

Telecommunications liberalisation in Sweden: Is “intermediate” regulation viable?

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Summary

■ It is an open issue whether the EC’s new legal framework for electronic communications is a framework for a gradual deregulation of telecommunications or whether, on the contrary, the “intermediate” regulatory regimes of the transition from monopoly to competition will be replaced by more forceful and encompassing regulatory intervention. This paper discusses these issues in the Swedish context. Sweden has been at the forefront of telecommunications liberalisation in Europe, but is now making an example of re-regulation. Mobile telephony markets have come under a regulatory regime that is stricter than the one that was designed at the time of liberalisation, including rate-of-return regulation of interconnection charges; unbundling requirements; and “everything-now” universal service obligations. It is not clear that the new legal framework will reverse this development. The paper recommends a focus in the coming implementation process on the regulation of essential facility bottlenecks and, in markets with network competition, on measures to avoid consumer lock-in.■

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The process of promoting competition in network industries such as telecommunications, rail transport and electricity generation is often called deregulation, although it can require more regulation than a public monopoly. Several commentators, eg. Bergman et al. (1998), perceive the liberalisation of such industries as an evolution of market structure from a Phase 1 of monopoly over a Phase 2 with a mix of monopoly and competition to a “mature” Phase 3 with extensive competition. These authors recommend a “hump-shaped” development of regulatory control, as they expect the greatest challenges to occur in Phase 2, while in Phase 3, market competition can be relied on to provide most incentives needed to obtain desirable outcomes.

The global liberalisation process in telecommunication over the past years has indeed enhanced regulatory activities in many countries, often including the institution of new legislation and regulatory agencies. A notable exception, though, is New Zealand, which abolished the regulatory authority and leapfrogged into the legal framework envisioned by the above authors for Phase 3, i.e. based mainly on the regular competition legislation (see eg. Laffont and Tirole, 2000, pp. 33-34).

In the European Union, where member states have hitherto been given some discretion over the implementation of the liberalisation process for telecommunications, several countries initially developed practices intended to restrain the increase of regulatory intensity during Phase 2, without going to the New Zealand extreme. As the markets now head towards Phase 3, a new common European regulatory framework for electronic communications networks and services is put in place (European Commission, 2000; SOU, 2002). The new le-

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gal framework, in force from April 24, 2002, prescribes recurrent market analyses to evaluate whether the regulatory grip can be loosened. It is an open issue, however, whether this is enough to secure a gradual deregulation or, on the contrary, “intermediate” regulatory regimes are now being replaced by a more forceful and encompassing regulatory intervention.

In the 1980s, the liberalisation of the telecommunication markets took off in the United States, the United Kingdom, and New Zealand as part of Reaganomics and Thatcherist policies, but also in the Scandinavian countries, for less transparent reasons. The telecommunications market in Sweden was gradually deregulated during the 1980s and formally liberalised in 1993. This was three years ahead of the United States (the 1996 Telecom Act) and five years before the introduction of the European common policy for open and competitive telecommunications markets in January 1998. Norway and Denmark followed close to Sweden. Finland has had one operator for long-distance and international calls and several local-call operators since the end of the 19th century.

Being an early starter¹, the Swedish government had to develop a new regulatory framework on its own.² A platform for the legislative work was, however, established by the Open Network Provision Framework Directive, accepted by the Council of the European Community on June 28, 1990, and a lot could be learned from the UK experiences. The parastatal³ telecom operator Televerket, to become the company Telia AB in 1993, had an overwhelmingly dominant market position in 1991, with market shares for domestic national calls, international calls, and mobile communications at 100, 96,

¹ This refers to the introduction of a completely liberalised market which was ahead of the schedule made up by the European Commission. During the 1980’s, countries like UK and the US took more decisive actions towards liberalisation than Sweden. Also, privatisation of the national telecom operator was slow in Sweden.

² Sweden has, in some respects, always had a more liberal legislation for telecommunications than most other European countries. Televerket was born into a free market, there was never any link to the postal service and the separation from the government budget has been clear cut (Thorngren, 1990). Televerket was never converted to a statutory network monopoly, so there was no need for a formal decision on the opening of the network.

³ Since 1636, when the operation of the postal services started, the administration of the national public services in Sweden has been organised in state-owned public enterprises (“affärsverk”).

and 90 per cent, respectively.⁴ In the choice between classical “heavy-handed” regulation to prevent the abuse of this incumbent’s market power, or a laissez-faire inclined reliance on the existing competition legislation, as in New Zealand, the Swedish government chose an intermediate approach. The government refrained from any structural separation; introduced a mild and temporary price-cap; a (very) light-handed regulation of interconnection; and allowed the granting of obligation-free licenses to other telecom operators.

Later, and partly in response to the emergence of a common European regulatory framework, regulatory intensity has successively been raised, and more elements of “classical” regulation have been introduced. Also, the realm of regulation has been widened to include markets that have emerged after the liberalisation, such as mobile communications. This paper describes and discusses central components of the Phase 2 “intermediate” regulatory approach and the present trend into what is characterised as Phase 3 “regulated competition”. It is concluded that this trend can continue in the coming years, also within the new legal framework. However, it is not clear that such a route choice would promote consumer welfare better than more “hands-off” alternatives.

1. Liberalisation forces in Sweden

The liberalisation process started in 1980 by a parliamentary decision to open the market for terminals attached to the public network. In 1981, a private operator started building its own nationwide cellular network in competition with the NMT system run by Televerket. The decisive step of liberalisation, however, was the launch of the Telecommunications Act, effective from July 1, 1993. This was done by a non-socialist government, but the reform had been prepared earlier under Social Democratic rule (Karlsson, 1998). The alertness in this matter was not just due to political clarity of vision but had more pro-

⁴ Telephony developed in Sweden in the late 1870s in competition between two private networks, one using equipment from the Bell Company and the other from the Swedish company LM Ericsson. The private initiatives, however, were obstructed by the national Telegraph Administration in the 1880s. In the 1890s, the Telegraph Administration changed strategies and started to acquire the private networks. Since 1918, all telephony has been in public hands. Because of this history, however, Televerket was never granted a formal monopoly to telephony, just the sole right to connect equipment to the public network.

found reasons. The most important reason was, paradoxically, the efficiency of the national operator.

By all international comparisons, Televerket was an efficient operator at the technological frontiers of the industry. In the early 1990s, Sweden (and the rest of Scandinavia) offered residential and business customers usage charges more than 50 per cent below the charges in continental European countries, in spite of a low population density. Market penetration was remarkably high. For example, in fixed-line telephony, Sweden had 0.63 main lines per capita in 1985, while the highest penetration in non-Scandinavian European countries, such as France and Germany, just reached 0.42. In wireless communications, the penetration in Sweden in 1990 exceeded France and Germany, not only per capita but also in absolute numbers. Therefore, at the time when a world-wide, or at least Pan-European, tide of liberalisation of telecom markets could be sighted, signalled by the 1987 Green Paper of the European Commission and the AT&T divestiture in the United States, the management of Televerket was quite confident in its ability to defend its market positions, if just given a free hand. Whatever could be lost on the domestic markets, the management expected, would be compensated by expansion abroad (Carleheden, 1999, Ch. 6).

In 1989, Televerket created its subsidiary Swedish Telecom International to "compete on the international markets for the profitable large customers". In 1991, Unisource was established, a joint venture with first the national telecom operator in the Netherlands and later on the Swiss and Spanish counterparts (Carleheden, 1999, Ch. 6).⁵ To be able to follow this strategy, which required "an own identity to be attractive as an internationally active company and a potential partner in strategic collaboration", Telia asked the government to be constituted as a limited liability company in 1990. Also, Telia wanted the government to analyse "in a constructive manner" the reasons for selling some of the shares in order to introduce Televerket on the

⁵ The process of market orientation was set on foot by an internal strategy report in 1977 by Bertil Sunesson and Bertil Thorngren that recommended profound measures to improve Televerket's ability to operate in a competitive environment. The newly appointed Director General of Televerket Tony Hagström immediately began to pursue such a strategy. In the following years, Televerket invested in 40-50 subsidiaries, sub-subsidiaries and partly owned associate companies to sell hardware and software on the global market. These operations contributed to 30 per cent of Televerket's total revenue in 1992 (Karlsson, 1998).

stock exchange. This was the initiative that triggered the complete liberalisation in 1993 when the new company Telia AB was formed and a new Telecommunications Act was launched (Carleheden, 1999; Karlsson, 1998). The high self-esteem of the operator thus paved the way for a swift reform, influenced by the management’s strategic decision to perceive liberalisation as inevitable, seeking control of the process rather than trying to obstruct it.

It seems that Televerket also managed to set a footprint on the content and timing of the reform. The parastatal had every possibility to do that, as its role extended beyond being the national operator; until 1992 it was also the national regulation authority. Inter alia, it was commissioned the task of regularly reviewing the telecommunications policy and suggesting its future direction. In retrospect, the liberalisation process during the 1980s was adapted to the parastatal’s strategic needs. For instance, Televerket’s privilege to supply company switches was not abolished until 1989. The delay of liberalisation for this product protected the parastatal’s position at the high end of the market, during the vulnerable phase of a technological jump from electromechanical to digital switches (Carleheden, 1999, Ch. 6).

The design of an “intermediate” regulatory system for the completely liberalised market from 1993 should presumably be seen in this light. While national telcos in other countries strongly resisted reform, the Swedish operator took a fairly progressive stand supporting the change, at least in parts.⁶ Therefore, legislators and political decision-makers had some grounds for expecting the liberalisation process to be smooth. A route was taken for the reform that was intended to minimise red tape to a greater extent than in the US and

⁶ For instance, in a speech in September 1987, the Director General of Televerket explicitly stated that the parastatal did not want to have a regulated network monopoly and that the liberalisation process should be completed. (Karlsson, 1998, p. 268). In April 1991, Televerket pointed out that it was prepared to introduce the recommendations from the European Community for open network provision before they were implemented elsewhere in Europe (Karlsson, 1998, p. 294). When the new national legal framework for telecommunications was prepared, Televerket in October 1991 argued for the introduction of rules for reciprocity in the Swedish legislation that would prevent foreign operators from establishing themselves in the Swedish market if Televerket was refused access to their home markets. According to Televerket, such rules would promote a more rapid liberalisation in other countries (Karlsson, 1998, p. 296). This suggestion won support by the Social Democratic Party, but not by the non-socialist government that finally presented the legal bill to the Parliament.

UK. Reflecting the double-purpose agenda of both promoting market competition in the interest of consumers and providing support for Televerket’s growth strategies, the Swedish government also avoided imposing any restraint on the ability of the incumbent operator, still kept in state ownership, to develop its competitiveness in domestic and foreign markets.

2. The Swedish “intermediate” Phase 2 regulation

Since July 1, 1973, there are no explicit legal barriers for protecting the incumbent from entry in the telecommunications markets in Sweden. A number of remaining barriers of a more indirect form were lifted in the subsequent years, in particular on September 11, 1999, when customers could pre-select an operator and therefore did not have to dial an extra code for each call. The Telecommunications Act was revised in 1997, mainly to accommodate the Commission’s Interconnection Directive 97/33/EC.

In this second phase of a liberalisation process, the main regulatory task is to contain the former monopoly. Competition is gradually introduced, so that monopoly power remains in some markets and the former monopoly can act so as to deter market entry. In telecommunications, the emphasis during this second phase is on the existing network and in particular on the local access part of the network, i.e., the “last mile” of closed-loop circuit copper network, the so-called local loop. This is the part of the network that could be regarded an “essential facility” bottleneck to the whole industry, i.e., it could not, for economic reasons, be duplicated by other firms (Knieps, 2001). The local loop monopoly raises three significant regulatory issues: (i) The danger of abuse of monopoly power in the determination of retail (consumer) prices, in particular fixed access charges and usage charges for local and regional calls; (ii) the terms of interconnection between networks, in particular for calls originating and/or terminating in the incumbents’ local access network; and (iii) universal service obligations (see below).

The regulatory framework that was introduced in 1993 tried to meet these demands with a low level of regulatory effort. The minimalistic character of the regulatory framework in Sweden during the first years stands out in a comparison to the UK which, at that time, provided the only European model for a reform of the kind. Below, we briefly compare the regulatory reforms in these two countries with

respect to structural changes and ownership; rules for the provision of licenses; universal service obligation; price-caps; and interconnection terms.

2.1. Structural changes and ownership

While the British telecommunications policy during the 1980s did not employ the American approach to preventing monopoly abuse, it still contained several measures of this type. The national operator, British Telecom (BT), was privatised. BT was required to provide separate accounting and reporting systems for its network and apparatus supply business, and was prohibited to unfairly favour its own business to the detriment of its competitors. To foster facility-based competition from other firms, restrictions were imposed on BT's operations in the cable-TV market and, later on, broadband networks.

The Swedish reform did not include any structural measures of this type at all. Several operations of the parastatal that already met market competition, such as cellular telephony and cable TV, were not technically integrated with the copper pair wire network, but no horizontal split was made as Telia AB was formed. Telia was, and is, the largest provider of both cable TV and mobile telecommunication.⁷ Nor was the network, or at least the local loop, vertically separated. In fact, not even accounting separation was initially required. This stands in contrast to the reforms that were pursued at the same time in other infrastructure network industries, in particular electricity and railways, which both vertically separated the “natural monopoly” part of the industry from the downstream services for which competition could be more readily introduced. The liberal and conservative parties, as well as the first private competitor, Tele2, moved for a vertical separation of the “public network” in 1991 before Televerket was transformed into a limited liability company, but met strong resistance from Televerket. The parastatal was successful, despite the fact that the non-socialist parties were in power when the reform was passed in the Parliament (Karlsson, 1998, Ch. 5). A second opportunity for dividing the company came up when it was to be brought into the stock market, but a series of reports to the government during 1996 with that message did not have any result (Bergendahl-Gerholm and Hultkrantz, 1996; The Swedish Competition Authority, 1996).

⁷ As a condition imposed by the competition authority for the merger with Sonera, Telia is required to sell its cable-TV operations in 2003.

Full state ownership remained until 2000, when the state sold 30 per cent of its shares to private investors. The government therefore remained in the dual role of being both the (majority) owner of the incumbent and responsible for the regulatory system and regulatory actions that have a substantial influence on the value of the company.

2.2. Licenses

The 1984, UK legislation was based on licenses (Vickers and Yarrow, 1991, Ch. 8; Newbery, 2001, pp. 55-57), with elaborate provisions as a prerequisite for having the right to operate “public telecommunications systems”. Until 1991, only two companies were granted licenses, thereby providing a temporary protection for the first competitor to the former monopoly (and to the incumbent itself). In contrast, the Swedish legislation opened the markets as much as possible for new entrants. Except for operators in need of radio spectrum allotment, licenses were seen as a mere formality and were required only for operators with a significant market share on the markets for voice telephony. This was later amended by a notification procedure for entrants, as it was found that many firms considering entering the Swedish market asked for a formal approval (RRV, 1995).

2.3. Universal service obligations

Telecommunication services have some public good and social (fairness and equity) features such as the provision of services in sparsely populated regions and to low-income consumers (Crandall and Waverman, 2000). During the monopoly era, such universal service was funded through cross-subsidisation, but free market entry would limit the scope for that. Both in the UK and Sweden, the issue of the future funding and provision of universal service was initially treated in a light-handed manner. Investigations by a consultancy firm (in fact the same firm in both countries) together with the respective incumbent indicated that the cost of universal service for telephony services was low, so the chosen policy was to wait and see if any intervention in the market were needed.

2.4. Price cap

During the early stage of liberalisation, competition emerges in some market segments, while the incumbent keeps a monopoly, or at least a dominant position, in other parts of the market. The price develop-

ment on the latter parts of the market may therefore be an important regulatory concern during this stage of liberalisation.

The British policy towards retail price regulation brought a significant regulatory innovation in the form of price cap regulation, i.e., the so-called RPI-X price scheme (Vickers and Yarrow, 1991; Vogelsang, 2002). The price cap sets a ceiling on the prices charged in monopoly markets, or in markets where competition is ineffective. It constrains the weighted average of price increases for a basket of regulated services to the rate of inflation, RPI, less the projected productivity growth, “X”. The “X” term can be used to redistribute rents to consumers. A price cap can have several desirable properties: The regulated firm is given freedom to adjust the relative prices of its services. If the weights are equal to the future realised quantities, then profit maximisation by the regulated firm will result in Ramsey price structure (Laffont and Tirole, 2000). Also, a price cap provides cost-reducing incentives in the periods between the reviews of the “X”-term.

The first price cap was introduced in 1984 as a condition in the licence granted to BT. “X” was set to 3 per cent in the first five-year period and later raised to 4.5. Similar price caps were subsequently adopted for telecommunication services in most European countries⁸; in Britain it is also used for airport services, gas transportation and electricity transmission.

As part of an agreement between the Ministry of Communications and Televerket a short time before the launch of the regulatory reform, an RPI-X cap was also imposed in Sweden in 1993. The cap was, however, of a temporary nature merely introduced as a safeguard against strong price movements that could jeopardize the political support during the first vulnerable years of the regulatory reform. It was not based on a legal requirement and limited to a duration of just three years (1993-1996). It restricted retail price increases on a basket of fixed-line telephone services to households and company direct lines. The “X” part of the formula was set to 1 per cent, which reflected the purpose of a short-term price freeze, not the expected future productivity growth. The basket of services in the price cap mixed services provided with and without competition. After a short prolongation, the price cap for usage charges was abolished in July

⁸ In 1999, all EU countries except Luxemburg did regulate retail prices for telecommunication services. 10 countries used price caps (ODTR, 1999).

1997. A “minimal” cap, or, in fact, a price freeze, for rental and installation charges remained until the end of 2000.⁹

2.5. Interconnection terms

Many regulatory problems that arise in Phase 2 relate to interconnection. New firms have to connect to the existing networks. The vertically integrated incumbent can therefore manipulate the terms for interconnection in various ways, so as to deter entry and/or mitigate competition from other operators.

In the UK, the incumbent’s licence conditions required BT to enter a connection agreement with any operator. If the parties themselves failed to agree on the terms and conditions within a reasonable period of time, the regulator was given the power to determine them. This “light-handed” approach to the regulation of interconnection terms was later adopted by many countries (for a formal analysis of bargaining trade-offs under such a regulation, see King and Maddock, 1999).

In Sweden, before the Telecommunications Act in 1993, the parastatal was commissioned by the government to set interconnection terms on its own. From 1993, Telia was obliged to start negotiations with any firm that wanted to interconnect. As in Britain, the regulator would mediate in case of disagreement, but the Swedish regulator could not decide on the terms. Hence, this was rather an “ultra-light” than a “light-handed” approach.

3. Evolution of competition, 1993-2000

Since 1993, the legislation and the agenda of the regulatory agency have been amended several times. The legislation has been adapted to the emergence of a common European regulatory framework for the industry. One milestone in this development was the Interconnection Directive of June 30, 1997, that laid the basis for the full liberalisation in most member states from the beginning of 1998; another was the legislative package for a new regulatory framework for all electronic communications services put forward by the Commission in July 12, 2000. This framework will be integrated in the member states’ legislations before the end of July, 2003.

⁹ SFS (1997), PTS (2000a).

A shift in the regulatory focus has also been called for by the remarkable market developments. The “POTS” (plain old telephony services) that were the core service provided by the industry when the reform was made have now been surpassed by mobile telephony and the Internet. Household market penetration of mobile telephony and Internet services scored world top rates at 75 per cent and 56 per cent, respectively,¹⁰ in the middle of 2001. These two services together contributed to more than 50 per cent of the industry’s revenues (and close to two thirds if calls from the fixed-access network to mobiles are included), see Table 1. Both markets have evolved mainly after the reform. They are Phase 3 markets with facility-based competition. Three country-wide network operators and some firms without their own networks provide GSM mobile telephony services. There are around 120 Internet service providers and a number of these offer broadband access with different technologies¹¹ to companies and households. In just a few years, the emphasis of the industry has shifted towards services that have no history of monopoly. As shown in Table 2, the current market concentration, here measured by Herfindahl’s index (i.e., the sum of the squared market shares), is pretty low in the markets for mobile telephony and fixed-line broadband access.

If the main objective of telecom liberalisation in Sweden was to promote competition for “POTS”, the outcome of the reform has been far from revolutionary as yet. As shown in Table 1, the market for fixed-line access is still a monopoly and Telia has been able to keep three fourths of the usage charges in this market. In fact, not much happened until September 11, 1999 when pre-selection was introduced for national and international calls. From February 2, 2002, this option was extended to local calls.

¹⁰ PTS (2001). These rates are defined as the number of subscriptions divided by the whole population (mobile telephony) and the number of households (Internet), respectively. Both numbers exaggerate the real penetration because one individual can have several subscriptions. PTS estimates that these rates, if corrected for this, would be close to 65 per cent (mobile) and 50 per cent (Internet), respectively.

¹¹ The three major technologies (ADSL, Cable-TV, and LAN) currently have equal shares in the household market (Stelacon, 2002). However, ADSL grows most quickly.

Table 1. Telia’s market shares 1991, 1996 and 2000, and total market size 2000

	Market share, (%) 1991	1996	2000	Market size GSEK 2000
Fixed line, subscription	100	96	96	10.8
Fixed line usage thereof	98	92	76	14.7
- to Internet				(~5.0)
- to mobile				(5.2)
Mobile, NMT + GSM	96	71	52	14.4
Internet service provision	--	42 ^a	31 ^a	3.4 ^b

Notes: ^a Proportion of ISP subscribers. ^b Not including interconnection charges or within-company payments.

Sources: Own calculations based on Ministry of Communications (1992) and PTS (2001).

Table 2. Market concentration in the year 2000 (2002) measured by Herfindahl’s index

	Herfindahl
Fixed line, subscription	0.92
Fixed line, usage	0.59
Mobile	0.40
Broadband access (2002)	0.23

Sources: Own calculations based on PTS (2000c) and Stelacon (2002).

Another reason for the slow progress of competition may have been the “ultra-light” regulation of interconnection in the first years. In fact, the regulation authority’s lack of regulatory powers turned out very much as in New Zealand, i.e., in lengthy court processes. Televerket/Telia’s first line of defence was to provide interconnection to new entrants (Tele2 and others) at a high level in the network hierarchy, “as if Tele2 were a second Norway” (RRV, 1995), and therefore charged interconnection as if the whole network was used, even if the actual physical connection was, or could be, made at a local station. From 1995, Telia demanded an interconnection fee for a so-called double segment (origination and termination of a call in Telia’s access network) at SEK 0.70 per minute, while the consumers’ retail price for a regional call during office hours was just SEK 0.48 per minute (for national calls, consumers were charged SEK 0.80, from

December this year 0.64 SEK/minute). Telia thus squeezed the margins so as to make competition for domestic calls impossible.¹²

The interconnection dispute could not be solved in negotiations mediated by the regulation authority Post- och Telestyrelsen, PTS. Therefore, the competition authority, Konkurrensverket, KKV, intervened, referring to the essential facility doctrine in the competition legislation. Telia soon made another price change; KKV intervened once again, and was overruled by a district court. At the end of 1995, Tele2 seemed to have exhausted the legal means to get access to the local loop at terms that made it possible to start competition for domestic fixed-line telephony.

Telia’s ability to deter entrance was also encouraged by the design of the price cap. It supported an aggressive pricing policy by Telia on competitive segments such as long- distance and international calls, as it gave room under the cap for price increases on segments that were still monopolised, in particular rental charges and local calls (Bergendahl-Gerholm and Hultkrantz, 1996; PTS, 2000a).

However, market forces finally solved the interconnection dispute. Tele2 realised that if interconnection charges exceed the marginal cost, it would be a better business to sell interconnection services to Telia than to buy.¹³ One way of changing the direction of trade was to target its marketing to customers with a “non-isotropic” call pattern, i.e. with more incoming than outgoing calls (Isakson, 2000; Laffont and Tirole, 2000, section 5.5.4). A golden opportunity came when the market for household access to the Internet opened. Tele2 initiated a massive marketing campaign to get subscribers to their own Internet access service. This strategy eventually became so successful that Tele2 got an interconnection fee surplus against Telia in 1996. This forced Telia back to the negotiation table. After seven months of negotiations and mediation, Telia finally reached an agreement with Tele2 and a second entrant, Telenordia, in May 1997 (Isakson, 2000).

The “ultra-light” regulation of interconnection was abolished in 1999. Since then, operators are required to have separate accounting for interconnection traffic, to make interconnections charges public,

¹² However, this begs the question whether retail prices were too low, given the increase in rate-of-return requirements that may have resulted from corporatisation.

¹³ The interconnection agreement between the firms included a rule of reciprocity, implying equal charges for interconnection in both directions. This rule had been established by Telia and was not required by the legislation.

and the regulation authority was given the right to decide on inter-connection terms.

4. Re-regulation: The case of mobile communications

Around 1999, the “intermediate” regulatory approach was abandoned. The regulatory intensity increased substantially, not just for “POTS” (i.e., new rules for interconnection and pre-selection) as described above. The change in policy was most pronounced in relation to mobile telephony, i.e. in a Phase 3 market.¹⁴

This new policy was outlined in a joint report at the end of the year by PTS and the national competition and consumer agencies (PTS, 1999). The report claimed that the competition for mobile telephony in Sweden “does not perform well”, a remarkable assessment given the rapid development of the Swedish GSM market. However, the report pointed at the oligopolistic market structure (three operators) and the fact that prices had not changed in several years. Also, a comparison made of prices for mobile telephony indicated that prices in Sweden were higher than in the other in the Nordic countries. That comparison, however, did not take into account the variety of price menus and the subsidies to handsets offered by the Swedish operators.¹⁵

A series of regulatory efforts were initiated. To reduce consumer lock-in, operators were prevented from offering price menus, in which “unused” calls can be saved for a later period, and a number portability reform was prepared (enacted in September 2001). Both these reforms aim at reducing consumer switching-cost, and can therefore be expected to intensify price competition (see below). Some other regulatory interventions pursued in the mobile communications market, however, are more dubious in a welfare policy perspective. Three examples will be given.

¹⁴ Another market with intense facility-based competition is the market for broadband access. However, because of the success of the ADSL-technique, the control of the local loop still gives the incumbent some advantage (PTS, 2002b). Telia has been accused by other operators of exercising a retail margin squeeze, a claim that is currently (January 2003) under investigation by the competition authority.

¹⁵ Later comparisons taking such factors into account found the cost of mobile telephony services to residential users in Sweden to be lower than in 13 other European countries. Only in Denmark and France, were operators offering cheaper services. (Hultkrantz et al. 1999; PriceWaterhouseCoopers, 1999, 2000).

A first case concerns the regulation of interconnection charges. The 1997 European Interconnection Directive allows for special treatment of operators with a “significant market power” (SMP) which, as a rule of thumb, are firms with a market share exceeding 25 per cent. In 1998, the Swedish regulation authority notified Telia to the European Commission as an SMP operator for the interconnection to mobile networks, thereby extending the implementation of the directive to the market for mobile telephony. In February 21, 2002, also the two other mobile network operators, i.e. Tele2 and Vodaphone, were given SMP status. The market shares of these operators were 18.6 and 13.4 per cent, respectively (PTS, 2002a), but PTS argued that they have a significant market position anyway. Hence, the SMP interconnection rules now apply to all network operators in the GSM market, i.e., a Phase 3 market that has developed fully under liberalised market conditions.

For SMP operators, interconnection charges must be “cost oriented”. As currently applied by PTS, “cost-orientation” stands for a conventional rate-of-return regulation based on historical fully distributed costs. Hence, changes are determined after a long cumbersome process¹⁶, do not encourage cost minimization (except for during the regulatory lag) and create an inefficient price structure¹⁷ (Lafont and Tirole, 2000). As interconnection charges play an important role in the mobile communication markets (40 per cent of the turnover at the retail level), the market has turned into a state of “regulated competition”.

Furthermore, PTS made a decision on August 8, 2000, in a ruling in a dispute between Telia and Tele2 on interconnection charges for calls originating in another network but transmitted between these two operators’ networks. PTS observed that, at that time, Tele2 (before it was given SMP-status) had the right to charge a “market price” for termination, and decided that for this reason, it was allowed

¹⁶ For example, on May 31, 2000 PTS determined a new fee for interconnection to Telia’s mobile network based on Telia’s account for 1998. Telia appealed to the county court (*Länsrätten*), which ruled in favour of PTS. However, a new appeal to a higher court (*Kammarrätten*) was more successful. On March 4, 2002, it decided to resubmit the case to PTS for re-examination.

¹⁷ So-called Cost Volume Elasticity (CVE) correction has not been allowed by PTS. CVE correction is used in Britain to enhance competition in the market for final services by giving the provider of an interconnection the benefit of the economies of scale arising from a larger traffic volume than the one that could be achieved if all operators had equal market shares (Hultkrantz, 2002a,b).

to charge more than a “cost-oriented” price, however, not more than 10 per cent above such a price (PTS, 2000b) In point of fact, a complete regulation of prices may not be so far away.

A second example of dubious market intervention is an amendment (§ 23a) to the Swedish Telecommunications Act (May 1, 2000), requiring the unbundling of mobile network capacity “on market terms”. This is a parallel to the local loop unbundling obligation. From December 31, 2000, a European regulation enforces unbundled access to copper local loops of operators with significant market power.¹⁸ This is motivated by the “essential facility” doctrine. The Commission states that “the local access network remains one of the least competitive segments of the liberalised telecommunications market. New entrants do not have widespread alternative network infrastructures and are unable with traditional technologies to match the economies of scale and scope of operators notified as having significant market power in the fixed networks (“notified operators”). This results from the fact that operators rolled out their old copper local access networks over significant periods of time protected by exclusive rights and were able to fund its investment costs through monopoly rents.” (European Commission, 2000.)

The Swedish legislation, however, enforces a similar obligation to mobile networks, which are not monopoly bottlenecks, and are constructed, funded, and operated (mostly) in the private sector of the economy. The amendment was proposed by PTS in 1999. The legislator, though, limited the obligation to periods with excess capacity in the network, i.e. during off-peak hours. Another amendment requires operators to let other operators use their networks (at all hours) for national roaming. Roaming allows subscribers to a network to use another network when the “home” network is not available.

A third example of re-regulation is the universal service policy for new networks, such as broadband access and UMTS. While the Swedish government had previously joined the European Commission in defining universal service as “affordable voice telephony service”, it took the offensive in 2000 and declared that Sweden should enter “the Information Society” first of all countries (Prop. 1999/2000:86). This goal was to be met by a fast roll out of broadband networks all

¹⁸ On May 2, 2002, PTS proposed a change in the Swedish Telecommunications Act that would extend this obligation to also include the unbundling of high-speed bit stream access.

over the country to provide equal accessibility everywhere (SOU, 1999).

In 2000, licenses for third-generation mobile communication networks were distributed in Sweden by a kind of “universal service contest” that reflected the new USO policy. Four licenses were awarded after a two-stage procedure. The licenses were granted to those candidates that had passed a first-stage pre-selection and that, in the second stage, scored highest on a “universal service index” which comprised land area and population coverage at different times. Thus, instead of paying license fees to the state, the winner of a license committed to providing a specific amount of universal service without economic compensation. A peculiar feature of the design, though, was that the license holders were obliged to fulfil only 30 per cent of the promised coverage through own investments. Thus, they only had to “pay” 30 per cent of their “bids” themselves (Hultkrantz and Nilsson, 2003). So, perhaps not so surprising, the candidates that won all scored the maximum, i.e., they all promised to roll out networks covering 99.98 per cent of the population at the end of 2003. This is considerably more, and faster, than in any other EU country. A consultancy firm estimates the *pro bono* license cost imputed on the operators to SEK 10 billion (Hultkrantz and Nilsson, 2003, and references therein).¹⁹

These three examples indicate that the Phase 3 mobile telephony markets have come under a regulatory regime that is stricter than the one that was designed in Sweden in Phase 2 at the time of liberalisation. The “ultra-light” regulation of fixed-line interconnection has been replaced by the rate-of-return regulation of mobile interconnection charges. Unbundling was not even an issue in 1993, but is now required for mobile networks, even though the division of networks and network services into separate “components” is considerably more difficult than it may be for fixed-line networks (Carlsson, 2001). The “wait-and-see” approach to universal service obligations has given way to “everything-now” obligations for third-generation mo-

¹⁹ This is the estimated cost difference to a 97 per cent coverage, which may be an overly optimistic estimate of the regional coverage that would be achieved in the absence of regulation, implying that the real cost of the universal service obligation can be larger. For comparison, license fees at the level (i.e., weighed with GDP) achieved in the Danish UMTS auction in September 2001 would have yielded SEK 5 billion, while the level of the UK auction in March-April 2000 would have resulted in SEK 20 billion in license charges.

bile communication networks. Political decision-makers and the regulation authority thus seem to be catching-up for the loss of control of the industry during the initial steps of the liberalisation process.

5. Will the new legislation prevent re-regulation?

Several forces have driven this regulatory development. One is the evolution of the regulation framework within the European Union. However, the re-regulatory turn in Sweden is mainly the result of deliberate domestic decisions. The European legislation has given the member states ample liberty in forming the national telecommunication policies. The Interconnection Directive from 1997 leaves the authority to determine whether an organisation has significant market power to the national regulatory agencies. The Regulation of Unbundled Access enacted in January 2001 is, for the reasons cited above, limited to the local loop. Sweden requires license holders for third-generation mobile communications to roll out networks that cover 99.98 per cent of the population before the end of 2003, while most other European countries demand a 20-40 per cent coverage in that time (European Commission, 2001; Hultkrantz and Nilsson, 2001).

Whether the new legal framework for electronic communications will restrict the scope for re-regulation will be seen from the implementation in the EU member countries in the coming years. As of yet, it is not clear that the new legislation will have such an effect.

In Sweden, the Parliament will decide on a new Electronic Communications Act that will replace the current Telecommunications Act and the Radio Communications Act (SOU, 2002) during the spring of 2003. This act is based on a general duty to give notice of network and communication services activities. This involves an extension of the notification duty in relation to the Telecommunications Act, now also including Internet service providers, for instance. The act specifies a number of duties that a regulatory authority can decide to impose. The Access Directive anticipates that interconnection and other forms of access will primarily be achieved through voluntary agreements concluded on a commercial basis. However, if it fails, the act provides powers, subject to certain preconditions, to introduce special obligations. These obligations are generally framed and basically only provide a framework for what an authority can prescribe. Consequently, there is large scope for determining how they can be formulated and satisfied in each individual case.

Regulatory intervention is conditioned on annually conducted market analyses showing market dominance in the meaning of this concept in the general competition law. The change to this concept from the previous trigger for regulatory intervention, i.e., significant market power, raises the market-share threshold, as a rule of thumb, from 25 per cent to 40 per cent. However, firms with lower market shares can be found to have a “joint dominance”. Therefore, at least for the mobile communications market with its oligopolistic structure, entrance restrictions, and wholesale-level trade, the regulatory authority may find the reasons for intervention under the current legislation to still be valid under the new law. If that is accepted by the courts, the new legislation may turn out, if anything, to be less restrictive to tight regulatory control than the current one (Knieps, 2001).

The regulatory policy, therefore, stands at a crossroads. It may be possible to continue a re-regulatory route or, on the contrary, choose a more hands-off approach. In the next section, we discuss whether the latter alternative exists.

6. Are there alternatives to intense regulation in Phase 3?

One alternative to a regulatory intervention is to do nothing. The cost of not correcting a perceived market failure should be weighed against the excess burden of a regulation. The main source of this excess burden is the asymmetric information between the regulator and the regulated firms. If some kind of intervention is found to be desirable, it may furthermore be possible to find market-based methods that can reduce the cost of intervention. In the three cases described above, it does not seem that the possibilities for market-based solutions have been exhausted. In fact, they have not even been explored.

6.1. Interconnection charges

The market failure that could justify the regulation of interconnection conditions in a Phase 3 market with facility-based competition is not the unwillingness of the incumbent to offer a “reasonable” price, as in a Phase 2 market, but “too much” cooperation, i.e., tacit collusion. This can be achieved through “wholesale agreements” in which each operator includes a mark-up in the price for the termination of calls from another network, thus raising the marginal cost of a call that

originates in that network.²⁰ Thus, even if price competition is intense in the retail market, firms can, by raising each other’s costs, coordinate a retail price above the social marginal cost through the control of interconnection charges at the wholesale price level.

However, as the Swedish experience of local loop interconnection demonstrates, if one firm prices interconnection above the marginal cost, possibilities for arbitrage emerge for other firms. More precisely, Laffont, Rey and Tirole (1998a) show that for small departures from the marginal cost pricing of interconnection, an equilibrium in retail prices exists and is unique, and the retail price is an increasing function of the interconnection fee. As the charge grows, though, the temptation for other firms to undercut retail prices increases. By lowering their retail prices, they can raise their market shares, and therefore the shares of calls terminating in their own networks, thus avoiding paying the mark-up imposed on interconnection. For a high enough mark-up on interconnection, therefore, the retail equilibrium breaks down. Moreover, that critical level will be lower, the more easily consumers can substitute between networks. Therefore, the more fierce retail price competition is, and hence the stronger firms desire to impose substantial mark-ups on interconnection, the lower will the feasible mark-up that can sustain an equilibrium be.

In a policy perspective, this suggests that a market-based intervention should target switching costs and consumer lock-in (see also Klemperer, 1995, and Galbi, 2001). Since this is precisely what has been done in Sweden through the prohibition of saving “unused calls” and the number portability reform, it is not clear that more has to be done, even if the wholesale mechanism were to be considered as

²⁰ Following Laffont, Rey and Tirole (1998a), assume that a carrier incurs the marginal cost c_0 both at the originating and terminating ends of a call and the marginal cost c_1 for costs in between. Each network charges an interconnection charge a for the termination of a call originating in another network. Thus, the perceived marginal cost for an off-net call is $c_0 + c_1 + a$, while the real marginal cost is $2c_0 + c_1$. If there are two symmetric networks with equal market shares, and interconnection charges are reciprocal, then the perceived marginal cost of an average call (on net or off net) differs from the real (social) cost by $(a - c_0)/2$. Laffont, Rey and Tirole show that the retail market equilibrium in a market where two networks are differentiated according to a symmetric Hotelling model will be characterised by a price that includes a mark-up on this perceived marginal cost (i.e., as a variation of Lerner’s inverse elasticity rule).

a serious obstacle to efficiency.²¹ Hence, it should be carefully considered whether there are reasons to continue the regulatory control of any operator’s termination charges for mobile calls.

A complementary reason to call the need for strong regulatory intervention in question is related to the linear form of interconnection charges. Even if mark-ups on the per minute interconnection charges are used to raise retail prices, consumers may be at least partly compensated by competition in other components of the total price for the network services, such as fixed fees, termination-based price discrimination, and reception subsidies (Laffont, Rey and Tirole, 1998b; Laffont and Tirole, 2000; Cambini, 2001). In particular, the first of these mechanisms, fixed fee reduction, has been intensely and enduringly used in the Swedish market for mobile telephony through subsidies to customers for buying handsets. Since the GSM networks started to operate, Swedish consumers have been able to buy handsets at a symbolic cost (often SEK 1 for the least expensive telephone) if they commit to a network subscription for some time (normally one or two years). Also, all mobile operators offer lower prices for calls terminating in the same network. Reception subsidies are less frequent, but one operator (Tele2) offers cash-card customers a reception fee for calls to such customers.

However, the fixed-line local access network remains a monopoly. Although the demand for broadband has promoted the roll out of competing networks, the DSL-technologies that provide fast-speed transmission and “always-on” connection over the copper-wire network have had a remarkable market success in recent years. This preserves the essential facility issue on the regulatory agenda. Telia-Sonera currently sells up-stream wholesale ADSL services to its competitors at a price that is very close to the down-stream retail price, thus apparently preventing entrance into this business by a margin squeeze.²²

²¹ As the third generation of mobile communications arrives, the scope for lock-in of subscribers into buying only services that are provided through a specific network may increase, see Hultkrantz (2002c). However, Cambini (2001) shows that competition in upstream access also enhances competition in the markets for downstream services.

²² The wholesale monthly charge is SEK 230 (January 2003), while the lowest retail monthly charge is SEK 220. Although wholesale purchasers can get a quantity discount of 10 per cent at most and some consumers are charged higher prices, this does not give much room for profits at the retail level.

6.2. Unbundling

The Swedish regulation on the unbundling of conveyance capacity in mobile networks is intended to prevent network operators from debaring “virtual” network operators. A motive for such a regulation could be that market entry in the mobile telephone market is limited by the regulation of spectrum rights. As mobile communications develop into a “wireless Internet”, it is envisaged that the number and the variety of services that can be accessed over the mobile handset multiply. Mobile network operators will then have excellent opportunities for foreclosing the downstream service markets that may evolve, if they want to. Restraints for securing privacy, idiosyncratic informational structures, operator-provided systems for secure payments, and multi-tier transmission capacity bottlenecks are some of the hurdles that can be used by a network operator to restrict the downstream providers from distributing services to network subscribers without the operator’s consent (Hultkrantz, 2002c).

However, for the same reasons, an unbundling requirement is not likely to be effective under such circumstances. If the regulator attempts to regulate the price of unbundled network capacity, then the network operators can use non-price methods to exclude the “virtual” operators.²³ So it is not clear that anything will be achieved, more than the introduction of another regulatory risk for mobile network investors.

Furthermore, once again, the real issue seems to be the possibility for consumers to substitute between different networks. No operator will gain much from restricting its subscribers to buy only its own services, or services supplied by affiliated providers, if consumers can easily shift from one network to another (Cambini, 2001).

6.3. Universal service obligations

The outcome of the Swedish “universal service contest” for UMTS licenses highlights the possibilities for a regulator of imposing a hidden cost on winners of a beauty contest. The cost of the very high coverage requirement is borne by the license holders. Therefore, the government has not had to assess and compare the benefits and costs

²³ Laffont and Tirole (2000, Section 4.5) discuss the regulation of exclusionary behaviour.

of increasing coverage beyond what operators would choose on commercial grounds.²⁴

Hence, social efficiency would probably have gained from an explicit procurement procedure in which the government had purchased extended coverage. This would have informed the political decision-makers about costs and also made it necessary for them to take a position on whether benefits exceed costs. One way of organising a procurement of this kind would have been to grant spectrum licenses in several regions and then allocate licenses in a combinatorial auction, or a simultaneous ascending auction, in which both positive and negative bids are allowed.²⁵

7. Concluding discussion

The liberalisation of the telecommunications market has been a remarkable achievement. As barriers to entry were abolished, new firms entered and competed head to head with the incumbent in the old markets and in new markets for services like digital telephony, Internet, and broadband. Prices have fallen, but it is hard to tell whether that would have happened anyway. More important, new products and services have penetrated the markets more forcefully than elsewhere, indicating that consumers have found value for their money.

Still, the extent of regulatory intervention to advance competition in the telecommunications markets in Sweden has not followed a “hump-shape” path. Since the liberalisation reform in 1993, the intensity of both market competition and regulatory control has increased. The first change of the governance regime for telecommunications from a state-owned monopoly to market competition with regulation was part of a global development, instigated by profound technological changes that interacted with the political and ideological currents of the time. However, the Swedish process was influenced by specific national circumstances, such as Televerket’s choice of an offensive strategy. The result was that Sweden followed a faster track to liberali-

²⁴ There are no publicly available reports stating such motives.

²⁵ Experimental evidence about the functioning of a market with both positive and negative bids is provided in Hultkrantz and Nilsson (2003). In the UK, auctions for fixed wireless broadband (28GHz) in 2001, three licenses were sold in each of the 14 separated regions. However, no negative bids were allowed and only 16 were sold in the first round.

sation, and took a more light-handed regulatory approach than many other countries.

The causes behind the subsequent increase in regulatory intensity, in particular from 1999, that have been described here remain to be explained. Perhaps, regulation is simply following a learning curve as a new regulatory authority develops its skills and makes use of a new legislation. One may observe that the new policy employs some of the regulatory tools that were developed in the global liberalisation process during the 1980s and 1990s. As the Jacobins learned when beheaded by the guillotine, some inventions come to be used for unexpected purposes.

In the implementation of the new legal framework for electronic communications, there now exist several challenges for policy makers. First, it is time to consider another regulatory reform, this time for deregulation, to take advantage of the competition in the Phase 3 mobile communications markets. The reasons for continuing the regulatory control of termination charges for mobile calls deserve careful analysis. The focus of the regulation of interconnection should be on the essential facility. The present rapid growth of the market for ADSL broadband implies that the terms for access to the old copper-wire network will stay on the regulatory agenda for some time.

Second, it is high time to end the dual role of the Ministry of Industry, in being both responsible for telecommunications policy, and still the main owner of Telia after the merger with Finnish Sonera, which remains a cause of suspicion and fear in the industry.

Third, the efficiency in spectrum management can probably be much improved. This has recently been demonstrated in Britain (Cave, 2002), and there is no reason to expect Sweden to be an exception.

Fourth, universal service, whenever desired, should be procured, not prescribed, to make the cost visible.

Finally, the prime issue for making the telecommunication markets reasonably efficient seems to be measures for avoiding consumer lock-in. This will therefore require continued attention.

References

- Bergendahl-Gerholm, M. and Hultkrantz, L. (1996), *Nästa steg i telepolitiken*, Rapport till expertgruppen för studier i offentlig ekonomi (ESO), Ds 1996:29, The Swedish Ministry of Finance.

TELECOMMUNICATIONS LIBERALISATION IN SWEDEN: IS “INTER-MEDIATE” REGULATION VIABLE?, Lars Hultkrantz

- Bergman, L., Doyle, C., Gual, J., Hultkrantz, L., Neven, D., Röller, L.-H. and Waverman, L. (1998), *Europe’s Network Industries: Conflicting Priorities*, CEPR and SNS, London.
- Cambini, C. (2001), *Competition between vertically integrated networks*, *Information Economics and Policy* 13, 137-165.
- Carleheden, S.-Å. (1999), *Telemonopolens strategier. En studie av telekommunikationsmonopolens strategiska beteende vid liberalisering av teleoperatörsbranschen*, *Lund Studies in Economics and Management* 47, The Institute of Economic Research, Lund University Press, Lund.
- Carlsson, A. (2002), *A marketplace for trading with network capacity in mobile telephone networks*, Mimeo, Blekinge Institute of Technology.
- Cave, M. (2002), *Review of radio spectrum management, An independent review for Department of Trade and Industry and HM Treasury* (www.spectrumreview.radio.gov.uk).
- Crandall, R.W. and Waverman, L. (2000), *Who Pays for Universal Service? When Telephone Subsidies Become Transparent*, Brookings Institution Press, Washington D.C.
- European Commission (2000), *Proposal for a regulation of the European Parliament and the Council on unbundled access to the local loop*, COM(2000) 294; and *Proposal for directives of the European Parliament and the Council on a common framework for electronic communications networks and services*, COM (2000) 393 final.
- European Commission (2001), *The introduction of third generation mobile communications in the European Union: State of play and the way forward*, COM (2001) 141 final.
- Galbi, D.A. (2001), *Regulating prices for shifting between service providers*, *Information Economics and Policy* 13, 393-410.
- Hultkrantz, L. (2002a), *Samhällsekonomiska perspektiv på CVE-justering vid prisreglering*, Report submitted by Telia AB to the County Court in Stockholm, Länsrätten, mål nr 3356—02.
- Hultkrantz, L. (2002b), *Kommentar till Post- och telestyrelsens yttrande 14 mars 2002 till Länsrätten*, Report submitted by Telia AB to the County Court in Stockholm, Länsrätten, mål nr 3356-02.
- Hultkrantz, L. (2002c), *Will there be a unified wireless marketplace for tourism?*, *Current Issues of Tourism* 5, 149-161.
- Hultkrantz, L. and Nilsson, J.-E. (2001), *Nya bud—en ESO-rapport om auktioner och upphandling*, Ds 2001:40, The Swedish Ministry of Finance.
- Hultkrantz, L. and Nilsson, J.-E. (2003), *Joint allocation of exclusive rights and universal service obligations*, CTEK Working Paper 3001:1, Dalarna University.

TELECOMMUNICATIONS LIBERALISATION IN SWEDEN: IS "INTER-MEDIATE" REGULATION VIABLE?, Lars Hultkrantz

- Hultkrantz, L., Isakson, B. and Nilsson, J.-E. (1999), Reglering av mobiltelemarknaden: "Open access" till nätkapacitet, Report to the Swedish Ministry of Industry, T&S Working Paper 1999:12, Dalarna University (www.du.se/~jen).
- Isakson, B. (2000), Local loop interconnection charges, reciprocity and enhanced services, CTEK working paper 2000:4, Centre for Transport Economics, Dalarna University and National Institute of Road and Transport Research (www.ctek.nu).
- Karlsson, M. (1998), The liberalisation of telecommunications in Sweden. Technology and regime change from the 1960s to 1993, Ph.D. Thesis, Linköping Studies in Arts and Science 192, Linköping University.
- King, S.P. and Maddock, R. (1999), Light-handed regulation of access in Australia: Negotiation with arbitration, *Information Economics and Policy* 11, 1-22.
- Klemperer, P. (1995), Competition when consumers have switching costs: An overview with applications to industrial organization, macroeconomics, and international trade, *Review of Economic Studies* 62, 515-539.
- Knieps, G. (2001), Regulatory reform of European telecommunications: Past experience and forward-looking perspectives, Discussion Paper 77, Institut für Verkehrswissenschaft und Regionalpolitik, Universität Freiburg.
- Laffont, J.-J., Rey, P. and Tirole, J. (1998a), Network competition: I. overview and non-discriminatory pricing, *Rand Journal of Economics* 29, 1-37.
- Laffont, J.-J., Rey, P. and Tirole, J. (1998b), Network competition: II. price discrimination, *Rand Journal of Economics* 29, 38-56.
- Laffont, J.-J. and Tirole, J. (2000), *Competition in Telecommunications*, MIT Press, Cambridge.
- Ministry of Communications (1992), Svensk telemarknad i förändring, Ds 1992:86, Kommunikationsdepartementet.
- Newbery, D.M. (2001), *Privatization, Restructuring, and Regulation of Network Utilities*, MIT Press, Cambridge.
- ODTR (1999), International benchmarking on the application of price caps, Office of the Director of Telecommunications Regulation, Ireland.
- PriceWaterhouseCoopers (1999), Jämförelse av priser för mobiltelefoni i Norden, Europolitan AB, Stockholm.
- PriceWaterhouseCoopers (2000), Report on the Level of Mobile Tariffs in Sweden, Telia Mobile AB, Stockholm.
- Prop. 1999/2000:86, Ett informationssamhälle för alla, Proposition from the Swedish Government.
- PTS (1999), Svenska mobiltelemarknaden ur ett konsument- och konkurrensperspektiv. En rapport från Post- och telestyrelsen, Konsumentverket och Konkurrensverket (www.kkv.se).

TELECOMMUNICATIONS LIBERALISATION IN SWEDEN: IS “INTER-MEDIATE” REGULATION VIABLE?, Lars Hultkrantz

- PTS (2000a), Analys av prisreglering på telemarknaden, Post- och telestyrelsen, Stockholm (www.pts.se).
- PTS (2000b), Post- och telestyrelsens beslut 2000-08-31, ref nr 00-781.
- PTS (2000c), Svensk telemarknad 2000, Post- och telestyrelsen, Stockholm (www.pts.se).
- PTS (2001), Svensk telemarknad första halvåret 2001, Post- och telestyrelsen, Stockholm (www.pts.se).
- PTS (2002a), Post- och telestyrelsens beslut 2002-02-21, dnr 00-14849/23.
- PTS (2002b), Alltid på—broadbandsmarknaden ur ett konsumentperspektiv, Rapport från Post- och telestyrelsen, Konsumentverket och Konkurrensverket (www.pts.se).
- RRV (1995), Två år med Telelagen, Riksrevisionsverket, Stockholm.
- SFS (1997), Förordning om taxor för telefonitjänst mellan fasta nätanslutningspunkter, SFS 1997:400.
- SOU (1999), Bredband för tillväxt i hela landet, Huvudbetänkande av IT-infrastrukturkommittén, SOU 1999:85.
- SOU (2002), Lag om elektronisk kommunikation, Delbetänkande av e-komutredningen, SOU 2002:60.
- Stelacon (2002), En beskrivning av den svenska bredbandsmarknaden ur ett konsumentperspektiv, Rapport genomförd av AB Stelacon på uppdrag av Post- och telestyrelsen, Konsumentverket och Konkurrensverket, mars 2002.
- The Swedish Competition Authority (1996), Konkurrens på avreglerade marknader, Konkurrensverket, Stockholm.
- Thorngren, B. (1990), The Swedish road to liberalization, *Telecommunications Policy* 14, 94-98.
- Vickers, J. and Yarrow, G. (1991), *Privatization: An Economic Analysis*, MIT Press, Cambridge.
- Vogelsang, I. (2002), Incentive regulation and competition in public utility markets: A 20-year perspective, *Journal of Regulatory Economics* 22, 5-27.