Economic effects of introduction of third generation mobile telephony (3G)

The financing of the telecom sector has attracted a great deal of attention in Europe over the past few years on account of the rising debt caused by substantial investments in licences and the development of the next generation of mobile telephony systems. In total, international telecom operators have paid more than EUR 200 billion in licence fees for the next generation of mobile telecom systems, of which more than EUR 60 billion have been invested in England and Germany. Operators will have to make further heavy investments in developing and expanding the network. The suppliers of these new systems are also under considerable financial pressure since, after many years, they have reached the final phase of their investments in new technology. In view of the large sums invested and the accumulation of risk the banking sector's exposure to the telecom industry is being watched closely by international and national supervisory groups.

In Sweden the telecom industry accounts for some four per cent of GDP and almost 20 per cent of the country's exports. Even more importantly, it contributes one half of a percentage point to Sweden's annual economic growth. The telecom sector thus has an influence on the banking system via the cyclical fluctuations besides the direct credit exposure to the sector.

The shift to next generation technology over the coming years as a result of the expansion of fixed and mobile systems with high transmission capacity (broadband systems) will mean a further accumulation of risk on the part of Swedish players, even though operators in Sweden have not paid particularly large sums for their licences. These operators have an important role to play in the marketing of the new technology and providing services that are attractive to consumers and business users. If they succeed, this will create conditions enabling a high enough cash flow to be generated for the investments to pay off and guarantee long-term profitability and stability in the telecom sector.

The expansion of third generation mobile telecom networks is an interesting example of a business that requires substantial investments that create a need for financing and consequently the provision of large lines of credit. To this may be added uncertainty regarding future cash flows and the not insignificant risk that these investments will not generate anything like the expected return. These are the very characteristic features of many of the financial bubbles that have been the main causatory factors behind financial crises. The purpose of this detailed look at the telecom sector is to shed light on how much of a risk there is that developments in the telecom sector would lead to such a bubble, which if it were to burst would mean that banks and other financiers would incur heavy losses.

WHAT ARE THE DISTINGUISHING CHARACTERISTICS OF THE MOBILE TELECOM INDUSTRY?

The role of the mobile telecom system in relation to the mobile telephone may be compared with the functions that roads provide for motorists. If we are to be able to use a car, we need an extensive network of roads, and in its absence we will find alternative means of getting from A to B. It is the same with the mobile phone; without a well-developed network that incorporates all the components of a mobile telephony system, we cannot use our mobile phone and will have to resort to other means of communication. The development of a mobile telecom network that enables us to make a phone call from any part of a country or a particular region is normally known as a coverage investment.

In practice, a mobile phone has to be located within a few kilometres of a transmitting station (known as a base station) if it is to be used at all. The base station consists of transmission and receiving equipment and an aerial that sends signals to and receives signals from the mobile phone. The base station is connected to the public telephone network, either by means of a telephone cable or via a microwave link. The network of base stations is controlled by a number of switching stations that vary in size and which connect calls via the network and keep a check on which base station is nearest to the mobile phone in question.

Just like a road that gets jammed, a mobile telecom network can jam if too many people try to call from the same place at the same time. The network often gets congested at central locations in big cities, and locations with busy roads or traffic jams. This is solved by increasing the capacity of each base station in the overloaded area and installing more base stations in the network than would normally be required to provide adequate coverage. Installing additional capacity to enable the network to handle numerous calls at the same place is known as a capacity investment.

LICENCE PROVIDES RIGHT TO A SCARCE RESOURCE

The mobile phone and the base station contact each other by means of radio waves that are transmitted on a frequency that is determined by the switching unit that controls the base station. Radio waves can vary in length and are transmitted at different intervals, known as frequen-

cies. Short frequencies are easily disturbed and have a poor range, but they can communicate a great deal of information. Long frequencies are less easily disturbed and have a longer range, but they cannot carry so much information. The range also depends on the strength of the signal and the surrounding environment. An aerial that is placed high up in an open landscape with plenty of water in the surroundings can transmit a signal further than an aerial that is placed on a low building in a town. This means that optimisation of aerial locations is very important if information is to be transmitted using radio waves.

One component in a mobile telecom system has a mobile aerial and a weak transmitter; this is the mobile telephone. Taken together the above factors determine an optimum frequency range for mobile telephony. This frequency range is, not surprisingly, also optimised for other types of radio communication that use weak, mobile transmitters, and mobile telephony shares its optimal frequency range with military radio transmitters and civilian radio transmitters, such as those on aircraft and in taxis.

Two transmissions in the same area on the same frequency will disturb each other, which will prevent information from getting through. This makes it necessary to divide and allocate rights to use this optimal frequency range. The distribution of rights to use a given bandwith in this frequency range is handled by the telecommunication authority in the respective country. In Sweden, this is the responsibility of the National Post and Telecom Agency (PTS). However, co-ordination of frequencies at national level is not enough, as it is an advantage if radio transmitters can use the same frequency regardless of where in the world they may be located. This means that frequency ranges for some types of use, such as civil aviation and mobile telephony, are co-ordinated at international level.

Most countries in Europe have awarded three or four licences giving the licence-holder the right to provide mobile telephony services across a given frequency range throughout the entire country. This means that there are three or four mobile systems with national coverage in most countries in Europe. Large countries, such as Russia and the USA, have awarded licences to provide mobile telephony in a given region, which means that these countries have more mobile telecom systems, which are provided by different operators. In Europe the most widely used standard is that known as GSM, while in Russia and the USA a number of different and incompatible standards are in use.

Over the past two years countries in Europe have awarded four or five additional, new licences with the right to transmit mobile telephony within a nationwide frequency range. The intention is that these licences should be used for third generation mobile telephony (known as 3G). In some countries, such as Germany and England, these licences have been auctioned off to the highest bidder, which has resulted in historically extremely high prices for frequency bandwiths. Sweden opted for a different method; it charged an administrative fee of SEK 100,000 and then awarded licences to the companies that promised to install the new mobile telecom systems fastest, and to provide the best coverage and capacity to serve subscribers. This way of awarding licences is normally known as a beauty contest.

DEVELOPMENT FROM FIRST TO SECOND AND THIRD GENERATION MOBILE TELECOM SYSTEMS

After three decades of trials and experimentation the first commercial mobile telecommunication system was introduced at the beginning of the 1980s. A number of standards based on analog technology were developed, such as NMT and AMPS. The services provided by these first generation systems were limited to normal telephone calls with poor quality sound.

Second generation mobile telephony (2G) is based on digital technology and was introduced at the beginning of the 1990s with the launching of the GSM and Digital AMPS standards. Later in the 1990s other standards were introduced for second generation mobile telephony, such as CDMA. The introduction of second generation mobile telephony resulted in better quality calls than with first generation systems, as well as new services, such as push-button telephones and automatic services connected to the subscription. Digital technology also made it possible to manufacture smaller phones/handsets. These improvements were appreciated so much that the use of mobile telephony rocketed in the 1990s. This dramatic increase in turn led to lower prices which in their turn further stimulated the use of mobile phones to the point where just about everybody seemed to have one.

The end of the 1990s saw the introduction of a facility for reading Internet pages that had been adapted to the small display panels on mobile phones. NTT-Docomo, a Japanese operator, was particularly successful with its I-mode concept, which allowed a large number of Internet pages to be adapted to the mobile phone and made accessible by means of a permanent connection. I-mode was a great success and is now used by more than thirty

million people in Japan. In Europe, the intention was that WAP should become the equivalent of I-mode. WAP is an open standard for converting Internet pages to enable them to be read on a mobile phone. WAP failed to make a breakthrough as it lacked one important feature possessed by I-mode, namely the permanent connection.
We are currently in a borderland between the second and third generations of mobile telephony. Over the past year, 2.5G has been introduced as a result of technology that improves the capacity to transmit data.

The introduction of third generation mobile telephony (3G) in the European countries has been planned jointly, which has resulted in the standardisation of technologies, specifications of requirements, and time schedules. The development of 3G has been based on earlier generations but 3G uses a new technology to transmit large volumes of information by means of radio waves. What began, in the first generation analog systems, as a simple phone call of poor quality is now, with the third generation, a technology that can transmit moving pictures with sound in real time.

Players with important roles in the introduction of 3G

There are a number of players with a range of different roles in the development and introduction of 3G. The *telecom operators* are the providers that have contact with subscribers, and most often they also own and operate networks. Many of them have their roots in yesterday's state-owned monopolies that provided fixed telephony services within their mandate to provide telecom services throughout the whole country. In Sweden, we had the National Telecommunications Administration, which became today's Telia. However, deregulation and the allocation of 2G[74] licences to private companies has resulted in most European countries having at least two private mobile operators to challenge the former monopoly. In Sweden we now have three 2G operators (normally known as mobile operators or GSM operators). They are the semi-privatised Telia, Europolitan, and Tele2-owned Comviq.

The global market for mobile telephony has been expanding strongly in recent years and this has induced operators from many countries to seek to identify and then exploit the potential that exists outside of their own core markets. Telia is a case in point, with operations in Norway, Comviq is a member of a European group with operations in 12 European countries, while Europolitan's main shareholder is Vodafone AirTouch, the world's largest mobile telecom operator.

Given the substantial investments required and the risks associated with 3G projects, alliances have been formed by international operators and financiers to bid for national 3G licences. These alliances have then set up jointly owned *consortia* whose members share the responsibility for operations and financing. The consortia are separate companies from the shareholding companies; they have their own balance sheets and are liable for their own commitments using the equity capital injected by the shareholders. It is the *consortia* therefore that will become the *operators* that will have contact with customers and own and operate the 3G networks.

In Sweden the following four consortia have been awarded 3G licences:

1. *Europolitan*, whose main shareholder, Vodaphone Airtouch, is the world's largest telecom operator with equity interests in mobile telephony networks in 24 countries.
2. *Hi3G* is 60 per cent owned by Hutchison-Whampoa, a Hong Kong-based conglomerate with equity interests in several consortia that also has 3G licences in Hong Kong, England, Italy, Austria and Denmark. Hutchison is also one of Hong Kong's largest mobile operators, as well as being engaged in mobile telephony businesses in another 10 countries. The remaining 40 per cent of Hi3G's shares are owned by Investor, a Swedish investment trust.

74 See box: "What are the distinguisting characteristics of the mobile telecom industry?"

3. *Tele2* is a Sweden-based operator with operations in both fixed and mobile telephony, mainly in Sweden and the other Nordic countries but also elsewhere in Europe. Tele2 owns Comviq, a Swedish mobile telephony operator. Since being awarded a licence, Tele2 has reached an agreement with Telia to operate and own its 3G network through a joint venture company in which they each have a 50 per cent interest. Telia concentrates on fixed and mobile telephony in the Nordic countries, although it is also involved as a subcontractor to telecom operators elsewhere in Europe and in the USA. The company also has an equity interest in a Russian operator that has plans to build a national network there. The company has also been awarded one of Denmark's 3G licences.
4. *Orange* was formed by Hutchison in 1994 and set up a mobile telephony business in England. It then used the English company as a base for establishing mobile telephony systems in Belgium and Switzerland. Hutchison later sold Orange to Mannesmann, one of Germany's telecom operators. Orange is now owned by France Telecom and is active in eight countries. The Orange consortium, which was awarded a 3G licence in Sweden, initially consisted of Orange (51 per cent), Shibsted (2 per cent), NTL (3 per cent), Skanska (10 per cent) and Bredbandsbolaget (34 per cent). However, Bredbandsbolaget has sold its holding to Orange, which now owns 85 per cent of the consortium.

The *main suppliers* of mobile telecom systems are a small number of companies that operate on a worldwide basis. The market leader in 3G systems is Sweden's Ericsson. Other suppliers of systems include Finland's Nokia, Siemens from Germany, the French company Alcatel, and Lucent and Motorola in the USA. Ericsson and Nokia have contracts to supply the majority of the 3G projects in the world.

Apart from these main suppliers of mobile telecom systems, building contractors such as Skanska, NCC and Peab, as well as other small *subcontractors*, supply the consortia direct, as well as indirect through the above listed main suppliers.

Who will pay for the new mobile telecom services, when and why?

The freedom to be able to make a phone call and to be reached on the phone anywhere and at any time has so far been the benefit that consumers have been willing to pay for, and it is this that has made GSM systems profitable. Third generation mobile telephony adds three more areas for business development. *Firstly*, it makes it possible to disengage the computer from its stationary location without losing the connection with the local network. *Secondly*, it makes possible new services that will enable users to transmit large amounts of information, such as moving pictures, to any destination and from any source. *Thirdly*, it provides a facility for linking together sources

of information in a way that will create added value, such as positioning and the gathering of information from mobile and semi-mobile locations. Positioning means that the network identifies and keeps a check on the location of the mobile phone. This capability can be used to optimise service organisations, carry out local advertising campaigns, etc. The collection of information from mobile and semi-mobile locations would, for example, mean that electricity meters and stock levels could be read off with the aid of mobile technology instead of sending a person to do it manually.

Even though it is possible to identify new services that can be provided using the new 3G technology, estimates of the size of these new areas of business are highly uncertain. The arguments used to suggest that the revenue generated will be nowhere near the levels mentioned in the estimates are rather similar to those put forward when mobile telephony was first introduced. For example, it was questioned whether people really wanted to be able to use their telephone anywhere and at all times of day and night. The doubt now is about whether people will want access to data services anywhere and any time. The arguments in favour of 3G include the fact that people spend more and more of their working hours and leisure time online at their computers, sending or receiving e-mail, or surfing the Internet/Intranet or their company network. Furthermore, we spend more time sitting at our computer than we spent, or now spend, talking to each other on the phone. Moreover, as noted above, the new technology creates new opportunities to provide customised services. The conclusion of all this is that the conditions are such that the demand for the new mobile telephony services will be great enough for the investments in 3G to pay off.

The first 3G system was launched in Japan on 30 September, 2001. It has a data transmission speed that is up to 40 times faster than that of today's 2G system. In size, the first telephones are comparable to existing 2G phones, one model incorporates a small video camera, and another one can be put in a card slot on a standard laptop computer. The degree of success of the first systems will serve as a guide to the growth potential on the networks, and possibly to how soon the investments will pay off. However, teething problems with handsets, short battery lives, and problems with software and systems could seriously delay the projects as a result of effects on both the demand and the supply sides.

Operators in Europe and Sweden will be starting test systems during the coming year. In Europe, however, some operators would prefer to have phones that can handle both 2G and 3G. This means the phones would take longer to develop and also that they would be larger than the phones in Japan.

How large are the initial investments?

Originally, the four consortia that were awarded licences undertook to invest SEK 100 billion in third generation mobile telecom networks. However, if they co-operate, the consortia could share some of the construction costs. They could, for example, build one

aerial that all four of them would be allowed to use for their base stations, instead of building four separate aerials close to each other. Effective co-operation of this type would enable the four consortia to reduce the original total of SEK 100 billion and the average of SEK 25 billion per consortium to below SEK 70 billion in total and SEK 18 billion per consortium.

Apart from the capital investment in the mobile telecom system, some initial working capital will be required to finance the build up of the organisation, for marketing and to cover operating costs during the first few years.

The process leading up to the applications mostly took place between September 1999 and September 2000, a period when the IT sector was seriously overvalued. The planned investment volume was also an important parameter influencing the decision on who should be awarded a licence. On aggregate, this means that it would be reasonable to suppose that the investment levels stated are inflated and will be subject to revision once the approval of PTS has been obtained. Such a review will probably reduce the total investment volume further from the level of SEK 70 billion mentioned above.

The decisions on awarding licences were based on commercial plans that included assumptions that are highly uncertain, given that the technology and business concepts are entirely unproven. The approved investment volume will therefore have to be revised to take into account new information that is becoming available. Each consortium will wish to optimise the investment volume to match its project's earning capacity, while PTS's role is to ensure that the operators provide networks that have the promised coverage and capacity. It is reasonable to suppose that the investment volume will be used to overcome this possible conflict of goals as an operator that fails to make a profit will in the long run be incapable of delivering what has been promised.

If we assume that the figure of SEK 70 billion we have arrived at above does not reflect the coming investment volume since the figure is based on business plans that contain unreasonable assumptions, what will the investment volume actually be? We can make a reasonable guesstimate by looking at the investments made in the second generation mobile telecom systems and adjusting these for known differences between 2G and 3G. To cover the populated areas of Sweden requires an investment of SEK 2 billion over the first two years, and regular investments of SEK 450 million per year, assuming that a 2G system with competitive capacity, but without any upgrading, is extended. Based on these figures, the operator's total investment volume for a 2G system over 15 years (corresponding to the 3G licence period) would amount to SEK 8 billion.

One of the differences between 2G and 3G technology is that 3G coverage is poorer than that of 2G. Put simply, this means that a 3G system, if it were to provide the same coverage and capacity as a GSM system, would require an investment volume that is twice as high. This gives an indicative investment volume of SEK 16 billion for 3G (Scenario 1).

The consortia that have a 2.5G[75] network – Europolitan, Tele2 via Comviq and Telia – could install 3G systems in the metropolitan regions and complement them with 2.5G technology in rural areas. Such a solution would require the investment of SEK 9 billion by a 3G consortium (Scenario 2).

The traffic growth for mobile systems is expected, according to experts in the industry, to amount to 30 per cent a year, with price reductions averaging 6 per cent a year in Sweden, between now and 2006. On the basis of these forecasts and the above arguments, and assuming that 3G systems would capture 30 per cent of the growth in traffic in 2004, 50 per cent in 2005 and 100 per cent thereafter, we can arrive at the following presumptive income statement.

The development in scenario 2 follows the earnings trend for the 2G systems that were installed in Sweden at the beginning of the 1990s. In Scenario 1, the system becomes profitable one year later on account of the higher level of investment. A highly simplified cash-flow calculation that assumes a constant, weighted capital cost of 12 per cent and the perpetual capitalisation of the cash flow in 2014, and a growth rate of 2 per cent, gives a negative current value of 1.2 billion kronor for Scenario 1 and a positive current value of 3.6 billion kronor for Scenario 2. Even though the cash flow calculation is highly simplified, it still implies that the consortia will probably attempt to reduce the investments below the indicative level of SEK 70 billion.

TABLE 4. INCOME STATEMENT IN SEK MILLION FOR A CONSORTIUM THAT INVESTS SEK 16 BILLION (SCENARIO 1) AND FOR ONE THAT INVESTS SEK 9 BILLION IN 3G (SCENARIO 2).

Scenario 1	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenue	330	1,227	4,109	6,131	8,602	9,963	11,459	13,105	14,915	16,907	19,097
Direct costs (50%)	165	614	2,055	3,066	4,301	4,981	5,729	6,552	7,458	8,453	9,549
Gross operating profit	**165**	**614**	**2,055**	**3,066**	**4,301**	**4,981**	**5,729**	**6,552**	**7,458**	**8,453**	**9,549**
Operating costs	660	982	2,465	2,759	3,411	3,985	4,584	5,242	5,966	6,763	7,639
Operating profit/loss before depreciation	**–495**	**–368**	**–411**	**307**	**860**	**996**	**1,146**	**1,310**	**1,492**	**1,691**	**1,910**
Depreciation	158	474	685	790	895	684	473	473	473	473	473
Profit/loss before tax	**–653**	**–843**	**–1,096**	**–483**	**–35**	**313**	**673**	**838**	**1,019**	**1,218**	**1,437**
Investment (16 bn over 15 years, total)	2,530	2,530	840	840	840	840	840	840	840	840	840

Scenario 2	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenue	330	1,227	4,109	6,131	8,602	9,963	11,459	13,105	14,915	16,907	19,097
Direct costs (50%)	165	614	2,055	3,066	4,301	4,981	5,729	6,552	7,458	8,453	9,549
Gross operating profit	**165**	**614**	**2,055**	**3,066**	**4,301**	**4,981**	**5,729**	**6,552**	**7,458**	**8,453**	**9,549**
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Operating profit/loss before depreciation	**–495**	**–368**	**–411**	**307**	**860**	**996**	**1,146**	**1,310**	**1,492**	**1,691**	**1,910**
Depreciation	89	266	385	444	503	385	267	267	267	267	267
Profit/loss before tax	**–584**	**–634**	**–796**	**–138**	**357**	**611**	**879**	**1,043**	**1,224**	**1,423**	**1,643**
Investment (16 bn over 15 years, total)	1,420	1,420	475	475	475	475	475	475	475	475	475

Source: Riksbanken

75 See box: "What are the distinguisting characteristics of the mobile telecom industry?"

In first and second generation mobile telecom systems earnings have been driven by the number of subscribers, and a 2G operator has normally been able to earn a profit with 250,000–300,000 subscribers. In the scenario with full coverage and capacity investments, this would imply that a 3G operator would need a critical mass of 450,000–540,000 subscribers or twice the revenue per subscriber as for a 2G operator. This comparison is not entirely accurate as a 3G operator's revenue does not need to be so closely tied to the number of subscribers. For example, take the case of a company that wishes to make its Intranet accessible using mobile technology. This service could have a fixed price for up to a given volume of data and a given number of users per month, which means the provider would be operating according to a business model in which corporate services are supplied instead of services to individual subscribers.

Initially, the systems will co-exist with the same sources of income, and 3G will take over some of the growth and cash flow that is at present generated in the 2G systems. Data traffic is expected to correspond to less than 20 per cent of the revenue during the first few years. However, it is forecast that by 2007–2008 revenue from data traffic in the 3G network would be higher than revenue from voice traffic.

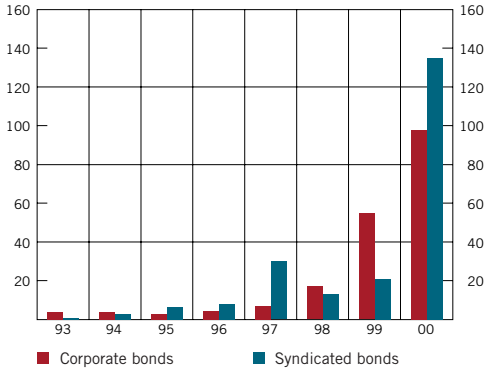
Who is responsible for financing and risk-taking in the consortia?

The financing of infrastructure projects in the mobile telephony sector involves the owners of the 3G consortia, banks, suppliers and export credit guarantee boards.

Initially, as already discussed, an operating consortium is formed to draw up business plans, contact suppliers, apply for financing and finally apply for a licence. In contacts with suppliers demands are often made that the tender should include a financing proposal. Banks and other financiers are contacted with a prospectus inviting them to finance the first year's investments and working capital. Depending on their risk propensity and the prices quoted by suppliers, bankers and other financiers, the owners of the consortium then decide upon a financing structure with a suitable mix of equity capital, trade credit, supplier finance, bank loans and other forms of financing.

The equity capital is injected exclusively by the operators and other financiers who are part-owners of the consortia. The owners that are international operators are able to finance their share of the capital by issuing corporate bonds. Previously, the borrowing costs on this market for companies in the telecom sector were only one percentage point above the risk-free yield. However, the growing indebtedness of the sector in recent years and the revaluation of the risk premium for telecom companies have pushed this premium up to between two and three percentage points. In Europe, the increased borrowing in the corporate bonds market by the tele-

Figure 46. Corporate bonds and syndicated loans in the European telecom sector. USD billion



Sources: Capital DATA and Loanware.

com sector is mainly a consequence of the high 3G licence fees paid by the consortia around Europe.

The figure above shows a marked increase in the use of corporate bonds to finance the telecom sector in 2000, the peak year for the issue of 3G licences in Europe.

The international operators with interests in the consortia also finance their activities by means of short-term bank overdraft facilities from banks. Although these credits account only for a small proportion of their total borrowing, there has been a tendency recently for the companies to make greater use of them in response to a more strained cash-flow situation.

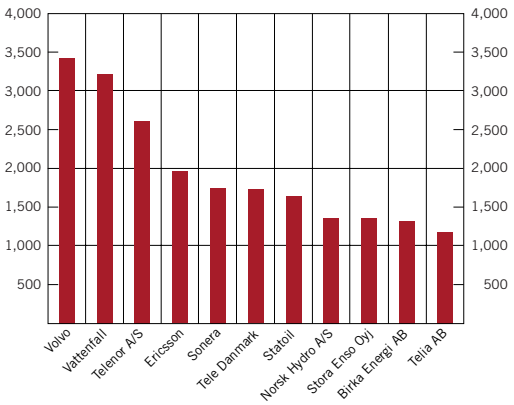
The infrastructure suppliers include system suppliers such as Ericsson and Nokia, and construction companies like Skanska and NCC. Their deliveries give rise to short-term trade liabilities which, following sector practice, allow 60–120 days' interest-free credit, in some cases up to 180 days. In the initial phase of a system development project, it is not unusual, however, for a telecom system supplier to offer a bridging finance plan, in addition to the trade credit, to cover the development period and the first year of operation. Normally, this bridging finance would then be taken over by banks when the consortium begins to show a positive cash flow. Before providing bridging finance, suppliers often require parent company guarantees from the consortium operators, floating charges on the assets of the consortium and collateral in the form of equipment.

Telecom system suppliers can also, on the odd occasion, supply longer-term credit to key customers or markets. For example, Ericsson might conceivably agree to finance a new operator on a new market for mobile telephony and Nokia a new operator on a market where Ericsson supplies competing competitors. (Cases in point are Ericsson's financing of operators in Nigeria and Nokia's financing of Telsim in Turkey.)[76] This type of credit is often combined with insurance from the export credit guarantee board in the country where the supplier manufactures its equipment. In such cases too, the supplier will require parent company guarantees, floating charges and physical collateral.

Over the years, the suppliers have been successful and have avoided incurring any major credit losses on the financing of their customers. However, in the past year, Nokia, Motorola and Lucent have all been hit when customers owing them large sums of money have suspended payments.

Ericsson has won 34 contracts for 3G, three of which involve financing. In total, Ericsson had 20 billion kronor of customer financing on its balance sheet at the turn of the year, none of it for 3G projects. Nokia has taken 27 contracts, three of which involve financing, and had financing of 8 billion kronor on its books at the end of 2000. The difference in actual financing volumes is due to Ericsson's system sales always having accounted for a higher proportion of total sales.

Figure 47. Bond issues by Nordic companies since 1999. USD billion



Source: Capital DATA.

76 Examples of this are Ericsson's financing of operators in Nigeria and Nokia's financing of Telsim in Turkey..

The suppliers also use the corporate bond market for their borrowing, and have contributed to some extent to the growth in corporate bond issues in the European telecom sector in recent years.

Five of the eleven most active Nordic companies on the European corporate bond market in the past two years have been telecom companies (see Figure 47). Nokia has not needed to borrow any money because of the high profits it has been earning, which means its own growth and the development of 3G have been largely self-financed.

Ericsson also uses some short-term bank financing, and at the beginning of 2001 had loans of 13 billion kronor from finance institutions on its books. To put this figure into perspective, it had equity of SEK 92 billion and corporate bonds that had been issued for SEK 16 billion.

The banks finance operators and suppliers with short-term and long-term loans, and support them with issues of corporate bonds. Direct loans to newly started consortia are uncommon, and banks seldom accept more than 10 per cent of the risk on own account, which means that 90 per cent of their financing is covered by parent company guarantees from the consortium's owners and/or suppliers. In those cases where they do arrange financing for a newly started consortium, it is a case of syndicated loans that are guaranteed the owners of the consortium and its suppliers.

The banks' exposure to the telecom sector is governed by established limits. Some of this exposure takes the form of direct loans and some to purchases of corporate bonds. Table 5 shows the exposure of Sweden's leading banks to the telecom sector on December 31, 2001. It may be noted that the exposure in relation to Tier 1 capital is quite high. If a few of the companies in this sector were to suspend payments this would involve the banks in relatively heavy credit losses.

TABLE 5 EXPOSURE OF SWEDEN'S FOUR MAJOR BANKS TO THE TELECOM SECTOR, 31 DECEMBER, 2001.

	SHB	SEB	FSPB	Nordea
Exposure to telecom sector	13,400	12,000	N/A	69,069
Tier I capital	34,596	36,507	35,045	79,443

The collapse of a 3G project – if the project could proceed further – would require a financial reconstruction of the company. In cases where the project could not proceed, the financiers could recover some of their money by selling equipment or the licence. In general, however, the amount recovered would probably only cover a small proportion of the debt.

What happens if the cash flow is delayed?

A delay in 3G owing to a failure of technology or unsuccessful marketing would probably prompt the operators that own 3G consortia to transfer their investments to existing 2G or 2.5G networks, either direct through their own networks or by acquiring holdings in 2G

operators. The Swedish consortia have so far invested only a limited amount of money in 3G since they needed to pay practically no licence fees. This means that they will not suffer any serious financial discomfort in the event of a delay. The fact that other countries are bringing forward their 3G systems will also benefit the Swedish consortia since they can then learn from their failures and successes. This means they can kill off a project at an early stage if 3G turns out to be a problem elsewhere. They can adapt their pace of development to make it commercially viable.

As the members of the consortia responsible for developing the Swedish 3G system are all international companies, they are also affected by the progress of 3G in other countries. However, owing to the consortium structure, the development of 3G in Sweden need not be so adversely affected, and the consortia can continue to lead their own lives even if one of the owners finds itself in trouble. However, it is also likely that if the 3G systems are affected by general problems, this will have a knock-on effect on their development in all countries. Should such a situation eventuate, this would particularly benefit the Swedish consortia, in that they would not need to purchase their licences and the development of the network can be based on lessons learned from 3G projects that were begun earlier in other countries.

A delay would hit the suppliers harder. They have been investing heavily for many years, and they would not be able to capitalise these investments as soon as would be necessary in the event of the cash flow being delayed. They have also built up a large organisation to enable them to handle the expected demand, which means that they would face considerable costs with no matching cash flow. In such a situation the telecom suppliers would require far-reaching restructuring and incur high costs. However, demand for mobile telephony is growing rapidly around the world and if 3G were delayed the operators would invest more in 2G projects which would mitigate the effects of a delay at least as far as Ericsson is concerned as they have strong cash flows from their GSM operations.

The effects on financial stability

The Swedish banking system is mostly at risk from the effects on the suppliers, especially Ericsson, rather than from the effects on the operators. The conclusion is that an extreme-case scenario would have to materialise for financial stability to be shaken by a delay in the introduction of 3G mobile telephony in Sweden. The reasons for this are that the Swedish operators have not paid large sums of money for their licences, that they will be able to learn from others' mistakes and that in the event of a delay they would transfer their investments into Ericsson's strongest product area. Nor is the rapid growth in the amount of debt on the balance sheets of European telecom companies of particular concern, since the loans have largely been raised by companies that are earning healthy profits and are in a strong financial position as a means of covering the liquidity deficit that a long-term investment project would involve. This in-

vestment might not pay off, but this would not be a problem for the banking system unless several large companies were to suspend payments.

Nevertheless, a serious delay in 3G owing, for example, to teething troubles with early models, could harm Sweden's economy. Ericsson would need to restructure and close down excess capacity. 3G subcontractors and service developers would also be seriously affected. This would hurt an industry that is already hard pressed by restructuring and plant closures, which would mean that the telecom sector's contribution to GDP and its expected contribution to future growth would decline even further. Ericsson would lose an estimated SEK 15 billion worth of potential sales for 2002, SEK 30 billion in 2003 and SEK 60 billion in 2004. The impact of this scenario on forecast GDP would be –0.02 per cent for 2002, –0.05 per cent for 2003 and –0.1 per cent for 2004. From this, we can conclude that a delay in 3G would only have a marginal direct effect on the Swedish economy. An indirect and unpredictable effect might, however, emerge from the extent to which public confidence in the Swedish economy is influenced by how Ericsson is doing. A decline in consumer confidence would affect GDP in the form of higher saving and lower consumption. Ericsson's problems would, however, be eased by its sales of other systems, and they would therefore probably be only of a transitory nature and therefore probably have little impact.