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Competition in the post-trade markets: A network economic analysis of the securities business

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Abstract:

In order to analyse the role of competition in the post-trade markets a normative network economic analysis of the securities business is provided. The theory of monopolistic bottlenecks constitutes the theoretical reference point for this analysis in order to identify stable network specific market power. It is shown that clearing and settlement are competitive value-added telecommunications services and therefore do not justify ex ante market power regulation. Precondition for competition on the markets for clearing and settlement is non-discriminatory access to the complementary technical regulatory function – the notary function (authenticity, registry, links between competing end custodians).

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1. Introduction

The controversy surrounding the competitiveness of post-trade markets in the securities business is currently on top of the agenda to achieve an integrated European capital market. In that respect traditional network sectors are increasingly being referred to. The European Financial Service Round Table (2003, p.2) maintains, for example, that clearing and settlement service providers are infrastructures that have the characteristics of a natural monopoly. As a result, access to clearing and settlement facilities would require regulation. In this context, post-trade services are compared to railways, airports, and telecommunications infrastructures in particular.[1] As a consequence, post-trade services would demand far-reaching regulatory measures similar to those established in the telecommunications, energy or railway sectors. These measures include, for example, provisions guaranteeing open network access at regulated tariffs, discussion of the need for vertical unbundling, provisions on unbundled network access etc. The matter of whether or not comprehensive rights of access and choice should be guaranteed at every level of the trading and settlement chain by means of EC regulations is also a subject of controversial discussion with regard to post-trade services.[2] The current debate surrounding the introduction of regulatory measures on the markets for clearing and settlement draws parallels to the traditional network sectors.

The hypothesis that clearing and settlement as a whole constitutes a network infrastructure in need of regulation is based on the assumption that clearing and settlement represents an essential facility. As a basic infrastructure this would have to be separated from all other commercial activities in the financial and

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[1] "Clearing and settlement infrastructures benefit from a natural monopoly – granted de facto, if not by law.... As a result, access to these infrastructures is compulsory for financial intermediaries, who serve retail and institutional investors. Their roles can partly be compared to that of railway, airport or telecommunication infrastructures. As such, they must be adequately regulated and supervised as long as the barriers to competition in this field are not removed." (European Financial Services Round Table, 2003, p. 2).

[2] Cf. Commission of the European Community, Communication from the Commission to the Council and the European Parliament, Clearing and Settlement in the European Union, – The way forward, COM (2004) 312 final, Brussels, 28.4.2004.

stock exchange sector.[3] In order to evaluate these types of hypotheses the application of network economics is essential for thoroughly examining the potential for competition on the post-trade markets. A normative analysis, of whether or not a need for regulation of stable network-specific market power can be established in the post-trade markets' value chain is of key significance. Depending on its findings, cost allocation and pricing decisions on the markets for clearing and settlement should be left to the flexibility of market participants (within the framework of general competition law), or, alternatively, sector-specific market power regulation is justified.

The paper is structured as follows: Based on the securities trading value chain, section 2 will demonstrate how the functions of clearing and settlement can be differentiated from the notary function, and enhanced custody services. Section 3 starts with an explanation of the theory of monopolistic bottlenecks, which can be used as a basis for distinguishing between parts of a network where competition functions efficiently and other parts with stable, network-specific market power. Section 4 explores the opportunities for potential and active competition on the post-trade markets in securities. In particular, it is shown that clearing and settlement are value-added telecommunications services, which means that these markets are competitive.

Alongside the problem of regulating network-specific market power, matters of technical regulation are also of significance as part of this paper. Although technical regulatory functions can also have implications for competition policy, the latter differ fundamentally from regulatory intervention applied to discipline network-specific market power. In section 5, the layering scheme of network economics is introduced and applied to post-trade markets in securities trading. The technical regulatory functions in the area of the notary function are examined more closely. Building on the differentiation between technical regulatory

[3] "The centralised organisation for securities clearing and settlement that can be found in most of the European countries constitutes an essential facility necessary for all market transactions. … These infrastructures are therefore analogous to the electricity grid, gas pipelines, or telephone system but with the added factor of importance to the economic well-being of the EU Member States concerned." (Citigroup, 2003, pp. 26, 27).

functions and services on different network layers, this section centres on the need for non-discriminatory access to these technical regulatory functions.

2. Characteristics of post-trade markets

In order to analyze the role of competition on post-trade markets, closer appraisal of the securities trading value chain is needed.

2.1 The securities trading value chain

Four consecutive stages can be identified in the securities trading value chain:

(1) Information stage (pre-trade phase), where investors collect information in order to make investment decisions.

(2) Order-routing stage, where securities orders within the banking system are placed on an over-the-counter/OTC market or a stock exchange.

(3) Trading stage, where securities are traded and a suitable counterparty has to be found. At this stage a price is set for a specific volume. Trading can take place with either newly issued securities (primary market) or with securities that have already been placed (secondary market). Trading can take place either via a stock exchange (with differing levels of automation on trading platforms) or within or directly between credit institutions and securities service providers.

(4) Post-trade stage; this covers the functional elements of clearing, settlement, the notary function, as well as enhanced custody services (e.g. of distribution of investment income). Clearing and settlement are services that arise from securities trading (e.g. Giddy, Saunders, Walter, 1996, p. 987). Clearing refers to the calculation of the bilateral net liabilities from the purchases and sales of a securities transaction. Settlement means the conclusion of a securities transaction, i.e. the exchange of securities against a cash counter value. The focus of the notary function is to maintain an issuer account as a

"memorandum account" (authenticity) as well as a periodically distribution by issuers to the owners of the securities (registry). Downstream custody services cover the implementation of capital services as well as corporate actions (cash capital increases, exchange offers, etc.).

It is important to differentiate between activities on the trading stage and activities on the post trade stage. Central counterparties (CCPs) belong to the trading stage. A CCP interposes itself between counterparties to financial contracts traded in one or more markets, becoming the buyer to every seller and the seller to every buyer. Therefore, CCPs take principal risks facing in particular the counterparty credit risk as well as the liquidity risk. In analogy to ancillary banking services, capital requirements, guarantee funds and other banking regulations are recommended for CCPs (Bank for International Settlements, 2004). Those regulations should not be confused with proper regulation of market power on the post-trade markets.

2.2 Organizational and institutional alternatives to clearing and settlement

The securities business is linked to numerous accounting processes that occur at different points in the value chain. A basic distinction has to be made between account movements in the settlement of securities transactions at end-customer level (business relationships between investors and their principal bank) and those at earlier stages. Furthermore, a distinction should be made between two different types of end customer within the securities transaction value chain: the issuers, who distribute new securities via an underwriter and trading in securities that are already in circulation.

There are different organizational / institutional alternatives for trading in securities; depending on this, the necessary clearing and settlement functions are carried out by different market participants. These include: commercial banks (intra-bank trading: over-the-counter /OTC), transaction banks, end custodians

(Central Securities Depository -CSD-)[4], International Central Securities Depositories (ICSDs) as well as global financial services providers (Global Custodians).[5]

2.3 Distinction of clearing and settlement from the notary function

The notary function has to be differentiated into authenticity and registry. Authenticity means the confirmation of the authenticity of the securities holdings. The registry function can generally be rephrased as "keeping legal record of ownership of securities" (securities deposit).[6] The registry function responds the needs of securities issuers. In contrast to bank notes, where proof of authenticity is sufficient but information on the distribution to the different owners is completely irrelevant, securities generate earnings that are in general periodically distributed by issuers to the owners of the securities. The prerequisite in this case, therefore, is that issuers have access to the necessary information.

Clearing and settlement on the one hand and the notary function on the other represent fundamentally different functions of the post-trade value chain. It is important to note that the notary function is *not* an integral component of settlement. The transfer of ownership takes place within the settlement process, even if registration has not yet taken place or will not take place at all on the issuer's account (cf. Horn, 2002, p. 11). The transfer of securities ownership from seller

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[4] This paper uses the term "end custodian", equivalent to the term "Central Securities Depository" (CSD) which is more common in general use. The standard international term Central Securities Depository (CSD) is confusing insofar as, for example, pursuant to the German Safe Custody Act (Depotgesetz – DepotG), more than one "*Wertpapiersammelbank"* may operate as collective custodian, making the term end custodian more apt. The use of the term end custodian is advantageous, therefore, as it does not suggest terminologically that only one securities depository can exist; furthermore, this use makes clear that it is possible to have a chain of several intermediate custodians.

[5] For more detailed explanations of the different providers and their various roles in clearing and settlement,

see e.g. Bank for International Settlement, 1995, Annex 3, pp. 46-57; Bank for International Settlement, 2003; Kröpfl, 2003, pp. 28-32.

[6] The term "registration" is introduced in the sense of a notary function. The term "registration" therefore does not focus on different kinds of shares.

to buyer does not require the involvement of the notary function of an end custodian. The end custodian takes on the role of neither the agent of the purchaser nor the authorized agent of the seller.[7]

To the extent that a CSD provides clearing and settlement services, it operates on the same functional level as transactions banks or other intermediate custodians. Of key importance for settlement, however, is that every single securities transaction is booked on time and on a case-to-case basis.[8] There are different kinds of clearing and settlement services depending on the type of securities transaction.

Transactions within collective safe custody are subject to registration when accounts of securities holders of the end custodian require rebooking. As this rebooking can also involve netting (i.e. the aggregation of several offsetting transactions of securities account holders), it does not necessarily imply any direct conclusions concerning the actual changes in ownership at end-customer level. CSDs are particularly unable to function in an auditing capacity for all settlement bookings, as in many cases they have no information concerning such account activities.

3. Criteria for the regulation of network-specific market power

The introduction of network-specific market power regulation is only justified if a stable market power problem can be localized in the sectors examined. A suitable economic reference model that exposes the need for regulation in disciplining stable market power in the network sectors needs to be able to capture the essential network characteristics, without automatically equating them with market power. The following section establishes that stable network-specific

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[7] "Because according to the perception of market participants, declarations of intent are submitted and received, both in personam as well as in rem, by sellers and purchasers and the banks acting on their behalf." (Horn, 2002, p. 11; translation by the author).

[8] For example, these requirements are given in the provisions of the German Commercial Code (*Handelsgesetzbuch* - HGB, esp. section 239).

market power and ensuing need for regulation can only be derived in the case of a monopolistic bottleneck.

3.1 The theory of monopolistic bottlenecks

The monopolistic bottleneck theory is based on a consistent implementation of Stigler's concept of a barrier to market entry to identify stable, network-specific market power.[9] Stable, network-specific market power can only be identified for a combination of a natural monopoly and irreversible costs. A natural monopoly exists if a single supplier can serve the market in question more cost-efficiently than several suppliers, meaning that the cost function in the relevant area of demand is subadditive.[10] Reviews of the cost side of networks focus primarily on the bundling advantages achieved through economies of scale and economies of scope in service provision. These bundling advantages can imply that a single network operator may be able to serve a given market at a lower cost than a number of competing suppliers. This is termed a 'natural monopoly' (cf. e.g. Baumol, Panzar, Willig 1982; Baumol, 1977).

For the incumbents, irreversible costs no longer affect decision-making. Potential entrants on the other hand have to decide whether or not to incur these irreversible costs in the market they wish to enter. The incumbents therefore have lower decision-relevant costs than the potential entrants. Irreversible costs in combination with a natural monopoly constitute a credible threat that may discourage a second network operator from entering the market. Although even the

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[9] Stigler defines barriers to market entry as follows: "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" (Stigler, 1968, p. 67).
According to Stigler, production factors do not constitute barriers to market entry as long as they are available to both the incumbents and potential entrants on the same terms. Hence, economies of scale do not constitute a barrier to market entry as long as potential entrants have access to the same cost function.

[10] For the single-product case, economies of scale are sufficient to characterize a natural monopoly. Networks typically represent the multi-product company case. Transportation between different points of the network, for example, constitutes different products.

irreversible costs have to achieve risk-equivalent rates of return, they would be irrevocably lost after market entry, so the threat that the incumbent could temporarily reduce its prices down to the variable cost level is indeed credible.

The conditions necessary for a monopolistic bottleneck facility are fulfilled if

(1) facility is necessary in order to reach customers, i.e. if there is no second or third such facility, in other words no active substitute is available. This is the case if due to bundling advantages there is a natural monopoly situation, meaning that one supplier can make available the facility more cost-efficiently then several suppliers;

(2) and if at the same time the facility cannot be duplicated on reasonable economic terms, i.e. there is no potential substitute available. This is the case if the costs of the facility are irreversible.

This means that the established company can only be expected to have network-specific market power in those areas that are characterized not only by bundling advantages and the resulting natural monopoly, but at the same time also by irreversible costs. As a result, the company that holds this kind of monopolistic bottleneck has stable market power even if all market participants are perfectly informed, all consumers are prepared to switch provider, and minor price changes lead to a shift in demand (Knieps, 1997, pp. 327-328).

In the absence of irreversible costs, bundling advantages, however, do not result in stable market power – even where a natural monopoly exists – due to the disciplinary effect of potential competition.[11] This applies regardless of the size of the market share of the network operator involved, because inefficient providers whose services are not market-oriented are replaced by new market entrants due to competitive pressure. In such cases, there is no need for regulation in order to discipline the market power of active network operators.

[11] In the absence of irreversible costs, natural monopolies do not have market power that is capable of withstanding alternative behavioral assumptions (cf. Knieps, Vogelsang, 1982). Market power based on the Cournot-Nash assumption becomes immediately instable when the Bertrand-Nash behavioral assumption is applied. As a result, any intervention by regulatory authorities would have to be based on behavioral hypotheses that are difficult to check empirically.

Whereas the focus of the theory of contestable markets concentrates on the role of the potential competition with identical cost functions for both active and potential competitors (cf. Baumol, 1982; Panzar, Willig, 1977), network competition does not only mean potential competition. Active network competition, characterized by network heterogeneity and network diversity, also may play a key role (Knieps, 1997, p. 333).

The remaining market power in monopolistic bottleneck facilities can be sufficiently disciplined by means of price cap regulation in monopolistic bottleneck areas and accounting separation. On the other hand, detailed input regulation contradicts the principle of price cap regulation.[12] Limiting the regulatory provision to the level of output prices is intended to keep information requirements by the regulatory authorities at a minimum. This not only reduces the regulatory task required, it also motivates companies to look for ways of making cost savings or implementing innovative price structures. One of the advantages of price cap regulation when compared with individual rate approval is that it does not hinder companies from seeking out innovative price structures.

3.2 Monopolistic bottlenecks and the essential facilities concept

The current debate surrounding the possible applications of general competition law as opposed to sector-specific regulatory provisions is reflected in the Access Notice at European level.[13] When rules of competition are used in order to discipline network-specific market power, the idea of essential facilities plays a key role in the Access Notice, thus, for instance, in Section 68, Access Notice: “The expression essential facility is used to describe a facility or infrastructure, which is essential for reaching customers and/or enabling competitors to carry on their business, and which cannot be replicated by any reasonable means.”

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[12] For more information on the instrument of price cap regulation the reader is referred to e.g. Braeutigam, Panzar, 1993.

[13] Notice on the application of the competition rules to access agreements in the telecommunications sector – Framework, Relevant Markets and Principles (98/C265/02), Official Journal of the European Communities, 22. 8. 98, pp. 2-28.

This provision suggests a connection with the essential facilities doctrine resulting from US antitrust law, which is now also being used increasingly in European competition law.[14] In accordance with this doctrine, a facility can only be regarded as essential if the following two conditions are fulfilled: (1) market entry to the complementary market is not actually possible without access to this facility, and (2) providers on the complementary market cannot, using reasonable effort, duplicate the facility; substitutes do not exist either (see e.g. Areeda, Hoverkamp, 1988, 736.2).

The application of the essential facilities doctrine means that a traditional instrument of competition law can be used as a regulatory instrument. A facility is regarded as essential if it fulfils the criteria for classification as a monopolistic bottleneck facility. The concept of an essential facility therefore provides a tailor-made instrument for the localization and disciplining of remaining network-specific market power. The starting point for this disaggregated regulatory approach is to differentiate between those network areas in which functional (active and potential) competition is possible, and those network areas in which stable network-specific market power can be localized.

The disaggregated regulation approach involves applying the essential facilities doctrine not only on a case-to-case basis, but to a category of cases, namely to monopolistic bottleneck facilities. The non-discriminatory conditions of access to the essential facilities must be set out in more detail as part of the disaggregated regulatory approach. In doing so, the application of the essential facilities doctrine must be seen in a dynamic context. The aim must therefore also be to design the conditions of access so as not to hinder infrastructure competition, but instead create an incentive for research and development, innovations and investments at facility level. This is the only way to establish a balanced relationship between services and infrastructure competition.

[14] This means that access to ports, airports or railway networks can neither be refused, nor granted under conditions that penalize competitors, without factual justification.

4. Network-specific market power on the clearing and settlement markets?

The reference to network economics is chosen in order to elaborate the potential for competition on the post-trade markets. This primarily involves a normative analysis, based on network economics, with the aim of localizing network-specific stable market power and the ensuing regulatory problems.

For this purpose, the following section will look at various network sectors. In particular, it becomes evident that absolutely no telecommunications services (both basic and value-added services) have the characteristics of a monopolistic bottleneck and, as a result, any form of market power regulation is completely amiss. In order to present the relevance of this case for the post-trade markets, it also becomes apparent that clearing and settlement can be interpreted as a particular form of value-added telecommunications service. This is because these services are based on a suitable combination of data transfer and processing. This implies that the markets for clearing and settlement can, in principle, be classified as competitive. This insight is corroborated using SWIFT (Society for Worldwide Interbank Financial Telecommunications) as an example of potential service networks alternatives in the area of clearing and settlement.

4.1 Competitive subparts and monopolistic bottlenecks in various network sectors

The sizes of the various monopolistic bottleneck areas vary considerably from network sector to network sector. The network areas are to be examined on a disaggregated basis in order to establish in which areas the criteria for a monopolistic bottleneck are actually fulfilled. The aim is also to avoid the danger of falsely identifying monopolistic bottlenecks.

Network areas characterised by a combination of a natural monopoly and irreversible costs can be localised in different network sectors:[15] unlike airplanes,

[15] For detailed case studies see Knieps, Brunekreeft (eds.), 2003.

airport infrastructures involve irreversible costs. Investments in terminal buildings and runways, for example, cannot later be transferred elsewhere, as is possible with airplanes. Where carriers rely on a single airport in a particular region, the airport has the characteristics of a monopolistic bottleneck. Rail track infrastructure is a monopolistic bottleneck system (unlike the actual transportation service and train traffic control) because the rail track operator in a given geographic area has a natural monopoly and there are irreversible costs when rail tracks are built.

4.2 Competition on the markets for telecommunications services

Telecommunications services can be differentiated into various basic services, such as telephone calls, fax, data transfer services, and value-added services. These value-added services are created by combining basic services and the appropriate computer software, whereby the proportion of data transfer and data processing components can vary strongly depending on the type of value-added service. Examples of value-added services that consist mainly of pure data transfer are e-mail or electronic data exchange. Examples of value-added services that consist mainly of data processing are information services of all kinds, interbank clearing and broadband internet services.

The market for telecommunications services continues to be characterized often by economies of scale and scope. Nonetheless, competition is a key feature of these telecommunications services networks. Free market entry means that inefficient providers are replaced by more efficient ones. Even if the established company has a high market share, inefficient production or the provision of services that are not market-oriented would very quickly result in the company suffering considerable market share losses. This is because customers are not tied to any specific provider and can respond immediately to price decreases on the market. Regardless of whether or not basic or value-added services are involved, the criteria for a monopolistic bottleneck are not fulfilled. New market entrants in particular have the opportunity to position themselves against the established providers by means of technology and product differentiation. This means that

in the case of telecommunications services, active network competition is typically characterized by network heterogeneity.

The markets for services provided on the basis of telecommunications infrastructures are currently dominated by intense innovation competition. This means that traditional value-added services are being increasingly replaced by Internet services and Internet Service Providers. As a general rule, a distinction must be made between the required network resources (transmission networks, intelligent circuit switching facilities, routers, etc.) on the one hand, and the required PC networking software (multimedia platform, browser, etc.) on the other. The network resources required for long-distance telecommunications do not represent bottleneck facilities. The establishment and provision of PC networking software is not considered a monopolistic bottleneck either, which means that there is no ensuing need for regulation, because standardized interfaces provide all PC networking programs (multimedia platform, browsers, etc.) with non-discriminatory access to telecommunications infrastructures.

Unlike on the services markets, monopolistic bottlenecks cannot be ruled out at telecommunications infrastructure level at present. Sunk costs are only relevant in the area of cable-based telecommunications infrastructure. Since economies of scale are exhausted in long distance telecommunications networks, competition between active (and potential) firms will prevent the existence of market power. As a result, monopolistic bottlenecks are only relevant to the local loop. The increasing use of alternative network access technologies and the ensuing potential for competition are expected to lead to a successive phasing out of the bottleneck situation, even within local telecommunications infrastructure (e.g. Knieps, 1997, pp.331-333).

4.3 Network economic characteristics of clearing and settlement as value-added telecommunications services

The following section will illustrate that clearing and settlement has the same characteristics as value-added telecommunications services. Since telecommunications services, be it basic or value-added services, can not be classified as mo-

nopolistic bottlenecks, clearing and settlement, as a result, do not fulfil the characteristics of essential facilities and therefore should not be subjected to ex ante regulation. A market power situation, in the sense that clearing and settlement are infrastructures with the characteristics of essential facilities does not exist. Therefore there is no need or justification to regulate access to clearing and settlement facilities.

4.3.1 Various value-added telecommunications services in the clearing and settlement sector

Clearing and settlement services are a particular form of value-added telecommunications services, because they are based on suitable combinations of data transfer and processing. In principle, a distinction must be made between the paper side of the securities business, which involves transferring ownership of the securities, and the cash side of the securities business, which relates to the corresponding cash payment. In contrast to CCP, credit and liquidity risks do not occur. Nevertheless, operational risks within data transfer cannot be excluded.

Since both the securities traded and the required monetary amounts are not normally transferred physically, but rather by corresponding rebookings, telecommunications services are involved in both the cash transactions and the securities transactions. Depending on whether clearing and settlement is performed within one bank, between banks, transaction banks, national or international "custodian" banks or via specialized clearing houses, numerous different clearing and settlement services networks are employed.[16] These are often characterized by

[16] A large number of banks and financial institutions are actively involved in interbank trading (OTC). In Germany, one example of a transaction bank is dwpbank, the shareholders of which are DZ Bank Frankfurt, WGZ-Bank Düsseldorf, Westfälisch-Lippische Sparkassen- und Giroverband Münster and Rheinische Sparkassen- und Giroverband Düsseldorf. Examples of end custodians (CSDs) are: Clearstream Banking Frankfurt (Germany), Euroclear France (France), Österreichische Kontrollbank (Austria), etc. There are currently two International Central Securities Depositories (ICSDs) in Europe: Clearstream Banking in Luxembourg and Euroclear in Brussels. Both are active in the cross-border securities business. Global financial services providers also offer securities settlement services. These are classified as global custodians or sub-custodians depending on whether or not the markets served are cross-border markets or national markets.

the establishment and operation of various types of hardware (terminals), software and appropriately trained employees. Furthermore, given that clearing and settlement involves not only data transfer via telecommunications networks (leased lines, Internet, etc.) but also always involves data processing, the clearing and settlement process involves bundled network services and, as a result, value-added telecommunications services.

Various different communication methods are available for clearing and settlement, applying electronic data exchange using standardized data formats. Standardized data formats enable clients to feed order data automatically directly from their in-house system, dispensing with the need to capture data twice. The required clearing and settlement functions are executed by various different market participants. Developments in information technologies are making fundamental changes in the potential for shaping the securities trading value chain. One fundamental characteristic is an increasing standardization and automation of the various phases of securities settlement. A key example of this is the trend away from floor based trading towards partially or fully-automated trading platforms. As a result, there is a growing incentive to harmonize the trading level of the value chain as well as the clearing and settlement level of the value chain. The potential for the implementation of global straight through processing is already being discussed in the literature. (cf. e.g. Weitzel et al., 2003, p. 409).[17] Advances in information and communications technology are creating potential for the standardization and automation of clearing and settlement processes that cannot be regarded independently of the institutional/organizational securities settlement alternatives.

4.3.2 Potential service network alternatives using the SWIFT example

SWIFT (Society for Worldwide Interbank Financial Telecommunications) is an interesting example of a potential service network alternative for clearing and settlement. SWIFT was formed by banks as a joint venture in 1973 with the aim

[17] Straight trough processing is the end-to-end automation of the entire value-added process from the initiation of trading to settlement with no requirement for manual intervention.

of facilitating interbank trading. SWIFT then witnessed a period of rapid growth resulting from the network effects of a common communication standard and an ensuing reduction in transaction and control costs. It does not, however, fulfil the conditions of an essential facility in any way as a result. Instead, SWIFT is a typical example of a high-quality service network based on common communication standards and electronic data processing systems. Traditionally, SWIFT services have been limited to the data transfer required for the monetary side of the securities business. The banks involved are responsible for executing the orders themselves.

There are different ways of establishing innovative value-added data transfer and processing services. In particular, the market has openings for competing value-added services, which means that there is no long-term cost asymmetry between established SWIFT network providers and possible alternative value-added service providers. A high market share does not imply network-specific market power.[18] Additional competition potential also arises from the dynamic development of the SWIFT network based on the use of new communications protocols (IP protocol) and new communications software (XML).

Whereas in the past, SWIFT specialized in providing a secure communications standard for the electronic exchange of standardized SWIFT messages (SWIFT MT messages), it is developing towards becoming a system for the generation of SWIFT ML messages.[19] The objective is to achieve a greater degree of interoperability with other systems traditionally used for electronic data exchange for a diverse range of financial products between banks, brokers and other capital market participants, in particular FIX ML.[20] The aim is to achieve cooperation

[18] Rather, the "winner-takes-most market" principle applies due to the high fixed costs involved in software development, meaning that the active provider can only survive with a high market share. Nonetheless, competition exists due to the lack of long-term cost asymmetries; this is corroborated by innovation competition on the dynamic markets over the course of time (cf. Economides, 2001).

[19] The integration of heterogeneous systems can now be performed using XML, an interface language described as message-oriented middleware used to represent a central data model (cf. Weitzel et al., 2003, p. 412.

[20] The FIX ML protocol is the advanced XML version of the existing FIX protocol, developed in 1994, a medium for electronic data exchange for a range of financial products between banks, brokers and other capital market participants.

between, and integration of FIX ML and SWIFT ML in order to actively employ SWIFT in the post-trade phase, too.[21] The intention is therefore to use this cooperation to establish straight-through processing, i.e. end-to-end automation of the trading process. Given that SWIFT ML documents are ten times larger than the corresponding SWIFT MT messages, the use of XML-based systems at banks is still under development (cf. Weitzel et al., 2003). Due to the drastic decline in telecommunications transfer costs and the fact that the current SWIFT network uses the considerably more high-performance Internet protocol (IP) (compared with the traditional X 25 protocol), SWIFT ML is expected to offer competitive performance potential in the clearing and settlement market in the future.

As a consequence, network-specific market power in the clearing and settlement markets cannot be localized. Rather, these markets are competitive, due, among other things, to the speed of innovation of individual service providers such as SWIFT.

5. Technical regulatory functions on the post-trade markets

In addition to the problem of disciplining network-specific market power, there are also questions concerning technical regulation on post-trade markets. Although technical regulatory functions can also have implications for competition policy, they are fundamentally different from regulatory interventions to discipline network-specific market power. As a first step in the analysis of this subject area, the layering scheme of the network economy is introduced.

5.1 The layering scheme of the network economy

From a network economic point of view, it seems useful to differentiate between the various network layers in order to localize network-specific market power and to separate these from the preceding area of technical regulatory functions:

[21] Information on SWIFT can be found on the SWIFT homepage: http://www.swift.de

Layer 1: Network services (e.g. air traffic, telecommunications, gas and electricity transmission)

Layer 2: Infrastructure management (e.g. air traffic control, railway traffic control)

Layer 3: Network infrastructure (e.g. rail lines, airports, telecommunications networks and local phone networks)

Technical regulatory functions (e.g. postal code system, telephone number administration, land registry) precede the provision of network services and the construction of network infrastructures and can be relevant to each of layers 1 through 3. They are a precondition for the construction and operation of networks and must therefore be provided without discrimination. Technical regulatory functions should in no way be confused with monopolistic bottlenecks, as only the latter are characterized as natural monopolies with irreversible costs. Technical functions of coordination are of a different nature than problems arising from network-specific market power and should be dealt with separately.

5.2 General distinction of technical regulatory functions from layers 1 through 3

Technical regulatory functions can have relevance on the network layers 1 through 3. For instance, it is necessary that the vehicles used for the provision of transportation services (layer 1) meet technical safety standards and are periodically monitored for compliance with these standards. Providers of telecommunications services must be technically able to conduct billing, for which access to source numbers and the relevant participant data (name, address) are required. The compulsory access to this data, however, should not extend to the much broader demand that the established provider grant access to its invoicing and collection systems for competitors. These constitute neither technical regulatory functions nor an essential facility. There are numerous sectors of the economy in which only minimal revenue is garnered from each customer in mass business and solutions are devised to contend with the problem of billing. For example, a

cooperation between several telecommunications providers for the purpose of setting up a joint clearing centre for invoicing and collection would be conceivable.

The technical regulatory functions preceding the provision of network services (layer 1) can be distinguished from services on layer 1 in that they are always concerned with problems of coordination for an entire market rather than with the problems of a single provider. Technical regulatory functions are not concerned with the logistical problems of a single provider or a fraction of providers, but with the coordination of all services offered within the entire relevant market. In this sense, code sharing, interlining and joint frequent flier programs in the air traffic sector do not constitute technical regulatory functions.

Infrastructure management (layer 2) also requires as precondition a technical regulatory function. The definite geographical delineation of areas of responsibility for rail and air traffic control, as well as the assignment of competence to the control agency for a specified period is a technical regulatory function. The actual implementation of these functions as part of infrastructure management, on the other hand, is relegated to layer 2 and can be periodically reassigned.

Furthermore, some technical regulatory functions are complementary to layer 3. For instance, the building of network infrastructures, e.g. runways, rail lines or freeways requires planning procedures. The construction of mobile communications networks requires the assignment of the necessary frequencies.

5.3 Disaggregated analysis of the notary function

The requirement to register securities held under collective safe custody at a Wertpapiersammelbank is a specific characteristic of the German system, based on the statutory regulations of the German Safe Custody Act. At the time when the legislation was endorsed, lawmakers assumed that collective safe custody would be the exception among the various types of custody arrangements (e.g. individual jacket custody). But in practice, the development of securities trading

has seen collective safe custody become the rule. Absent the statutory provisions set forth in section 1 sub-section 3 and section 5 sub-section 1 of the Safe Custody Act, there would be no Wertpapiersammelbank in Germany. Nonetheless, collective safe custody matches the real demands of a high quality securities business. For instance, the Wertpapiersammelbank as an institution is equivalent to the end custodian in an international context. This could be, e.g. a CSD, but could also be a Common or Specialized depository. In the area of Eurobonds, for example, the end custodian functions are performed by specialized banks called Common Depositories, which ensure access to International Central Securities Depositories (ICSDs).

Precondition for competition on the markets for clearing and settlement is non-discriminatory access to the complementary technical regulatory function – the notary function.

5.3.1 Authenticity

One technical regulatory function of the notary function performed by the end custodian is the documentation of the authenticity of individual securities (certificates) and total holdings. The authenticity function involves the documentation of total holdings and the changes resulting from capital increases or redemptions. The authenticity function is subject to increasing rationalization, in which the transition from individual certificates to global certificates is particularly noteworthy. Experience from several countries shows that a complete cessation of the use of certificates and a transition to dematerialized securities is possible. In Italy and France, for example, dematerialization is common. An example for Germany is the public register for German Government Bonds (Register für Bundesschulden bei der Bundeswertpapierverwaltung).

5.3.2 Registry

An end custodian must document (register) the current account balance of its institutional securities depositors in relation to the issuer. In Germany, for example, the custodian banks as depositors with an end custodian must be finan-

cial institutions subject to the statutory custody requirements. Therefore, an end custodian is in a position to compile the registry statement upon which all of the securities under custody on the accounts of its institutional securities depositors are apparent at any given point in time (record date registry). This allows up-to-date determination and exercise of property rights by the custodian bank and the periodic distribution and forwarding of securities income to beneficial owners. At its core, the registry function seems to be separable from the authenticity function.

There are several possible ways to organize the distribution of securities income. For example, the issuer can engage an agent bank to execute the distributions based on the record date registry. Distributions via custodian banks would, however, also be feasible; or at any rate, distributions need not necessarily be performed by the custody service of an end custodian, but could be executed directly, based on the account data provided by the end custodian.

5.3.3 Links between competing end custodians

At present, links already exist between individual end custodians in the various countries. These links, however, are characteristically complementary when it comes to the settlement of cross-border securities transactions. Still, the question of potential for competition between end custodians of securities held under collective safe custody must be kept separate from this fact.

If more than one end custodian is involved, access to the accounts of custodian banks i.e. corrections is only possible if the necessary links between the end custodians are in place. It is not sufficient that custodian banks holding accounts with several end custodians confirm their own bilateral transactions. There is no need for the registry function to be exclusively assigned to a single end custodian. In Germany, this is taken into account in the Safe Custody Act, which permits several end custodians. The registry function, in addition to the authenticity function (certification of the assets under custody), also requires links between competing end custodians in order for the alignment of accounts to be possible in cases which involve more than one end custodian. These technical

regulatory functions – summarized by the notary function - apply to all securities under collective safe custody.

6. Conclusions

The analysis of this paper has shown that clearing and settlement have the characteristics of value-added services in the area of telecommunications, and are consequently assignable to network layer 1. Thus, clearing and settlement do not represent monopolistic bottlenecks in need of regulation. The core argument is that although bundling advantages can occur in the provision of clearing and settlement services, the building of networks to provide such value-added services in the area of telecommunications is not characterized by long-term cost-asymmetry based on irreversible costs.

Clearing and settlement markets are characterized by active and potential competition. The potential for competition in the provision of clearing and settlement services cannot be evaluated sufficiently using purely static estimates concerning the efficiency with which bundling advantages are exploited. The diversity of different competing clearing and settlement service providers with a variety of products also plays an important role. Sector-specific market power regulation of clearing and settlement is not justified.

Furthermore, it can be asserted that the authenticity and registry functions do not represent a monopolistic bottleneck. In particular, the provision of these services does not require irreversible costs. Moreover, the idea of competing end custodians is entirely viable. The notary function for securities held in collective safe custody should rather be viewed as a technical regulatory function, similar to the access provided by the postal code system and address changes in the postal sector or the access to participant data in telecommunications. Non-discriminatory access to the technical regulatory functions should be obligatory. It appears to be necessary that the needs of all active and potential providers of clearing and settlement services are equally taken into account in order to guarantee non-discriminatory access to the notary function.

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