion, the monopolist may generate dynamic efficiency advantages. However, since tradeoffs are at work, the overall assessment becomes an empirical question.

Not only is investment likely to differ between monopoly and competition but also the market behavior relative to capacity and demand. This is particularly important, given that a large fraction of telecommunications investments are long-lived or even irreversible.¹⁴ Under excess capacity, the price for services under competition may be driven close to zero, while capacity shortage may lead to a high rationing price. In contrast, the monopolist may be able to keep prices high under excess capacity. Thus, the consequences of excess capacity are likely to be less severe for the monopolist than for competitors. The opposite is true for capacity shortages because the monopolist may care more about its reputation, while the competitors can free ride on each other's reputations. Thus, a monopoly may hold excess capacity to meet demand surges (in addition to preventing entry). For given fluctuations in capacity and demand we therefore expect more price volatility under competition than under monopoly (which has a higher price level). In other words, higher stability under monopoly may simply be perceived because prices do not fluctuate as much as under competition. Although such price fluctuations are generally disliked in the public, they could be more efficient than stable prices with larger fluctuations in capacity utilization. The effect price fluctuations will have on investment by competitors and customers would depend on demand and supply elasticities and on risk attitudes. This area provides for fruitful research both to empirical and theoretical economists.

The role of regulation in excessive investment

Hausman and Sidak (forthcoming) argue that the telecommunications reform process in the US has not gone far enough in terms of deregulation and that the problems are caused by asymmetric regulation that prevents the regulated incumbents from investing in necessary infrastructure, while it induces entrants to invest too much in the wrong infrastructure.

Under investment by the vertically integrated incumbent and over investment by the competitors are potentially two sides of the same coin. The main claimed feature of regulation responsible for both outcomes is alleged under pricing of inputs provided by the incumbent to its competitors. As a result of such under pricing the incumbent (a)

¹⁴ Even if a second hand market develops, long-run assets can be sunk in the sense that the original investment may not be recoverable.

would lose funds for capacity investments and (b) would lose the incentive to invest, given that the new capacities have to be provided to competitors at non-compensatory charges. At the same time, entrants get a free ride on the old and new capacities of the incumbent. This would ordinarily induce them to invest less in own capacity. However, they may now have an incentive for excessive investment in those parts of the network not provided to them by the incumbent. Since their costs would be reduced by the under pricing (and the arguably lower risk from not investing in sunk assets), they would expand excessively. In addition, their average costs would be reduced, which would lead to excessive entry by new competitors. Such excessive investment and entry would not, however, lead to a crisis among new competitors, as long as the regulatory under pricing continues and margins are not too much reduced by increased competition. The latter could happen if loss in market share induced Deutsche Telekom to price aggressively. All this is complicated by questions about the extent to which such reactions are anticipated in entry behavior.

What about the actual prevalence of under pricing? Most of the pricing of network interconnection in Germany depends on foreign benchmarks, while unbundled local loop pricing and the benchmarks used are based on so-called cost proxy models.¹⁵ These models derive the long-run costs of capacities of an efficient network provider with the geographic features of Germany. The resulting intermediate input prices are potentially biased downward by the efficiency assumption and by the assumption that always the newest capital equipment is applied. However, assumptions about input prices, common cost allocations and the location of nodes go in the other direction. Worldwide, the ISP reciprocal compensation problem, which leads to heavily asymmetric traffic, has shown that the same incumbent local exchange companies that claimed prices for call termination to be set too low, complained when they had to pay instead of receiving them. Since the TKG specifies efficient costs as the yardstick for access charges, regulators in Germany (and abroad) have not so far become convinced that these biases are significant (in spite of the fact that some economists, such as Hausman, 2000, have claimed that actual economic costs are 2-3 times as high as measured).

4. Where is the German telecommunications reform going?

4.1 The reform effort for 2003

Because the TKG brought about many changes in a short time, including the creation of the RegTP and the opening of telephone markets with tremendous short-term changes in prices and market shares, a quick transition to new stages of telecommunications reform seemed possible at the time the law was passed. This was backed by the original expectation expressed by the fathers of the TKG that regulation would be a transitional phenomenon. Meanwhile, however, consolidation has set in and further revolutionary changes are not expected anytime soon.

¹⁵ In Germany, the price of unbundled local loops derives from the WIK Kostenmodell, while conveyance rates are based on international benchmarks, which themselves are mostly based on cost models.

Privatization, liberalization and the establishment of the RegTP have led to a fundamental transformation of the composition of interest groups in the German telecommunications sector. Compared to the time before telecommunications reforms, the set of beneficiaries of the status quo has changed dramatically. Postal workers and postal customers are no longer part of the relevant interest groups and entirely new groups have emerged in the form of shareholders of Deutsche Telekom and stakeholders in new competitors.¹⁶ Conflicts of interest are built into the relationship between the regulatory functions of the Economics Ministry (relative to the RegTP) and the ownership functions of the Finance Ministry in the Federal Government. Before the three sector reforms the main stakeholders in Deutsche Bundespost had an interest in the status quo that kept entrants out and preserved cross subsidization between telecommunications and postal services, while rural areas were pacified by uniform nationwide telephone prices and domestic users were pacified by low and steady monthly fees. Today, there are new interest groups in the form of competitors that want to be protected from Deutsche Telekom's market power, while Deutsche Telekom wants to be deregulated. Thus, in a way, the new competitors want to preserve the institutional status quo, while Deutsche Telekom wants it changed.

The institutional and performance changes in the German telecommunications sector over the past 5 years appear to be quite extraordinary. Nevertheless, they are not substantially above average within the EC. In fact, the German reforms were driven largely by the EC's zeal toward liberalization and harmonization of the telecommunications sector. The same is likely to hold for the future. The next reforms are already predetermined by the new EC directives. Over six years after the TKG and almost five years after liberalization of voice telephony, changes in the TKG are required by new EC rules. These changes could be used for an overhaul of other TKG provisions if that seems warranted.

Changes required by the EC are quite fundamental and could have substantial effects on the future of the telecommunications sector. Three important changes concern (1) the scope of dominant firm regulation, (2) the power of regulators relative to the EC and (3) relative to their own governments.¹⁷ Dominant firm regulation will be based on (a) significant market power, (b) equal treatment of all parts of telecommunications sector and (c) market analyses based on the EC concept of broad markets. Requirement (b) means that convergence of the different parts of the telecommunications sector with respect to technologies and contents of messages is anticipated, implying that the German fixation on voice telephony for ex ante regulation may have to be abandoned. Market dominance (significant market power) would be the necessary and sufficient condition for regulation in the telecommunications sector. This could prevent deregulation in cases, where efficiencies from deregulation might compensate for market dominance, and the power to deregulate may largely be taken away from the German legislator, although the legislator may be able to influence details of the remaining regulation (Koenig et al.,

¹⁶ The new presence of foreign stakeholders may reduce the power of these interest groups. All major competitors of Deutsche Telekom are now foreign owned, and Deutsche Telekom has a 20% foreign ownership share. Foreigners, however, exert influence through the EC, WTO and diplomatic channels.

¹⁷ See, for example, Koenig et al. (2002).

2002). Most likely, deregulation decisions will have to be made by the RegTP, while the legislator will have limited possibilities to interfere with binding rules. The power of the European Commission will be strengthened to harmonize national regulators (NRAs), and the power of NRAs will be strengthened against their own governments.

Because the changes required by the EC have to go through a tedious two-step process, first requiring consensus building in the EC institutions and then parallel legislation in all member states, they have to last for some length of time. The EC approach therefore has built-in flexibility to accommodate major changes in the telecommunications industry. It can react to changes in market dominance by deregulation and reregulation. It can allow for changes in the composition of markets by redefining the markets and establishing the extent of market dominance. For the time being, the initial market definitions provided by the EC are not contradicting current German regulations. As a result, the introduction of the new rules is unlikely to lead to initial quantum changes in regulations. However, that will not necessarily hold after major changes in market conditions occur. In my view, the new EC rules are strong and coherent. However, while the assured absence of market dominance could be a good sufficient criterion for deregulation, it may be too strong as a necessary criterion. In particular, the presence of market dominance may be too strong a sufficient criterion for (re)regulation. Rather, assured market dominance should just be a sufficient criterion for deregulation and its absence a necessary criterion for (re)regulation. This would allow for other considerations, such as efficiencies, to compensate the effects of market dominance. Since both deregulation and reregulation are risky policy moves, hurdles may have to be high for moves in both directions so that deregulation only occurs if the odds of its success are high, while (re)regulation only occurs if regulation is deemed strongly preferable. This could ultimately allow telecommunications markets to be treated like other markets, where market dominance is tolerated without sector-specific regulation. But this is a question of the distant future.

4.2 Long-term reform prospects

In an ideal end state, with workable competition in all its segments, the German telecommunications sector would be fully privatized, liberalized and deregulated. What factors are likely to spur and what factors likely to hinder the move to this end state? What will be the major steps? Absent a change in the overall attitude in German Society towards markets, the reforms in privatization and liberalization, with the likely exception of public TV and radio broadcasting, will be completed within the next few years. The German government will dispose of its remaining ownership stake in Deutsche Telekom as soon as its share price recovers. While that recovery cannot be fully assured, the government's aspiration level will eventually adapt to a lower share price. Liberalization is already very advanced and will soon see the abolition of licenses in favor of general authorizations to offer telecommunications services. Further liberalization (and, to some extent privatization and deregulation) could occur through the introduction of tradable frequency licenses or even genuine frequency ownership, which could reduce or eliminate the sunkness of investments in frequency licenses. Ownership of broadcasting stations by the German Länder is constitutionally assured and unlikely to be changed. However, the total weight of broadcasting in the sector is decreasing over time and sector

convergence and the overwhelming force of the Internet may force a common approach to the regulation (or deregulation) of communications media (Büllingen and Stamm, 2001, p. 104).

Assuming that the EC rules on the criteria for deregulation will become part of the revised TKG and that further legal changes are not envisaged, the long-term future of deregulation is quite uncertain. Even partial deregulation, for example, in long distance and international telephony, will be difficult, as long as local bottlenecks and cross-subsidization of local lines persists. However, while partial deregulation with safeguards on the local issues will eventually happen, full deregulation is open, even in the long run. First, some regulatory interventions are independent of market dominance. Those include frequency and numbers management and two-way interconnection issues. These interventions are technical in nature and not very contentious.¹⁸ Much more contentious, however, is dominant firm regulation (Immenga et al, 2001). Regulation of market dominance occurs at two production stages, regulation of essential facilities (bottlenecks) and end-user regulation. Until now, both stages are regulated. The classical local loop is hard to duplicate and represents large sunk costs. It will therefore remain a bottleneck that requires access regulation and continued unbundling obligations. In addition, the problem of bundled end-user services with the potential for leverage of market power into other markets requires continued regulatory attention. My view has been that end-user regulation is likely to terminate before bottleneck regulation (Vogelsang, 1999). This view is based on the confidence that, over time, bottleneck regulation improves and becomes more dependable. This in turn would increase and assure end-user competition.¹⁹ In this case, end-user deregulation could occur without sufficient infrastructure competition and therefore without deregulation of access. Given the incumbent's geographic and product scope, I would envisage end-user regulation to be abolished, after collocation becomes so widespread that it enables competitors to offer the full scope of the incumbent's services throughout the country at competitive conditions and with some long-term assurance. This long-term assurance should, in my view, mean that bottleneck regulation could only cease, when the entrants' investments in collocation are no longer sunk (i.e., entrants have other alternatives).

Another possibility for downstream deregulation is that intermodal competition arises that would shield end-users from market dominance, while competitors may continue to depend on bottlenecks to the extent that they have made sunk investments complementary to the bottlenecks. Williamson's fundamental transformation is at play here if entrants have ex ante choice, which network to collocate with, but are ex post stuck with that network. In the remainder of this paper I will concentrate on the issue of intermodal competition between telephone and cable TV networks and between fixed line and wireless services as the basis for possible deregulation of bottlenecks.

¹⁸ See, for example, Knieps (1999). Note that universal service regulation in Germany has been formulated in such a cumbersome way that nobody has invoked the provisions until now. This may change if and when geographic deaveraging of local telephone rates occurs but even then I regard universal service interventions as unlikely.

¹⁹ The new EC rules make end-user regulation depend on imperfections in bottleneck regulation.

The development of the German cable TV network is an example how institutional arrangements made in the past (and messed up) can stand in the way of reform. Because of the longtime resistance to competition in telephony no early measures were taken to enable cable TV to grow into a hybrid cable TV/telephone network. When telephone competition became a legislative goal in 1996, these steps were still not taken. Deutsche Telekom was allowed to keep its ownership in the crucial parts of the cable TV network. Again, it took the EC to force some change, though that appeared to be too little too late. As a result, it is questionable now if the cable TV infrastructure will be upgraded in time to catch up with the broadband penetration achieved by DSL. Given the bad experience of late starters in mobile sector, the question arises if the upgrade of the cable TV network will be viable at all and if it may presuppose some industry consolidation. As suggested by Neumann (2002) such questions may require an open and constructive discussion. Other fixed access technologies, such as powerline or WLL, are either behind cable TV in their development (powerline) or have to recover from recent disappointments (WLL).²⁰ The emergence of fixed line access competition therefore remains quite open. Should it turn out that competition for broadband fixed line access cannot be established on a significant scale, new institutional solutions, including subscriber ownership of fiber access lines, may have to be considered. An interesting feature in this connection is that the ultimate access (drop cable) in German cable TV networks is currently often privately owned by small suppliers.

Wireless services are workably competitive. They could break the market dominance of the incumbent fixed network provider if two conditions are fulfilled. *First*, the price of wireless services has to come down enough, through cost reductions and increased wireless competition. Cost reductions relative to POTS are likely to continue over time. Competition could be increased through reductions in customer switching costs. Number portability for mobile services will be introduced soon. Elimination of long-term contracts and subsidies on mobile phone purchases may take longer. Ultimately, mobile technology may become cheaper than POTS. *Second*, wireless has to become more of a substitute for POTS and landline services in general. The more wireless services will become substitutes for landline services the less pronounced would be market power issues in the local loop and the greater are the chances for deregulation. Wireless communication has already made inroads in the crucial area of customer access to the telecommunications network. About 2 million wireless subscribers in Germany do not subscribe to the landline network. Many others have chosen wireless as a second telephone instead of a second fixed line. This is not yet enough, seriously to affect Deutsche Telekom's market power in local telephony but, if the trend continues, it could well do so in the future.²¹ The main question is, will it do so and will the two markets for wireless and fixed line services eventually merge? The German Monopoly Commission does not believe so, arguing that fixed lines will continue to substantially exceed wireless in capacity and will therefore support more advanced services (Monopolkommission, 2001, pp.67-70, see also Büllingen and Stamm, 2001, p. 59). On the contrary, they believe that substitutability between wireless and landline will decrease in the future, due

²⁰ Although WLL is wireless, it is not mobile.

²¹ In spite of dramatic increases in mobile penetration in Germany in 2000, the current penetration is well below several other European countries, such as Italy, Portugal or Finland.

to the increasing dominance of data services. I am more optimistic but by no means certain. The uncertainty and the continuity in the range of possible outcomes require openness for the possibility that market boundaries do not run neatly between mobile and fixed line services but rather may sometimes include both and sometimes exclude each other.

We need to be able to deregulate when the market power is sufficiently reduced and we may need new tools for delineating market power if the boundary of markets is fuzzy so that the relevant market cannot clearly be determined. The currently used two-step determination of market size and market dominance is unlikely to be satisfactory. In particular, the traditional method of market delineation that is based on the consumer needs (Bedarfsmarktkonzept), as it is applied by the German Federal Cartel Office and the courts, is likely to be inadequate for addressing this problem. The method of the U.S. merger guidelines, which is also applied by the EC, is definitely better but would, in my view, still need some refinement. This method tries to answer the question if a hypothetical monopolist (or perfect cartel) under a specific market definition would raise the price by more than 5% above the competitive level. Looking at successive market definitions, the market is determined to be the smallest one for which the 5% question is answered in the affirmative. Applied to fixed line vs. wireless services the question would be first if a hypothetical monopolist of both services would find it profitable to raise price(s) 5% above the competitive level. This could definitely be answered affirmatively at this point in time. Then the hypothetical monopoly market would be reduced to its two sub-components fixed line and wireless and the question would be repeated for each. We are here only interested in the fixed line component. The answer now would depend on the influence of wireless services on the incentive to raise price more than 5% above competitive levels. The answer depends on (a) cross elasticities in demand and (b) the equilibrium price in the wireless market. The cross elasticities themselves depend, among others, on relative market sizes and relative prices. Measurement of the cross effects will require extensive market analyses. Notwithstanding the position of the Monopolkommission, most likely, these cross effects will increase over time. In addition, there will be the relative price effects. Relevant for an assessment of competition for fixed line access is the extent to which the price changes are influenced by competition in the wireless sector. Our hypothesis is that more competition in wireless will, in the two-market equilibrium, result in a lower price for the fixed line local loop. Thus, the more competitive wireless, the less likely that the 5% test will show fixed line access to be in a separate market. Now, assume that the test is just passed (after wireless has become substantially cheaper than it is today) and that Deutsche Telekom has reduced its share in the local loop to 40%. Then it may well be that, not being a monopolist, it could only raise its price profitably by less than 5% above the competitive level. Thus, market definition and competition interact in subtle ways. The two-step procedure of first delineating market size and then market power would find for market dominance in this case, while it would not find market dominance if the 5% test were just rejected and Deutsche Telekom had 95% of the local loops. This shows that the market power test will have to be done in a similar way as the market delineation. It also will have to ask the question if the presumed dominant firm could raise its price profitably by X% above the competitive price.

The competitive relationship between fixed line and wireless communications is driven by the four variables mobility, speed/capacity, usage costs and capacity costs.²² These are provided in Table 1. The two demand-related columns make clear that users with high mobility needs depend on wireless, while consumers with high speed/capacity needs depend on fixed lines. Competition between wireless and fixed line networks therefore can only occur, where both these needs are not so important. The two cost-related columns show the relative cost advantages of the two. Because of the different cost structure, wireless is more advantageous for small users and fixed lines more advantageous for large users. Also because of the cost structure, wireless has a relative advantage in low-density areas and fixed networks in high-density areas.

Table 1: Relative advantages of fixed line and wireless

	Mobility	Speed/capacity	Usage cost	Access cost
Fixed line	None (-)	High (+)	Low (+)	High (-)
Wireless	High (+)	Low (-)	High (-)	Low (+)

The two-step procedure for determining market power would therefore probably have to be applied to three crucial market relationships:²³

1. At the low capacity end, between POTS and wireless. This will be largely for low users with a single mode of telecommunications access.
2. Between low capacity and high capacity users
3. Geographically, between low density and high-density areas.

Ad (1): The most likely outcome is that mobile services will dominate voice telephony, which would thereby cease to be a market of its own. Assuming that mobile services remain reasonably competitive, the old ex ante regulation of voice telephony would then become obsolete.²⁴

Most consumers, however, will keep their fixed line subscriptions so that usage competition between wireless and fixed line services will continue. Also, the old sunk copper lines will remain available for former subscribers. The question then is, to what extent wireless services will constrain the monthly and usage charges of fixed network

²² For a clear derivation of competition between fixed and wireless services (under the assumption that, at the same price, wireless is preferred because of mobility and that users can have only one subscription) see Cremer, Ivaldi and Turpin (1996). In their model of nonlinear pricing, wireless dominates for low-usage customers because of the low costs and for high-usage customers because of the mobility advantage, while fixed line service dominates for intermediate users.

²³ This probably cuts the telecommunications landscape quite differently from the EC approach of broad market studies that, nevertheless, may put wireless and fixed line services into different studies.

²⁴ A tricky question in this context is the potential regulation of call termination. Since every network provider (fixed line and wireless) has a monopoly on the termination to its customers, there exists a monopoly-pricing problem for such terminations. This could be more severe, the smaller the end-user market share of the network provider in question. Under network competition, this leads to pricing distortions, although ordinarily not to excessive profits. In my view, it is not clear if detailed regulation of termination charges is worth the effort. See DeGraba (2000) for the innovative COBAK proposal.

providers. This would depend on the availability of additional spectrum for wireless (in order to provide enough capacity for the necessary usage to compete). Assuming that excess capacity in fixed networks will persist for a long time, fixed line usage charges will remain low and that will release constraints on access charges of fixed networks.

Ad (2): Fixed line networks will dominate broadband access (in particular, next generation after ADSL and cable modem). The question therefore arises if high-capacity access will become a market of its own and need specific regulation in the future.

While capacity demands may vary smoothly with capacity, due to economies of scale in the provision of networks/access modes, there will only be a limited number of capacity options. That could result in separate markets in different capacities with market power confined to some of them. If the chain of substitution between fiber and other media (DSL, cable modem and UMTS) were not sufficiently close, there could emerge an ultimate natural monopoly for fiber to the home. If this became a problem it could call for ownership of drop line from curb into home or for whole local loop. Quite likely, the customers with the highest capacity demands may also be best equipped to buy their own high-capacity access.

Convergence creates new market boundaries, which affect the scope of regulation. Data traffic is much less regulated than voice traffic but both use the same facilities. So, telecommunications regulation should become blind to type of traffic and concentrate on facilities. In this context, access to and by the final customer becomes the issue (Vogelsang, 2002).

Ad (3): This is the problem of deaveraging that has some kind of taboo status in Germany. If rural areas had to pay for the long-run costs of providing fixed networks to them, prices would have to rise substantially in rural areas. This could trigger market analyses to delineate geographical markets or could invoke universal service policies. It may, however, turn out to be no major problem at all. This would be the case if fixed networks in those areas were not expanding, while expansion would move wireless. In this context an analysis of the costs of a nonexpanding or shrinking network may be in order.

5. Conclusions

Compared to telecommunications reforms in the UK, which started already in 1969 with a separation of posts from telecommunications, the German reforms were much accelerated. The first two German telecommunications reforms, particularly in terms of their performance effects, look like small steps from the current perspective. However, they appear to have been necessary conditions for the TKG, which would have been impossible to implement simultaneously with the two other reforms. Witte (1999b) believes that the organizational and institutional changes that culminated in the TKG would not have been possible in a single act. The TKG and its implementation have brought Germany to the efficiency frontier of telecommunications regulation. As a result, its current policies in many respects resemble those of other best practice countries. As a

further result, if Germany wants to remain at the frontier it will increasingly have to depend on its own reform efforts rather than learn from others. This has already happened over the last few years.

The German telecommunications reforms have been surprising, given the German administrative history and have been revolutionary, when viewed from inside the country; but the result looks quite normal when compared to other European countries. They were heavily influenced by EC rules and that will continue to be the case. At the same time, regulation differs between EC countries, showing that independent developments have been possible in the past.

In spite of the amazing changes that occurred in the German telecommunications sector, its degree of liberalization and competitiveness only barely ranks in the upper third of European countries (Elixmann, Kulenkampff, Schimmel and Schwab, 2001, Elixmann, Schimmel and Schwab, 2001). Nevertheless, during this time, Germany has been catching up with and overtaking the U.S. in terms of liberalization, regulatory reform and competition. The main explanation for this shift may come from the privatization of Deutsche Telekom. Privatization set the stage for a fresh start as compared to the U.S., which is caught in universal service policies and due process rules (Vogelsang, forthcoming). Through the TKG Germany created a strong, rather independent regulator and progressive rules for market entry including soft universal service provisions that are quite compatible with price rebalancing without necessarily triggering subsidies.

Under the new EC rules, the main factor affecting future deregulation in Germany is likely to be market dominance of Deutsche Telekom in the local loop and the influence of wireless communications on this market dominance. Market power in the local loop of the fixed network is going to persist for some time because no equivalent alternative fixed networks are in sight. The cable TV network comes closest but needs substantial upgrades before it is ready and, in the end, may only provide broadband modems in competition to DSL, no regular telephony. As long as alternative networks are not available, end-user deregulation would require dependable regulatory commitment to bottleneck regulation, which is not so easy if ultimate deregulation remains on the agenda.

Long-term predictions are notoriously hazardous. Who would have thought about the current penetration of mobile communications and the Internet only ten years ago? Similarly surprising has been the German telecommunications market. The prediction about the potential for future deregulation could be somewhat facilitated by three types of analysis. First, an analysis of the stability of competition in telecommunications and of its interaction with regulation is in order. Second, there should be work on the interaction between market definition and market power. Third, some microeconomic modeling is in order of

- (a) the competition in the mobile sector. This would include the role that spectrum limitation may play and the effects of a late start by some competitors.
- (b) competition in a joint mobile/fixed line sector. This would include a measure of distance between the two markets that could help analyze the dependence of

consumer fixed line access competition on both the distance and the amount of competition in the mobile sector.

Shelanski (2002) believes that a fundamental shift away from sector-specific regulation in US telecommunications is still far off. In spite of catching up with the US and probably overtaking it, Germany probably has a long way to go, too. Without dramatic technological changes, competition in the local loop - the main bottleneck area – is going to develop quite slowly, giving rise to gradual deregulation. Superimposed on this are long-term cycles in the political popularity of regulation and deregulation having to do with the entrenchment of interest groups in the political system. Thus, when the telecommunications market will be ripe for total deregulation of market power the political environment may not be ready for it.

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