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Hanno Beck and Aloys Prinz*

Should All the World be Taxed?

Taxation and the Internet

Governments are beginning to fear that the establishment of the "information society" will cause their revenue from taxation to shrink: economic activities in the virtual world of the Internet could escape the application of value added tax. Are these fears justified? Would a "bit tax" solve the problem?

Technical progress in the computer and telecommunications sector has rapidly increased in recent years. The changes to which these new technologies are expected to lead are manifold. The increasing use of the new communications techniques may lead especially to major changes in the supply of, and demand for, products and services: economic activities are expected to move increasingly to electronic markets. The marketing and supply of certain goods and services can take place there, and it is even possible to order as well as to pay electronically. Due to these changes, a number of suggestions have been elicited as to how governments should intervene in these emerging electronic markets. Some proposals concern the control of the supply of goods and services on the Internet and the adjustment of labour and social security laws. Other suggestions aim at government finances. One of them is the bit tax, a tax on the transmission of information on the Internet.¹ This suggestion will be investigated in the following.

Recent Developments

Four key factors can be identified which have contributed to the rapid success of the Internet.² The first factor has been the tremendous progress in creating, storing and processing data in digital form (microchips, optronics, computer technology and software). Second, new technologies for the online-transfer of large quantities of data have been created such as broadband technology, satellite transmission and mobile communication. Third, the compression of digital signals to enable the optimal use of

transmission capacities has been improved (e.g. within the ISDN-network). The fourth crucial factor leading to the success of communication techniques has been the development of user-friendly man-machine interfaces.

As a consequence of these developments, the use of telecommunication techniques has rapidly grown. The number of Internet hosts in Europe increased from 33,665 in 1990 to 1,999,997 at the end of 1995, and the number of users in 1995 was estimated at between 25 and 50 million persons.³ Along with these developments, the economic importance of the so-called information economy sector which includes information processing and transmission as well as information services has risen. In 1993, the turnover of this sector was DM 3,281 bn worldwide (Figure 1).⁴

These developments will, or might, have various effects. In the following, we shall consider only those which are due to the increasing use of the Internet.

□ New types of jobs (e.g. information broker) are expected to emerge, while others seem to be endangered by the new technologies. This process will even have an impact on the services sector, which was hitherto considered to be protected from technical progress.⁵ It is conjectured that many

¹ Luc Soete, Karin Kamp: The "BIT TAX": the case for further research, Internet 1996, URL: <http://www.ispo.cec.be/hleg/bittax.html>.

² Bundesministerium für Wirtschaft: Info 2000: Deutschlands Weg in die Informationsgesellschaft, Bonn 1996, p. 16.

³ Ute Hoffmann: "Request for comments": Das Internet und seine Gemeinde, Internet 1996, URL: <http://duplox.wz-berlin.de/docs/jb>.

⁴ Bundesministerium für Wirtschaft, op.cit., p. 17.

⁵ European Commission: First reflections of the high level group of experts, Internet 1996, URL: <http://www.ispo.cec.be/hleg/hleg-ref.html>.

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intermediaries may become obsolete in the future, as the development of electronic banking shows.

□ Another consequence of the increasing use of communication technology is the diminishing dependence of production processes on local conditions. The fast and worldwide interchange of information reduces the attachment of some businesses to any particular location: something like a "virtual enterprise" seems to be thinkable.

□ New forms of employment such as teleworking etc. will arise and may change the work and social relations of the future in various ways.⁶

These uncertain and somewhat ambiguous concomitants on the way to the "information society" should be kept in mind while discussing the idea of a bit tax. First of all, however, it is necessary to draw a rough picture of the working of the Internet.

The Internet: How Does It Work?

Three components constituting the Internet can be identified. First, the Internet can be understood as a "network of networks". This needs clarification: every computer network is an "internets", i.e. a connection between a number of computers. The Internet can be seen as the connection of a very large number of these (partial) networks. Inasmuch, the Internet is a so-called "literal network", since its participants are physically connected to each other.⁷ This implies the existence of property rights for these networks. A closer look at the organisation of the Internet verifies this. Three kinds of ownership can be identified:

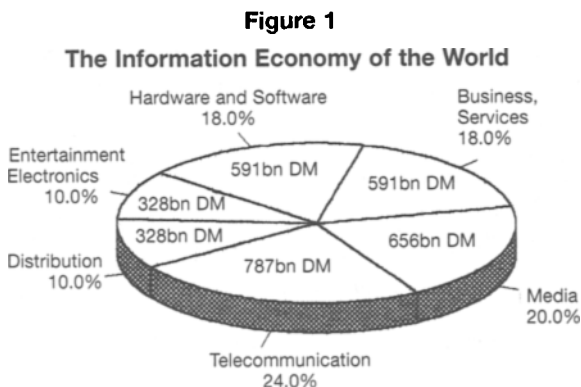
□ There are so-called intranets, internal company computer networks which are set up for firm-internal use. Some of them, but not all, are attached to the Internet.

□ There are networks run by scientific or educational institutions like universities, schools etc. The main purpose of these networks is to promote scientific research and education; commercial applications are excluded from most of these networks.

□ In the recent past, an increasing number of networks are run by commercial providers, which offer their customers not only access to the Internet, but also certain network services. The wires used in all these networks may be put in place by the carriers themselves or rented from network companies (e.g. telephone companies). From this it can be seen that there are set-up costs involved in the provision of the physical net.

The Internet is the sum of all these partial networks. But how do these networks communicate with each other? This leads to the second important feature of the Internet: a common transmission protocol. For the purpose of data transfer between the partial networks, a common communication standard, the Transmission Control Protocol/Internet Protocol (TCP/IP), has been developed and established which enables communication between different networks. Thus, the Internet is not only a literal net that consists of wires connecting users with each other, but it can also be regarded as a "metaphorical network": this means that the Internet is a non-physical network that provides interrelationships via TCP/IP without the necessity of being directly physically connected.⁸

These two main features of the Internet may explain some of its tremendous success in recent years. The early fixing of TCP/IP as a common standard avoided the problem of incompatibility among the different networks. Moreover, TCP/IP has made access to the Internet possible for people without specific knowledge about computer and network technologies. As a consequence of these developments, there is a very large community of actual and potential users. This, in turn, has increased the benefits of the net. A positive network effect has thus been at least partially responsible for the success of the Internet: an increasing number of users in the metaphorical network increased its utility for additional users and made participation in the net more attractive to them. The TCP/IP protocol facilitated the creation of new



Source: Bundesministerium für Wirtschaft, *ibid.*, p. 17.

⁶ *Ibid.*

⁷ S. J. Liebowitz, S. E. Margolis: Network Externality: An Uncommon Tragedy, in: *Journal of Economic Perspectives*, Vol. 8, No. 2, p. 135.

⁸ *Ibid.*, p. 136.

partial networks. This diminished the problem of high overhead costs to a large extent, which in the case of literal networks is often believed to lead to natural monopolies. Any provider might set up his own partial network, but would still be able to communicate with other nets. Put differently, a world-wide net can be used without bearing the tremendous block of fixed costs necessary to install such a net.

The third feature of the Internet is the collection of resources provided by the net. Some of them are (still) free of charge (e.g. search engines like Lycos or Yahoo, as well as ftp, E-Mail, WWW), whereas other services already charge fees.⁹ The commercial services, for instance, are offered by banks, insurance companies and travel agencies, but distributed by so-called Internet Presence Providers, a special kind of provider.

Using the Internet can be described as follows: the end-user needs an account with a host of a so-called provider, where access to the Internet is possible. The provider may be a firm, a university or a commercial enterprise, depending on the owner of the particular network. In the latter case, the user has to pay a fee to the provider. This fee may depend on the amount of data transferred as well as on the duration of the connection. Several providers charge a fixed sum, others use a two part tariff. The data sent by the user are transferred by the provider via his net. Because no provider owns a worldwide net, he uses the nets of other providers and pays for this. Generally speaking, a provider using any other net has to pay for it. A message sent by an end-user may be handed to its point of destination through many nets with various owners, whereby each owner will charge a fee for using his net. Every "handshake" between networks will trigger payments between their possessors. Figure 2 illustrates the organisation of the Internet.

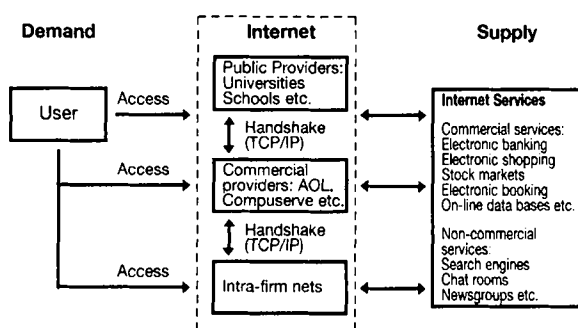
Now we are able to describe how the Internet is financed: the costs of setting up and maintaining the net are borne by the providers. Furthermore, they also bear the costs of installing and running the hosts necessary to access the Internet. If the provider is a commercial firm, it will shift these costs to its end-users.¹⁰ In addition to these costs, the end-user will have to pay his telephone bill for dialing up the nearest host of his provider (the so-called point-of-presence or Internet Service Centre) and the costs for the hardware and software needed to get access to the net. In addition to that, the end-user will have to pay for the chargeable commercial net services he actually uses. One point should be clear: even if the use of some services on the Internet is free, the transfer of data during this use is definitely not.

The Proposal for a Bit Tax

The proposal for a bit tax has recently been discussed in Europe as well as in the United States.¹¹ The arguments favouring such a tax are various and will be presented in the following.¹²

The basic idea leading to the proposal of a bit tax is as follows: the structure of our economies is shifting from the production, distribution and consumption of tangibles to intangible goods and services. The value added throughout the entire production and distribution process can easily be traced and located in the case of tangibles, but not in the case of intangibles. As a consequence, increasing parts of the value added in production and distribution are considered invisible and hidden in an "...unmeasured but not unnoticed increase in consumer surplus".¹³ Therefore, it seems that the benefits of the new information and communication technologies are not taken into account in official statistics: the Consumer Price Index may be overestimated due to the fact that it ignores product improvements and growing consumer surplus. Furthermore, profits, salaries and even prices may not reflect the gains associated with these new technologies.

Figure 2
Organisation of the Internet



⁹ Many of these services are financed by advertising, a fact that implies that the use of these resources is not for free in an economic sense.

¹⁰ A university or a school does not usually shift the costs of using the Internet to the end-users (e.g. students) due to its aim of promoting education. This does not mean that the use of the net is free of charge to these institutions.

¹¹ Mark Ward: All the world shall be taxed, in: The New Scientist, 20th July 1996, p. 14f.

¹² The arguments presented in this section are based on the paper by Soete and Kamp.

¹³ Luc Soete, Karin Kamp, op. cit.

At the same time, a nation's tax base may erode: the new communication technologies, according to this argument, are avoiding the prevailing taxes. Sending a message by traditional mail, for example, will cause the payment of VAT on the stamp or delivery bill, while the VAT on an e-mail will be practically nil (except the VAT on the dial-up and the local telephone costs). Put more generally, the producers of visible and easy traceable goods have to pay VAT which they pass on via prices to customers. Hence, they are becoming less competitive than those who are using the new communication technologies which avoid these taxes. This leads to the conclusion that electronic markets are likely to reduce tax revenues. Thus, a bit tax seems to be required to adjust the tax base in a way that allows the full amount of the value added in an information society to be induced.

The second argument is based on the presumably negative side-effects of network technologies that allow information exchange with low or zero marginal costs: a bit tax may reduce the so-called "information pollution" in the net, i.e. the overcrowding of the net caused by "...junk' and irrelevant information being transmitted".¹⁴ Due to this "data junk", the transmission speed of urgent data can be slowed down. A bit tax could be interpreted as a Pigou tax which is thought to fill the gap between the marginal private costs of information transmission and the marginal social costs of data congestion, thereby forcing the user to restrict the use of the Internet to transmissions with higher marginal benefits than the marginal social costs of congestion.

In addition to these arguments, a third reason for levying a bit tax is related to the misuse of the net by persons during their working hours. Such a tax could provide an incentive for a more efficient use of the net at work and restrain workers from surfing on the net just for fun.

Last but not least, a bit tax can be seen as an instrument to protect intellectual property rights: software, books, pamphlets etc. can easily be downloaded without paying for them. A tax on the amount of data transferred would reduce such activities.

The tax base in each of the forementioned cases would be the amount of bits or bytes transferred. The proceeds of this tax could be spent on social items. In particular, the High Level Expert Group, an independent group established by the European Commission, suggested spending the tax revenue on

financing the social security system in Europe. Their goal is to reduce the distributional implications of the emerging information society, which are partially considered to be negative. The question, however, is whether the arguments presented by the promoters of a bit tax are really convincing on economic grounds.

Erosion of the Tax Base?

To decide whether a nation's tax base is being eroded due to the new communication technologies, we shall check the arguments presented above.

First, what can be said about the taxation of intangibles? Will a substantial part of the value added in the production of intangibles "evaporate"?¹⁵ Recalling the nature of a value-added tax, this question must be negated: the efficacy of such a tax does not depend on the nature of the good, but, rather, on whether there has been an increase in its value. When the good is sold for a positive price the value added can be measured and, hence, taxed. There is no reason why the production of intangibles could escape VAT. Since all services are in a sense intangibles, they serve as a perfect example that intangibles are indeed subject to VAT.

Moreover, as has been shown above, the use of the Internet is not free of charge: the use of the net has to be paid for either by the provider or by the end-user. The bill also includes value-added taxes.¹⁶ In other words: using the Internet means nothing but using a service that is taxed like any other service. A letter sent by mail is taxed as is one sent by e-mail: in the first case, VAT is levied on the stamp, in the second on the fees paid to or by the provider.¹⁷ In both cases, the value of the transfer of information is taxed. Insofar, VAT cannot be avoided. From this point of view, an erosion of the VAT tax base caused by new communication technologies cannot be established.

However, it seems that the VAT paid for the transmission of information by mail is higher than for an equal amount by e-mail. Could this be called an erosion of the tax base? The higher the costs and prices for the transmission of information, the higher the VAT. Since traditional forms of information transfer are in several cases much more expensive than

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ VAT is usually explicitly mentioned in the bill; see for example <http://www.mcb.net/mannet/brochure.html>.

¹⁷ Furthermore, the telephone bill as well as the hardware and software are also covered by VAT.

electronic transfer via the Internet, the VAT receipts are also higher. Switching from traditional technologies to electronic means implies lower prices for a similar service and a lower VAT. In this way the consumer surplus of information exchange increases. But as a matter of fact, this feature applies to many kinds of technical progress. The Internet can be considered to be a process innovation: it is a new technology for transferring information with lower costs.¹⁸ Does this increase of the consumer surplus imply a reduction of the tax base? The answer is definitely no: an increased consumer surplus means a higher purchasing power for a given income. The increased purchasing power will be transformed into a higher demand for other products, or it will be saved. But even if it is saved, sooner or later it will be transformed into consumption, thus necessarily increasing the tax base of the VAT.

It is therefore not at all surprising that the recent trend to higher shares of service industries in GDP has not reduced VAT revenues. As Table 1 shows, even in high-technology industries the value added in all OECD-countries (except Italy) has risen since 1970.

Overcrowding the Internet?

The fear of an "overloading" of the Internet is as old as the net itself. Why has the net not broken down already, especially in face of the tremendous increase in the number of users in recent years? To answer this question, it may be helpful to distinguish between pecuniary and technological externalities.

Pecuniary externalities are external effects that are transmitted via the price system, while technological externalities are imposing benefits or costs directly on others. To improve welfare, it is necessary to internalise technological externalities by creating property rights through private negotiations or government interventions. Pecuniary externalities, however, should not be internalised because this would reduce welfare.¹⁹ This can be illustrated by the Internet.

The increased use of the net may indeed lead to a congestion of the net, and the time required to send a message or file may rise. An increasing network

workload implies rising response times in those networks that are especially popular.²⁰ This may cause dissatisfaction among the users. In contrast to congestions on literal highways, the data highway allows the users to switch to other providers, transmit their messages by other media or simply leave the net.

If a provider is aware of the increase in demand for the services of his net and the disaffection of his customers, he has two alternatives: first, he could raise the price for using his net by charging higher fees. This would reduce the amount of data sent on this part of the net like in any other market. The private costs of transferring data will, for any user, be equal to the social costs. Another possibility consists of expanding the capacity supplied to the customers: increased demand is answered by increasing supply. The latter reaction can be observed in recent years: in the Federal Republic of Germany, for instance, the only light wave cable net was increased from 31,000 kilometres in 1990 up to 100,000 kilometres in 1995.²¹

To sum up, the problem of the overcrowding of the Internet can be seen as a pecuniary effect: increasing demand leads either to higher prices or to an increasing supply, thereby solving the problem of overcrowding by market forces. External effects caused by the congestion of the net are internalised through the price system.²²

Table 1
Value Added in High-technology Industries¹ in Selected OECD Countries
(as percentages of total manufacturing)

Country	1970	1992
Australia	8.9	10.4 ^a
Canada	10.2	11.2 ^a
Denmark	9.3	12.3
Finland	5.9	10.7
France	12.8	18.8
Germany	15.3	20.8
Japan	16.4	22.2 ^a
Netherlands	15.1	18.6
Norway	6.6	9.4
Sweden	12.8	14.5
United Kingdom	16.4	21.8
Italy	13.3	13.2 ^a
United States	18.2	23.7 ^a

¹⁸ From another point of view, the Internet may also be considered to be a product innovation, because it enables the emerging of new products (like search engines etc.)

¹⁹ S. J. Liebowitz, S. E. Margolis, *op.cit.*, p. 137.

²⁰ It should be stressed that there is no demand for the Internet itself, but only for the services of certain strands which belong to single providers.

²¹ Bundesministerium für Wirtschaft, *op.cit.*, p. 22.

^a 1990

^b 1989

¹ These include aerospace, computers, communication and office equipments, semiconductors, electric machinery, pharmaceuticals and scientific instruments.

Source: The OECD Jobs Study. Evidence and Explanations, Part I: Labour Market Trends and Underlying Forces of Change, Paris 1994, p. 149.

Optimal Taxation

Since it is not possible to justify a bit tax with the arguments presented hitherto, it is economically important to ask whether such a tax could have some advantages in comparison to other forms of taxation. This leads us to the theory of optimal taxation. What can be said about a bit tax from this point of view?

The tax system is optimal when it minimises the efficiency losses of taxation for a given amount of tax revenues. This implies that taxation should not alter the production and consumption of goods and services that would prevail without taxation. The taxation of a new production process, i.e. the use of the Internet, would cause several disturbances of the allocation of resources: the bit tax would raise the prices for using the net and reduce its use although it is less resource-consuming than other forms of information exchange. In this way, economic efficiency would be reduced. Theoretically speaking, a bit tax only makes sense if the price elasticity of demand for net services were equal or near to zero. This, however, will not be the case because there are many substitutes for information transmission by the Internet.

The Internet is a rather new kind of technology that is not yet an integrated part of daily life. The introduction of a bit tax would, therefore, lead to a decrease in the use of the net, causing a distortion of the choice between alternative means of information transmission. In addition to that, the revenues from this tax would also be lower than expected.²³ Thus, the introduction of a bit tax is not desirable from a fiscal point of view.

Other Aspects

The remaining arguments for a bit tax require only short comments. Surfing on the net might indeed distract workers from doing their job. However, there are many ways in which workers may consume leisure during working hours. But it is not the role of the government to enforce work discipline. It is in the self-interest of the employers to solve this problem. Moreover, rising costs for the Internet may not

necessarily lead to a decrease in surfing activities, as Soete and Kamp pointed out: the monitoring of workers or other incentive devices would still be necessary.²⁴

The last argument in line is the protection of intellectual property. The bit tax could be seen as a kind of payment for the unauthorized use of information. This is only half the truth: most of the information available on the Internet has been placed there in order to be widely spread. Using this information cannot be considered as a violation of copyrights. Furthermore, many of the Internet services that are free at present may be chargeable in the near future. (And even if they remain freely available, why prevent an author from providing the public with his or her ideas for free?) The argument concerning the copyright problem is only valid when someone (not the author him- or herself) places articles or books on the net for free downloading without the permission of the author. This might not happen that often, and if it happens it can be prosecuted by law.²⁵ Moreover, the example of shareware shows that most programmers are not afraid to distribute their programmes, since this is an easy way to inform their (potential) customers about their newest products.

Summary

The arguments presented by the advocates of a bit tax have two flaws. First, the use of the Internet cannot be considered as free. Second, the tax base for VAT is the value added to a product. This means that any good that sells for a positive price is subject to VAT. Hence, the VAT on the transmission of information (in general: on intangibles) is not only possible but already in place. Furthermore, the providers own the literal nets and will restrict access to the net by increasing their prices if there is congestion on the data highway. As a consequence, there seems to be no economic reason for levying a bit tax. Moreover, the imposition of such a tax would decrease the efficiency of the distribution of information; taxing the net would be equivalent to taxing technical progress. There is no economic reason to slow down the increase in our welfare.

²³ Moreover, one could ask whether the increase of the transmission of so-called "irrelevant" information was not at least one reason for the success of the Internet. The increasing network workload caused by these applications may have led to an increase in the net's capacities. Furthermore, the rising number of people using the net, whether for useful or useless applications, may have increased the positive network effects described earlier.

²⁴ The estimations of the turnover of such a tax vary between \$ 5 and 10 bn for Belgium; cf. Luc Soete, Karin Kamp, op. cit.

²⁴ Soete and Kamp argue convincingly that similiar problems which arose with the introduction of telephones have been solved by the companies themselves.

²⁵ The comparison with existing taxes on photocopying, used by Soete and Kamp, does not stand up to closer examination. The reason is that an author can easily protect his copyright on the Internet, for instance, by allowing access only to users who have paid a fee.