

**Regulatory Practice in the
European Telecommunications Sector
Normative Justification
and Practical Application**

Margit A. Vanberg, Gordon J. Klein

Dokumentation Nr. 08-02

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Non- technical summary

The objective of this study is to provide a basis for a comparison of regulatory practice and the justification of regulation in different network sectors. The present documentation focuses on the telecommunications sector. The analysis consists of three parts. The first part discusses the general characteristics of the telecommunications sector. The second part introduces two regulatory approaches that are of particular relevance for regulation in this sector. The analysis of these approaches is used to derive normative conclusions for regulation of telecommunications infrastructure. Finally, the European regulatory framework for the regulation of electronic communications markets is evaluated.

The telecommunications sector is characterized by short- and long-run entry barriers both on the cost side as well as on the demand side. It is therefore susceptible to monopolization and the abuse of market power. The normative analysis evaluates the need for sector-specific regulation in the telecommunications sector. It is shown that regulation may have difficulties reconciling static and dynamic efficiency goals. The conflict is especially strong in dynamic markets such as the telecommunications market. If regulation is applied too liberally, with a focus on static efficiency, it can stifle dynamic efficiency. The analysis concludes that the disaggregated regulatory approach, which limits regulatory intervention to network areas with stable network-specific market power, is best at reducing the risks of overregulation while adequately addressing market power abuse.

The comparison of the normative conclusions on regulation and the European regulatory framework for electronic communications markets comes to the conclusion that in many respects, the framework is based on economic theory and that it could principally be used to pursue the objective of minimal regulation. In practice, however, especially the criteria for the assessment of SMP (significant market power) are applied too liberally, such that overregulation results.

Zusammenfassung – Das Wichtigste in Kürze

Das Ziel der vorliegenden Studie ist es eine Basis für den Vergleich der Regulierungspraxis und der unterschiedlichen Rechtfertigungsansätze für Regulierung in Netzwerksektoren zu schaffen. Im Fokus der vorliegenden Arbeit steht der Telekommunikationssektor. Die Analyse geht in drei Schritten vor. Zunächst werden die grundsätzlichen Eigenschaften des Telekommunikationssektors dargestellt. Danach werden zwei für den Telekommunikationssektor besonders relevante Regulierungsansätze diskutiert und normative Schlussfolgerungen für die Regulierung dieses Sektors hergeleitet. Anhand des normativen Gerüsts wird zuletzt die europäische Regulierung analysiert.

Der Telekommunikationssektor ist zum einen durch seine Kostenstruktur und zum anderen durch seine Einflüsse auf der Nachfrageseite durch kurz- und langfristige Markteintrittsbarrieren gekennzeichnet, so dass auf Telekommunikationsmärkten strukturbedingt eine Gefahr von Monopolisierung und Marktmachtmissbrauch gegeben ist. Die normative Analyse zeigt den konkreten Regulierungsbedarf im Telekommunikationssektor auf. Zur Bestimmung dieses Bedarfs werden sowohl statische als auch dynamische Effizienzkriterien herangezogen. Es zeigt sich, dass zwischen diesen Kriterien ein Zielkonflikt entstehen kann. Aufgrund des dynamischen Charakters des Telekommunikationssektors besteht die Gefahr, dass durch einen zu großen Fokus auf statische Effizienz eine zu weitgehende Regulierung zu Lasten der dynamischen Effizienz erfolgt. Es wird gezeigt, dass diesem Risiko am ehesten mit dem disaggregierten Regulierungsansatz Rechnung getragen werden kann. Dieser Ansatz basiert auf einem stabilen Kriterium zur Lokalisierung von netzspezifischer Marktmacht und beschränkt regulatorische Eingriffe auf solche Teilbereiche von Netzsektoren, in denen stabile Marktmacht vorliegt.

Der Vergleich der Schlussfolgerungen der normativen Analyse mit dem europäischen Regulierungsrahmen für den Telekommunikationssektor zeigt, dass die europäische Regulierung weitestgehend ökonomisch begründet wird und die Gesetzestexte für das Ziel einer minimalen Regulierung eingesetzt werden könnten. In der Praxis werden aber vor allem die Kriterien zur Bestimmung von SMP (significant market power) so umfangreich ausgelegt, dass eine Überregulierung erfolgt.

Regulatory practice in the European telecommunications sector¹

Normative justification and practical application

Margit A. Vanberg²

Gordon J. Klein³

May 2008

Abstract

The telecommunications sector is characterized by economies of scale and scope, high sunk costs, and strong network effects. This combination may facilitate monopolization and abuse of market power. The present study evaluates the need for sector-specific regulation in this sector. It is shown that there is a conflict between static and dynamic efficiency goals. A comparison of two prominent regulatory approaches for the telecommunications sector shows that the disaggregated approach takes account of this conflict most adequately, as it is committed to minimal regulation. The European regulatory framework for electronic communications markets is based on economic theory, and could principally be used to limit regulation to network areas in which stable network-specific market power is localized. However, especially the criteria for the assessment of significant market power (SMP) are applied too liberally, such that, in practice, overregulation has resulted.

¹ Sections 3.2, 3.3, 4.1, 4.4, 5.2 and 5.3 of this documentation correspond to a large degree to text passages in **Vanberg, Margit (2008)**, *Competition and Cooperation among Internet Service Providers: A Network Economic Analysis*, University Dissertation, Albert-Ludwigs-Universität, Freiburg im Breisgau, Germany

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1 Introduction

The objective of this study is to provide a basis for a comparison of regulatory practice and the justification of regulation in different network sectors. Such a comparison can clarify whether there is potential for aligning the criteria applied to determine when regulation is justified and also the instruments that are used in the regulation of network sectors. The present study focuses on the telecommunications sector.

In the past decades the telecommunications sector in Europe has changed immensely. The progressive abolishment of legal entry barriers opened the door for a fast and dynamic development in this market. This was accompanied by a process of deregulation and re-regulation. In addition to these legal changes, telecommunications technology also experienced fundamental changes. Most importantly, packet-switching technology facilitated the development of the Internet which has led to new dimensions in product and service variety in the telecommunications sector. This development is facilitating the convergence of telecommunications, Internet and broadcasting networks. Operators are currently migrating their voice services onto packet-switched networks. In the near future, a single core network will be used to transport data from multiple services. Current regulatory practice in traditional telecommunications policy will need to adapt to these changes. This study wants to provide an overview of the special characteristics of telecommunications markets and the implications for competition and regulation in this market.

Chapter 2 briefly explains why network sectors are considered different to other sectors of the economy. The telecommunications sector is introduced and the special competition policy issues arising in the telecommunications sector are explained. Chapter 3 discusses in general when economic theory provides a justification for government intervention into markets by sector-specific regulation. Chapter 4 introduces different approaches which have been suggested for the regulation of the telecommunications sector. These approaches are contrasted to theoretical criteria for when regulation may be considered to improve efficiency in a market. The chapter comes to normative conclusions for sector-specific regulation in telecommunications. The current regulatory framework for communications markets in the EU is presented in Chapter 5. This framework is compared to the normative criteria for telecommunications market regulation that were developed in chapter 4. Chapter 6 concludes the study.

2 The telecommunications sector as a network sector

2.1 Typical characteristics of network industries

Network industries such as telecommunications, electricity and transportation have in common that the production of their services is based on a network infrastructure. Networks are typically made up of various transmission lines and network nodes at which these transmission lines are interconnected. Generally, a user of a network service requires an exclusive point-to-point interconnection between its location and the nearest point of presence of the network at which transmission signals can be entered into the network. Up to this point, several lines of geographically close users can share a common ductwork. On the next network level, the transmission signals transported over the separate local lines can be multiplexed onto a single transmission line such that from there on the transmission signals of several users are transported via one line.

Network sectors are therefore characterized by significant bundling advantages, especially in higher network levels. Because of these bundling advantages, network infrastructures are associated with economies of scale. The unit average costs of production decrease with an increase in output. If in any given area investment in network inputs takes place, the overall capacity rises more than proportional. Services based on network infrastructures are often also associated with economics of scope, because different applications can share a common infrastructure, such that it is more efficient for a single firm to provide the market with multiple products than for several firms to separately provide these products. Substantial economies of scale and scope can be an indication of natural monopoly characteristics of a market. A market is considered a natural monopoly when a single firm can produce the market output at lower costs than several firms.

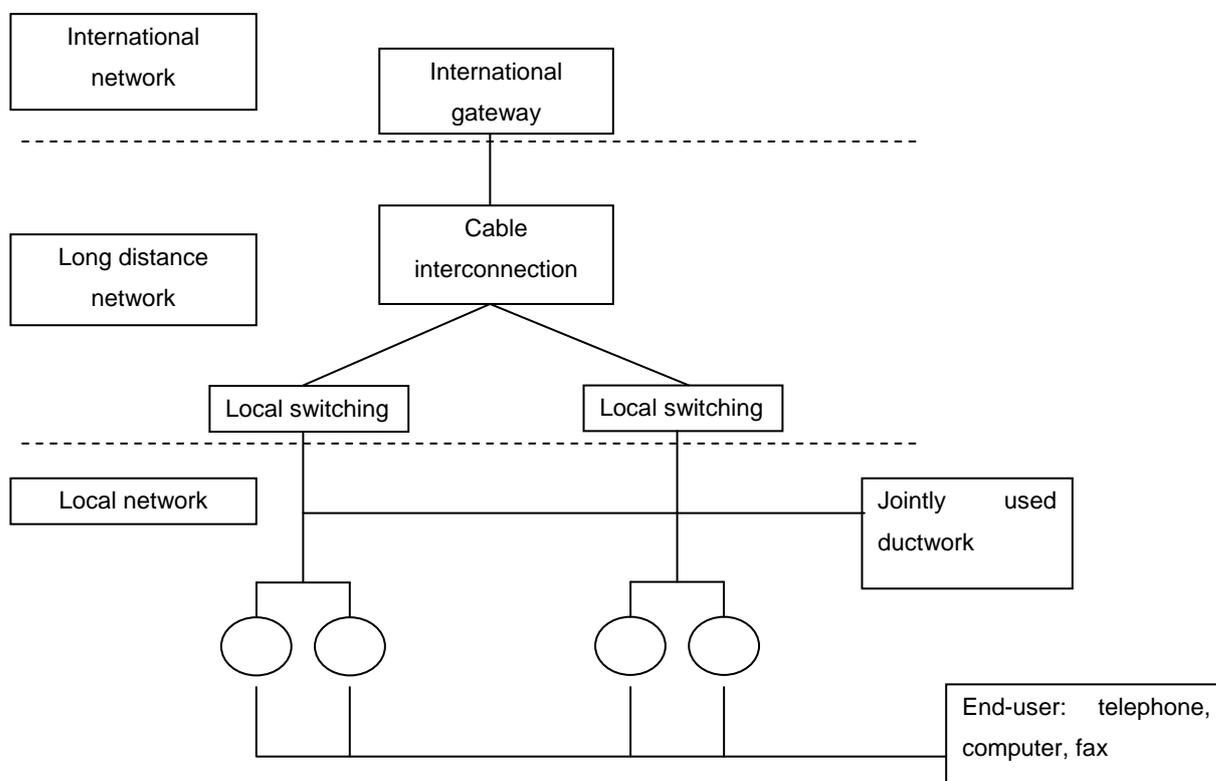
A second notable characteristic of many network industries is that demand is characterized by network effects. Network effects are a special kind of externality. Positive network effects in consumption are present whenever the consumption of a good or a service is valued more, the higher the number of other users of this good or service. In communications networks especially, a user's utility is positively related to the number of other users on the network since the possibilities for interaction are increased with more users on a network. The addition of a new user increases the willingness to pay of existing users in the network. However, when there is no price attached to

the external effect, then market processes will not necessarily lead to an efficient consumption level of the network service. In the absence of network interconnection the benefits from network effects will be higher on larger networks as compared to smaller networks.

2.2 Specific characteristics of the telecommunications sector

The telecommunications sector is characterized by large specific investments into a network structure. This leads to significant economics of scale and economics of scope. Moreover, a significant part of the investments costs is sunk. An idealised telecommunications network (focused on the fixed transmission of data and voice) consists of three hierarchy levels (Merk 1998: 29-30). Figure 1 provides an overview of these hierarchies. The first level comprises the connection of the consumers to the network. This connection is called the local loop. The local loops jointly use the local ductworks that are connected to the local switching ports. From there they are connected to the second hierarchy level, the long distance network. On this level, traffic can be further bundled and connected to international gateways. From an international gateway, international networks can be accessed.

Figure 1: Schematic telecommunications network



Source: Based on Gabelmann (2003: 31).

The bundling advantages of telecommunications networks therefore arise in several parts of the network. Firstly, whenever transmission lines jointly use a ductwork. Secondly, whenever the transmission signals of several lines are bundled in switching and interconnection facilities and thereafter transmitted via one single line (Gabelmann, 2003: 30ff.). Up to the capacity limit of a ductwork, a transmission line or a switch, the joint use of these facilities by the different consumer connections, leads to sinking average production costs (ibid.).

On the demand side, the telecommunications market is characterized by strong network effects. The network effects in telecommunications services are direct as well as indirect. The direct effects derive from the benefit a consumer obtains from interacting with other users (i.e. a user derives utility from being able to exchange telephone calls with other network users). The indirect effect derives from the fact that users benefit from the number of other users on the network by additional complementary goods, which are made available depending on the overall number of users on a network (i.e. the more Internet users exist the more Internet services are offered).

3 Competition policy concerns in network sectors

3.1 Efficiency and market structure

The typical characteristics of network sectors, natural monopoly on the cost side, as well as network externalities on the demand side, are traditionally viewed as sources of market failure (Viscusi et al., 2000: 314). In monopoly markets there is a conflict between productive and allocative efficiency. Productive efficiency requires that the resources devoted to producing a given output are minimized. In a natural monopoly, productive efficiency is generally achieved because there is a single producer in the market. Allocative efficiency requires that all resources are allocated to their most productive usage. Allocative efficiency is generally associated with competitive markets because prices which conform to marginal costs of production result in resource allocation according to productive usage. In monopolies, however, the competitive pressures which drive prices towards marginal costs often do not exist.⁴

⁴ Only in the case of a contestable natural monopoly is the monopolist under competitive pressure and cannot realize above-competitive profits over an extended time period.

Network externalities are viewed as a source of market failure because new entrants to the market need to gather a minimum number of users on their network in order to be able to offer the network benefits necessary to attract customers. The need to reach this so-called critical mass may constitute a barrier to entry in this market. Therefore, it might happen that an entrant providing a new network that is technically superior to the incumbents' network, or available at lower cost, cannot grant consumers an offer that compensates them for the missing network benefits. The consumers' willingness to pay for the new network might be low or possibly zero. This can prevent market entry (Gabelmann 2002: 33f.). Another concern resulting from network effects is the waste of surplus that could occur in fragmented industries, which hinder consumers to exploit the benefits of larger networks (Gabelmann 2002: 34). The reason is that if there are several networks, which are not interconnected, then consumers do not derive utility from being able to communicate with the consumers on the other networks. A consumer does not take these costs and benefits into account when he decides on his level of consumption. Therefore, he will choose either a too high or a too low level of consumption compared to the socially optimal level.

Productive and allocative efficiency are static efficiency concepts. They neglect the objective of dynamic efficiency, a concept which focuses on the inter-temporal efficiency of markets. From a static perspective, perfect competition may be welfare maximizing. However, from the perspective of dynamic efficiency, in a perfectly competitive equilibrium, with zero economic profits, innovation and investment incentives may be too low.

The competition policy evaluation of market structures should make allowance for inter-temporal welfare considerations by regarding competition in a market not as a static state but rather as a dynamic process (Kirzner, 1973: 88ff.). Hayek (1968) describes competition as a discovery process in which new and better solutions are continuously sought and found. This continuous process entails that market structure is constantly in flux and can temporarily also exhibit high concentration (Evans et al., 2005). Schumpeter (1943) was the first scholar to develop a dynamic theory of competition and innovation. His idea of "creative destruction" postulates that competition is a process of continuous innovation. Innovations can grant temporary monopoly status. The supra-normal profits which are made by a monopolist, however, attract new investments into the market and the monopolist may be replaced by a new temporary monopolist.

There exist a multitude of theoretical models and empirical studies on the question of how market concentration relates to innovation and investment.⁵ There are models that support the Schumpeterian idea that monopolies are more likely to innovate (i.e. Gilbert et. al., 1982) and others that negate a straightforward relationship (Vickers, 1985). In opposition to Schumpeter's theory Hicks has, for instance, argued that "...the best of all monopoly profits is a quiet life" (Hicks, 1935: 8). A quiet life, with low competitive pressure, will result in a low level of innovation (Gilbert 2006: 179f.). Aghion et al. (2005) find evidence that the relationship between competition and innovation has the shape of an inverted "U". At first, innovation increases with a move from strong competition to less competition in a market. However, a maximum of innovation is reached well before the monopoly case.

When competitive forces are restricted because of market failures, competition policy may be called for to modify market conditions such that welfare is improved. However, the conflict between static and dynamic efficiency properties of markets complicates attaining a clear position on when competition policy intervention may be beneficial in a market.

3.2 General competition policy vs. sector-specific regulation

If government intervention into markets is deemed necessary the implementation of two general instruments to promote economic efficiency, is possible. On the one hand, there is sector-specific regulation. On the other hand, there are general competition law interventions. These instruments differ in several aspects.

General competition law applies to all sectors of the economy. It is concerned with the supervision of mergers and acquisitions, with monopolization and with cartelization of markets. In "single dominance" (monopolization) or "collective dominance" (cartelization) cases the competition authority investigates claims of anti-competitive behavior, such as tying, predatory pricing, or refusals to deal. Competition authorities have the authority to reject or approve mergers, to impose fines and to prohibit particular behavior by dominant firms.

Market intervention based on general competition law is always decided on a case-by-case basis. Competition authorities can, in theory, use several market characteristics to approximate market dominance. In practice, the criterion most often applied to measure market dominance is the

⁵ See Gilbert (2006).

relative market share in the relevant product market. Further criteria used are the existence of barriers to expansion and entry and the market position of buyers in the market.⁶ Generally, antitrust is applied ex-post when abuse of market power has been established (at least according to the competition authority). Only in merger policy a decision needs to be taken ex-ante, before the consequences for the market can be directly observed.

In contrast to general competition law, sector-specific regulations are designed for a particular industry. Regulation is far more intrusive than antitrust action because the intervention pertains to ongoing activities of the regulated firm. Regulation can, for instance, be applied to restrict the price-setting freedom of the regulated firm or to mandate access to its industrial or intellectual property. A further fundamental difference to general competition policy is the fact that sector-specific regulation is generally instated ex-ante to prevent abuse of market power, which has not yet occurred. Lastly, since regulation is generally ongoing, the potential for phasing-out of regulation needs to be reviewed explicitly. As antitrust decisions are taken on a case-by-case basis they do not need to be reviewed again.

When should which instrument be applied? To justify sector-specific regulation, stable market power must be identified ex-ante. This instrument can only be used when a restrictive definition of market power comes to a clear assessment. The definition must relate to market structure as market behaviour can only be observed ex-post. When regulation can thus be justified, then its advantages as compared to general competition policy are: it is quicker to respond to market failures. Also, as a regulatory agency is often responsible for a market over a longer period, it can continuously collect data and will therefore be able to complement qualitative analyses by quantitative evidence. Antitrust agencies have more limited access to data and are often restricted to qualitative analysis. However, since uncertainty reduces over time, antitrust can avoid mistakes, which might occur in regulation.

⁶ Traditionally, competition authorities were quick to equate large market shares with market power (Spulber, 1989: 501). Competition authorities have increasingly recognized the shortcomings of this simplified approach and are striving to enrich their definition of market dominance by adding more criteria (see, for instance, a speech which Neelie Kroes, member of the European Commission in charge of competition policy gave before the Fordham Corporate Law Institute on 23rd September 2005, entitled “Preliminary Thoughts on Policy Review of Article 82.”)

3.3 Market failures as justification for sector-specific regulation

The conditions under which market failures are so severe as to warrant sector-specific regulation are a matter of controversy among scholars. Not only is it difficult to formulate the proper policy objectives for network sectors. Once policy objectives are decided on it is also very difficult for policy makers to assess when the market constellations are such that market outcomes deviate so strongly from aspired policy objectives as to justify market intervention. Any decision in favor of government intervention needs to bear in mind the trade-off between costs and gains from policy intervention. The costs of government intervention into market processes are not only the administrative costs of implementing regulation. There are also inefficiencies in any political process, which need to be taken into account. These result from the unintended consequences of regulation (i.e. Averch and Johnson, 1962) but also from the fact that a regulator does not necessarily have the interest of the general public in mind but is rather susceptible to rent-seeking by parties interested in the regulatory outcome (Stigler, 1971). Given the institutional and informational constraints under which government interventions into market processes take place, a non-intervention market outcome may well be closer to the ideal norm than an intervention outcome, even when market failure is apparent. This holds even more, the less severe the market failure which is to be corrected and also the more dynamic the market, in which the market failure is observed, because market conditions in these markets change rapidly.

A formal depiction of the trade-off that needs to be considered in implementing any competition policy is the distinction of Type-1 and Type-2 errors (Knieps, 2006: 70). A Type-1 error is committed when competition authorities intervene in a market even though competition is effective (false positive). A Type-2 error is committed when competition policy is not applied, even though market power is inhibiting effective competition (false negative). Most industrialized democracies are committed to free markets and fear a weakening of the market process in their countries. When free market processes are to remain the norm, and also when considering the limitations of regulation, then it is better to err on the side of committing a Type-2 error as compared to the side of committing a Type-1 error. Market intervention should therefore be made difficult by placing strong demands on the justification of sector-specific regulation.

The likelihood of committing a Type-1 error (false positive) is larger in sector-specific regulation than in antitrust policy. The most important reason for this is that regulation is implemented before abuse of market power has occurred. It is therefore based on less reliable conjectures of what

might have happened had market processes run their course. Furthermore, sector-specific regulation requires more information on the industry to fine-tune regulatory intervention than antitrust actions, which generally only prohibit particular actions, afford. This information is difficult to impossible for regulators to obtain. Lastly, regulation is far more intrusive with respect to the freedoms of the regulated firm than general competition policy. For all of these reasons, sector-specific regulation is likely to commit a Type-1 error. As a consequence, regulation should be based on an even stronger justification for market intervention than general competition law (Knieps, 2006: 49). A robust definition of market power is needed which can make it plausible that the market outcome can be improved by the application of regulation.

Market entry barriers as justification for market intervention

A robust definition of market power must be capable of differentiating between the typical characteristics of network industries which promote a market structure of only few large firms and stable market power which allows incumbent firms to make above competitive profits over an extended time period without inducing market entry. To assess competition in a network market, the regulator needs to understand when competitive forces are sufficient to restrain market power. This can be approached by analyzing the possibilities of market entry for the particular market.

There are different traditions in economic theory on market entry barriers. The traditional industrial economic theory on entry barriers is represented by Bain (1956). Embedded in the structural approach, which explains market outcomes by a given market structure, Bain formulated a broad theory of market entry barriers that includes variations of economies of scale, product differentiation advantages of incumbents, and capital requirements (Schmalensee, 1989: 968). In essence, Bain considers all market characteristics that lend cost advantages to an incumbent firm to be barriers to entry, even if these cost advantages are only temporary. For example, if economies of scale allow the installed firm to produce a higher level of output at lower average costs of production, then, according to Bain, this must be looked at as a barrier to market entry. Potential entrants would initially produce less output at higher costs. Also, when product differentiation by the incumbent forces potential entrants to spend more on advertising than the incumbent is currently spending, then this is considered a barrier to market entry.

A far more narrow definition of barriers to entry was formulated by Stigler, a representative of the Chicago School. Stigler defines: “A barrier to entry [...] as a cost of producing (at some or every rate of output) which must be borne by a firm which seeks to enter an industry but is not borne by

firms already in the industry” (Stigler, 1968: 67). This definition focuses on long-run cost asymmetries between an incumbent firm and firms willing to enter the industry. The foremost reason for long-term cost advantages held by incumbents is the irreversibility of investments necessary for production. When the incumbent has already made these investments, their costs are no longer decision-relevant to him. They are, however, relevant to a firm contemplating entering the industry. Other reasons for asymmetric cost advantages can be that the incumbent, for some reason, has access to a more efficient production technology or lower input prices than potential entrants, for instance, due to control over natural resources.

4 Approaches for regulation in the telecommunications sector

The general justification for sector-specific regulation in network sectors was illustrated above. This chapter will focus on the justification of regulation in the telecommunications sector. It introduces two normative approaches for the design and the implementation of regulation in telecommunications. These approaches are prominent examples for the fundamental principles that are being discussed in theory as well as in regulatory practice of telecommunications markets. These approaches also demonstrate very nicely how important the theories of market entry barriers are in the justification of regulation.

4.1 The disaggregated regulatory approach

A reference model, which was designed explicitly to localize stable market power in network industries is the *bottleneck theory* (Knieps, 1997). This theory is based on a strict application of Stigler’s definition of entry barriers in the context of network industries. It states that only network areas which combine the characteristics of a sustainable natural monopoly with irreversible investments have entry barriers that lend stable market power to incumbent firms. The formal definition of these network areas, so-called *monopolistic bottlenecks*, is given as (Knieps, 2006: 53):

- The incumbent controls a facility which is necessary for reaching consumers and no second or third such facility exists such that there is no active substitute for the facility in the market. This is the case when, due to economies of scale and economies of scope, it is less costly to have only one supplier of this facility in the market (natural monopoly situation).

- The facility cannot be duplicated by a potential entrant in an economically feasible way. Hence, there is no potential substitute for the facility. This is the case when the costs of the facility are irreversible.

Both conditions need to be fulfilled if an incumbent is to have stable market power. A natural monopoly alone is not sufficient to substantiate network-specific market power because it is not established that potential competition will not effectively discipline the incumbent.⁷ Further, irreversible investments alone are not sufficient to deter market entry as long as several active firms can operate in a market. Only when an incumbent natural monopolist has made irreversible investments does this give him an asymmetric cost-advantage over potential competitors in the sense of Stigler's definition of entry barriers. The irreversible investments are no longer decision-relevant to the incumbent, but are part of the calculation made by entrants contemplating market entry. The credible threat that the incumbent will lower its prices to the level of variable costs prevents potential entrants from entering the market. Potential competition is therefore not effective when large sunk costs are associated with market entry. Network industries are particularly vulnerable to this type of market power because large infrastructure investments create scale advantages and are often to a large degree sunk.⁸

There exists a regulatory approach which uses the bottleneck theory to identify network-specific market power as a justification for regulation. According to this *disaggregated regulatory approach* (Knieps, 1997 and 2006) the task of regulation is to “design a system for guaranteeing access to monopolistic bottlenecks” (Knieps and Zenhäusern, 2007: 9).⁹ The disaggregated approach uses a layered model of network industries and examines the separable elements of the value chain in a disaggregated manner (Knieps, 2006: 53). It can thereby identify on the lowest specifiable level those market segments that are competitive and those market segments that are

⁷ That natural monopoly alone does not lend market power to an incumbent is the central proposition of the contestable markets theory by Baumol et. al (1982). This theory can be seen as a precursor of the bottleneck theory (Knieps, 2006: 55). The aim of the contestable markets theory is to expand the traditional reference scenario of perfect competition to an alternative and more general reference scenario, compatible also with natural monopolies (Mantzavinos, 1994: 56). It derives the precise market conditions which guarantee market entry into markets with above competitive profits. The bottleneck theory focuses on the opposite viewpoint. It seeks to define market characteristics that lend stable market power to incumbent firms. It derives those market conditions that discourage market entry, even when above competitive profits are being made.

⁸ Von Weizsäcker points out that when economies of scale are present, very often the incumbent firm will own plant and equipment dedicated to the particular industry, such that the theoretical and empirical work on economies of scale as a barrier to entry may have misjudged the actual cause of the entry barrier (v. Weizsäcker, 1980: 401).

⁹ The design of access regulation within the disaggregated regulatory framework will be introduced in more detail in Chapter 9.

characterized by monopolistic bottlenecks. Access regulation is only to be applied to those network elements which conform to the definition of monopolistic bottlenecks.¹⁰

Figure 2 illustrates the disaggregated regulatory framework. All network areas that do not show natural monopoly characteristics are characterized by active competition (quadrants 3 and 4). According to the framework there is no need for sector-specific regulation in these network areas. Those network areas showing natural monopoly characteristics, but no substantial sunk investments, are considered contestable (quadrant 2). Only when natural monopoly characteristics are combined with substantial sunk costs (quadrant 1) should ex-ante regulation be considered.

Figure 2: The localization of monopolistic bottlenecks

Network area	w/ sunk costs	w/o sunk costs
natural monopoly	monopolistic bottleneck (1)	contestable market (2)
no natural monopoly	active competition (3)	active competition (4)

Source: Based on Knieps, 2000: 96.

Knieps (2001) employs the disaggregated approach to localize network-specific market power in the telecommunications sector. He differentiates between telecommunications services and telecommunications infrastructure. Telecommunications services must be considered at least contestable, if not competitive. Even when these markets may be characterized by economies of scale and scope, there are no sunk investments which need to be undertaken in order to be able to

¹⁰ Laffont and Tirole (2000: 98) also distinguish between bottleneck segments and potentially competitive segments of network industries. They also argue for access regulation to bottlenecks in order to preserve competition in

become active on the services market. Suppliers of value-added services can replace inefficient suppliers of telecommunications services since legal entry barriers have been abolished and since non-discriminatory access to underlying telecommunications infrastructure should be guaranteed by regulation whenever there are monopolistic bottlenecks. There is therefore no need for regulatory intervention in services markets.

Telecommunications infrastructure can be further differentiated into long-distance networks and local-access networks (Knieps, 2005). The market for long-distance network capacity is characterized by active and potential competition. Since telecommunications markets liberalization a number of firms have invested extensively into long-distance network capacity, especially at the time of the sharp increase in capacity demand during the Internet-boom of the late 1990s. There are therefore no monopolistic bottleneck network areas in long-distance network capacity.

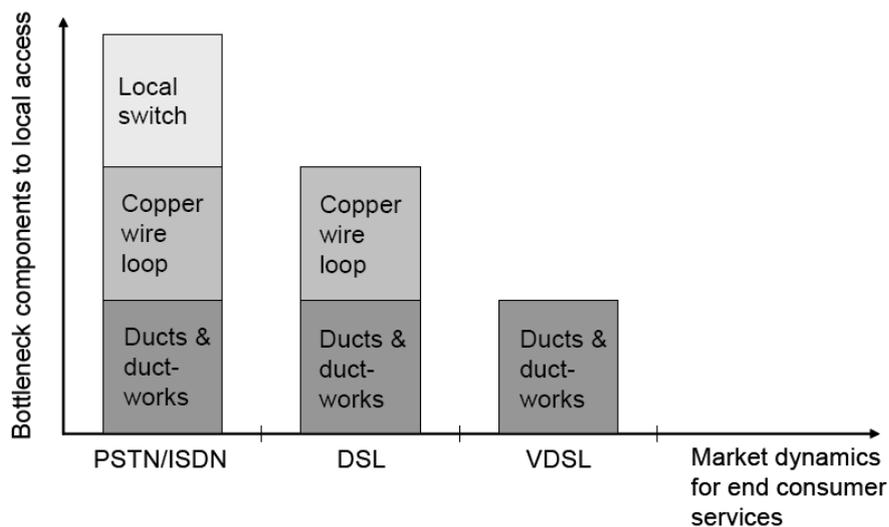
For a long time it was assumed that local-access telecommunications networks constitute monopolistic bottlenecks (Woroch, 2002). Technological advances have made available alternative infrastructures for local telecommunications services and are challenging this view. Wireless networks, Cable-TV networks and satellite technology are increasingly being employed to transmit telecommunications data between the end-user site and the long-distance networks. The localization of monopolistic bottlenecks in local access networks therefore needs to take existing technological variety and the possibility of future infrastructure-platform competition into account. Whenever there is no active or potential infrastructure competition equal-access regulation to local access infrastructure continues to be necessary. Generally it can be said that local access networks have lost their monopolistic bottleneck character in densely populated areas while in rural regions the incumbent telecommunications carrier retains a monopoly position.

The development of competition in telecommunications infrastructure ever since market liberalization shows that monopolistic bottlenecks are not stable over time. The advance of new technologies or a change in demand can change the extent of the monopolistic bottleneck network area. Blankart et al. (2007) demonstrate how technological advances in telecommunications access technologies have resulted in a shrinking of the monopolistic bottleneck over time (see Figure 3). In traditional Public Switched Telephone Networks (PSTN) the monopolistic bottleneck network area is made up of the ducts and ductworks in which the local loop is installed, of the copper local

potentially competitive market segments.

loop itself, as well as of the local switch installed at the main distribution frame site. When broadband DSL technologies are employed, the monopolistic bottleneck area no longer encompasses the local switch. With high speed access technologies, such as VDSL, the monopolistic bottleneck areas which remain are the local ducts and ductworks.

Figure 3: Shrinking monopolistic bottlenecks



Source: Blankart et al., 2007: 426.

4.2 The ladder of investment approach

An alternative regulatory approach which focuses on regulation in communications markets is the *ladder of investment approach* (Cave et al., 2003, Cave, 2006). This framework uses a broader definition of entry barriers than the disaggregated approach. In general, it is less sceptical of government intervention into market processes and foresees a more active role for the regulator in encouraging competition. The ladder of investment approach is also based on the notion that competition can be constrained by the presence of market entry barriers. Entry barriers are considered to exist, when it is difficult for a new entrant to replicate an asset that is needed to provide the end-user service. The more difficult the replication of the asset, the higher is the entry barrier.

The regulator's function in the ladder of investment approach, is to enable entrants to climb successive steps of the investment ladder. Entrants can be expected to invest first in those parts of the value-chain most easily duplicated and to acquire a customer base (critical mass) in the retail

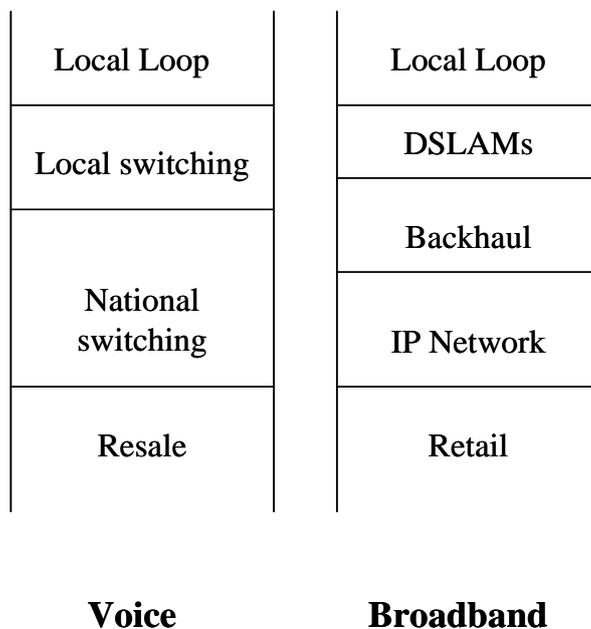
market by receiving wholesale access to the remaining parts of the value-chain from the incumbent operator. The entrants are then expected to successively climb the remaining steps of the investment ladder. The regulator has two instruments to set incentives for investments by competitors. Firstly, access pricing for the wholesale assets can be used to steer the investment decision. When access prices rise over time, this increases the incentive to self-provide facilities and therefore to invest. Secondly, the regulator can announce that wholesale access to the incumbent's assets will be available for a limited time-period only. Entrants then know that to remain in the market they must replicate the asset in question by the time the wholesale offer is withdrawn.

The provision of telecommunications services is based on several inputs and services. These necessary elements constitute a value-chain. In relation to the difficulty of duplicating the elements of the value chain it is possible to describe a path of progressive investment, which new entrants must follow in order to be able to serve the market with own facilities. In practice, Cave (2006: 229ff.) suggests that National Regulatory Authorities (NRAs) use cost models and existing analyses to determine the relative difficulty of replication of these assets. To decide where on the ladder of investment to intervene, a regulator should then employ evidence of replication in similar circumstances and evidence from cost-modelling (ibid., 231).

Figure 4 illustrates how the ladder of investment changes in the transition from PSTN to broadband communications. For broadband telecommunications markets, Cave concludes that the copper local loop occupies the lowest rung on the ladder of investment, as it is characterized by the fact that it is the least replicable asset among the network elements needed to offer telecommunications services. The DSLAM (= Digital Subscriber Line Access Multiplexer, a device which multiplexes the signals of several DSL lines onto one high-speed backbone line) collocated at the main distribution frame site of the incumbent, occupies the next rung on the investment ladder. The replicability of the DSLAM depends on the expected economies of scale a newcomer can achieve at one co-location site, determined by the number and the mix of customers the newcomer expects to serve at this site. Next in rank is the backhaul network. Its replicability depends on circumstances that determine the capacity demand on any given route. Central routes with more traffic will allow more active competition than "thin" routes in remote regions. The following core network is characterized by a higher likelihood for replicability, as suggested both by modelling as well as by observable investments. The last rungs on the investment ladder are

occupied by web-access services and retail/resale services. Both are characterized by effective competition.

Figure 4: Changing Ladder of Investment



Source: Based on Cave (2005: 4).

In contrast to the hypothesis of a shrinking monopolistic bottleneck in the disaggregated regulatory approach, the ladder of investment approach does not necessarily foresee a reduction in regulation as a consequence of the transition from narrowband to broadband services. Of course, the ladder of investment does not reflect regulated market areas. Actual regulatory intervention in the ladder of investment approach depends on the NRAs assessment of the difficulty of replicating the assets on the investment ladder. It is therefore not possible to compare the elements of the investment ladder to localized monopolistic bottlenecks. It can, however, be said that the NRA generally has more freedoms to introduce wider regulation in the ladder of investment approach as compared to the disaggregated approach.

4.3 Regulation and dynamic efficiency

The regulatory approaches introduced above focus on the static efficiency properties of competitive markets and therefore emphasize entry-barriers which may impede competition. It was already stated above that dynamic efficiency is also an important policy objective and that this can complicate the formulation of policy objectives for regulation as dynamic efficiency properties are often associated with markets that show at least some degree of concentration. This section evaluates the importance of this conflict in telecommunications markets.

The telecommunications market is currently undergoing a fundamental change from a circuit-switched network dominated by voice traffic to an all-IP based network capable of transporting voice, Internet and broadcasting applications. This change is accompanied by large investments in so-called next generation networks. The need for large investments has increased the awareness that regulation needs to respect dynamic efficiency criteria.

To implement a regulatory framework, which takes into account the possible trade-off between static and dynamic efficiency in the telecommunications infrastructure Baake et al. (2005) emphasize that the main driver of innovation is Schumpeterian competition. They argue that competition is most effective when there are competing infrastructures. Ex-ante regulation often destroys incentives for investment in infrastructure, because it leads to a situation in which a dominating undertaking covers all the risks of an investment, but cannot appropriate all the benefits. Competitors, on the other hand, can avoid investment risk by employing the incumbent's assets. For the regulation of new markets, Baake et al. (ibid.) suggest that regulation should only be implemented if there is no chance of infrastructure competition in the long term. If infrastructure competition is lacking in the short- to medium term only, then the company with the initial investment should be allowed to utilize this investment exclusively for a specified period without any regulatory intervention. The concept that new markets should thus be excluded from sector-specific regulation for several years has been called "regulatory holiday".

Vogelsang (2006: 38) argues for a differentiated assessment of when regulatory holidays may be justified to enhance incentives for investment. He differentiates between innovations and investment. A technology that is new on the national level, but already used successfully in other countries, does not qualify as a new market in the sense that it can be considered an especially risky innovation needing special promotion in the form of a regulatory holiday. Investments are

always risky and it is correct to consider this in regulation. Regulatory holidays should, however, apply to real innovations only.

With respect to innovations, Vogelsang (*ibid.*, 41) differentiates between innovations which rely on existing bottlenecks and innovations which are based on the creation of new bottlenecks. Whenever existing bottlenecks are the foundation for new innovations, the incumbent must grant non-discriminatory access to these bottlenecks. Regulatory holidays may then be granted on services markets only. When innovations are based on newly created bottlenecks, then regulatory holidays may be an option whenever the pioneer-monopoly status can be expected to be only temporary. When one can expect competitors to invest in innovations which compete with the incumbent's innovation then regulatory holidays may lead to the development of "serial monopolies" à la Schumpeter. If, however, competitive forces are hampered by the pioneer-monopoly for a longer time period, then Vogelsang argues that risk-adjustments to cost-based regulation should be favoured over regulatory holidays as a means to stimulate innovation. On the one hand, he suggests risk mark-ups on regulated prices for investments that should include not only the portfolio risk of an undertaking, but also the specific risk of an investment and a contribution to research and development costs. For wholesale products, he argues that access regulation can be designed such that the innovating firm is granted compensation of the full monopoly profits. Since competitors receive wholesale-access to the investment they are at least granted the possibility to enter the market and may even undersell the monopolist by operating more cost-efficiently (Baumol-Willig-Rule).

From the point of view of the disaggregated regulatory approach there can be no economic justification for regulatory holidays (Knieps, 2006: 68f. and Knieps, 2005b: 88ff.). Regulatory holidays can only be meaningful in cases where regulation would be justified due to ownership of monopolistic bottlenecks. And if such a bottleneck would be identified, then regulation would be necessary from the very beginning. Otherwise consumers would suffer a welfare loss from delayed competition in the market. To provide investment incentives, the disaggregated approach implies that the regulatory contract needs to commit the regulator *ex-ante* to a proper compensation for the risks involved in making irreversible investments (Knieps, 2005b: 90).¹¹ Blankart et al. (2007: 8)

¹¹ The Access Directive of the European Regulatory Framework (2002/19/EC, Art. 13(1)) explicitly allows taking account of investment risks in the price regulation of access.

state that “the reference point for economically efficient investment signals is a market rate of return and not a monopolistic profit.”

That the disaggregate regulatory approach abandons the option to grant regulatory holidays completely has to do with the fact that this approach already strives to minimize regulation. For instance, the disaggregated regulatory approach, as a basic principle, does not allow regulatory intervention on the service level, whereas many of the above mentioned instances in which others have argued for regulatory holidays referred to services markets. It is possible, when an investment into new infrastructure is particularly risky, that the regulator will find it too difficult to provide the proper investment incentives via price regulation alone. Such circumstances will be rare, and they may justify regulatory holidays. A thorough case-by-case analysis will be necessary to identify these cases.

4.4 Conclusions for the design of telecommunications regulation

It was argued above that government intervention into markets has many limitations. Even if regulation could be designed such that regulators act solely in the interest of social welfare, the difficulty of reconciling static and dynamic efficiency considerations remains. In practice, regulatory policy must deal with this conflict by weighing the relative importance of static and dynamic efficiency in a specific situation. The conflict is especially strong in dynamic markets such as the telecommunications market. In these markets, if regulation is applied too liberally, it can stifle innovation and result in considerable welfare loss. The difficulties in defining the objectives a regulator should pursue and also the limitations that result from institutional and informational constraints in regulation suggest that regulation should be applied restrictively. As a guiding principle, regulation should only be applied whenever market failure is so severe that it is likely that also imperfect regulation can achieve a considerable change for the better. To identify such circumstances, regulatory policy must be based on a stable and restrictive criterion of market power.

Of the above introduced concepts for regulation in communications markets, only the disaggregated regulatory approach is committed to minimal regulation and uses a limiting principle to localize network-specific market power. The definition of a monopolistic bottleneck limits the regulator’s ability to identify objects of regulation. The ladder of investment approach is not based on a stable criterion of market power. This approach extends far broader powers to the

regulator for defining the extent of regulation. This approach is therefore susceptible to overregulation, especially considering that it does not address the concerns raised by the positive theory of regulation with respect to rent-seeking in regulated markets.

Price regulation of monopolistic bottleneck network areas

When applying the disaggregated regulatory approach, it is the task of the regulator to guarantee non-discriminatory access to monopolistic bottlenecks. Optimally, the regulation of access prices to monopolistic bottlenecks should perform three objectives. Firstly, prices should provide signals for allocative efficiency. In competitive markets, marginal-cost prices steer resource allocation into efficient usage. Marginal cost prices, however, cannot cover all costs in markets featuring large fixed costs. Secondly, prices should encourage productive efficiency by sending the right signals for the decision on whether joint usage of a bottleneck or bypass investments by new entrants are economically efficient (Armstrong, 2002: sec. 2.4.1). Prices that reflect the incremental costs of additional usage of the bottleneck resource would meet this requirement. Lastly, access charges should send signals for dynamic efficiency and cover the total (efficient) costs of the monopolistic bottleneck, not merely its incremental cost. Only then does the regulated firm earn a rate of return that provides it with an incentive to maintain the network and invest into innovations.

These objectives for optimal price regulation are incompatible when the regulatory instrument consists of only one access charge. Any mark-up on marginal, respectively incremental costs that is required to cover the large fixed and common costs of network infrastructures will lead to inefficient usage of the bottleneck network elements. When only a linear access price is available to pursue the conflicting policy objectives of access-price regulation, then regulatory theory proposes a Ramsey-pricing structure as the second-best alternative to marginal cost pricing.¹² Ramsey-prices are obtained by maximizing social welfare under the constraint that a given revenue must be raised. This pricing approach yields prices that include mark-ups on marginal costs, which are inversely proportional to the elasticity of demand (Baumol and Bradford, 1970: 269f.). The lower the elasticity of demand for a given product, the higher will be the mark-up on marginal costs. By this pricing rule, the loss in social welfare which results from the need to cover total costs of production is minimized as quantity reactions to a price increase are lowest for those portions of demand that are inelastic.

¹² The term Ramsey-pricing originates from work by Frank Ramsey on the question of how a government can raise a given tax revenue with a minimum of utility loss (Laffont and Tirole, 2000: sec. 2.1.1).

A regulatory authority cannot “set” the welfare-maximizing Ramsey-prices because it lacks the necessary information on the demand elasticities of consumers as well as the production costs of the regulated products. However, the regulatory authority can create an environment in which it is in the interest of the regulated firm to set prices that approximate the positive welfare effects of Ramsey prices (Laffont and Tirole, 2000: sec. 3.4.1). As will be shown below, price-cap regulation, which is endorsed in the disaggregated regulatory framework (Knieps, 2006: 66) provides incentives for setting prices in inverse proportion to the elasticity of demand.

Price-cap regulation fixes the price level, but not the price structure, for a given basket of regulated goods.¹³

The key features of this price control are that, for a pre-specified period of four to five years, the company 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 Index (i.e. the rate of inflation) and X is a number specified by the government. At the end of the specified period, the level of X is reset by the regulator, and the process is repeated (Beesley and Littlechild, 1989: 455).

Price-cap regulation gives the regulated firm the freedom to allocate common costs among the products in a product basket in any way it chooses. It increases the incentives for productive efficiency by the bottleneck owner because for the regulated time period the operator gets to keep any gains in productive efficiency.¹⁴ Since the regulated firm’s revenues are maximized by setting the prices inversely proportional to the demand elasticities of the products, the resulting prices have similar efficiency properties as Ramsey-prices.

To deal with the objective of promoting also dynamic efficiency, price regulation could preserve innovation incentives by compensating the investing firm for the risk of failure. To compensate the incumbent for the risk associated with new investments into irreversible assets within price-cap regulation, a reduction of the factor x , which reflects the expected productivity increase in the

¹³ Price-cap regulation was developed by Littlechild for the British Department of Industry in the early 1980s during the privatization process of British Telecom. Littlechild criticized the prevalent rate-of-return regulation for two main reasons. In rate-of-return regulation the regulated firm provides the regulator with information on its operating costs and its cost of capital. The regulator, upon auditing these cost accounts, allows a fair rate of return on the invested capital. This provides the regulated firm with incentives to inefficiently increase its capital stock (Averch and Johnson, 1962). Furthermore, rate-of-return regulation is often applied to the regulated firm as a whole. Littlechild was looking for a regulatory instrument that is applied more specifically to monopoly areas only.

regulatory period, could be adopted. If a case-by-case analysis shows that for a particularly risky investment the regulator cannot provide the proper investment incentives via a higher return on investment, a regulatory holiday may need to be considered.

According to the disaggregated regulatory approach, price regulation should be complemented by an obligation of the bottleneck owner to keep separate accounts (Knieps, 2006: 67). This allows the regulator to monitor the regulated and non-regulated divisions of the regulated operator as separately as possible and can more effectively hinder the regulated firm from cross-subsidizing or from treating competitors differently from internal divisions.

5 Competition policy and regulation in telecommunications in the European Union

In the EU, competition law and sector-specific regulation do not exclude one another. Rather, they are meant to complement one another by addressing different kinds of competition problems (de Streef 2007: 329). European general competition law is laid down in articles 81 and 82 of the treaty of Amsterdam. Both articles are characterised by direct applicability and are enforceable at all national courts of all member states of the European Union (Motta 2004: 31). Article 81 prohibits collusion and other practices restricting competition within the common market of the European Union. Article 82 outlaws abusive exploitation of a dominant position by one firm.¹⁵ Sector-specific regulation is generally adopted first by the European Commission and subsequently incorporated into national law by the member state governments. This chapter gives an overview of current regulatory practice in telecommunications markets in the EU.

5.1 The European regulatory framework for electronic communications

EU legislation for sector-specific regulation of telecommunications markets was first instated in 1988 when the Commission opened the markets for terminal equipment. In 1990 the Commission declared the exclusive rights of national telecommunications carriers in the markets for value-added network services to be in violation of the common market. The Maastricht Treaty of 1993

¹⁴ In cost-plus regulation the efficiency gains are theoretically “regulated away” as soon as the firm lowers its production costs.

provided the legal basis for a consultative process on full telecommunications liberalization. In this process, the European Parliament accepted the goal to liberalize telecom services and telecom networks from January 1998 onwards. The EU directives that were issued until the 1998 liberalization of most telecommunications markets in the EU are subsumed under the term “1998 regulatory package.”¹⁶

Fast technological developments in the market as well as the trend towards the convergence of telecommunication, Internet, and media services led the EU to adopt a new regulatory framework for electronic communications in March 2002. The framework consists of the following five directives:

Directive 2002/19/EC – Access directive

Directive 2002/20/EC – Authorisation directive

Directive 2002/21/EC – Framework directive

Directive 2002/22/EC – Universal service directive

Directive 2002/58/EC – Directive on privacy and electronic communications

In addition, the framework includes several accompanying documents as, for instance, the Commission’s guidelines on market analysis and the assessment of significant market power (EC 2002/C 165/03).

The 2002 regulatory framework is subject to two basic conditions: firstly, it seeks to offer a consistent framework for different electronic communications platforms (2002/21/EC §5), secondly, it strives to harmonize the regulation of electronic communications in the EU member-states. To achieve the first objective, the framework is neutral towards the technology employed for the provision of electronic communications. To harmonize regulatory measures in the member-states, the framework draws from the principles and methodology of competition law, which are already common to all member-states. The close accord with competition policy also serves to emphasize the transitory character of regulation and is meant to facilitate the transition to an oversight by general competition law only, once sector-specific regulation is deemed unnecessary.

¹⁵ In general, competition law is enforced ex-post. An exemption of the ex-post character is when competition law is applied to merger cases. Mergers are analysed ex-ante and potential remedies are imposed before the merger itself takes place.

¹⁶ The European Commission has an informative, archived site on the 1998 regulatory package at:

The objective of regulation, according to the Framework Directive (2002/21/EC), is to provide successful conditions for effective competition in the telecommunications sector during the transition from a monopoly market to full competition. The framework foresees the following steps in the process of implementing regulation (each with an indication whether the Commission or a NRA, is responsible for the particular measure):

- | | | |
|----|--|------------|
| 1. | Market selection by application of the three-criteria test | Commission |
| 2. | Market definition in the context of national markets | NRA |
| 3. | Assessment of market dominance using SMP criteria | NRA |
| 4. | Imposition of regulatory remedies on dominant firm | NRA |
| 5. | Supervision of NRA decisions in Article 7 procedures | Commission |

Each of these steps is described in more detail below.

5.1.1 Market selection by application of the three-criteria test

The first step in the analysis of markets begins with the selection of relevant product and service markets. With regard to this selection Article 15 of the Framework Directive (2002/21/EC) states that the Commission is to recommend markets that may justify the imposition of sector-specific regulation. The criteria used by the Commission to identify markets that may not tend to effective competition without regulation are subsumed in a so-called “three-criteria test”:

The first criterion is the presence of high and non-transitory entry barriers whether of structural, legal or regulatory nature. ...the second criterion admits only those markets the structure of which does not tend towards effective competition within the relevant time horizon. ...The third criterion is that application of competition law alone would not adequately address the market failures concerned (C(2003)497: §9).¹⁷

The three-criteria test applies both static and dynamic efficiency principles (Buigues, 2004: 16). The first criterion determines the static efficiency properties of the market by analyzing structural and legal entry barriers and the existence of natural monopoly characteristics in the market. The second criterion focuses on dynamic efficiency. If entry barriers detected by the first criterion do

http://ec.europa.eu/information_society/topics/telecoms/regulatory/98_regpack/index_en.htm

¹⁷ C(2003)497 available at:

not persist over the relevant time horizon, then the market does not need to be subjected to regulation. The last criterion distinguishes between the scope of general competition law and sector-specific regulation. It limits the application of sector-specific regulation to those cases in which competition law cannot address the market failures in a sufficient and effective way.

By applying this test, the Commission comes up with a list of markets which may be relevant for regulation. The Commission's list, laid down in the *Recommendation on relevant markets*, is probably the most influential of the accompanying documents to the Framework Directive. Legally, the list is not a binding part of the framework. NRAs are, however, expected to critically appraise the competitiveness of the markets on the list for their respective countries. In practice, regulatory efforts of NRAs have largely concentrated on analyzing the markets on the Commission's list.

The list of recommended markets is continuously reviewed by the Commission. In theory, all of the three criteria must be fulfilled for a market to be added to the list. If one of the criteria fails, then a market will be taken off the list (*ibid.*: §16). Currently the Commission's list includes 18 markets. Seven of these are on the retail level, as for instance telephone access for residential customers, the provision of local calls and the provision of international calls. The remaining eleven markets are on the wholesale level, as for instance unbundled access to the local loop, call origination and call termination.

5.1.2 Market definition in the context of national markets

Given the Commission's recommendation, the NRAs are called upon to define relevant markets within their national territories (2002/21/EC, Art. 15). The NRAs are to respect the Commission's recommendation as much as possible and concentrate on defining the geographic boundaries of the recommended product and services markets. The Commission has published guidelines for the market analysis (2002/C 165/03), which present the NRAs with a set of instruments for their analysis. This set of instruments with its procedures and methodologies, relies on the same tools as competition law does (*ibid.*, § 25). Although the methodologies are similar, adjustments for the use in electronic communications took place.

The definition of a relevant market in a given geographical area depends on competitive constraints on the price-setting behaviour of producers or service providers by either demand and supply-side substitution (ibid., §38). In general, the definition of relevant product or service markets follows settled case law:

All those products or services that are sufficiently interchangeable or substitutable, not only in terms of their objective characteristics, by virtue of which they are particularly suitable for satisfying the constant needs of consumers, their prices or their intended use, but also in terms of the conditions of competition and/or the structure of supply and demand on the market in question (ibid, §44).

The Commission proposes that NRAs analyze these constraints by means of the hypothetical monopolist test (ibid., §40). This test is synonymous with the Small but Significant and Non-transitory Increase in Price-test (SSNIP-test). In this test the effect of a hypothetical price increase for a particular product or service of 5-10%, compared to the current price level, is evaluated. The response by consumers or producers will show whether there are significant competitive constraints for this specific good in the market. If the price increase is not profitable, then the good, which is the closest substitute, is included in the delineation of the market and the analysis starts from the beginning. This process is repeated until the price increase leads to no significant supply-side or demand-side substitution in the market. The products which were included define the extent of the relevant market.¹⁸

In general, the relevant markets in the electronic communications sector belong to one of two categories (ibid., §65), either end-user services (retail markets) or access services to infrastructure facilities necessary for service provision (wholesale markets). In §67 of the guidelines wholesale markets are defined as markets which include all types of infrastructure necessary for the provision of existing services.

5.1.3 The assessment of Significant Market Power

The application of the three-criteria test by the Commission and the subsequent market analysis by the NRAs are only the first steps in the identification of markets warranting sector-specific regulation. The confirmation that a relevant market, first identified by the Commission, also exists

¹⁸ See also Motta (2004: 102f.).

in a national context is not sufficient for the identification of market power. In a third step, to be executed by NRAs, the framework foresees an analysis of significant market power (SMP) in the identified markets. SMP is defined as “a position of economic strength affording an undertaking the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers” (2002/C 165/03, §5). This definition corresponds to the definition of market dominance used in EU general competition law.

In practice, NRAs analyze those markets suggested by the EC and which were confirmed by their own market analysis (plus any additional markets added by the NRA which pass the three-criteria test) using the principles and methodology of general competition law. To assess SMP the Commission guidelines emphasize the criterion of market shares (*ibid.*, §75). Market shares below 40 percent of sales value (or sales volume) are considered to be uncritical, while a market share which exceeds 50 percent of sales value is considered sufficient evidence of significant market power.¹⁹ On the other hand, the Commission recognizes that apart from actual competition, the market power of a firm can also be constrained by potential competition (*ibid.*, §74). The Commission therefore advises NRAs to also consider the development of market shares over time and to interpret stable market shares as evidence of dominance and fluctuating market shares as evidence of a lack of market power. Further economic market characteristics that NRAs are to consider when assessing SMP are (*ibid.*, §78):

- *overall size of the undertaking,*
- *control of infrastructure not easily duplicated,*
- *technological advantages or superiority*
- *absence of or low countervailing buying power*
- *easy or privileged access to capital markets/financial resources*
- *product/services diversification (e.g. bundled products or services)*
- *economies of scale*
- *economies of scope*
- *vertical integration*
- *a highly developed distribution and sales network*
- *absence of potential competition*

¹⁹ In the previous regulatory framework of 1998 a firm used to be designated as having market power that justifies ex-ante regulation when its percentage share of sales volume exceeded 25 percent.

- *barriers to expansion*

On the one hand, the listed criteria influence the elasticity of demand (e.g. the absence of or low countervailing buying power), on the other hand, they influence the elasticity of supply (e.g. barriers to expansion). Additionally, they address the possibility of natural monopoly (e.g. economies of scale and scope). The Commission explicitly states that one criterion alone may not be a sufficient condition for the assessment of SMP. A cumulative assessment of the criteria is to enable the regulator to assess the height of the entry barriers in the market and the persistence of these entry barriers over time.

The regulatory framework also addresses the issue of joint dominance. Annex 2 of the Framework Directive (2002/21/EC Annex 2) defines that two or more undertakings might be in a jointly dominant position, even if there is no structural or legal link between the two, if the structure of the market is susceptible to collusion. To assess the existence or possible emergence of collective dominance in a market, NRAs are called upon to evaluate market characteristics which are conducive to “coordinated effects” (ibid.):

- *mature market,*
- *stagnant or moderate growth on the demand side,*
- *low elasticity of demand,*
- *homogeneous product,*
- *similar cost structures,*
- *similar market shares,*
- *lack of technical innovation, mature technology,*
- *absence of excess capacity,*
- *high barriers to entry,*
- *lack of countervailing buying power,*
- *lack of potential competition,*
- *various kinds of informal or other links between the undertakings concerned,*
- *retaliatory mechanisms,*
- *lack or reduced scope for price competition*

As in the case of SMP determination, the criteria for joint dominance are neither exhaustive nor do they need to be proven cumulatively.

Table 1 gives an overview of the number of countries that have assessed SMP in the markets recommended by the Commission. The numbers indicate that the NRAs strongly tend to confirm the Commissions’s view that these markets are not competitive and in most cases find at least one operator to have SMP status.

Table 1: Assessment of SMP

Market	Number of countries that assessed SMP/No SMP	
	-SMP	-No SMP
<i>Retail level</i>		
1. Access to the public telephone network for residential customers	19	0
2. Access to the public telephone network for non-residential customers	18	1
3. Local and/or national telephone services for residential customers	16	2
4. International telephone services for residential customers	12	4
5. Local and/or national services for non-residential customers	15	3
6. International telephone services for non-residential customers	8	8
7. Minimum set of leased lines	16	0
<i>Wholesale level</i>		
8. Call origination from the public telephone network at a fixed location	21	0
9. Call termination on individual public networks at a fixed location	20	0
10. Transit services in the fixed public network	14	4
11. Unbundled access (including shared access) to metallic loops and sub loops	20	0
12. Wholesale Broadband access	18	0
13. Wholesale Termination segments	17	0
14. Wholesale Trunk segments	8	7
15. Access and call origination on public mobile telephone networks	6	11
16. Call termination on individual mobile networks	23	0

Source: Based on Kiesewetter (2007: 8).²⁰

²⁰ Markets 17, and 18 on the Commissions’s list of recommended markets concerning national wholesale markets for international roaming on public mobile networks and broadcasting transmission services were not included in the study.

5.1.4 Remedies

Once an NRA has defined a relevant market and assessed SMP the NRA is obliged to impose appropriate regulatory remedies as suggested in the Access Directive (for wholesale markets) and Universal Service Directive (for retail markets). While NRAs can independently choose and implement regulatory remedies, they must be justified in relation to the objectives of the regulatory framework and must be proportionate to the problem to be solved. When SMP is not found, any existing regulations are to be removed.

Regulatory remedies for wholesale markets govern the conditions for interconnection and access. By Article 9 of the Access Directive (2002/19/EC, Art. 9), for instance, an undertaking can be obliged to make transparent its conditions of interconnection and access. The *obligation of transparency* refers to “accounting information, technical specifications, network characteristics, terms and conditions for supply and use and prices”. Usually, the regulated firm will comply with this obligation by publishing reference offers for interconnection and access. By Article 10 (2002/19/EC, Art. 10), an *obligation of non-discrimination* can be imposed to oblige operators not to discriminate between other undertakings and own subsidiaries regarding interconnection or access. Article 11 (2002/19/EC, Art. 11) offers a means of enforcing non-discrimination as it allows a NRA to oblige vertically integrated companies to *keep separate accounts* for activities related to interconnection and access for third parties as compared to when these services are supplied to own subdivisions. By Article 12 (2002/19/EC, Art. 12) regulated undertakings can be obliged to *offer unbundled access* to specified network elements or facilities. These offers must be complemented by services which are technically necessary for third parties to use unbundled access, such as co-location offers, access to technical interfaces and access to protocols. Article 12 is also the basis on which regulated undertakings can be obliged to put third parties in a position to *offer resale of end-user services* of the regulated firm. Article 13 (2002/19/EC, Art. 13) gives the NRA the authority to impose *price controls* on wholesale services of the regulated undertaking. Regulated wholesale prices are to take capital investment and risk of investment into account and allow for a reasonable rate of return on this investment.

With respect to regulation of retail markets, Article 17 of the Universal Services Directive (2002/22/EC, Art. 17) allows *retail price regulation* if other means of regulation (on the wholesale market) do not lead to sufficient competition. Therefore, price regulation on retail markets is

considered a fallback solution. Retail price regulation can be implemented using price-cap controls, cost-orientation or benchmarking on the basis of comparable markets.

The Universal Services directive (2002/22/EC) further demands that member states ensure the availability of a “defined minimum set of services to all end-users at an affordable price” (ibid., Art. 4). The universal services include access to publicly available telephone services at a fixed location (ibid., Art. 4) and to public pay phones (ibid., Art. 6). The financing of universal services is addressed in Article 13 (2002/22/EC, Art. 13). If the *provision of the universal service* is considered an unfair burden on the regulated firm, then the firm can either be compensated out of public funds, or the costs of universal service provision can be shared between all providers of electronic communications networks and services.

5.1.5 Article 7 procedures

Article 7 of the Framework Directive extends supervisory powers to the European Commission with regard to the notifications made by the NRAs. Within a one-month period the Commission can either approve of a notification or issue a veto. The veto power applies to the market definition of an NRA as well as to the SMP analysis. A veto right does not exist for the remedies proposed by an NRA. Should the Commission require more time for an in-depth investigation into the NRA analysis, it can append two months of further investigation.

5.2 Current developments

The 2002 regulatory framework has recently been reviewed by the European Commission. The Commission adopted reform proposals in November of 2007. These proposals will be debated by the European Parliament and by member-state governments in the coming two years. The Commission plans to adopt a revised framework by 2010, which would then need to be incorporated into national laws in order to become effective.

In its reform proposals, the Commission has identified two areas needing fundamental reform and some areas in which minor changes can improve the framework (see EC, 2006). The first area for fundamental reform is spectrum management. Perhaps most important, the Commission wants to strengthen the rights of service providers by giving them the freedom to use any technology of their choosing in combination with spectrum and the freedom to offer any services of their choosing on this spectrum. The second area identified for fundamental reform is the procedure for

the review of relevant markets. The Commission plans to simplify the market analysis and notification requirements for those markets that were found to be competitive in a previous analysis or whenever the notification of the markets features only small changes compared to the previous notification.

Among the further changes proposed by the Commission is the intent to enlarge the catalogue of remedies by the possibility of functional separation. NRAs could then require incumbent operators to split their service divisions and their network-infrastructure divisions. The Commission also seeks a reduction in ex-ante regulation by reducing the list of relevant markets. The revised list proposes a removal of regulation in 11 of the 18 markets. The only retail market to remain on the list is the market for access to the public telephone network.

5.3 Critique of the regulatory framework

The experience with the 2002 regulatory framework is still relatively short, considering that many countries took several years to complete the market analysis of the markets on the Commission's list of recommended markets. The subsequent implementation of remedies took a long time and the effects of these remedies are often only now becoming apparent. Therefore, the assessment of the European framework remains theoretical in many points.

An essential positive aspect of the framework is that, in many respects, its provisions are based on economic theory. The Commission recognizes the importance of potential competition (EC, 2002: §74) and the control of bottlenecks (EC, 2002: §78) as criteria to establish whether a firm has SMP. The framework also addresses the importance of incentives for innovation and investment (Art. 8 (2c) of the Framework Directive). Furthermore, it includes a mechanism for eliminating regulatory obligations once these are made obsolete by market developments. A regular review process guarantees that market changes and technological developments can influence the assessment of SMP in a market and lead to the withdrawal of regulatory burdens.

The proposed reforms of the regulatory framework which concern spectrum management (EC, 2006: 11ff.) address some of the most pressing issues in furthering infrastructure-platform competition in the market for broadband access. Wireless access technologies will become especially important in European countries, such as Italy, Spain, and Greece, in which the coverage of the Cable-TV network is not good such that alternative infrastructure-platform

competition in broadband access would be strengthened significantly by a wireless access product.²¹ The proposed reduction in ex-ante regulation is an important signal that deregulation of electronic communications markets remains an ultimate policy objective.

The most important drawback of the European regulatory framework is its tendency to overregulation. Overregulation is, in part, addressed by the reform proposals of the EC. The suggested reforms are, however, not far-reaching enough. The European framework continues to lack a clearly defined limiting criterion for the application of ex-ante regulatory measures. The three-criteria test underlying the regulatory framework is, in essence, in accordance with the theory of monopolistic bottlenecks and could successfully be used to limit regulation to instances in which monopolistic bottlenecks hinder competitive market outcomes (Blankart et al., 2007: 11). The “presence of high and non-transitory entry barriers” (first criterion) in economic terms could be rewritten as a market with natural monopoly characteristics requiring sunk investments. Such a monopoly can be considered to pass criterion two, which requires the market to not tend towards effective competition within the relevant time horizon. In current practice, however, the three-criteria test is not being applied in this economically sound manner. The Commission has added markets to the list of relevant markets, which cannot be considered natural monopolies (this holds especially true for all of the retail markets on the list). Oldale and Padilla (2004) even speculate that the list of relevant wholesale markets is artificially inflated in order to facilitate short-term successes in market performance by increasing the number of firms active in the retail markets. They criticize the fact that the framework relies on competition law instruments for market analysis, but does not use the “limiting principles embedded in the competition law rules [...] when specifying the remedies to be used” (ibid., 52).

Besides the fact that the three-criteria test is not used to limit regulatory intervention to instances in which network-specific market power can be identified, the framework introduces a second step in which SMP status needs to be determined for the imposition of regulatory remedies. The SMP criteria of the Commission are open to much wider interpretation of market power than the criteria the bottleneck theory applies for the identification of network-specific market power. The criterion “control of infrastructure not easily duplicated” is open to interpretation because of the unspecified nature of the term “not easily.” The required economies of scale and scope are common in network industries. The bottleneck theory requires these to be relevant over the entire market output, thus

²¹ See OECD (2005: 219, Table 7.3).

substantiating a natural monopoly. Yet, the SMP criteria of the Commission are not clear on this point. Especially the focus on market shares for the assessment of SMP does not seem appropriate if one recalls the fact that network industries often have only few large market players even when they are competitive or potentially competitive. The notifications of the NRAs so far show that, in practice, their determination of SMP is in large degree based on market shares. Even if the threshold for assuming market power has moved from 25 percent market share to 50 percent, there is a danger that the value attached to the other criteria mentioned by the Commission pales in comparison to the easily grasped and readily available market-share figures. Finally, sunk costs are missing from the catalogue of SMP criteria, which also shows that the European Commission defines SMP wider than the bottleneck theory defines network-specific market power.

The regulatory framework has no unambiguous position regarding the handling of new and emerging markets. On the one hand, §27 of the Framework Directive (2002/21/EC) states that in new and emerging markets the market leader should not be subject to inappropriate obligations. § 15 of the Market Recommendation (C(2003)497) even states that new and emerging markets, where first mover advantages cause market power, “should not in principle be subject to ex-ante regulation”. According to §32 of the guidelines on market analysis (2002/C 165/03), on the other hand foreclosure by the leading company is to be prevented. It is clear that the Commission recognized the trade-off between regulation and investment incentives. So far, however, the regulatory framework includes no clear guidelines on how new and emerging markets are to be treated. As was concluded in chapter 4 above, to ensure adequate investment incentives in electronic communications markets, it is imperative that ex-ante regulation be minimized by aligning the three-criteria test with the theory of monopolistic bottlenecks. Generally it is sufficient to compensate for investment risks in price regulation. In rare cases it may be necessary to protect investments into particularly risky infrastructure projects by regulatory holidays.

6 Conclusions

In the present study regulatory practice in the telecommunications sector and its normative foundation was evaluated. A description of the telecommunications sector showed that as a typical network sector it is characterized by economies of scale and scope as well as high sunk costs. On the demand side, strong network effects characterize the telecommunications sector. This combination may lead to competition problems due to the possibility of monopolization and abuse of market power. There may be a need to address these competition concerns by sector-specific regulation.

Government intervention into markets has many limitations. Even if regulation could be designed such that regulators act solely in the interest of social welfare, the difficulty of reconciling static and dynamic efficiency considerations remains. In practice, regulatory policy must deal with this conflict by weighing the relative importance of static and dynamic efficiency in a specific situation. The conflict is especially strong in dynamic markets such as the telecommunications market. In these markets, if regulation is applied too liberally, it can stifle innovation and result in considerable welfare loss. Therefore, regulatory policy should be based on a stable and restrictive criterion of market power. From the presented approaches only the disaggregated regulatory approach is committed to minimal regulation and uses a limiting principle to localize network-specific market power.

The normative conclusions on regulation were compared to the provisions in the European Regulatory Framework for electronic communications. In many respects, the framework is based on economic theory. Most importantly, the Commission recognizes the importance of potential competition and the control of bottlenecks as criteria to establish whether a firm has significant market power. The framework also addresses the importance of incentives for innovation and investment. However, the regulatory framework has a strong tendency to overregulation. This is addressed, at least in part, by the reform proposals for the framework currently discussed in the European parliament. The suggested reforms are, however, not far-reaching enough. The central problem of the framework for the regulation of electronic communications is that it lacks a clearly defined limiting criterion for the application of ex-ante regulatory measures.

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99-05	Elke Wolf	Ingenieure und Facharbeiter im Maschinen- und Anlagenbau und sonstigen Branchen – Analyse der sozialdemographischen Struktur und der Tätigkeitsfelder.
99-06	Tobias H. Eckerle, Thomas Eckert, Jürgen Egel, Margit Himmel, Annette Hügel, Thomas Kübler, Vera Lessat, Stephan Vaterlaus, Stefan Weil	Struktur und Entwicklung des Oberrheingrabelns als europäischer Wirtschaftsstandort (Kurzfassung).
00-01	Alfred Spielkamp, Herbert Berteit, Dirk Czarnitzki, Siegfried Ransch, Reinhard Schüssler	Forschung, Entwicklung und Innovation in produktionsnahen Dienstleistungsbereichen. Impulse für die ostdeutsche Industrie und Perspektiven.
00-02	Matthias Almus, Dirk Engel, Susanne Prantl	The „Mannheim Foundation Panels“ of the Centre for European Economic Research (ZEW).
00-03	Bernhard Boockmann	Decision-Making on ILO Conventions and Recommendations: Legal Framework and Application.
00-04	Otto H. Jacobs, Christoph Spengel, Gerd Gutekunst, Rico A. Hermann, Claudia Jaeger, Katja Müller, Michaela Seybold, Thorsten Stetter, Michael Vituschek	Stellungnahme zum Steuersenkungsgesetz.
00-05	Horst Entorf, Hannes Spengler	Development and Validation of Scientific Indicators of the Relationship Between Criminality, Social Cohesion and Economic Performance.
00-06	Matthias Almus, Jürgen Egel, Dirk Engel, Helmut Gassler	Unternehmensgründungsgeschehen in Österreich bis 1998. ENDBERICHT zum Projekt Nr. 1.62.00046 im Auftrag des Bundesministeriums für Wissenschaft und Verkehr (BMWV) der Republik Österreich.
00-07	Herbert S. Buscher, Claudia Stirböck, Tereza Tykvová, Peter Westerheide	Unterschiede im Transmissionsweg geldpolitischer Impulse. Eine Analyse für wichtige Exportländer Baden-Württembergs in der Europäischen Währungsunion.
00-08	Helmut Schröder Thomas Zwick	Identifizierung neuer oder zu modernisierender, dienstleistungsbezogener Ausbildungsberufe und deren Qualifikationsanforderungen Band 1: Gesundheitswesen; Botanische/Zoologische Gärten/Naturparks; Sport Band 2: Werbung; Neue Medien; Fernmeldedienste; Datenverarbeitung und Datenbanken Band 3: Technische Untersuchung und Beratung; Architektur- und Ingenieurbüros; Unternehmens- und Public-Relations-Beratung Band 4: Verwaltung von Grundstücken, Gebäuden und Wohnungen; Mit dem Kredit- und Versicherungsgewerbe verbundene Tätigkeiten; Wirtschaftsprüfung und Steuerberatung; Messewirtschaft Band 5: Vermietung beweglicher Sachen ohne Bedienungspersonal; Gewerbsmäßige Vermittlung und Überlassung von Arbeitskräften; Personen- und Objektschutzdienste; Verkehrsvermittlung; Reiseveranstalter und Fremdenführer
00-09	Wolfgang Franz, Martin Gutzeit, Jan Lessner, Walter A. Oechsler, Friedhelm Pfeiffer, Lars Reichmann, Volker Rieble, Jochen Roll	Flexibilisierung der Arbeitsentgelte und Beschäftigungseffekte. Ergebnisse einer Unternehmensbefragung.

00-10	Norbert Janz	Quellen für Innovationen: Analyse der ZEW-Innovationserhebungen 1999 im Verarbeitenden Gewerbe und im Dienstleistungssektor.
00-11	Matthias Krey, Sigurd Weinreich	Internalisierung externer Klimakosten im Pkw-Verkehr in Deutschland.
00-12	Karl Ludwig Brockmann Christoph Böhringer Marcus Stronzik	Flexible Instrumente in der deutschen Klimapolitik – Chancen und Risiken.
00-13	Marcus Stronzik, Birgit Dette, Anke Herold	„Early Crediting“ als klimapolitisches Instrument. Eine ökonomische und rechtliche Analyse.
00-14	Dirk Czarnitzki, Christian Rammer Alfred Spielkamp	Interaktion zwischen Wissenschaft und Wirtschaft in Deutschland. Ergebnisse einer Umfrage bei Hochschulen und öffentlichen Forschungseinrichtungen.
00-15	Dirk Czarnitzki, Jürgen Egel Thomas Eckert, Christina Elschner	Internetangebote zum Wissens- und Technologietransfer in Deutschland. Bestandsaufnahme, Funktionalität und Alternativen.
01-01	Matthias Almus, Susanne Prantl, Josef Brüderl, Konrad Stahl, Michael Woywode	Die ZEW-Gründerstudie – Konzeption und Erhebung.
01-02	Charlotte Lauer	Educational Attainment: A French-German Comparison.
01-03	Martin Gutzeit Hermann Reichold Volker Rieble	Entgeltflexibilisierung aus juristischer Sicht. Juristische Beiträge des interdisziplinären Symposiums „Flexibilisierung des Arbeitsentgelts aus ökonomischer und juristischer Sicht“ am 25. und 26. Januar 2001 in Mannheim.
02-01	Dirk Engel, Helmut Fryges	Aufbereitung und Angebot der ZEW Gründungsindikatoren.
02-02	Marian Beise, Thomas Cleff, Oliver Heneric, Christian Rammer	Lead Markt Deutschland. Zur Position Deutschlands als führender Absatzmarkt für Innovationen. Thematische Schwerpunktstudie im Rahmen der Berichterstattung zur Technologischen Leistungsfähigkeit im Auftrag des bmb+f (Endbericht).
02-03	Sandra Gottschalk, Norbert Janz, Bettina Peters, Christian Rammer, Tobias Schmidt	Innovationsverhalten der deutschen Wirtschaft: Hintergrundbericht zur Innovationserhebung 2001.
03-01	Otto H. Jacobs, Ulrich Schreiber, Christoph Spengel, Gerd Gutekunst, Lothar Lammersen	Stellungnahme zum Steuervergünstigungsabbaugesetz und zu weiteren steuerlichen Maßnahmen.
03-02	Jürgen Egel, Sandra Gottschalk, Christian Rammer, Alfred Spielkamp	Spinoff-Gründungen aus der öffentlichen Forschung in Deutschland.
03-03	Jürgen Egel, Thomas Eckert Heinz Griesbach, Christoph Heine Ulrich Heublein, Christian Kerst, Michael Leszczensky, Elke Middendorf, Karl-Heinz Minks, Brigitta Weitz	Indikatoren zur Ausbildung im Hochschulbereich. Studie zum Innovationssystem Deutschlands.
03-04	Jürgen Egel, Sandra Gottschalk, Christian Rammer, Alfred Spielkamp	Public Research Spin-offs in Germany.
03-05	Denis Beninger	Emploi et social en France: Description et évaluation.
03-06	Peter Jacobebbinghaus, Viktor Steiner	Dokumentation des Steuer-Transfer-Mikrosimulationsmodells STSM.
03-07	Andreas Ammermüller, Bernhard Boockmann, Alfred Garloff, Anja Kuckulenz, Alexander Spermann	Die ZEW-Erhebung bei Zeitarbeitsbetrieben. Dokumentation der Umfrage und Ergebnisse von Analysen.
03-08	David Lahl Peter Westerheide	Auswirkungen der Besteuerung von Kapitaleinkünften und Veräußerungsgewinnen auf Vermögensbildung und Finanzmärkte – Status quo und Reformoptionen.
03-09	Margit A. Vanberg	Die ZEW/Creditreform Konjunkturumfrage bei Dienstleistern der Informationsgesellschaft. Dokumentation der Umfrage und Einführung des ZEW-Indikators der Dienstleister der Informationsgesellschaft.
04-01	Katrin Schleife	Dokumentation der Ruhestandsregelungen in verschiedenen Ländern.
04-02	Jürgen Egel, Thomas Eckert, Christoph Heine, Christian Kerst, Birgitta Weitz	Indikatoren zur Ausbildung im Hochschulbereich.
05-01	Jürgen Egel Christoph Heine	Indikatoren zur Ausbildung im Hochschulbereich.
05-02	Margit Kraus Dan Stegarescu	Non-Profit-Organisationen in Deutschland. Ansatzpunkte für eine Reform des Wohlfahrtsstaats.
06-01	Michael Gebel	Monitoring und Benchmarking bei arbeitsmarktpolitischen Maßnahmen.
06-02	Christoph Heine, Jürgen Egel, Christian Kerst, Elisabeth Müller, Sang-Min Park	Bestimmungsgründe für die Wahl von ingenieur- und naturwissenschaftlichen Studiengängen. Ausgewählte Ergebnisse einer Schwerpunktstudie im Rahmen der Berichterstattung zur technologischen Leistungsfähigkeit Deutschlands.
06-03	Christian Rammer, Jörg Ohmstedt, Hanna Binz, Oliver Heneric	Unternehmensgründungen in der Biotechnologie in Deutschland 1991 bis 2004.
06-04	Alfred Spielkamp Christian Rammer	Balanceakt Innovation. Erfolgsfaktoren im Innovationsmanagement kleiner und mittlerer Unternehmen.

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| 06-05 | ZEW: Thies Büttner, Thomas Cleff, Jürgen Egel, Georg Licht, Georg Metzger, Michael Oberesch, Christian Rammer
DIW: Heike Belitz, Dietmar Edler, Hella Engerer, Ingo Geishecker, Mechthild Schrooten, Harald Trabold, Axel Werwatz, Christian Wey | Innovationsbarrieren und internationale Standortmobilität. Eine Studie im Auftrag der IG BCE, Chemieverbände Rheinland-Pfalz und der BASF Aktiengesellschaft. |
| 07-01 | Christoph Grimpe | Der ZEW-ZEPHYR M&A-Index – Konzeption und Berechnung eines Barometers für weltweite Fusions- und Akquisitionstätigkeit. |
| 07-02 | Thomas Cleff, Christoph Grimpe, Christian Rammer | The Role of Demand in Innovation – A Lead Market Analysis for High-tech Industries in the EU-25. |
| 07-03 | Birgit Aschhoff, Knut Blind, Bernd Ebersberger, Benjamin Fraaß, Christian Rammer, Tobias Schmidt | Schwerpunktbericht zur Innovationserhebung 2005. Bericht an das Bundesministerium für Bildung und Forschung (BMBF). |
| 08-01 | Matthias Köhler, Gunnar Lang | Trends im Retail-Banking: Die Bankfiliale der Zukunft – Ergebnisse einer Umfrage unter Finanzexperten |
| 08-02 | Margit A. Vanberg, Gordon J. Klein | Regulatory Practice in the European Telecommunications Sector. Normative Justification and Practical Application |

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