
HOW DOES HANDSET SUBSIDIES AFFECT INCENTIVES TO INNOVATE?

ECONOMIC THEORY AND EMPIRICAL EVIDENCE | 04 JULY 2008

INFORMED DECISIONS



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| COLOPHON

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Chapter 1 EXECUTIVE SUMMARY

It is very common that mobile operators offer consumers a new mobile phone at a low price (i.e. a subsidised handset), but in return require that the consumer accepts a minimum subscription period of for example 12 months. We call this handset bundling.

In Norway, there is a debate about whether handset bundling is good or bad for consumers. Some argue that handset bundling reduces competition and thus harm consumers. Others argue that handset bundling benefits consumers because it induces innovation.

In a report for the Norwegian Post and Telecommunications Authority, Teleplan shows that handset bundling seems to reduce competition and create entry barriers for mobile operators¹. However, the report did not examine how handset bundling affects innovation.

The Norwegian Post and Telecommunications Authority has asked Copenhagen Economics to examine whether minimum subscription periods lead to more innovation, i.e. faster adoption of new technologies.

We address the question by examining the economic theory and experience in different countries.

Firstly, we conclude that economic theory does not give a general answer. The relation between market structure and innovation depends on the characteristics of the industry in question. Some theories suggest that competition reduces innovation (called the Schumpeterian view) because competition reduces the value of bringing new products to the market. Other theories suggest that competition increases innovation (called the Arrow view) because new products introduced by monopolies tend to cannibalise profits on old products. Neither, the empirical literature gives a clear answer. However, some recent research supports an “inversed u-shape” relation between competition and innovation, i.e. that neither pure monopolies nor harsh competition maximises innovations. The highest degree of innovation is related to industries with “moderate” competition. Nevertheless, the relation between competition and innovation varies between industries.

Secondly, we conclude that the empirical evidence is also unclear. We have both compared the adaptation of new technologies across countries with different regulation of minimum subscription periods, and examined how the market responded when Finland relaxed the regulation of minimum subscription periods for 3G mobile phones. There is evidence that handset bundling promotes diffusion of technology, but the available data is limited so we cannot reach strong conclusions. In particular, we find three indicators that suggest that handset bundling may induce innovation.

¹ The Norwegian Post and Telecommunications Authority, “Forbrukeradferd påvirker konkurransen i ekomarkedene”, www.npt.no

One indicator is that the share of 3G mobile subscriptions generally is highest in countries with long minimum subscription periods and that the share of mobile data traffic is slightly higher in countries with long minimum subscription periods.

Another indicator is the findings in a Portuguese study (Barros (2006)). The study shows that new and more advanced mobile phones are subsidised the most. This indicates that handset subsidies are used to speed up the shift to the newest technology.

Finally, experience from Finland indicates that changes in regulation allowing longer minimum subscription periods may have induced more innovation. From 1996 to April 2006, handset bundling was totally banned in Finland. In April 2006, the ban was lifted, but only for 3G mobile phones. After this change, the penetration of 3G increased from about 0.5 percent to about 10 percent in one year. Moreover, the competition shifted from a focussing on price to focussing on service. Finally, the market churn declined after the regulatory change. It is, however, not evident that handset bundling is the main explanation of the development in Finland.

Chapter 2 | ECONOMIC THEORY - COMPETITION AND INNOVATION

There is a debate on whether or not handset bundling, i.e. bundling subsidised handset and minimum subscription periods, is good or bad for consumers. This debate has mainly focused on the competition effect of bundling.

We focus on the innovation effect of bundling. It is, therefore, of interest to see what economic theory and empirical literature tell about the relation between competition and innovation.

We conclude that economic theory does not give a general answer on the relation between competition and innovation. The conclusion depends on the characteristics of the particular market. Broadly spoken, economic theory can be divided into two points of view focusing on opposing effects.

According to the first point of view, market power, i.e. limited competition, may stimulate innovation by making it easier to recover cost and earn profits. Moreover, large firms may enjoy economies of scale in innovation and benefit from better risk diversification. This point of view goes back to Schumpeter (1942).

According to the other point of view, market players with substantial market power, in the extreme a monopolist, are more reluctant to innovate as new innovative products would replace some of the market players' existing products. This is called cannibalism. The cannibalism effect is reduced with increasing competition intensity. Moreover, competition may create a pressure to innovate and introduce new products to win market shares. This view is normally attributed to Arrow (1962), cf. Table 2.1.

Table 2.1: Does increased competition lead to more innovation?

Schumpeter: No	Arrow: Yes
<ul style="list-style-type: none"> ▪ Monopolists retain the whole gain with new products ▪ Possibility for risk diversion ▪ Economies of scale in investments 	<ul style="list-style-type: none"> ▪ Cannibalism, new products replace old products ▪ Competition for a market gives high innovation

Source: OECD (2006), Arrow (1962), Schumpeter (1942).

The empirical literature on the relationship between competition and innovation is also not conclusive. An important reason is that it is difficult to measure the level of competition, as competition has several dimensions such as productivity, concentration, and profit. Hence, different indicators of competition may give different result.

However, there is a tendency that recent research supports an “inversed u-shape” relation between competition and innovation, indicating that neither pure monopolies nor harsh competition maximises innovations. The highest degree of innovation is related to industries with “moderate” competition. Nevertheless, it must be said that this is a generalised description and that the findings vary from industry to industry. Hence, this description does necessarily reflect the situation in the mobile telecoms, cf. OECD (2006).

In section 2.1 we provide the main views of both schools, and in section 2.2 we survey some of the recent empirical findings.

2.1. THEORETICAL LITERATURE

Economic theory predicts that the intensity of competition in an industry is related to the degree of market innovation in that industry. But exactly how competition relates to market innovation is disputed and depends on the conditions of the markets.

The economic literature reveals that economists predict that competition is capable of both promoting and deterring innovation. This result is demonstrated in a number of recent surveys of the economic literature, see for instance OECD (2006), Dalen & Riis (2005), Shapiro (2002), and Konkurransetsynet (2007).

Competition may reduce innovation

The point of view that big, dominating firms are more likely to innovate than smaller ones goes back, at least to Schumpeter (1942) and is sometimes denoted the Schumpeterian (mark II) view². There are several arguments why there may be more innovation in less competitive industries.

Fierce competition may reduce profits of innovations that lead to new products that still have to compete with the existing products³. An example of this would be competition between 3G and 2G mobile communication. The stronger the competition among the existing products is, the lower the potential profits of a new product will be. Therefore, strong competition may reduce the incentives to innovate. This result is demonstrated in a number of models on product differentiation, see for example Dixit and Stiglitz (1977) and Aghion et al. (2005).

Another argument why competition can be harmful to innovation is that monopolies or dominating firms may be able to earn more on introducing a new product than firms in a competitive market, cf. OECD (2006). There are two main arguments. First, a monopolist might be able to price discriminate more effectively than a non-dominant firm, which would increase its profits. Second, a monopolist may have more to lose by not introducing a new product, than a player in a competitive market can gain by introducing a new product. Monopolies may therefore have strong incentives to innovate in order to protect their position and keep ahead. This argument can be based on the so-called “efficiency” argument of Gilbert & Newbery (1982), cf. Box 2.1.

² Even though Schumpeter (1942) is somewhat vague whether it is size or the market structure that matters.

³ This is referred to as non-drastic innovation in the literature.

Box 2.1: The “efficiency” effect

Consider the following scenario: There is a monopolist and an entrant that simultaneously invest in R&D in order to win a patent for a new product.

The entrant faces the following problem: On one side; if the entrant wins the patent, then the entrant will have to compete with the monopolist with the existing product, and this may result in relative low post-innovation profits. On the other side, if the entrant does not win the patent, then it will lose its investment and the profits it can earn are based on the entrants current products and may be very limited. Hence, the maximal amount of money the entrant will be willing to invest is the expected difference in the profits with the new technology and without it.

Contrary, the monopolist faces the following outcomes: If it wins the patent it will continue to be a monopolist. If it loses the patent to an entrant, then it will have to compete with the entrant which will result in duopoly profits. Hence, with these assumptions, the entrant can at most get duopoly profits whereas the monopolist can earn monopolist profits. The monopolist will therefore have more to win from the patent compared to the entrant. Hence, the monopolist will have an incentive to invest more in innovation compared to the entrant.

Source: Based on the discussion in OECD (2006)

Schumpeter (1942) also argues that size of the firm matters for innovation, as large firms are able to diversify the risk between R&D projects and the risk associated with the adoption of new technology and there is Economics of Scale in innovation. These two sources are inter-linked with the size of the firm and therefore not directly related to the market structure of the firms. However, there is a tendency for dominating firms to be rather large and therefore have the benefits of being able to diversify the risk of R&D projects and utilize the economics of scale in innovation⁴.

Competition may promote innovation

Even though several economic models predict a negative relationship between competition and innovations, there are also theoretically founded arguments that give the reverse predictions; that there is a positive relationship between them.

The very basics of economic theory predict that in a market with full competition the firms will steal customers from each other by undercutting the competitors’ prices and drive profits down to zero. In such a market innovation can be a way to make profit. A firm could either reduce production cost, so called process innovation, or invent new products and thereby create a new market with less competition. Another type of innovation that could render profits is to increase the quality of ones product so that it becomes preferred to the competitors’ products. The competitors would then have even larger incentives to innovate in order to “keep up” and not be eliminated from the market.

⁴ Tirole (1988)

One of the other main insights that leads to the prediction that competition may promote innovation is the so-called “replacement effect” from Arrow (1962). The “replacement effect” is motivated by the fact that new innovations for monopolists may cannibalise on his current products, causing him to replace himself, i.e. he becomes his own competitor. Hence, a potential entrant has more to gain by investing in R&D, cf. Box 2.2:

Box 2.2: The replacement effect

The replacement effect can be understood in the following way. Consider a true monopolist, if he invents a new product then this new product may be a substitute for his old product or in other words, it may replace his old product, thereby cannibalise on his current products.

At one extreme when the innovation is drastic, making the current product(s) obsolete, the benefits for a monopolist would be a new monopoly replacing the monopoly he has with a new monopoly. For a firm with competitors, the benefits will be a monopoly.

The replacement effect will also be present on a market with some competition and differentiated products. However, the effect will be significantly smaller as an innovating firm, pre-innovation, competes against the products of the competitors. Hence, the innovator will not face the full cannibalisation cost. Therefore, the replacement effect may be considerably smaller.

Source: Arrow (1962)

2.2. EMPIRICAL LITERATURE

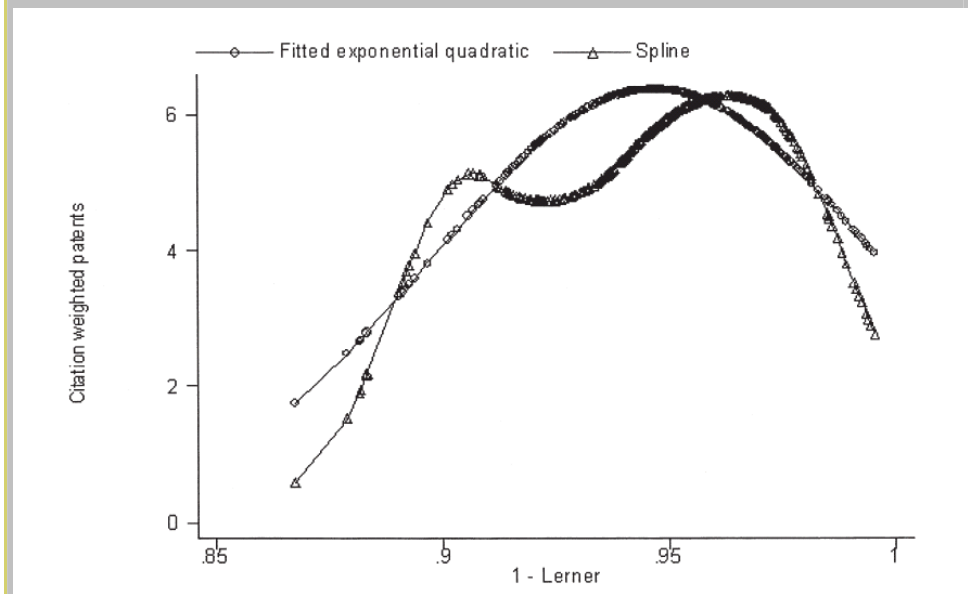
As argued above, the amount of competition on a market will have an influence on innovation. However, it is unclear whether there will be a positive or a negative relationship.

It is reasonable to assume that the arguments presented in the previous section apply differently to different industries and that the relation between competition and innovation therefore to some degree is industry specific. There is a long tradition using empirical evidence trying to answer these questions.

Several papers find a positive relation between innovation and competition, see for instance Van Reenen et al (1999). However, there is a growing consensus that there is an inverse “U-shaped” relationship between measures of innovation and market concentration, which is used as measure for (lack of) competition. That is, when you plot the market concentration on the horizontal axis and innovation on the vertical axis. This implies that neither fierce competition nor monopoly is associated with a high degree of innovation. The inverse u-shaped relation was first found by Scherer (1967) and has been reproduced in many recent studies, and appears to be fairly robust to different measures of competition and innovation as well as control variables. A recent study by Aghion et al. (2005), which we consider being state of the art within this field, also finds evidence of the “inverse-U relationship”, cf. Box 2.3.

Box 2.3: Relation between competition (Lerner) and Innovation (Patents).

Aghion et al. (2005) used an unbalanced panel of 311 firms within the larger R&D sectors. They used a modified version of the Lerner index as a measure of competition. As a measure of innovation, they used the average number of patents taken out by firms in an industry. In order to reflect the heterogeneous value of patents, they weighted each patent by the number of times it had been cited by another patent. Using these measures and state of the art econometrics techniques they found an “inversed U-shape” relation between market power and innovation as shown below.



Note: The circles and triangles represent fitted values. A higher density of circles or triangles in an area means that more of the observations are in that area.

Source: Aghion et al (2005)

Although there seems to be a growing consensus on the “inverse-U relationship”, the empirical literature still gives a mixed picture of how competition affects innovation. There are three main reasons for this.

First; normally one is only able to identify correlations between competition and innovation, which is not the same as finding the causal relationship between competition and innovation. In other words, showing that a high degree of competition is associated with a high degree of innovation is not the same as showing that competition leads to innovation. There could be an inverse causality or it could be other factors that explain the observed pattern.

Second; it is not trivial to find good measures for innovations and competition. The issue of how to measure innovation is discussed in more detail in Copenhagen Economics (2007) where we propose eight different measures, e.g. patents and investments in R&D. Alternative ways of measuring the level of competition in a market are discussed in the same report. Finally; it is difficult to separate *ex ante* incentives to innovate and *ex post* realisations of innovations which may have an influence on market power and firm size, i.e. there may very well be potential problems with selection bias.

Chapter 3 | EMPIRICAL EVIDENCE - HANDSET BUNDLING AND INNOVATION

Handset bundling normally includes some amount of handset subsidy. The mobile phone operators sell a handset at subsidised rates in order to attract subscribers to a particular network. The price that the consumer must pay is to accept a minimum subscription period. During this minimum subscription period the consumer is required to buy some services, which make it possible for the mobile phone operator to recoup the cost of the handset subsidy. Consequently, there is a close connection between the size and use of handset subsidies and the length of the minimum subscription period. In many countries, including Norway, the widespread use of handset bundling has been criticized.

The opponents usually point to two main reasons. One is that a minimum subscription period creates a customer lock-in, which reduces the market churn and potentially the level of competition in the mobile industry. Another reason is that handset bundling makes the mobile industry less transparent to the consumers.

The proponents typically point to the fact that handset bundling guarantees the mobile operators a more constant payment flow, which may potentially increase their incentive to innovate and adopt new technology. Therefore, proponents of handset bundling argue that handset bundling may be an advantage to both the consumers and the society as a whole.

In this chapter, we examined the argument of the proponents. We have examined whether handset bundling leads to more innovation. We have done this by examining the empirical evidence in countries with different regulation of handset bundling.

We highlight the main theoretical arguments for and against a positive impact of handset bundling on adoption of new technology in the mobile industry. Furthermore, we compare a number of European countries' rules concerning handset bundling and eventually we look at empirical evidence concerning handset bundling and diffusion of technology (section 3.2).

We find that the link between handset bundling and diffusion of technology is unclear. Firstly, we find that the theoretical arguments give an unclear picture of whether handset bundling has a positive impact on adoption of new technology in the mobile industry. Secondly, we find that the empirical evidence is consistent with this unclear picture. There is evidence that handset bundling promotes diffusion of technology, but there is also evidence that does not support this conclusion and the available data is limited.

3.1. ARGUMENTS FOR AND AGAINST BUNDLING

There are a number of theoretical arguments that handset bundling promotes diffusion of new technology. There are, however, also arguments that point in the opposite direction.

In this section, we summarise the most important arguments concerning handset bundling and diffusion of new technology, cf. Table 3.1.

Table 3.1: Does handset bundling promote diffusion of technology?

Pros	Cons
<p><i>Faster spread of new technology:</i></p> <ul style="list-style-type: none"> ▪ Lower initial cost for the users ▪ Smaller risk of hesitation due to cannibalisation on current business 	<p><i>Customer lock-in:</i></p> <ul style="list-style-type: none"> ▪ Handset bundling creates a consumer lock-in which may restrict competition and thereby the spread of new technology
<p><i>Better utilisation of technology:</i></p> <ul style="list-style-type: none"> ▪ Better ability to customise services for mobile phones and the other way around 	<p><i>Lower transparency:</i></p> <ul style="list-style-type: none"> ▪ Handset bundling reduces price transparency which may restrict competition and thereby the spread of new technology
<p><i>More and better services:</i></p> <ul style="list-style-type: none"> • If subsidies make the users change easier, more network effects will be realised. Network effects can promote the development of more services and lead to lower prices 	<p><i>Barriers to entry:</i></p> <ul style="list-style-type: none"> ▪ When the handset manufacturers and the service providers co-operate, the harder it may be for new players to set up new businesses

Source: Copenhagen Economics based on Tallberg (2004, 2007).

Why handset bundling may promote diffusion of new technology

Proponents⁵ of handset bundling have come up with several arguments why handset bundling promotes diffusion of new mobile technology. Three arguments are the most important and intuitive.

Firstly, handset bundling may speed up the diffusion of a new technology. The main intuition is that handset bundling promotes the use of handset subsidies, which decrease the consumers' initial cost of switching to a new technology. A lower initial cost may persuade some consumers to make the switch earlier than without a handset subsidy.

Handsets of the new technology are usually more expensive than the old mobile phones. Especially in the beginning when the services of the new technology are less developed. Consumers may therefore not find it attractive to buy the new handsets. A handset subsidy can persuade the consumers and help the supplies of the new technology to gain a critical mass.

Moreover, the incumbent may be reluctant to adopt and spread the new technology because the incumbent will thereby cannibalise the existing business from the old technology. An incumbent with high profits on 2G technology, may be reluctant to promote 3G technology replacing the 2G technology. Therefore new technologies may be most likely to be promoted by new entrants. However, without the possibility to grant handset subsidies, an entrant may have difficulties in selling the new and more expensive handsets to consumers who already uses the old technology. The possibility to grant a handset subsidy makes it more likely that the entrant succeeds and puts an effective competitive pressure on the incumbent.

⁵ See for example Tallberg (2004, 2007) for a discussion of the views.

Secondly, handset bundling may give rise to better exploitation of a technology. Handset bundling means that the manufacturers of mobile phones and service providers can cooperate, and create packages of mobile phones and mobile services that are designed uniquely and specially for each other. Such cooperation may enable a better quality, which at the end of the day will be an advantage to the consumers. The consumers may, for example, experience that the mobile phone has less errors and that the mobile phones support all the services that the service provider supplies.

Thirdly, handset bundling and handset subsidies may eventually result in both cheaper services and a larger supply of services. The mobile industry is a network industry with positive network externalities. If handset subsidies promote the diffusion of a new technology so that more consumers use the technology, the actors can realise more network benefits so that it becomes more attractive and cheaper to produce and develop the services for the new technology. To the benefit of the consumers and the society, this may increase the supply of services and decrease the price level of these services.

Why handset bundling may not promote diffusion of new technology

Opponents⁶ of handset bundling argue that it creates a consumer lock-in and thereby decreases the intensity of competition. However, the opponents are also not convinced that handset bundling promotes the diffusion of new technology. They have two main arguments.

Firstly, they argue that the consumer lock-in not only decreases the intensity of competition, but also slows down the diffusion of new technology. The intuition behind their argument is that competition is the key driver behind the diffusion of new technology. With this intuition, handset bundling obviously slows down the diffusion of new technology.

Secondly, handset bundling may potentially increase new entrants' entry costs, which in the end may result in less product variety and higher prices.

If handset bundling implies that the current actors cooperate and design their product for a common and unique standard, a new entrant may have to develop both a mobile phone and services to enter the market. This can be expected to increase the entry costs and potentially decrease the number of suppliers and thereby decrease the product variety and increase the price level.

Handset bundling may increase the importance of having retail stores where consumers can hold mobile phones in their hand before they buy. As retail stores are expensive, this may create an entry barrier⁷.

⁶ See for example Tallberg (2004, 2007) for a discussion of the views.

⁷ See for example, The Norwegian Post and Telecommunications Authority, "Forbrukeradfærd påvirker konkurransen i ekomarkedene", www.npt.no

3.2. PRACTICAL EXPERIENCES

In many countries, including Finland and Denmark, an important argument in favour of handset bundling is that it promotes adoption of new mobile technology, for example 3G mobile technology.

Nevertheless, there is only limited evidence that handset bundling really does promote adoption of new technology in the mobile industry. An important reason for the lack of empirical evidence is that it is generally difficult to isolate how handset bundling affects the diffusion of new technology.

Several difficulties arise when trying to isolate the impact of handset bundling on the diffusion of new technology. With or without bundling, it is an industry with a fast technological development complexity which makes it even more difficult to isolate the impact of bundling. This dynamic development is influenced by a number of factors. Handset bundling is only one of them.

In this section, we compare the rules concerning handset bundling in a number of countries. Furthermore, we study some of the important empirical conclusions concerning the connection between handset bundling and the adoption and diffusion of technology in the mobile industry. Firstly, we investigate the connection between duration of the minimum subscription period and three possible indicators of the technological performance of the mobile industry in a number of countries. Secondly, we summarise the results from a recent Portuguese study focusing on the connection between handset subsidies and adoption of new technology. Finally, we study some recent experiences from Finland where handset bundling has been banned since 1996, but recently allowed for 3G mobile phones.

The conclusion of our study concerning the impact of handset bundling on adoption and diffusion of new technology is that there seems to be some support for the view that handset bundling may increase innovation, but the evidence is not strong and the available data is limited and as it is difficult to isolate the effect of handset bundling.

Regulation of handset bundling in selected countries

In Norway, handset bundling through a combination of a handset subsidy and a minimum contract period is very common. Norway has no restrictions on the use of handset subsidies, but the duration of minimum contract period for mobile subscriptions is restricted to 12 months. The restriction on the minimum contract period is not the result of a formal sector regulation, but follows from an agreement between the Norwegian mobile operators and Forbrukerombudet, the main consumer organisation in Norway.

In most other countries, there are no formal restrictions on either the handset subsidies or the minimum contract period. In many of these countries, a minimum contract period of 18 or 24 months is common practice. The length of the commitment period is the result of an industry practice resulting from general rules concerning consumer agreements and the

competition rules. Among these countries are Sweden, Germany, UK and Japan, cf. Table 3.2.

A few countries have a specific regulation that directly restricts the use of handset bundling. Denmark is one of these countries. Denmark has a formal regulation of the duration of the minimum contract period, but no restrictions on the use of handset subsidies. The maximum duration of the minimum contract period is by law restricted to 6 months, cf. Table 3.2.

Three other countries with restriction on handset bundling are Italy, Finland and Korea. In Italy, it is forbidden for the mobile companies to subsidise new mobile phones. In Finland, bundling of a mobile phone and a subscription has been banned since 1996, but from April 2006 the ban has been lifted for 3G mobile phones. In Korea, handset subsidies are only allowed for 3G mobile phones and the level of the subsidy is restricted to 40 percent of the full price of the mobile phone, cf. Table 3.2.

Table 3.2: Minimum contract periods and handset subsidies: Selected countries

	Minimum contract period	Handset subsidies	Comment
Denmark	Max. 6 month	No restrictions	Formal regulation
Norway	Max. 12 month	No restrictions	Industry agreement
United Kingdom	12 or 18 month	No restrictions	
Sweden	12 or 24 month	No restrictions	
Finland	12 or 24 month	Only 3G (since April 2006)	
Italy	12 to 24 month	Banned	Leasing solutions are common
Germany	24 month	No restrictions	
Korea	12 or 24 month	Only 3G (since 2004)	Max. subsidy 40 percent
Japan	12 or 24 month	No restrictions	
USA	12 month	No restrictions	

Sources: *The National IT and Telecom Agency (2007)*, *Tallberg (2004)*.

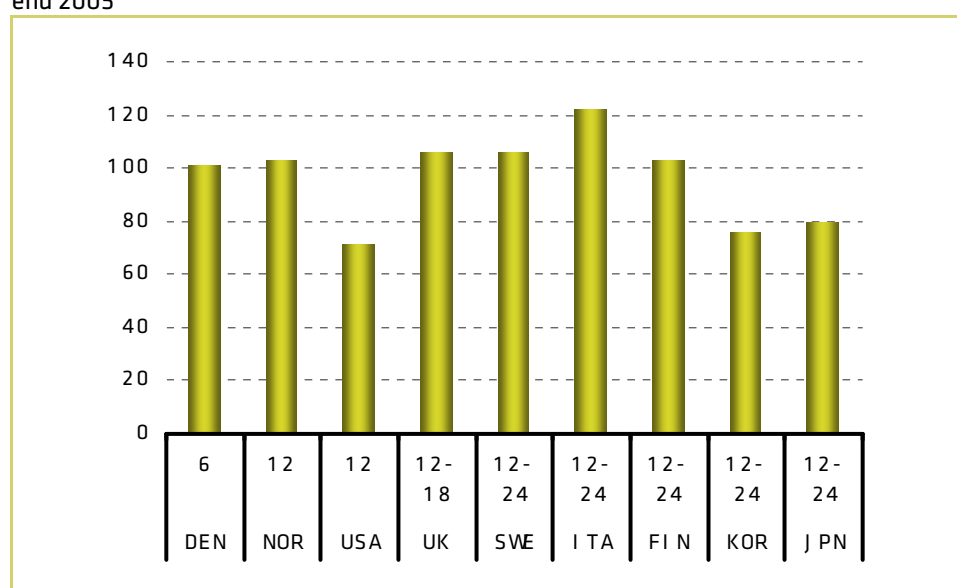
Handset bundling and mobile penetration rate

There is no single indicator that summarises the adoption and diffusion of new technologies in the mobile industry. As a result, it is fruitful to study a number of different indicators to examine the connection between handset bundling and the adoption and diffusion of technology.

The overall mobile penetration is one possible indicator of the diffusion of technology within the mobile industry. If handset bundling promotes adoption and diffusion of technology, we would expect the overall mobile penetration rate to be generally higher in countries with a long minimum subscription period.

This hypothesis is generally not supported by a comparison of the mobile penetration rate in different countries. Some of the countries that have restrictions on handset bundling have as high a mobile penetration rates as countries with no restrictions. For instance, a relatively high level of mobile penetration is observed in Italy, Denmark and Finland where the use of handset bundling is restricted to some extent, cf. Figure 3.1.

Figure 3.1: Mobile subscriptions per 100 inhabitants and minimum subscription periods, end 2005



Source: OECD (2007).

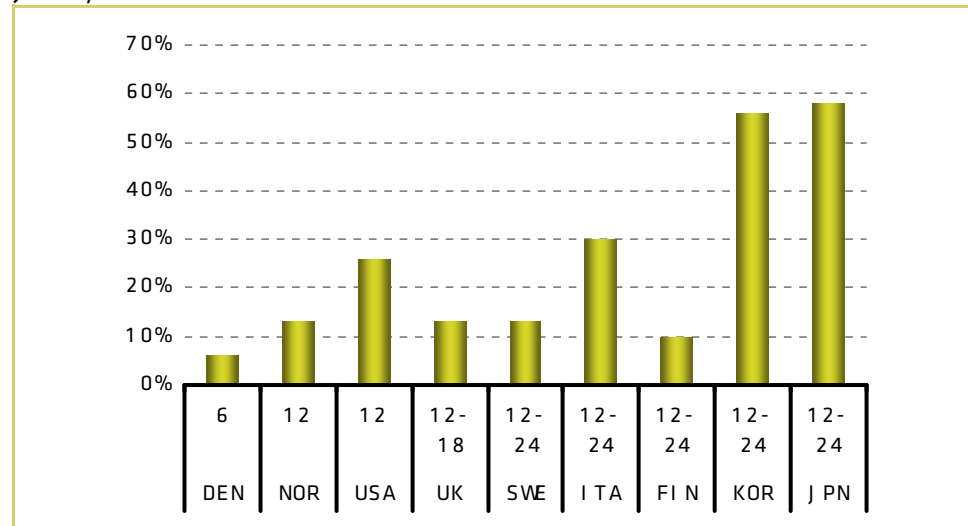
Handset bundling and 3G penetration rate

Another possible indicator of the adoption and diffusion of new technology is the penetration of 3G mobile phones. 2G mobile technology is today regarded as a relatively mature technology. In contrast, the 3G mobile technology is a newer technology and the field where the real innovation takes place. If handset bundling promotes innovation and the diffusion of new technology, it should be expected that the penetration of 3G mobile technology is higher in countries with long minimum subscriptions.

Empirically, there are some signs that the 3G penetration rate is positively related to the duration of the minimum subscription period.

Firstly, there is some support that the share of 3G mobile subscriptions in all mobile subscriptions generally is the highest in countries with long minimum subscription periods. Disregarding Finland, where handset bundling was not allowed before April 2006, the share of 3G mobile subscriptions was by end 2006 relatively high in countries as Japan, Korea and Italy, where minimum subscription periods of up to 24 months are observed. Furthermore, the share of 3G mobile subscriptions was relatively low in Denmark and Norway where the minimum subscription period is restricted to respectively 6 or 12 months, cf. Figure 3.2.

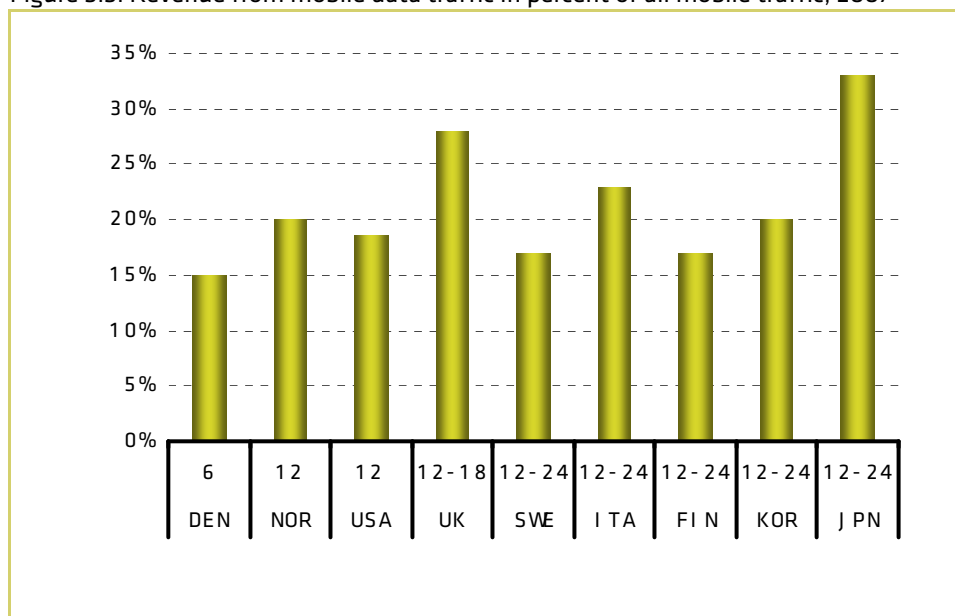
Figure 3.2: Number of 3G mobile subscriptions in percent of all mobile subscriptions, January 2007



Sources: IDATE (2007) and Chetan Sharma Consulting (2008).

Secondly, a comparison between countries reveals a weak tendency that also the share of mobile data traffic in all mobile traffic (voice and data) is higher in countries with longer minimum subscription periods. If we once again disregard Finland, we observe some signs that countries with long minimum subscription periods have a relatively high share of data traffic. However, again the picture is not unambiguous, cf. Figure 3.3.

Figure 3.3: Revenue from mobile data traffic in percent of all mobile traffic, 2007



Source: Chetan Sharma Consulting (2008).

Characteristics of most subsidised mobile phones

If a long minimum subscription period promotes diffusion of new technology, it should be expected that the new and most advanced mobile phones are subsidised more intensively than old and less advanced mobile phones.

A recent study from Portugal supports the argument that handset subsidies, and thus handset bundling, promote diffusion of new technology in the mobile industry (Barros (2006)). The study is based on data on prices, handset subsidies⁸, and features of the mobile phones that were sold in Portugal in years 2000-2006. It examines to which extent the size of the handset subsidy can be explained by factors such as the brand value, the characteristics of the mobile phone, the age of the mobile phone and so on.

The Portuguese study reveals two results that support the argument that handset subsidies may promote the shift from old technologies to newer and more advanced technologies.

Firstly, the study shows that the Portuguese mobile industry is subsidising new models of mobile phones more intensively than old models of mobile phones. As new models of mobile phones are generally more technologically advanced than the older models, this result indicates that handset subsidies are in fact speeding up the shift to the newest technology. It is generally accepted that the consumers are more likely to buy a new mobile phone when the initial cost is reduced.

⁸ The handset subsidy was calculated implicitly as the difference between the “unlocked” phone price and the “locked” phone price.

Secondly, the study supports the argument that a long minimum subscription period can be used to promote and induce a takeoff of a brand new mobile technology. The study shows that the Portuguese mobile industry is generally subsidising new 3G mobile phones more intensively than the old and less advanced 2G mobile phones. This result indicates that handset subsidies are promoting the shift from 3G to 2G mobile phones in Portugal.

The case of Finland

The recent developments at the mobile market in Finland are highly interesting when studying the effects of handset bundling on the diffusion of new technology.

Finland has historically been one of the frontrunners when it comes to penetration of mobile communications. However, in recent years Finland has been lagging behind when it comes to the adoption of new mobile technology such as 3G mobile technology. The adoption of 3G mobile technology has happened at a faster pace in several other countries, especially in Japan and Korea but to some extent also in some other Western European countries.

The slow adoption of the 3G mobile technologies was a key argument behind a recent liberalisation of the law concerning handset bundling in Finland. From 1996 to April 2006, handset bundling was totally banned in Finland. In April 2006, the ban was lifted, but only for 3G mobile phones⁹. The logic behind this was that handset subsidies for 3G would promote the penetration of 3G mobile phones in Finland.

The interesting question is whether the new rules concerning handset bundling for 3G mobile phones have had any visible effect on the penetration of 3G mobile phones in Finland. In other words, it is interesting whether the adoption of 3G in Finland was slower before than after handset bundling was allowed for 3G mobile phones in Finland.

Today, it is possible to gain some insight of the impact of the new rules on handset bundling for 3G mobile phones. The conclusion based on the evidence so far is not unambiguous. The adoption of the 3G mobile technology has indeed accelerated in Finland, but it is not evident that the acceleration is due to the more liberal rules on handset bundling.

However, according to recent Finnish research, there are several signs that the more liberal rules on handset bundling have had the expected and the desired effects (Tallberg (2007)).

Firstly, a significant increase in the penetration of 3G was observed following the change of law. From August 2005 to September 2006, the penetration of 3G mobile phones increased from about 0.5 percent to about 10 percent. Furthermore, the demand for mobile data traffic increased by 300-400 percent.

⁹ The time duration of the exemption for 3G mobile phones was initially restricted to three years, but with the possibility to be extended. A decision on this issue has not yet been published.

Secondly, a change in the competition in the market has been observed. Before, almost only price competition on regular voice and SMS services was observed. Today, the competition is more focused on 3G packages (mobile phones and subscription). A little bit surprisingly the marketing efforts on mobile data have not grown rapidly after the allowing of 3G handset bundling.

Thirdly, as expected, a decline in the market churn was observed. The researchers stress that this is not necessarily only due to the introduction of 3G handset bundling, but the researchers claim that it is evident that the 3G handset bundling will have negative effects on the market because of the higher switching costs created by handset bundling.

Table 3.3: The Finnish mobile market before and after April 2006

	Before	After
Handset bundling	Not allowed	Allowed 3G
Competition	Price	Services and 3G-packages
Share of 3G mobile phones	About 0.5 percent	About 10 percent
Marketing of mobile data	No	Still No
Usage of mobile data traffic	X MB	(3-4)*X MB
Customer churn	Higher than 15 percent	Less than 15 percent

Source: Tallberg (2007).

At first glance, the development in Finland indicates that a combination of handset subsidies and a minimum subscription period can be used to promote and speed up adoption of a new technology, for example 3G mobile technology.

There is, however, an important caveat that must be taken into account. Based on a comparison of the recent development at the mobile market in Denmark, it is not obvious that the accelerated diffusion of 3G mobile technology is due to a change in law.

In Denmark, the minimum subscription period has remained at 6 months for both 2G and 3G mobile phones. Nevertheless, Denmark has recently also experienced a significant acceleration for the penetration rate of 3G mobile phones. From January 2006 to January 2007, the share of 3G mobile subscriptions increased from 3.5 percent to 8 percent and the share of mobile data traffic increased with about 600 percent.¹⁰ The Danish development may support a view that the Finnish development is not necessarily the result of the new rules concerning handset bundling for 3G mobile phones.

¹⁰ Source: The National IT and Telecom Agency, Denmark.

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