THE ECONOMICS OF INTERNET FLAT RATES[*]

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Abstract

Some studies suggest that the European Union lags behind the United States in Internet developments. The differences in pricing structures for Internet access may be one of the key factors to explain differences in Internet developments. For about a year, some Internet access providers have been experimenting unlimited Internet access services – "flat rates". However, most of these unmetered Internet access services have been withdrawn soon after their launching. Some Internet access providers claim that the introduction of unmetered Internet wholesale services is needed to make "flat rates" commercially viable. This paper aims at providing a simple economic analysis of Internet flat rates, both at the retail and wholesale levels. In particular, I suggest that wholesale unmetered interconnection does not necessarily encourage the development of flat rates, but may encourage innovative pricing.

Keywords: Internet access, Flat rate, Network economics.

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1. Introduction

Some studies suggest that the European Union (EU) lags behind the United States (US) in Internet developments. For instance, in a recent study, OECD develops indicators to compare countries with regard to Internet development. The study shows that there are far less Internet hosts or secure servers in European countries than in the US.[1] It has been suggested that the differences in pricing structures for Internet access may be one of the key factors to explain differences in Internet developments. Indeed, while US consumers are charged for Internet calls on an unmetered basis through "flat rates", European Internet users are charged on a metered basis.[2] OECD (2000) considers that the "*price of access to the Internet, and the structure of this pricing, is one of the key factors in explaining the relative development of electronic commerce across the OECD area*" (p. 5). Regarding Germany, Welfens and Jungmittag (2000) expect that "*a switch to flat-rate pricing (...) will create a growth effect around a half-percent of the gross domestic product*".

Flat rates for Internet access –where consumers pay a fixed monthly fee for Internet use– are expected to increase the amount of time spent online. For example, it is often claimed that when AOL replaced metered charges by a flat rate in December 1996, the average time spent online doubled within three months.[3] Recently, Nielsen-NetRatings published datas on Internet usage which illustrate the gap between the US and the EU: average Internet usage is twice as high per person in the US as in the UK.[4] Since increasing the time spent online, flat rates are also claimed to allow Internet users to experiment Internet services and to favour "always on" and real time activities on the Internet.

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[1] According to OECD (2000), in March 2000, there were 185 Internet hosts per 1000 inhabitants in the US, compared with 41 per 1000 in the United Kingdom and 16 per 1000 for France. There were also six times as many secure servers on a per capita basis in the US than in the European Union.

[2] European consumers pay for local calls on a per-minute basis, while US consumers pay a fixed monthly fee for an unlimited amount of local calls. Other countries where unmetered Internet services are available include Australia, Canada, New Zealand and Mexico. Note however that in Australia, ISPs charge for Internet usage on a metered basis.

[3] Actually, AOL only followed Microsoft Network and small Internet service providers who started offering flat rates earlier (see, for example, "Flat-rate pricing changing Internet use patterns", Central Ohio Source, Dec. 19, 1996, http://centralohio.thesource.net/Files4/9612198.html).

[4] According to Nielsen-NetRatings, the time spent online per month in September 2000 was approximately 4:45 in the UK and 9:35 in the US (see: http://www.nielsen-netratings.com/). In France, Internet users are charged on a metered basis and stayed online roughly 8.7 hours in September 2000 (see: AFA; http://www.afa-france.com/html/chiffres/index.htm). According to OECD (2000), US AOL users stay 27 hours online per month.

In the last two years, some European Internet service providers (ISP) have announced they would launch flat rates for Internet access. In 1999, Alta Vista UK announced it would launch a free unlimited Internet access service in the United Kingdom in the following months.[5] Alta Vista was soon followed by other ISPs, notably NTL, Freeserve, Telewest and CallNet0800. In France, in March 2000, World Online launched an unlimited Internet access service during off peak hours. In May 2000, OneTel also entered the unlimited Internet access market, offering a 22.7 euros-a-month flat rate.

The striking feature of these new unlimited Internet service services is that most of them stopped after some time. In July 2000, CallNet0800 announced it had to stop offering unlimited Internet access because the business was not viable.[6] In August 2000, Alta Vista revealed that its promised service –for which 270,000 consumers had already signed– never went live. The fiasco of offering but never launching an unmetered Internet access service forces Altavista UK's director to resign.[7] Six weeks after launching its unlimited Internet access service, WorldOnline decided to stop it. In November 2000, OneTel definitely stopped its unlimited access service.[8] When unlimited Internet access services are maintained, they are usually not really available to everyone, anytime. For example, Freeserve recently announced it stopped taking on new users for its unmetered package. Freeserve had earlier threatened heavy Internet users to throw them off because of capacity problems.[9]

According to some ISPs and authors, unlimited Internet access services are not viable because of uneconomic interconnection conditions; in particular, ISPs lack a cost-effective unlimited Internet access wholesale service.[10] For instance, Welfens and Jungmittag (2000, p. 27) state that "*flat rate pricing at the retail level demands the introduction of similar models in the wholesale sector*". In May 2000, UK regulator Oftel satisfied this request by requiring BT to

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[5] In March 2000, Alta Vista announced it would eventually roll out its service by the end of June 2000.

[6] See: BBC NEWS, "ISP's new service never existed", Monday, 21 August, 2000, http://news.bbc.co.uk/hi/english/business/newsid_889000/889956.stm.

[7] See: BBC NEWS, "Altavista UK boss resigns", Monday, 4 September, 2000 http://news.bbc.co.uk/hi/english/in_depth/business/2000/internet_price_wars/.

[8] See: "OneTel renonce aussi à son forfait illimité", La Connexion Informatique, 30 octobre 2000, http://www.vnunet.fr.

[9] See: "Freeserve suspends registration for unmetered", http://www.zdnet.co.uk/news/2000/42/ns-18611.html.

[10] For example, Andy Mitchell, managing director of Alta Vista UK, claimed that the main reason why unmetered Internet access services were not viable was that ISPs were "*reliant on the provision of flat rate circuits from BT*" (See: "Alta Vista fails to deliver free Internet promise", August 22nd, 2000, http://www.totaltele.com).

offer a wholesale unmetered interconnection service to network operators.[11] David Edmonds, Oftel Director General of Telecommunications, stated that this decision provided "*a sound basis to promote competition in unmetered Internet access*" and that he expected "*to see more companies providing unmetered Internet access packages in the coming months*".[12] In November 2000, the German regulator (RegTP) required Deutsche Telekom to offer an unmetered Internet access wholesale service by February 2001.[13] In February 2001, following discussions between France Télécom, the French regulatory authority (ART) and new entrants, France Télécom introduced a flat rate interconnection offer.[14]

The rationale behind the introduction of an unlimited Internet wholesale service is the following: with flat rates, interconnection costs increase with the time Internet users spend online, while Internet service providers earn no marginal revenues; therefore, a wholesale flat rate is required, so that Internet services providers or IP network operators can pay for interconnection on an unmetered basis. However, due to flat rate pricing, networks may also experience a huge increase in connections in given periods of time. Since the extra capacity they would have to install would be filled only for a short period of time, metered interconnection could be more economic than unmetered interconnection.

This paper aims at providing a simple economic analysis of Internet flat rates to explain why Internet service providers introduce flat rates, why these offers may have failed, and to understand under which conditions unmetered interconnection could encourage the development of flat rates for Internet users.

The rest of this paper is organised as follows. Section 2 provides a brief review of the industrial organization of the market for Internet access. Section 3 discusses the impact of flat rates on Internet usage. Section 4 analyses the likely impact of retail flat rates and wholesale flat rates on the competitive environment. Section 5 concludes this paper.

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[11] See: "Determination of a dispute between BT and MCI Worldcom concerning the provision of a Flat Rate Internet Access Call Origination product (FRIACO)", Oftel, http://www.oftel.gov.uk/competition/fria0500.htm.

[12] See: "Unmetered Internet access: Oftel moves to reassures consumers", *Press Release*, 22 août 2000, http://www.oftel.gov.uk/releases/2000/pr63_00.htm.

[13] "Deutsche Telekom AG must offer wholesale flatrate product as from 1 February 2001", Press Release, RegTP, Bonn, 16 November 2000, http://www.regtp.de/en/aktuelles/start/fs_03.html.

[14] See: "Flat rate interconnection for Internet traffic: ART takes a position", *Press Release*, http://www.art-telecom.fr/communiques/pressrelease/index-13-2001.htm.

2. The market for Internet access

This section provides an overview of the market for Internet access. I first describe the demand side and then the supply side. Finally, I expose the pricing strategies observed in the wholesale and retail markets.

Demand

Internet access is a fastly growing market. In september 2000, around 378 millions people were online according to NUA Internet Surveys.[15] As table 1 below shows, Internet penetration vary substantially across countries, with the US and Nordic European countries as leaders. However, note that these figures must be analysed with some caution, since they are not necessarily coherent.[16]

Country	People online	Percentage of population online	Source
United States	153.8	55.8%	NielsenNetRatings[17], Nov. 2000
Norway	2.4	52.6%	Norsk Gallup[18], Oct. 2000
Sweden	5.0	56.4%	NielsenNetRatings, Nov. 2000
United Kingdom	20.0	33.6%	NielsenNetRatings, Nov. 2000
Germany	20.1	24.8%	Mediagruppe Digital[19], Nov. 2000
France	5.3	8.9%	AFA[20], Nov. 2000

Table 1: Online penetration in selected countries in 2000

[15] See: http://www.nua.ie/surveys/how_many_online/.

[16] For instance, in France, AFA measures only *active* Internet users, while it is not necessarily true in other countries.

[17] See: http://www.nielsennetratings.com/.

[18] See: http://www.gallup.no/menu/default.htm.

[19] See: http://www.mgd.de/.

[20] See: http://www.afa-france.com/html/chiffres/index.htm.

Demand for Internet access is heterogeneous with regard to both consumption behaviours (low users vs. high users) and technological aptitudes ("newbies" vs. "veterans"). Moreover, there are some switching costs incurred when leaving a given Internet service provider (ISP). For instance, the e-mail address or the web site attached to a given user is no longer active if it leaves its current provider. However, Internet users may subscribe to more than one ISP if these charge only usage fees (for instance, users may subscribe at no cost to more than one "free" ISP). It is also possible to get an ISP-independent e-mail address from some portals (e.g., hotmail.com).

Supply

When a consumer accesses the Internet, three types of firms are involved (see also figure 1 below):

- *Its local loop operator.* In most cases, the Internet user subscribes to the incumbent's local loop. However, in the near future, some consumers will be able to access the Internet through alternative local loops. First, alternative infrastructures, like cable networks or UMTS networks, are developing. Second, the unbundling of the local loop – which is due to take place in all Europe in 2001 – will enable new entrants to lease access lines to the incumbent to offer local loop services.

- *A transport operator.* It is interconnected with the local loop operator at a Point of Interconnection (POI). It collects traffic from Internet users, conveys and delivers it to the Internet service provider. Typically, transport operators are long distance network operators. Indeed, in most if not all countries, ISPs do not have access to the incumbent's Reference Interconnection Offer.

- *An Internet service provider.* The ISP is interconnected with the transport operator. It provides connectivity to the Internet.

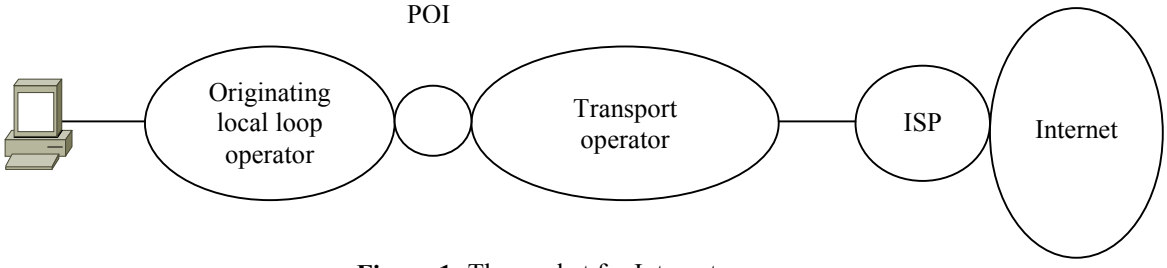

Figure 1: The market for Internet access

Market structures

Due to high entry cost, in most countries, the local market is still controlled by the incumbent historical operator.[21] However, due to its dominant position, the incumbent is regulated.

The IP transmission market is an oligopoly. A few national Internet backbones (for instance, in France, companies like France Télécom, MFS and Colt) are competing for collecting and conveying traffic. Barriers to entry are due both to the entry cost and to regulatory barriers (e.g., holding a licence).

At first sight, the ISP market seems to be highly competitive. For instance, in the UK, there are more than 500 ISPs, 250 of which are subscription-free ISPs. Moreover, regulatory barriers to entry are relatively low.[22] However, the market is concentrated among a few players: according to OFTEL, the three largest ISPs in the UK (Freeserve, AOL and BT Internet) are used by 47% of home Internet users. In France, 63% of the market is served by the four largest ISPs, namely Wanadoo, Free, Liberty Surf-Tiscali and AOL France. Market concentration derives probably from large economies of scale and the existence of switching costs for customers. Indeed, large ISPs have a cost advantage: since they have a larger customer base, they are able to get lower prices from transport operators than small ISPs.

Finally, some Internet service providers are vertically integrated either with telecommunications operators or content providers. For instance, in France, three of the four largest ISPs are vertically integrated with telecommunications operators.[23] Moreover, some national Internet backbones are vertically integrated with European or international backbones.

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[21] A notable exception is the UK where in 1999 cable network and wireless local loop operators earned about 12% of total local loop revenues (source: Oftel Market Information, June 2000). However, according to Oftel (2001, §S.3), "*99 per cent of residential consumers who access the Internet do so via PSTN dial-up*".

[22] For example, in France, ISPs belong to L.34-2 article of the French 1996 Telecommunications Act. They do not need to apply for a licence.

[23] Wanadoo is a subsidiary of France Télécom. Libertysurf Group controls both Liberty Surf and a network operator, AXS Telecom. Finally, Free controls 100% of Linx, which holds an L.33-1 network operator licence. In March 2001, Vivendi Universal announced that Cegetel and Canal Plus would exchange their 55 percent share in AOL France for junior preferred shares in AOL Europe.

Internet access pricing mechanisms

There are currently two technologies to access the Internet on raw copper local loops: dial up and DSL.[24] With dial-up Internet access, the local loop operator collects traffic from Internet users through local switches. The transport operator receives traffic at its point of interconnection. Internet circuit-switched traffic is translated to IP data traffic through a Network Access Server (NAS). In most cases, the NAS belongs to the ISP. With DSL Internet access, local loop operators collect data traffic from Internet users through digital subscriber line access multiplexers (DSLAM). The transport operator receives IP traffic at a point of interconnection.

Dial up access pricing

In most European countries, due to their dominant position in the local loop, incumbents are required to offer Internet interconnection services. Two main interconnection models are available for Internet access. With direct interconnection, the incumbent operator charges up to the local rates to Internet users and transfers a proportion of the revenue to the terminating operator. The ISP may charge users for Internet connectivity. This interconnection model provides no room for flat rate pricing since, in Europe, local calls are currently charged on a metered basis.

Direct interconnection has given rise to the two first pricing models for Internet users. The first model involved the customer paying its local operator for local Internet calls and a subscription to its ISP. The move towards the second model –the "free model"– began in the UK in 1998 with electronics retail Dixons' service, Freeserve. The success of Freeserve led to an explosion of free ISPs, first in the UK and later across Europe. In February 2000, Freeserve served 32% of the ISP market with 1.9 million of active subscribers. There are currently over 250 free ISPs in the UK.[25] Free ISPs also operate in France, Spain, Denmark and Ireland.

Following the development of "free" Internet access, some ISPs have introduced fixed monthly fees which allow users to access the Internet for a given number of hours. In France, these packages were first introduced by France Télécom, soon followed by other ISPs. Unlimited Internet access services –Internet flat rates– have also been introduced in some countries. These new pricing models have been made possible by indirect interconnection

[24] DSL stands for "Digital Subscriber Line".

[25] See OFTEL (1999).

services. With indirect interconnection, transport operators pay Internet interconnection rates to the incumbent, while ISPs collect revenues from users. Contrary to direct interconnection, indirect interconnection provides ISPs with the ability to charge Internet users for both calls and Internet connectivity.

In most countries, Internet interconnection services are charged on a metered basis.[26] In some countries, regulators envision to require incumbent operators to introduce wholesale flat rates. Unmetered Internet interconnection has been introduced first in the UK. In May 2000, following a dispute between MCI Worldcom and BT, Oftel required BT to offer a wholesale flat rate service, "FRIACO",[27] at the local exchange level by June 1st, 2000.[28] The rationale behind Oftel's decision was that the lack of an unmetered Internet access wholesale product could distort or restrict competition.[29] In February 2001, Oftel further required BT to provide a single tandem wholesale flat rate Internet access service.[30]

DSL access pricing

As for DSL Internet access, the availability of wholesale services differ across countries. First, in some countries (e.g., France), the incumbent resells its own DSL access service with a discount. An ISP can buy the incumbent's service and resell it under its own brand name.[31] The second type of wholesale DSL service, known as "Bitstream Access" or "Permanent Virtual Circuit" enables service providers and operators to access customers over the incumbent's upgraded network; DSLAM equipments are owned by the incumbent. Third, the

[26] See: ARCOME (2000) for an in-depth description of Internet interconnection in Europe.

[27] FRIACO stands for "Flat Rate Internet Access Call Origination".

[28] See: Oftel (2000b).

[29] In December 1999, BT announced it would launch Internet flat rate products –under the name "Surftime" –in 2000. The first version of Surftime –"Surftime I"– bundled two segments of Internet access: origination and IP transmission. Oftel together with network operators complained to the fact that "Surftime I" gave no room for IP network operators to compete with BT on the IP transmission segment. Mid-February, BT announced a revised version of Surftime –"Surftime II". This new version of Surftime provided customers with only the origination segment. IP network operators were allowed to interconnect with BT to provide IP transmission. In September 1999, MCI Worldcom requested BT to offer an interconnection product (FRIACO). In December 1999, after BT's refusal, MCI Worldcom referred the dispute to Oftel. In May 2000, Oftel published its Direction, which required BT to offer FRIACO to IP operators.

[30] See Oftel (2001).

[31] For instance, in France, Mangoosta, a new entrant which provides DSL access, uses resell to commercialise its own products.

unbundling of the local loop enables network operators to lease copper lines to the incumbent for a fixed monthly fee and to install their own equipments in the incumbent's buildings. Contrary to dial up Internet access, all rates for DSL wholesale services are unmetered.

3. Internet usage

Internet services

"Internet" is not a service in itself. Rather, Internet provides access to a wide range of Internet-based services: e-mail, file transfer, online news, online games, peer-to-peer services, web browsing, etc. To explore the impact of various rate structures on Internet usage, I try to estimate a very simple utility function for each type of Internet service. The drawback with this approach is that it might not be possible to define an aggregate utility function for Internet access. However, my aim here is to establish that the impact of the Internet access rate structure on Internet usage depends on the type of Internet-based service considered. Therefore, it seems appropriate to look at different uses separately.

For an Internet-based service, the typical utility function will have the following form:

$$U = U(t, b, n)$$

where t is the time spent at using the Internet service, b is the available bandwidth, and n the number of users. This utility function specifies:

- *How utility varies with respect to the amount of time spent at using the service:* utility certainly increases with time for Internet services like instant messaging or online radios; however, for services like file transfer (FTP), the longer it takes to download a file, the lower the utility; for e-mail, the analysis is more difficult: on the one hand, the longer it takes to download new messages, the lower the utility; on the other hand, users benefit from staying online longer to receive new messages on a continuous basis.

- *How utility varies with respect to the number of Internet-based service users online:* some services, like peer-to-peer services (e.g., Napster or Gnutella) or online games exhibit strong positive network externalities, which means that for a given user, utility increase with the number of other users online. Other services (like streaming services) involve no positive network externality.

- *How utility varies with respect to bandwidth:* the impact of the available bandwidth on utility also vary across Internet-based services. Firstly, larger bandwidth has a direct positive quality effect: Internet users get access to a wider range of Internet services (a variety effect) or quality improves (e.g., for audio or video services or online radios). An increase in bandwidth may also have an indirect positive quality effect: for instance, it takes less time to download files as bandwidth increases, which (indirectly) increases utility.

For example, the utility function for online games seems to satisfy the following properties: $\partial U/\partial t > 0$, $\partial U/\partial n > 0$, $\partial U/\partial b > 0$. By comparison, the utility function for file transfer satisfies different properties: $\partial U/\partial t < 0$, $\partial U/\partial n = 0$, $\partial U/\partial b > 0$.

The following table synthesises this analysis and proposes a tentative analysis of the utility function for various Internet-based services.

Service	***Utility increases (+) or decreases (-) with…***			
	Time	**Number of users online**	**Bandwidth**	
			Direct effect	*Indirect effect*
E-mail	?		+	+
Instant messaging	++	+	+	
Chat, online games	+	+	+	
P2P (Napster/Gnutella)	+	+	+	+
Online radios	++		+	
Streaming	+		+	
File transfer, web browsing	-		+	+

Table 2: Properties of utility function for various Internet services

From the analysis above, it follows that there is also a strong relationship between the usage profile of Internet users and the Internet access rate structure. Firstly, the impact of a switch to flat rate Internet access on Internet usage depends on the distribution of Internet-based services currently used by consumers. Secondly, the introduction of flat rate Internet will certainly have an impact on the structure of Internet usage. In the following, I will focus on the first effect.

The analysis above ignores two possible effects. First, if capacity constraints are binding, the number of users may have a negative impact on the quality of service. For some services, there is hence a balance between positive and negative network externalities. Second, at this stage, the analysis does not take into account the opportunity costs of being online for Internet users. Opportunity costs include opportunity costs of time, and for users with a single phone line, opportunity costs of tying up this line. I introduce these "usage costs" in the analysis below.

The impact of flat rates on Internet usage[32]

Since each Internet-based service has its own characteristics and rules, a switch to flat rate pricing will impact Internet-based services in different ways. For the purpose of analysis, assume that each Internet user uses only one Internet service. He derives no utility ($U = 0$) if he chooses not to access the Internet and utility U if he chooses to access. The Internet user maximises its utility with respect to a connection choice, c ($c = 1$ if he connects, $c = 0$ otherwise), and time spent online at using the service, t, net of the price charged for Internet access, p, plus usage costs, $v(t)$:

$$\max_{c,t} \left\{ U(t,n,b) - \left(p + v(t)\right) \right\}$$

The total price paid by the consumer is $p = p_0 \cdot t$ if the ISP charges consumers on a metered basis, and $p = p_1$ under a flat rate (p_1 does not depend on t). The analysis below suggests that a switch to flat rate pricing will impact time spent online in different ways depending on the type of Internet-based service considered.

Direct positive effect on the time spent online

First, consider Internet services like file transfer. The marginal utility with respect to time is always negative, whatever the tariff structure (i.e., $\partial U / \partial t < 0$). Indeed, users would like file transfer to be immediate (i.e., $t = 0$); in that case, time spent online depends on the size of the file and the available bandwidth, i.e. the minimum time needed to download the file. A switch

[32] In the analysis, I will ignore issues related to priority of information. Indeed, following MacKie-Mason and Varian (1995), economists have suggested that appropriate pricing schemes might solve congestion problems, by allocating bandwidth according to the users' valuations of congestion . This literature will be briefly discussed in the conclusion.

to flat rate has therefore a limited impact on that type of usage. However, note that thanks to flat rate, users may download larger files or more files without incurring extra costs.

Second, consider services like online games or audio/video streaming. It seems reasonable to assume that utility increases with time up to a saturation point, above which marginal utility turns negative. A switch to flat rate increases time spent online up to that point, since $\partial U/\partial t - p_0 - v'(t) < \partial U/\partial t - v'(t)$.

Third, consider services like instant messaging or online radios. Here, it can be assumed that utility increases with time. Therefore, users will stay online up to an upper ceiling, such that $\partial U/\partial t = v'(t)$. If marginal usage costs are low compared to marginal utility, this equation might not have a solution. In this case, a switch to flat rate pricing leads to "always on" behaviours: users stay online all the time.

Indirect negative effect on the time spent online

The introduction of flat rates may also have a negative indirect effect on the time spent online. Indeed, if flat rates create congestion problems, the available bandwidth for each user may be reduced. Since time spent online increases as bandwidth becomes larger, capacity problems may indirectly lead to a decrease in the time spent online. However, some unmetered Internet access providers – like RedHotAnt in the UK – have observed that congestion problems may encourage users to stay online longer: once they get online, users stay online for fear of not getting on again later.

Whether the direct positive effect dominates the negative indirect effect depends on various factors, among which the ability of ISPs and transport operators to cope with congestion problems.

The impact of flat rates on the number of simultaneous connections.

Services like instant messaging or online multi-player games exhibit strong network externalities (i.e., $\partial U/\partial n > 0$). Flat rates may stimulate the demand for these services. First, a switch to a flat rate scheme allows Internet users to increase the time spent at using these services. This, in turn, makes it more appealing to participate in network activities.

Network externalities may lead to an increase in the number of simultaneous connections. For instance, on March 1, 2000, WorldOnline launched an Internet access service in France with unlimited access during off peak hours for USD 27.35 per month. It appeared that 65% of subscribers tried to connect a few minutes after the beginning of the off peak period, at 19:00. A high number of simultaneous connections may subsequently increase the peak load for the networks involved in the Internet access service.

The following table summarizes this analysis. For simplicity, I ignore the indirect negative effect of flat rates on the amount of time spent online. If included, this effect would limit the increase in the time spent online.

Service	***Flat rates tend to increase…***	
	Time spent online	**Number of simultaneous connections**
E-mail	?	No
Instant messaging	Yes	Yes
Chat, online games	Yes	Yes
P2P (Napster/Gnutella)	Yes	Yes
Online radios	Yes	No
Streaming	Yes	No
File transfer	No	Yes

Table 3: The effect of flat rates on Internet-based services usage

This analysis suggests that a switch to flat rate pricing has two major effects. First, it encourages "always-on" connections to the Internet (for services like instant messaging or online radios). Second, it increases the number of simultaneous connections in given periods of time for services which exhibit strong network externalities.

4. The impact of flat rates on the market for Internet access

In most European countries, Internet service providers have launched or announced they would launch retail flat rates for Internet access. This section aims at discussing the impact flat rate pricing can have on the competitive environment. I first concentrate on the impact of

retail flat rates and then turn to wholesale flat rates (and the relationship between retail and wholesale flat rates).[33]

4.1. The impact of retail flat rates

Internet service providers have both incentives and disincentives to introduce flat rates. I discuss first the former and then the latter. Finally, I turn to quality issues.

Increasing revenues from e-commerce and advertising

The introduction of Internet flat rates may increase the amount of time spent online, and incidentally e-commerce revenues. In a recent study, Jupiter Research suggests that online shopping in Europe depends on Internet experience: Jupiter estimated that only 11% of "newbies" (who have been on the Internet for less than a year) have purchased something online while 41% of "veterans" (who have been on the Internet for more than two years) have purchased online.[34] Since Internet experience increases with time spent online, Internet flat rates may stimulate the growth of e-commerce revenues.

Will ISPs benefit from this growth of e-commerce revenues? Typically, the question is: will Internet users spend more time on the ISPs' own portals? The answer depends on the costs incurred by users when switching to a different e-commerce web site. If switching costs are low, ISPs will not *directly* benefit from the increase of e-commerce revenues. Low switching costs are associated with an "open" service – like most ISPs provide – while high switching costs may exist in a "walled garden" model of the Internet.

ISPs may also benefit *indirectly* from the growth of e-commerce revenues through advertising. Indeed, a proportion of e-commerce revenues are transferred to the sites that send potential customers to e-commerce sites (either through advertising or partnership). IPSs' portals with a large Internet audience may therefore earn increasing revenues from advertising or partnership.

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[33] In the United States, the situation is quite different from the one observed in Europe. Historically, local operators used to charge customers a flat rate for local services. Flat rate pricing for Internet access was first introduced by new ISPs for various reasons including: fierce competition, technical difficulties of introducing metering in the TCP/IP environment, etc. These first-movers were soon followed by the incumbent online services providers like CompuServe, or AOL.

[34] See: http://www.emarketer.com/estats/dailyestats/europe/20001116_europe.html.

Extracting more surplus from customers and locking them in

Flat rate pricing provides users and service providers with known expectations for payments. However, users have often only imperfect information ex ante about their usage behaviour (e.g., how long they will stay online each month). Therefore, some customers may subscribe to a flat rate scheme, even though it could be less costly for them to subscribe to other pricing schemes (e.g., a per-minute pricing scheme).[35]

ISPs may also view flat rates as a means to lock Internet users in. First, once he has subscribed to a flat rate, a consumer has no incentive to subscribe to another Internet service provider, since the marginal cost of accessing the Internet is zero. Internet users with flat rates should therefore have a single ISP (while free ISPs' customers tend to have more than one Internet service provider). Second, customers may be required to subscribe to a flat rate for a given time period (e.g., a year). Such constraints increase the switching costs for customers. Flat rates may therefore reduce the Internet churn rate.[36]

Profit incentives

Competition between ISPs has led to a decrease in prices for Internet access for all users. The introduction of Internet flat rates may be viewed as a step toward lower prices for large Internet users. From an economic point of view, low prices ex ante (i.e., prices below costs) may be rational if customers have switching costs: firms compete ex ante to attract customers and are able to raise prices ex post, once they have a customer base. Besides, flat rates may attract new customers to the market.

Flat rates for Internet access may also be seen as a competitive reaction to broadband service providers. Indeed, dial up ISPs compete with broadband providers (either cable- or ADSL-based) which offer flat rates for unlimited broadband Internet access. The tariff structure adopted for broadband access services represents a quality advantage for early entrants in the broadband access market.[37] Therefore, dial up Internet service providers may simply follow or anticipate broadband Internet service providers in charging flat rates for Internet access.

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[35] This phenomenon has also been observed in the mobile telephony industry.

[36] In 1999, The Strategis Group estimated the Internet churn rate in Europe around 25%. See: "European Internet Churn Rate At 25% Reports The Strategis Group", Press Release, Dec. 16, 1999, http://www.strategisgroup.com/press/pubs/eiut99.htm.

[37] For example, this is the case in France for France Telecom's ADSL service, "Netissimo". In November 2000, on Netissimo's Web site, it was clearly indicated that Netissimo involved no metered charges ("*Grâce à*

Encouraging consumers to learn by using and switch to broadband access

As they stay longer online, users get aware of content and services available on the Internet. Once they have explored the Internet and estimated the utility they can derive from it, they may decide to switch to broadband Internet access. Hence, flat rates may help users to experiment Internet-based services at a reasonable cost.

Since Internet service providers will certainly all offer both broadband and dial up Internet access to Internet customers, offering Internet flat rates may be an adequate strategy for an ISP to make consumers "learn by using" and eventually switch to a broadband service. This strategy is rational if the Internet user leases a broadband connection to the same Internet provider. This could be the case if switching costs are sufficiently high.

Cannibalisation

For some Internet service providers, the competitive or profit incentives to introduce flat rates may be weakened by the fear to cannibalise their existing access services. For instance, service providers which offer both dial up and broadband Internet access may be reluctant to introduce flat rates for dial up access, by fear of cannibalising their broadband services.

Leading ISPs may also be reluctant to introduce flat rates if it decreases the revenues they earn from large Internet users. Note that in France and in the UK, flat rates were not introduced first by Internet access leaders but by followers.

Quality issues

Internet flat rates may create network congestion problems. On one hand, if they try to solve these congestion problems, ISPs will have to invest in network capacity. However, investing in dial up network technologies today may be viewed as risky, if one considers that broadband Internet access will substitute to narrowband Internet access in the coming years.

Netissimo associé au service d'accès Internet de votre choix, vous naviguez sur le Net affranchi des communications locales"; see: http://www.netissimo.tm.fr/offre_gamme.asp). The fact that you may access Internet faster with ADSL was not mentioned!

One the other hand, if ISPs do not solve congestion problems, the quality of service decreases. The reputation of the service provider (as being a high quality provider) may decrease and lead customers to switch to other ISPs identified as "high quality" service providers.

Furthermore, flat rate pricing *per se* gives ISPs low incentives to provide customers with bandwidth, compared to metered charging schemes. Indeed, first consider an ISP which charges the local rate to its customers: if bandwidth costs are ignored, the larger bandwidth, the longer users stay online and the larger the revenues. Now, consider that the ISP charges a flat rate to its customers. If we ignore reputation issues, the ISP has no incentive to provide quality, since its revenues are fixed. In other words, with metered charges, ISPs have both traffic and reputation incentives to provide quality, while with unmetered charges, ISPs have only reputation incentives to provide quality.

4.2. The impact of wholesale flat rates

In this section, I focus on the effect wholesale flat rates may have on retail flat rates and the incentives to introduce innovative pricing schemes. Wholesale flat rates may have additional effects. For instance, some historical operators claim that flat rate interconnection raises strong quality issues and may deteriorate not only the quality of Internet access services but also the quality of telephone services. The introduction of wholesale flat rates may also have an impact on the industrial organization of the backbone market. These effects are not covered in this section.

Wholesale flat rates are not necessarily favourable to retail flat rates

It has been suggested that wholesale flat rates always favours the introduction of retail flat rates. I would like to suggest that it may not be necessarily the case. For example, it might not be true if retail flat rates considerably increase the number of simultaneous connections in a given period of time.

To understand why, assume that an ISP introduces a flat rate for Internet access. Assume this ISP (or, more exactly, its transport operator) can choose between two interconnection pricing schemes: an unmetered (flat rate) interconnection scheme with price per circuit p_K and a per-minute pricing scheme, with price per minute $p_{\min}$. The transport operator minimises its interconnection costs.

To simplify, assume there are two periods of time : "day" and "night". Assume further that there are two Internet-based services: an "always-on" service (e.g., instant messaging) and a "community" services (e.g., online games). Users of the "always-on" service are always connected to the Internet (e.g., to receive instant messages), day and night. Users of the "community" service connect massively to the Internet in a given period of time, say night. For instance, online gamers often connect to the Internet at specified hours to play multi-player games.[38] Assume there are k_1 "always-on" users and k_2 "community" users. The network operator must therefore install a capacity equal to $k_1 + k_2$ to avoid congestion (see figure 2 below).

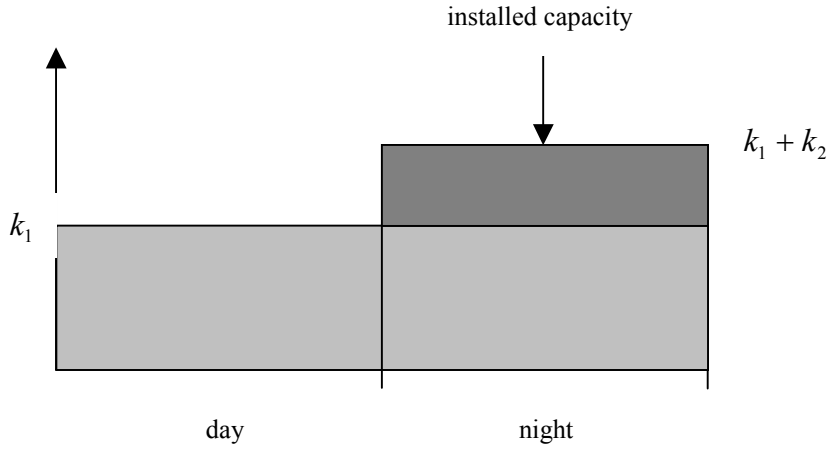

Figure 2: network capacity with always-on and community users

In this framework, the transport operator will choose the flat rate interconnection scheme only if it uses its capacity more efficiently than the incumbent does. If the incumbent's load curve is flatter than the transport operator's, the transport operator will choose the per-minute pricing scheme (see also box below for a development).

For example, assume "day" lasts twenty hours and "night" four hours. The transport operator chooses flat rate interconnection if and only if:

$$p_K \leq \frac{24 \times 60 \times k_1 + 4 \times 60 \times k_2}{k_1 + k_2} \cdot p_{\min}$$

[38] For example, Goa, France Telecom's online platform, organises "Quake nights" which start at specified hours, e.g. 20:00.

Let k_1^I and k_2^I be the capacity used in the incumbent's network, respectively during "day" and "night". p_K is related to $p_{\min}$ through the following formula:

$$p_K = \frac{4 \times 60 \times k_1^I + 4 \times 60 \times k_2^I}{k_1^I + k_2^I} \cdot p_{\min}$$

Let $\alpha \equiv k_1 / (k_1 + k_2)$ and $\alpha^I \equiv k_1^I / (k_1^I + k_2^I)$. It is easy to see that the transport operator chooses flat rate interconnection if and only if $\alpha \geq \alpha^I$, i.e. if its load curve if flatter than the incumbent's.

Wholesale flat rates may encourage innovative pricing

Flat rate pricing at the wholesale level provides transport operators or ISPs with more flexibility in terms of (retail) pricing. Indeed, as Cave and Crowther (1999, p. 17, §3.28) explain: "*If [capacity charging] were adopted, it would then be in the interests of an operator which had bought capacity to seek to fill it in ways which maximise its revenues using whatever retail tariffing methods it found appropriate*". Therefore, flat rates at the wholesale level may provide IP network operators and ISPs with strong incentives to introduce innovative pricing schemes.

5. Concluding remarks

This article aims at discussing the impact of the introduction of flat rates in Europe on the competitive environment. In a first step, I have explored the impact of flat rates on Internet usage. This analysis shows that flat rate pricing has two major effects. First, it tends to increase the time spent online and encourages "always-on" connections to the Internet. Second, flat rate pricing tends to increase the number of simultaneous connections in specific periods of time. In a second step, I have used this analysis to show that the introduction of wholesale flat rates is not a necessary condition for the development of retail flat rates. For the ISP (or its transport operator), flat rate interconnection is less costly than metered interconnection only if it can fill capacity more efficiently than the incumbent. In this paper, I have also analyzed the incentives to introduce (or not to introduce) flat rates. Finally, I have shown that flat rates may create quality issues, due either to congestion issues or low incentives to provide quality.

From a policy point of view, flat rates will probably contribute to increase the time some Internet users spend online. However, it is beyond the scope of this paper to determine whether dial-up flat rates could encourage the development of Internet usage in European countries. First, this paper has focused on dial-up Internet and ignored broadband Internet access. However, broadband Internet access will probably develop fastly in the coming years. Second, Internet access pricing structures might not be the main factor which influences Internet developments. Other factors might also have a strong influence: the competitive environment, the cost of Internet devices, etc. For instance, Bauer, Berne and Maitland (2001) develop a statistical analysis that shows that while price level or regulatory variables have a strong influence on the national diffusion of the Internet, price structure has not.

Finally, as McKnight and Boroumand (2000) suggest, a relevant question is now: what next? Following MacKie-Mason and Varian (1995), economists have suggested that flat rate pricing is an inadequate pricing scheme, once there is congestion problems. The idea is that flat rates do not take into account the users' valuation of congestion. One way to solve network congestion is to over-provide bandwidth. When it is too costly to do so, appropriate pricing schemes might be introduced to allocate bandwidth between users in a more efficient way.

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