UNIVERSITÄT LÜNEBURG

Fachbereich Wirtschafts- und Sozialwissenschaften

A Revised Theory of Contestable Markets - Applied on the German Telecommunication Sector

by

Christian Growitsch

and

Thomas Wein

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Christian Growitsch (CG)
Thomas Wein (TW)
University of Lueneburg
Institute for Economcis

D-21332 Lueneburg
Germany

++49/+4131/782303 (CG)
++49/+4131/782302 (TW)
++49/+4131/782026 (Fax)
growitsch@uni-lueneburg.de

wein@uni-lueneburg.de

Abstract

Despite the scepticism raised by the German Monopoly Commission our analysis shows that the revised theory of contestable markets can be applied to the telecommunications market better than expected. The original contestable market theory implied three assumptions necessary to be satisfied to establish potential competition: Free market entry, market exits possible without any costs, and the price adjustment lag exceeds the entry lag. Our analysis shows that if the incumbent reduces its prices slowly (high adjustment lag) and the market entry can be performed quickly (low entry lag), a new competitor will be able to earn back sunk costs. Therefore it is not necessary that all three conditions are complied with for potential competition to exist. We applied the „revised" contestable market theory to the German telecommunication market and have been able to clearly identify the sections in which regulation is required. Under the present conditions local loops - which should be seen as natural monopolies - are not contestable due to sunk costs, high entry lags expected and a probable short price adjustment lag. Local loops can be identified as bottlenecks therefore. Regional and local connection networks should also be regulated because a high entry lag and a low price adjustment lag have to be expected as well as current competition does not exist today. The national connection network shows current competition between several network providers, hence regulation can be abolished in this field. Moreover, services can be supplied by several firms, and we predict strong potential competition.. There are no arguments favouring a natural monopoly in the section of terminals.

I Introduction

The German telecommunication market has been deregulated based on European directives in 1995. A regulatory authority was established and a national telecommunication law, the TKG, enacted. According to § 81 TKG, the German monopoly commission is assigned to publish a special survey every two years. The issues of this report are defined within § 81 TKG likewise. Primary aim of the TKG is to establish a functioning competition, whereas it is up to the monopoly commission to interpret this term. Main topic of the report is therefore the development of competition on the telecommunication market, which is still dominated by the former monopolist and current market leader 'Deutsche Telekom AG'. Now the monopoly commission states in the current report, published in December 2001, that the competition on the German telecommunication market is far from being competitive (cp Monopoly Commission 2001). She therefore argued in the year 1999 already that the regulation should be kept up or in some cases even further intensified (cp. Monopoly Commission 1999). Some authors are of a contrary opinion and claim that at least parts of the German telecommunication markets are contestable in the sense of the Baumol et al´s *'theory of constable markets'* (cp. Kruse 2000, Immenga et al. 2001, and Wein, 2000) They hence postulate to reconsider the current regulatory practice towards a bottleneck regulation and abandon the price regulation on final customer markets in particular. The monopoly commission retorted upon this, that Baumol´s theory is for various reasons not applicable. Especially the assumptions of the theory have been criticised sharply. Therefore, the monopoly commission pointed out that the ubiquity of sunk costs prevents contestability in nearly all markets. In addition, she refuses bottleneck regulation, arguing that such a regulation policy does not prevent predatory pricing.

In the course of this article we will demonstrate, that the criticisms of this theory do not regard certain important aspects. If, for instance, a potential competitor enters the market with small supply, the incumbent firm will have no incentive to decrease its price rapidly and noticeable, since the losses associated with a shrinking contribution margin would exceed losses due to decreasing sales. As it is therefore possible for the new entrant to amortise the irreversible investment, sunk costs lose importance. For that purpose we will introduce the theory and the primary premises shortly and face the criticism subsequently. In the following the theory will be applied to the German telecommunication market. Finally, we will draw the results and give some basic regulatory advice for the German telecommunication market.

II The Theory of Contestable Markets and Critics Towards

The theory of contestable markets has been established by W. Baumol, J.C. Panzar, and R. Willig in their 1982 book *Contestable Markets and the Theory of Industry Structure*. Within the theory, a market would be perfectly contestable, if the following three conditions were satisfied (cp. Baumol et al. 1982, pp 5-7; Borrmann/Finsinger 1999, pp. 278-280; Viscusi et al. 2000, pp 160-161):

1. *Market entry is totally free* in the sense of Stigler. This condition means that new firms face no disadvantages compared to the incumbent firms. They have access to the same production technology, input markets, input prices, products, and serve the same demand. There is no asymmetric information about customers´ preferences, and legal market barriers do not exist. The potential customers are indifferent about the supplier, they react totally rationally and immediately.

2. *Market exit is free of charge*, sunk costs are zero. Accordingly, all costs concerning market entry are fully recoverable. Any market firm could sell its production facilities either on a secondary market for their present value or use them in different markets alternatively without any losses.

3. *The entry lag* (which means the time between noticeable market entry of the new firm and its ability to sell its products) *is less than the price adjustment lag* (the time between market entry and the price reaction of the incumbent firms). The market will only be contestable if the incumbent firms do not reduce its price significantly during this period.

If these three conditions are complied with, incumbent firms will face *potential competition* by the threat of *hit-and-run-entry*. Even in case of a monopoly, the incumbent firm is therefore disciplined and sets the equilibrium price as if under perfect competition. Otherwise, a new firm would freely enter the market (free market entry), undercut the monopolist´s price, gain super normal returns, and leave the market (market exit is free) at the time the incumbent firm responds by adjusting its price (entry lag less than price adjustment lag). The central result is then an equilibrium leading to a social efficient outcome.

The most common arguments against the theory of contestable markets criticise the premises as to be unrealistic and not robust (cp. Borrmann/Finsinger 1999, pp 301-304; Knieps (2001), pp 33-34; Viscusi et al 2000, p 161). In the following we will analyse to what extent these criticisms are qualified.

Discussing the premises of the theory, certain aspects which contradict the situation on several markets become obvious.

- *Market entry is totally free (1)*. This assumption tends to be not satisfied in reality. There is hardly symmetric information about customers preferences. Customers are not perfectly informed and do not act totally rational in monetary dimensions. Legal market barriers are quite common. And, if production technology is complex, free access is unlikely.

- *Market exit is free (2)*. As defined above the level of irreversibility of an investment depends on either the possibility to sell a specific asset on secondary markets or on a probable alternative usage. But even in sectors where one or both of these possibilities are given a certain level of sunk costs will occur: e.g. expenditures for marketing, brand building, legal permits or market research. Such sunk costs arise as well, if production facilities are hireable; the costs for renting are sunk costs likewise. Markets with sunk costs (close to) zero do not exist accordingly.

- *Entry lag is less than price adjustment lag (3)*. The level of closeness to reality of this condition depends on the dimension of market entry. Assuming a market entry the incumbent firm faces an optimisation problem: It rationally calculates the losses due to a price reduction (sales * -? price) and compares them with the opportunity costs (loss of profit: profit per unit * -? sales). It will reduce its price, if opportunity costs are higher than losses due to price reduction. Such a situation will be given if the market entry is expected to lead to a great loss of market shares (meaning high -? sales). In other words: The incumbent firm reacts the more immediate, the more aggressive the market entry is. If the incumbent firm expects to lose little market share, she would probably not decrease her price; the market entry would be left without response. The reaction of the incumbent firm is also deterred by the customers´ ability and the speed of switching to the new supplier. Long-term contracts and market intransparency escalate the entry lag, whereas at least the latter – in form of informational deficits of the incumbent concerning the new entrant - could also increase the price adjustment lag. A last incrementing factor of the price adjustment lag can be found in regulatory conditions, which delay a price reduction by the incumbent firm through a long lasting permission process.

As we see, all the three assumptions are not that realistic. Contrariwise, it would be scientifically arguable to judge a theory just on the realism of its assumptions.

The important question is about how *robust* is the theory instead. In this perspective, the assumptions two and three could be considered differently. They show a monodirectional substitutive relation: If the price adjustment lag is for various reasons larger than the entry lag, sunk costs will lose importance. A potential competitor would enter the market, if the sunk costs are less than the positive (above normal) surplus resulting from market entry. That profit depends on the price adjustment lag: The longer the price adjustment lag the higher the surplus. It becomes obvious, that at a certain duration of price adjustment lag, market entry could be reasonable although sunk costs exists. The market is therefore contestable. Although the static market outcome is no competitive equilibrium (incumbent firm has not reduced its price), experience on real markets shows a convergence towards competitive prices in the long run. This might be explained theoretically by the growth and therefore a gain in market shares of the new firm; for rational reasons (s.a.) the incumbent will reduce its price.

Nevertheless, the theory of contestable markets is just applicable to a certain extend. Several markets tend to lack contestability and are therefore not disciplined by potential competition, regulation could be necessary. Before adopting a regulatory regime to a specific market it is necessary to analyse whether evidence for a *natural monopoly* exists. A natural monopoly is described as a market, which shows subadditivity. If such a market additionally lacks contestability, it is called a *bottleneck* or *essential facility* (cp. Knieps 2001). Those conditions are frequently fulfilled in sectors with grid-bound or pipeline-bound infrastructure (e.g. telecommunication, energy markets). Such a market is efficiently supplied by just one supplier. More than one supplier in the market would lead to cost duplication. As the market is not contestable (and the monopolist therefore not disciplined by potential entrants) and current competition is not intended, it is necessary to regulate this market (segment): *bottleneck regulation should be implemented*. If despite of economic rationality new competitors have entered the market and built up own infrastructure the regulatory suggestions would change. Assuming cartel agreements are prohibited, the oligopolistic competition prevents monopoly prices. Regulation would therefore lose its necessity.

In conflict with our conclusions, some authors emphasise the necessity of exceeding bottleneck regulation due to the phenomenon called *predatory pricing*. Predatory pricing in general could be described as a strategy to deter potential competitors from entering a certain market by the credible affirmation of the willingness to decrease the market price below average (variable) costs in case of contest. Thus, market entry would be ex ante irrational for a potential competitor, he would therefore stay out of the market. For the incumbent, predatory pricing would be rational only, if he will be able to compensate possible current losses by discounted future profits. Although, the empirical evidence of predatory pricing is few (cp. Bork 1978; and Baumol 1996; and Emmerich 2001, pp 189-191). In our opinion predatory pricing is not a regulatory problem anyway; such a case should be covered and solved by the general competition policy.

In accordance with the considerations above, we suggest to divide a natural monopolistic sector into its sections of value added by using the assumptions of the contestable market theory. Regulation should be restricted on the essential facility. The aim of this kind of regulation is assuring access and inhibiting excessive prices. In consequence, the revised theory of contestable markets can be used to create an analytical framework for regulatory policy suggestions.

III. Contestability in the Telecommunication Market

In this chapter we will describe at first in which areas the telecommunication sector can be split up. In the second part we use the assumptions of contestable markets theory (Market entry is totally free; market exit is loss free; entry lag is less than price adjustment lag) in telecommunication. The following analysis is based upon the current German telecommunication market assuming that no regulation has been introduced in this market yet: The viewpoint "no regulation" allows to identify necessary regulations. The restriction to the current German market is important because the conditions for natural monopolies have to be applied to given demand conditions and given technical circumstances.

The telecommunication sector can be divided in *local loop, connection network, services*, and *terminals* (see *Gabelmann/Gross* 2000, and *Fritsch/Wein/Ewers* 2001, pp 253-255).

S *Local loop* means the physical infrastructure between customers and local switchboards. Every client usually has one exclusive connection to the switchboard. The local loop can be seen as a section with subadditive cost function because a monopolistic provider is able to realize density advantages: The connection of several subscribers to the switchboard provided by one firm is normally cheaper (in other words: more efficient) than the same provision by several firms. Current competition in local loops is therefore not desirable. Contrariwise it is very important to examine whether potential competition can be expected in the local telecommunication markets. Turning away from present circumstances the subadditivity condition might be removed by the use of alternative technologies in the future (micro waves -, powerline -, telecommunication broadband cable - or mobile phone networks) or by increasing telecommunication demand.

S *Connection networks* include all technical equipment which are necessary to interconnect the local loops. A special hierarchical network structure has been developed in Germany, separating between local, regional, and national connection networks (cp. Monopoly Commission 2001, §§ 73-80). Local connection networks are provided by "Deutsche Telekom" predominantly. In contrast to local loops, (local) connections are used by several subscribers, stochastic economies of scale persist: As the volume of the cables is not exhausted; parallel local infrastructure is not necessary. Since new firms have rarely established own local connections yet, subadditive cost functions are probably given on local networks. On the regional network level the former monopolist "Deutsche Telecom" has built up 273 regional connection networks, while its largest competitor, "Mannesmann Arcor", has been able to establish one third thereof. Other competitors are hardly found. From the economic viewpoint, this development can be interpreted in two ways: On the one hand, subadditivity could have vanished in one third of regional networks because of parallel infrastructure due to technical progress or increased demand. On the other hand, Mannesmann Arcor possibly uses connections which had been established before deregulation. These capacities might have been built up to circumvent the former legal monopoly restriction. We are not able to appraise the relevance of subadditivity in regional connection networks. Analysing national connections it appears that German market leader provides 23 points which are interconnected. Several competitors have built up own national networks, and local telecommunication suppliers have merged with other connection networks. As the competitors´ networks have been designed for own purposes only and therefore not been connected to the former monopolist´s network, third competitors are not able to use this infrastructure today. Connections to abroad and to mobile networks are not touched

by this problem. Contrary to the opinion of the Monopoly Commission we assume that new owners of fixed networks and potential users of these networks will – in case of effective competition - find solutions to overcome existing switching costs. As the technological development in telecommunication – and therefore a more efficient use of nation-wide connections - can be expected additionally, competition will increase further on (cp FAZ 2002). Thus, we assume that current competition by several suppliers in the national connection exists and therefore regulation is no bnger requisite. As to regional connection networks we can not assess whether the condition of a subadditive cost function is not fulfilled or if alternative national networks are the result of former regulation. Independent from that we assume *potential* competition in the German national connection networks to be dispensable. Admittedly, the effectiveness of potential competition should be considered in local and regional networks sections.

S *Services* can be defined as the use of networks to provide telecommunication services. It seems obvious that economies of scale are limited in this field and that therefore a subadditive cost function seems to be unlikely. Services can be supplied by several firms without any additional costs compared to the provision by one supplier. Current competition is possible and desirable, whereas potential competition becomes less important.

S *Terminals* are all equipment which can be used by customers to use telecommunication networks and services, for example telephones and fax machines. The economic interpretation of this section is consistent to the section services: The cost function is not subadditive because several firms supply terminals without any indication for additional unnecessary costs; current competition is effective, and potential competition not required therefore.

Recapitulating the first step of our analysis current competition does not occur in the section local loops. Our results on connection networks are miscellaneous: Local connection networks should be supplied by just one firm, whereas several firms operate as regional and primarily national connection network providers in Germany possibly caused by former regulation. Another feasible explanation might be a change in technical or demand conditions so that subadditive costs functions are not longer given. Current competition exists nationwide only and is available in the sections of services and terminals. Thus, potential competition is economically not necessary.

The contestability of the telecommunication sector depends on a totally free market entry (*assumption 1*), besides loss free market exit (*assumption 2*), and *assumption 3* "entry lag < price adjustment lag". Free market entry would be given if established telecommunication firms and new

suppliers face the same costs of market entry. Thus, the following conditions should be fulfilled in the German telecommunication market:

S *Same access to input markets and production technologies.* Concerning *local loops* and *terminals* there are no indications of a violation of this condition. In order to facilitate the supply in *connection networks* access to local loops has to be ensured. Local loop access will be dispensable if so called „by pass,-connections are possible. „By pass" means that connection networks are directly linked to terminals. But as such „by passes" are cost intensive, they are not commonly used even by large telecommunication demanders. As our analysis has shown suppliers in local loops are non-contestable natural monopolists. Therefore, they will have no incentive to open their essential facility to competitors: Following the theory of vertical integration suppliers of local loops can be seen as upstream monopolist; if regulation prevents capturing monopoly profits in the upstream section an integrated monopolist will discriminate downstream competitors (firms in the other sectors of the industry; see for example Wein 2001). Hence, to ensure contestability in connection networks regulation should grant the access to local loops. Such a regulation policy would be a decisive step to fulfil the first assumption of the contestable market theory. Providers of *services* will have no disadvantage in network access if the access regulation operates effectively in the local loop and if competition in the form of several connection network suppliers is given. Concerning the German telecommunication market several national connection network firms are established, whereas the other market sections lack competition in form of divers suppliers. To achieve free market entry for services regulation has to assure free access to local loops as well as to local and regional connection networks

S *New firms have the same information as incumbents.* Information disadvantages are only discussed in the section of services (cp. Monopoly Commission 2001). Small service providers are particularly interested in using a collective collecting agency, creating own corresponding infrastructure would be very expensive in case of small market shares and rather irrational therefore. If the incumbent firm takes over the function as collecting agency for all competitors it will gain two information advantages: The price structures currently used in the market, and in the way customers react to these prices and price changes. Both information could be decisive for the incumbent´s reaction concerning its own tariffs. Consequently, new firms would not be able to gain market shares by price reduction. But no new service supplier has the obligation to use the collecting agency function of the incumbent, all new service suppliers have the possibility to cooperate in creating own (collective) collecting agencies. If the service providers do not

cooperate, the importance of collecting agencies for market entry should be analysed. Assuming that customers do not accept new suppliers without a collective collecting agency while those have not been established yet, information advantages of the incumbent could be expected. Contestability is not given in telecommunication market therefore. We will discuss the role of collective collecting agencies in detail later on.

S *No quality differences between new and incumbent firms.* If the regulation is able to secure non discriminatory use of local loops and local/regional connection networks service providers will probably be able to supply the same quality: There are no differences concerning the availability of connections/services. Having established an adequate access regulation service quality should differ hardly; the contestability of this market is not threatened therefore.

S *Customers are able to switch the supplier without any costs.* Switching costs are discussed in telecommunication markets on three arguments. *First*, before changing his service provider, a rational customer would have to know the prices taken by the competitors. Assuming that information costs about alternative suppliers exceed the potential price savings the consumer will not switch, and competitors with lower prices cannot contest the premium price markets. The problem of high costs of information does not occur in Germany admittedly, as price comparisons are published frequently in newspapers or on websites on the internet. Switching costs due to information intransparency should be very low in the current German telecommunication market therefore. *Second*, switching costs may occur if telephone calls are processed by just one (new) competitor (preselection) and a change of the supplier call by call is not possible: If the new competitor lacks capacities it will not be possible to telephone trouble-free (problem of busy lines). This danger may be an explanation why German telephone consumers hardly choose the alternative „preselection" (see RegTP 2001). Accepting these facts it seems necessary to grant the opportunity of call by call legally. *Third*, switching costs could be caused by customer preferences on facile payment transactions. Having just one collecting agency creates the advantage of getting one invoice every month only and having one single contact in case of problems. If the consumers valuate these benefits as important they will not be disposed to leave the incumbent firm; the competitors will be unable to contest the market therefore.

To prevent asymmetric market entry costs it is necessary to assure non discriminatory access to local loops, and to local as well as regional connection networks. An existing collecting agency shows two contradictory effects. On the one hand possible switching costs can be prevented. On the other hand the incumbent firms may be informed well of the reaction of demand on competitors prices. In

order to avoid the corresponding information disadvantage, the competitors could establish a joint collection point. Hence, switching costs would be reduced to a low level and the incumbent would have no information advantage. In addition, the duty to provide call by call leads to a reduction of switching costs as well. Resuming the first assumption of contestability we are able to conclude that mandatory call by call and non discriminatory access to local loops are necessary with certainty. The collection point function can be taken over by an organisation established by the competitors themselves, such a solution inhibits switching costs and information advantages for the incumbent. All other cost disadvantages discussed above can be neglected for the German telecommunication market.

The *second assumption* contestable market theory is based on is that market exit must be possible without costs (absence of sunk costs); as mentioned above sunk costs will not prevent contestability if assumption three of the contestable market theory is given. Exit without costs will be reached if the production facilities can be sold without a loss (purchase price diminished by depreciation) or can be used without difficulties on other markets. Concerning *local loops* the firm has neither an opportunity to sell the local equipment on a secondary market nor a possibility of alternative usage (investments are irreversible): Expenses for creating local loops can not be returned in case of ceasing the local provision. Hence, it is impossible to leave this market without intensive losses. The existence of considerable sunk costs questions the contestability of this market. In *connection networks* other conditions are relevant: If the firms are using micro waves or satellite transmission capacities they will have the ability to change to other regional markets to some extent. Therefore, loss-free market exit is partly possible in this area. Analysing *services* we consider advertising expenses as to be normally lost in case of market exit, neither a secondary market for advertised brands is conceivable nor can it be used in other markets. But these sunk costs have no significance because it is not really necessary to intensely invest in advertising in the German „call by call"-telecommunication market, as price comparisons for finding a (new) service supplier are frequently published in newspapers. Firms which supply *terminals* can probably not leave the market without costs because the production facilities are very specific and the scope of secondary markets is limited. Loss-free market exits are not given in the local loop. Connection networks have some elements which allow to leave the market easily. Advertising expenses which are normally a typical example for sunk costs might not play an important role for services. The production of terminals is not possible without accruing exit costs. Looking on the two latter sections: As both are not

characterised by subadditivity, current competition is possible; contestability/potential competition is not strongly important therefore.

If the price adjustment lag exceeds the entry lag the *third assumption* of contestable market will be satisfied. Furthermore, the longer the price adjustment lag lasts the easier it is to earn back sunk cost investments for the new entrant. In other words: A „high" price adjustment lag may be a substitute to assumption two „loss-free market exit". As far as *networks*, local loops and connections are concerned, it is clear that market entrants require a longer period of time to build up a new network. Hence the entry lag in this section is important. Additionally, creating new own networks will only be reasonable if a large market entry is intended. In such a case the incumbent will suffer a big decrease of revenue if he does not adjust his price. Therefore we expect a short price adjustment lag in the networks. The existence of a short price adjustment lag and of a high entry lag in the networks violates assumption three.

As to the *services,* it is important to ensure a non discriminatory access to networks. Given this condition entrants require only a short period of time to enter the market; the dimension of the entry lag is caused particularly by switching costs. Switching costs would be close to zero if the obligatory call by call third party access and the provision of collection points were established. If the new firm confines market entry on the section services, third party access substitutes consumer tolls against interconnection revenues for the incumbent. Thus, the loss of revenues the incumbent would have to suffer in case of price adjustment are higher than losses due to decreasing sales. Acting rational, the incumbent will therefore leave its price stable. Resuming all arguments a high price adjustment lag should be expected. Experience in Germany after 1997 can not be used to reject this hypothesis: The Deutsche Telekom decreased its prices relatively slowly compared to the competitors (cp. RegTP 2001). It seems that condition three is complied with in the field of services. Concerning terminals an intensive discussion about entry lag and price adjustment lag is not necessary; current competition is given and subadditivity does not exist. In conclusion, assumption three is not given in networks: Entry lags are high and price adjustment lags are low. We see the opposite result in the section services: Low entry and high price adjustment lag are to be found; condition three is given therefore.

Examining all conditions led us to the following conclusions:

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- The local loop section has to be characterised as a natural monopoly; at least the technological and demand conditions are given. The non-existent possibility to sell production facilities on secondary markets and the absence of alternatives for the local loop create large market exit costs. This section is not contestable, as market entry lag is high, price adjustment lag is low and sunk costs exist. For the German telecommunications market all indicators show that the local loops should be considered as non contestable natural monopolies (bottleneck, essential facilities; cp. Knieps 2001). Hence regulation is necessary, especially to ensure the non discriminatory access.

- Connection networks can be recognized as natural monopolies, mainly on the local level. Regional and in particular national networks are supplied by divers firms. We are not able to decide whether these market structures are caused by regulation or provoked through changing demand or technical conditions. Nevertheless, no current competition takes place in local and regional connection networks. To prevent entry cost disadvantages it is necessary to secure access to local loops as well as to local and regional connection networks. Multi routing, micro wave and satellite communication are technical possibilities which lead to loss-free market exits in this section. In any other case sunk costs are given. The high entry and the low price adjustment lag are decisive: Potential competition can not be expected in all connection networks. But we have current competition on national level. Thus, regulation should be restricted to local and regional connection networks.

- Concerning the services we do not doubt that current competition is possible. Furthermore, with the obligation to offer network access for call by call services and perhaps to supply a collection point by the incumbent, combined with the non discriminatory access to local loop as well as local and regional connection networks, the first assumption of contestability will be given. Moreover, a nearly loss-free market exit can be found, and the entry lag is very low with the price adjustment lag being very high. These results fulfil the second and third assumption of contestability. There can be no doubt that current and potential competition are possible and powerful in services. Any further regulation is not necessary.

- A subadditive cost function is not given in the market for terminals. Current competition works. The power of potential competition is not decisive and can be neglected.

IV. Conclusion

At first we concentrate on the theoretical interpretation of the contestable markets theory. We will answer in which section of telecommunication regulation is necessary afterwards.

The original contestable market theory implied three assumptions to be satisfied to establish potential competition. Premise one demands a free market entry: A market entrant faces the same conditions as the incumbent firm. Assumption two stipulates that market exits have to be possible without any costs. If the price adjustment lag takes longer than the entry lag the third condition will be fulfilled. Our analysis shows that if assumption three is not satisfied this non-compliance can work as substitute for assumption two: If the incumbent lowers its prices slowly (high adjustment lag) and the market entry can be performed quickly (low entry lag), a new competitor will be able to earn back sunk costs. The second assumption will be the lesser important the longer the pay back period is. Therefore it is not necessary that all three assumptions are fulfilled to have potential competition. Thus, the original contestable market theory underestimated the force of potential competition.

We have applied the „revised" contestable market theory to the German telecommunication market and have been able to clearly identify the sections in which regulation is required. As to local loops natural monopolies have to be accepted today. If new technologies are developed and adopted or demand curves shift to the left the condition of subadditivity is no longer given and current competition will be possible. Under the present conditions local loops are not contestable due to sunk costs. High entry lags should be expected and the price adjustment lag will probably be short. The current local loops are identified as bottlenecks which should be regulated. Regulation should ensure non discriminatory access and prevent monopoly prices. The analysis of connection networks has led to contradictory results. Local and regional connection networks should be regulated because a high entry lag and a low price adjustment lag must be expected (absence of potential competition) as well as current competition does not exist today. The national connection network shows current competition between several network providers, hence regulation can be abolished in this field. Moreover, services can be supplied by several firms, current competition works. We can predict strong potential competition: If regulation ensures non discriminatory access to local loops as well as local and regional connection networks, call by call and perhaps the supply of collecting agencies by the incumbent - the first assumption of contestable market theory can not be

rejected. No sunk costs are given to violate assumption 2; the typical example for sunk costs, advertising expenses, are not important in this section because customers are informed about the existing suppliers by using the several price comparisons, advertising is not necessary. The regulation mentioned above leads to a low entry lag, and if small market entries are expected by the incumbent and the incumbent is able to realize interconnection revenues he will be less incited to cut down prices quickly. Besides the other assumptions, assumption three is given, the markets for services are perfectly contestable. There are no arguments favouring a natural monopoly in the section of terminals, several suppliers exist in this market. It is not necessary to discuss contestability in this section therefore.

Despite the scepticism raised by the German Monopoly Commission our analysis shows that the theory of contestable markets can be applied to the telecommunications market. Our analysis shows clear indicators in which sections regulation is necessary and which regulation specific questions have to be answered in the future. Furthermore, the theory summarises in detail which key factors have to be satisfied to achieve potential competition. The relevant question is not - as mentioned by the Monopoly Commission - whether we have a contestable telecommunication market today. It is rather important what should and can be done to strengthen potential competition. The paper shows that potential competition is necessary if natural monopolies are given. If no natural monopoly exists, the question of contestability will be just of secondary importance. In addition, the careful reconsideration of the theory showed that the rejection of the second assumption is the lesser important the smaller the entry lag is and the larger the price adjustment lag is. The contestability of a market can be achieved more easily than expected by the traditional interpretation of contestable markets theory.

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