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Does the system of letter conveyance constitute a bottleneck resource?*

by

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88

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- Revised Version -

Critical comments to the author are welcome!

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1 Introduction

The basic idea behind the disaggregated approach to network regulation is to identify those parts of networks where market power remains, which may be abused in the interconnection process. The key concept is the identification of monopolistic bottlenecks and the application of the Essential Facilities Doctrine, which is well-known from the US Antitrust law. In the context of networks, this principle, which is traditionally applied case by case, can be generalized and applied to a class of cases, where the localization of market power is based on the same reasons (e.g. Knieps, 2000). As it turns out, government regulation of interconnection/access conditions (tariffs, quality of access, etc.) is only justified in those parts of networks where market power can be identified *ex ante*. In all other parts of networks, government regulations of interconnection/access conditions are not only superfluous but hamper efficient negotiations of the parties involved.

Although politically desired universal service objectives still play an important role in postal markets compared with other network industries, equity considerations should not be mixed with the question whether monopolistic bottlenecks do exist. It is well-known that socially desirable subsidization can be made compatible with the advantages of free entry without cream-skimming possibilities setting up an universal service fund (eg. Blankart, Knieps, 1989, pp. 592). Regulatory necessities due to legal entry barriers on final product markets (exclusive licences for letter services) should not be mixed up with the question whether network-specific market power does exist on the upstream level of the letter conveyance chain.

The paper is organized as follows. In section 2 the disaggregated approach is developed, localizing the monopolistic bottlenecks. In section 3 the localizing of monopolistic bottlenecks in different network sectors is pointed out. In section 4 the question is analyzed whether monopolistic bottlenecks do exist in letter mail conveyance. The bottleneck problem will be examined from a disaggregated perspective, assuming an economically viable disaggregation of the conveyance chain (collecting, sorting of outgoing letters, transport, sorting of incoming letters, delivery).

2 The theory of monopolistic bottlenecks

Criteria like relative market share, financial strength, access to input and service markets etc. can only serve as a starting point for evaluating the existence of market power; but the development of an ex ante regulatory criterion creates a need for a more clear-cut definition of market power. This is even more important, because “criteria for conjecturing a dominant position” (“Vermutungskriterien”) on the basis of market shares can lead to economically unjustified criteria for government intervention in network industries. From a competition economics point of view, the use of ex ante sector-specific regulatory intervention constitutes massive interference with the market process and therefore always requires a particularly well-founded justification based on modern network economics.¹

It is important to identify the regulatory basis by means of Stigler’s concept of entry barriers, focussing on the long-run cost asymmetries between incumbent and potential entrants (Stigler, 1968, p. 67):

“A barrier to entry may be defined 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”.

The sector-specific characteristics of network structures (economies of bundling) are not a sufficient reason to conclude that market power does exist. It is necessary to differentiate between those areas in which active and potential

¹ The traditional methods and approaches in general competition law, both with respect to merger control and the control of abusive practices, are fundamentally different from those of sector-specific regulatory economics. Any mingling of these two different approaches cannot but be misleading. The paper examines the question of a sector-specific need for regulation and therefore does not comment on merger cases. Market shares and turnover are easily measurable and are therefore usually taken up as criteria in competition law. However, they must not in any way be confused with a sound economic analysis of the effectiveness of active and potential competition. When examining a merger case, the competition authorities use a large number of criteria to which they attach, by their own discretion, a varying degree of significance on a case-by-case basis. For the general control of abusive practices, too, competition law envisages a correction of market processes on a case-by-case basis. By contrast, the aim of the bottleneck theory is to derive the specific need for regulation in network sectors not for specific cases but for all classes of cases characterised by network-specific market power.

competition can work and other areas, so-called monopolistic bottleneck areas, where a natural monopoly situation (due to economies of bundling) in combination with irreversible costs exists. It can be demonstrated that the regulation of network-specific market power is only justified in monopolistic bottleneck areas. In all other cases, the existence of active and potential competition will lead to efficient market results as in the other sectors of an economy. The pressure of potential competition can be sufficient to discipline the behavior of the active supplier, even if he is the owner of a natural monopoly. Such networks are called “contestable” (e.g. Baumol, Panzar, Willig, 1982).

An essential condition for the functioning of potential competition in order to discipline a firm (natural monopoly) already providing network services is that the incumbent firm does not have asymmetric cost advantages in comparison with potential entrants. In contrast, if sunk costs are relevant, consumers, who would intrinsically be willing to switch immediately to less costly firms, cannot do so. Sunk costs are no longer decision relevant for the incumbent monopoly, whereas the potential entrant is confronted with the decision whether or not to build network infrastructure and thus spend the irreversible costs. The incumbent firm therefore has lower decision relevant costs than potential entrants. This creates scope for strategic behavior of the incumbent firm, so that monopoly profits (or inefficient production) will not necessarily result in market entry (e.g. Knieps, Vogelsang, 1982).

Market entry therefore cannot be expected easily, if sunk costs are sufficiently high. Therefore we can conclude that sector-specific ex ante regulatory intervention in order to discipline market power can only be justified in non-contestable networks (monopolistic bottleneck areas), i.e. where bundling in combination with irreversible costs is relevant. The basic concept of the disaggregated identification of network-specific market power can be illustrated by the following table:

Table 1: The localization of monopolistic bottleneck facilities

| Network area | With sunk costs | Without sunk costs |
|---|---|---|
| Natural monopoly (bundling advantages) | (1) Monopolistic bottlenecks | (2) Potential competition (contestable networks) |
| No natural monopoly (bundling advantages exhausted) | (3) Competition among active providers | (4) Competition among active providers |

An interesting question is the relation between “pure economic” analysis and real life networks (and the services that are provided via those networks). What about the reality of “contestable networks”? It seems obvious that, as soon as competition works, the behavior of markets for network services becomes more complex than is assumed in the “simple” model of the theory of contestable markets. Examples may be strategies of product differentiation, price differentiation, creation of goodwill etc. However, even strategic behavior on competitive markets for network services should not lead to the opposite conclusion to regulate these markets. In contrast, the very point of the disaggregated approach is the development of the preconditions for competition on the markets for network services. The only purpose of the theory of contestable markets is therefore the localization of stable network-specific market power, which systematically impedes the development of competition on the vertically related markets for network services. Whereas strategic behavior and informational problems do not lead to stable market power on the markets for network services, monopolistic bottlenecks – due to bundling advantages in combination with sunk costs – do create stable market power even if all market participants are well-informed. The development of a set of rules for dealing with transactions across the boundary between competitive networks (with active and/or potential competition) and monopolistic bottlenecks is therefore important in order to guarantee the preconditions for competition on the markets for network services.

3 Localizing monopolistic bottlenecks in different network sectors

The theory of monopolistic bottlenecks was not specifically developed for a specific network sector, but is rather an economically sound instrument for localising and disciplining remaining network-specific market power in all network sectors (e.g. railways, air traffic, telecommunications etc.). The combination of economies of bundling and irreversible costs can occur in different network sectors: For example, airport infrastructures – in contrast to aeroplanes – are associated with irreversible costs. Once made, investments in terminals and runways cannot be transferred to another location, the way an aeroplane can. Thus airports constitute monopolistic bottlenecks. Railway infrastructure, unlike rail transport services and railway traffic control, represents a bottleneck facility, because the track operator holds a natural monopoly and the building of rail tracks involves irreversible costs. The same situation holds for transmission and distribution networks in the electricity sector, as these networks are characterized by economies of bundling and irreversible costs and thus require sector-specific regulation. In the telecommunications sector, bottleneck facilities can only be found in the local loop, while in long-distance networks there is both active and potential competition. Thus in the telecommunications industry, in contrast to the electricity sector, only the local loops are still in need of being regulated.

The following tables 2 to 5 illustrate the application of the theory of monopolistic bottlenecks to the network sectors mentioned above.²

² For a more detailed discussion, cf. Knieps (1996), (1997); Knieps, Brunekreeft (eds.) (2002).

Table 2: Airports as monopolistic bottleneck facilities

| | Natural monopoly (economies of bundling) | Irreversible costs |
|---------------------|---|--------------------|
| Air traffic | X | – |
| Air traffic control | X | – |
| Airports | X | X |

Table 3: Railway infrastructure as a monopolistic bottleneck facility

| | Natural monopoly (economies of bundling) | Irreversible costs |
|-------------------------|---|--------------------|
| Railway traffic | X | – |
| Railway traffic control | X | – |
| Railway infrastructure | X | X |

**Table 4: Electricity networks (transmission and distribution networks)
as monopolistic bottleneck facilities**

| | Natural monopoly (economies of bundling) | Irreversible costs |
|---|---|--------------------|
| Generation | – | X |
| Transmission networks | X | X |
| Regional/local distribution networks | X | X |

Table 5:
Local telecommunications networks as monopolistic bottleneck facilities

| | Natural monopoly (economies of bundling) | Irreversible costs |
|---|---|-----------------------|
| Terminal equipment | – | – |
| Telecommunications services (including voice telephone services) | X | – |
| Satellite/mobile networks | X | – |
| Long-distance cable-based networks | – | X |
| Local cable-based networks | X | X |

4 Are there monopolistic bottlenecks in letter mail conveyance?

Technical functions of coordination (e.g., access to the postal code system, information on changes of address) must be differentiated from postal services proper, specifically the processing of letters. Letter mail conveyance comprises the collecting, forwarding and delivering of letters. From the perspective of network economics conveyance can be segmented into the following complementary components (functions): collecting, sorting (of outgoing letters), transport, sorting (of incoming letters) and delivery. Technical functions of coordination (such as access to the postal code system, information on changes of address) are of a different nature than problems arising from network-specific market power and should be dealt with separately.

In the following, the bottleneck problem will be examined from a disaggregated perspective, assuming an economically viable disaggregation of the conveyance chain (collecting, sorting of outgoing letters, transport, sorting of incoming letters, delivery).

4.1 Collecting

Collecting is not a bottleneck resource

Different modes of collecting letters are being employed simultaneously. Economies of bundling exist, in so far as letters are handed in at post offices, large-scale collecting facilities and mail boxes, avoiding to collect them from each household individually. On the other hand, it can be economically viable to offer pick-up services, especially to large-scale customers. New entrants typically focus their market access strategy on large-scale customers. The building up of collecting facilities does not involve irreversible costs. Buildings and office space used for collecting facilities can be transferred to different uses, letter boxes can be moved to other locations, and transport services required for collecting letters are not restricted to specific routes. Economies of scale associated with regular collecting can, however, be of significance on the regional level, for instance in rural areas.

4.2 Sorting

Sorting (of both outgoing and incoming letters) is not a bottleneck resource

Letter sorting centres basically serve a dual function, as centres for sorting outgoing mail in the evenings and as centres for sorting incoming mail in the mornings; the ratio of incoming to outgoing mail may vary considerably. The sorting process may be automatized to a larger or smaller extent. For sorting by hand machines will not be used, while in case of fully automated sorting each item will be processed individually by a camera: the addressee and the format of the letter will be registered and encoded; even the tracking of individual letters (especially in express logistics networks) may be possible in the future. Besides the basic mechanical sorting process, sorting machines are capable, depending on the intelligence of the software involved, of performing additional sorting and logistics services, registering information about the destination of a letter in the form of a machine-readable bar code and processing it logistically, as far as reasonably possible, in order to facilitate processing at the point of destination.

The diversity of technologies available in the field of sorting machines means that software (intelligence) can be developed gradually, independent of hardware (mechanics). The specific deployment of sorting machines depends both on the organization of the sorting centre and on the logistic concept of the entire conveyance chain. It is not only the process of sorting incoming and outgoing mail that must be optimized, but also the respective transport routes.³ The length of these routes is influenced by the number of sorting centres but at the same time also by the potentials for bundling in those facilities. Where several parallel „sorting lines“ for the same product are operating simultaneously (e.g., standard letter sorting machines and maxi letter sorting machines) economies of scale inherent in the sorting process are exhausted. However, economies of scope may still exist with regard to the use of video coding machines for the manual registration of non-machine readable addresses. A letter which has to be sorted out by the coding personnel because the address is illegible must be processed manually. Economies of bundling will then soon be exhausted.

Depending on the product spectrum, the product qualities, the amount of mail to be processed, and the logistic concept used, the number and size of the sorting centres owned by a postal services provider varies. Irrespective of the size of a sorting centre, this segment of the conveyance chain is characterized by economies of bundling in the form of economies of scale and economies of scope. Economies of scale are relevant for separating sorting services according to letter size, priority etc. Economies of scope are relevant for correcting addresses, sorting by hand and especially for exploiting the dual function of letter sorting centres, of processing both incoming and outgoing mail. However, the facilities connected with sorting centres are not characterized by irreversible costs. The buildings – typically located in industrial areas – can be transferred to different uses, sorting and coding machines are not tied to the specific geographical location of a given sorting centre. Thus we can conclude that sorting centres do not

³ Deutsche Post AG differentiates between: „Regular network for standard/compact letters, large-size letters and maxi letters“, „Express-Logistic network for Infopost items“ and „High-speed network for urgent Pressepost items“ (Deutsche Post AG Brief: The High-Tech Programme of the Letter Mail service, The Production System of 83 Letter Mail Centres, p. 5).

constitute monopolistic bottleneck facilities, the use of their capacities not being indispensable to alternative postal services providers.

In addition, depending on the product spectrum, the product qualities, and the respective logistic concept, it may be economically viable to set up competing sorting centres. Their number and geographic location as well as the sorting technology employed should be determined endogenously, taking into consideration the resulting transport routes between the sorting centres. While the location of airports or railway stations is directly relevant as a quality criterion for serving customer demand, the location of sorting centres is the exclusive result of optimization processes on the input level (this does not concern the location of large-scale collecting facilities). It is quite possible that the owners of letter conveyance systems might reduce the number of sorting facilities in the course of their gradual network optimization.

Different logistic concepts and the resultant processing chains imply a larger or smaller number of distribution centres and thus a considerable variety of machines for pre-sorting or fine-tuned sorting, respectively. It has to be noted that market entrants, too, are able to use their own facilities for pre-sorting or fine-tuned sorting.

4.3 Transport

Transport is not a bottleneck resource

Letter containers are transported from collecting facilities to letter sorting centres for outgoing mail, from letter sorting centres for outgoing mail to those for incoming mail, and from there to the delivery centres. In principle, all modes of transport can be utilized, e.g. lorries (of different sizes), trains and aeroplanes. Economies of scale inherent in regular collecting can only be significant on the regional level, for instance in rural areas. As there are no irreversible costs involved throughout, the transport of letter containers is not a monopolistic bottleneck resource.

4.4 Delivery

*Delivery is not a bottleneck resource*⁴

The delivery districts are served from the delivery centres. The number of delivery districts served by the same delivery centre varies considerably, depending on the average volume of mail. Mail is delivered on foot, by bike or by car, in rural areas with few parcels to be delivered there may even be a combined delivery of letters and parcels. There are economies of scale involved in delivery, which have an impact on both the design of the delivery districts and the specific mode in which these districts are served. The higher the population density and the larger the amount x of letters to be delivered, the lower the average cost $AC(x)$ of delivery.

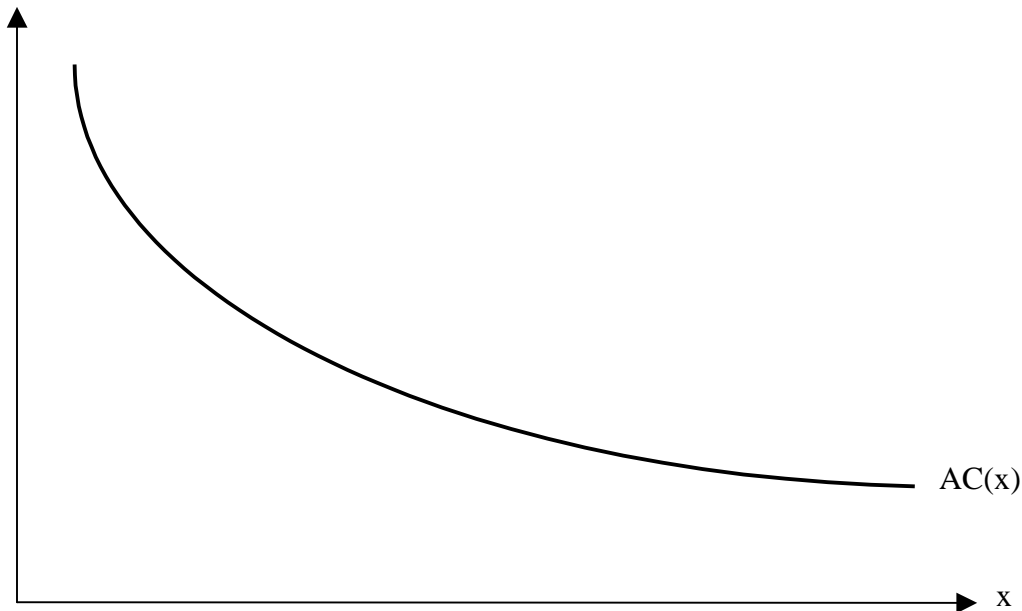


Fig. 1: Economies of scale for delivery

⁴ For a transitional period there may well be cost asymmetries between the incumbent and the new entrants, due to civil servant employment contracts, legally protected reserved services, etc. This problem, however, must be differentiated from the question of whether there are monopolistic bottlenecks. Here it is necessary to focus on the abolishment of the exclusive licence and solve universal service problems separately by means of a universal service fund instead of asymmetric universal service obligations.

In particular, it is cost-saving to have one postman deliver standard letters for one row of houses, rather than several postmen. The situation is different for express services or when dealing with large-scale customers. Here individual delivery is necessary and economically viable.

Such economies of scale, however, are not combined with irreversible costs, as both delivery personnel and delivery vehicles are mobile factors, their deployment not irreversibly tied to a specific delivery district. In principle, it is possible for market entrants to build their own delivery networks. On the other hand, entrants can also restrict their activities to the market segment of selective delivery.

The delivery of letters is characterized by a learning curve.⁵ This means that delivery is less time-consuming for an experienced postman with detailed knowledge of addresses and of the area than for a less experienced one. The average cost curve $AC(t)$ of delivery in a given district falls over time t . These learning curve effects are illustrated in figure 2.

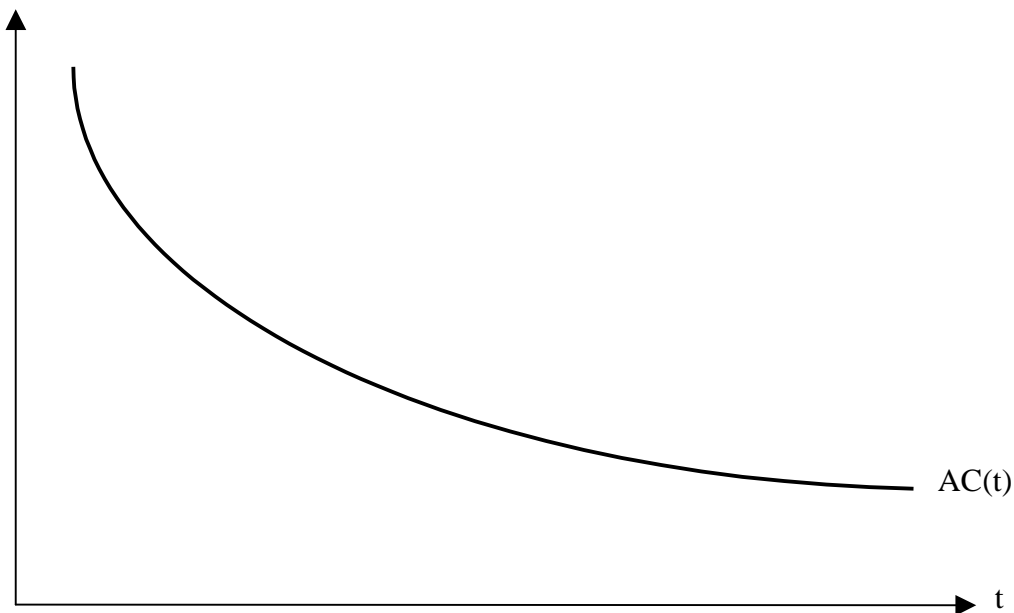


Fig. 2: Learning curve for delivery

⁵ For the significance of learning curves in competition, cf. e.g. Spence (1981).

The combination of economies of scale due to an increased volume x of letters to be delivered and the learning curve effect results in the following figure:

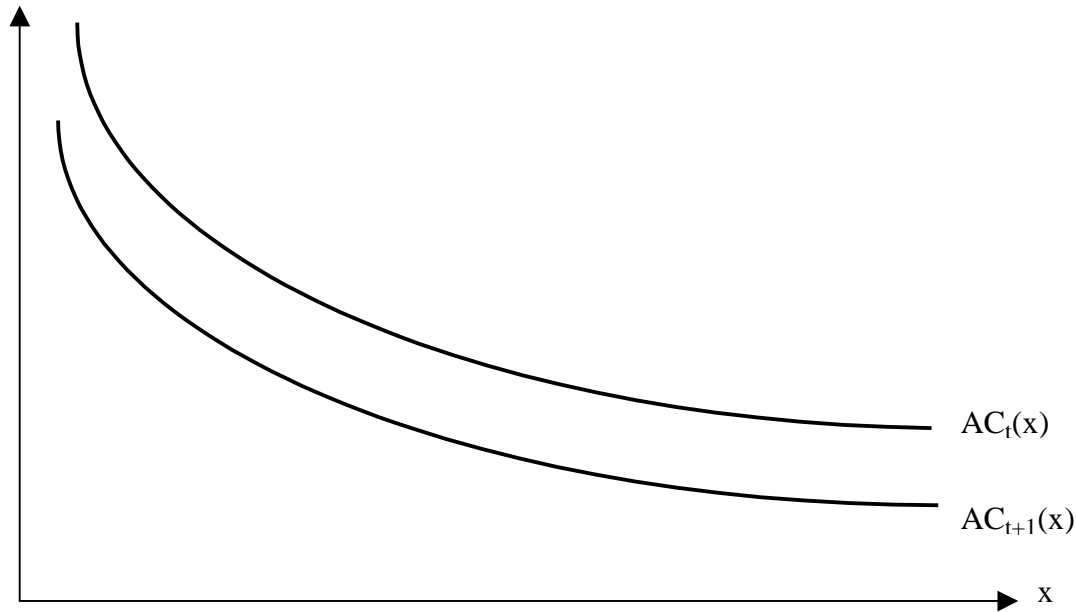


Fig. 3: Economies of scale and learning curve effect

But learning costs do not constitute cost asymmetries either, as they have to be paid by incumbent and entrant alike. Besides the high proportion of personnel expenses, there is only a minor proportion of capital cost, which is, however, mobile, and thus does not constitute irreversible costs either.

4.5 Logistic concepts

Logistic concepts are not a monopolistic bottleneck resource

The essential difference between intermediate products (input level) and end product level is the transformation of basic components (functions) into end products. In this context, the use of logistic concepts is necessary in order to ensure certain quality parameters of the end product. Depending on the product spectrum and product qualities on offer, different logistic concepts are required, which can be developed as entrepreneurial efforts both by incumbents and by

market entrants. In particular, the logistic concept employed depends on what type of services are being offered: mass market versus high quality services, end-to-end versus partial services, local, regional or national services

The conclusion to be drawn from this is that logistic concepts are not monopolistic bottleneck facilities, but that they can be developed by new entrants independently, depending on the market entry strategy chosen.

5 Conclusion

The results of this paper can be summarized in the following table:

Table 6:
No monopolistic bottlenecks in any component of letter mail conveyance

| Components | Natural monopoly (economies of bundling) | Irreversible costs |
|--------------------------|---|--------------------|
| Collecting | X | — |
| Sorting of outgoing mail | X | — |
| Transport | — | — |
| Sorting of incoming mail | X | — |
| Delivery | X | — |

Even though economies of bundling are relevant for several components, they do not occur in combination with irreversible costs. Thus none of these components constitutes a bottleneck resource.

Although economics of bundling play an important role on several stages of letter conveyance, in the meantime alternative entry strategies can be observed; in particular high quality letter services (e. g. express mail) as well as large volume mail delivery. It can be expected that after the abolishment of all legal entry barriers the role of active competition will increase further.

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