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JULY 2002

Ruling the waves

NEW EC LEGISLATION WILL ALLOW SPECTRUM TRADING IN THE UK

As new technologies create new ways of using spectrum, competing demands for this finite resource must be resolved. Historically, European legislation has prohibited the trading of spectrum but a new EC framework directive changes this. In the UK, recent months have seen the publication of an independent review of spectrum management, which recommends the introduction of trading, and a draft Communications Bill, which paves the way for the adoption of this approach. In a recent study of spectrum policies for Vodafone, Frontier has explored some of the implications of these developments.

All radio spectrum up to 60GHz is fully committed in the UK. At a global level the International Telecommunication Union co-ordinates international agreements on frequency use. At the European level the basis for spectrum management is provided by EC legislation across the Community while CEPT (the European Conference of Postal and Telecommunications Administrations) provides a forum for more detailed →

planning decisions. Within the UK the Radiocommunications Agency (RA) and the MOD primarily manage the use of spectrum, although some responsibilities fall to sector-specific regulators (e.g., the Civil Aviation Authority).

In recent years the RA has introduced usage charges designed to reflect market values and has used auctions to assign new spectrum rights for 3G mobile services. However, current European legislation prohibits the actual trading of licences. Instead, transfers of spectrum rights can only be achieved through takeovers or if existing users choose to surrender their rights, allowing the RA to reassign them.

An independent review of spectrum management in the UK (the "Cave report") was published in March 2002. Professor Cave's recommendations are clear and, in his own words, this review "strongly advocates the earliest and widest application of spectrum trading possible". Two new pieces of legislation are likely to make this recommendation a reality.

- The new European Framework Directive on the regulation of electronic communications networks and services allows member states to introduce spectrum trading. It requires national spectrum management authorities to ensure that transactions do not distort competition or result in the infringement of existing international agreements on spectrum use.[1]

- The draft UK Communications Bill, which will reform the regulatory framework in the communications sector, will create a single regulator (Ofcom) and give it powers to authorise the trading of spectrum rights.[2]

As a result, two questions are currently occupying both the users and managers of spectrum rights in the UK: should rights be made tradable, and if so, how?

WHY AND HOW?

The economic rationale for spectrum trading is straightforward: in general, a competitive market will deliver an efficient allocation of resources. Specifically, trading should ensure that spectrum rights are obtained by those who place the highest value on them. This point is illustrated by the following example.

A good deal

Alphacom possesses the rights to use a particular range of frequencies that it values at £1m. Betatel does not have rights to this spectrum but values them at £3m. This difference in the valuations might reflect the fact that Betatel is more efficient than Alphacom, or that it wishes to use the spectrum to provide a higher-value service. Allowing trading would result in Betatel buying spectrum from Alphacom at a price between £1m and £3m. Economic efficiency is increased since spectrum is moved from a low-value to a high-value use. The efficiency gain from trade is given by the difference in the users' valuations; i.e., £2m.

For a competitive market to allocate resources efficiently a number of conditions must be met. A market for spectrum rights could fail if any of the following do not hold:

- information on the price and availability of spectrum rights is available to all potential users;
- there are no significant transactions costs associated with trades;
- use by one party does not impose costs on another; and
- no potential user can restrict competition in a downstream market by acquiring spectrum rights.

In the UK the first two conditions should not pose problems. The process of trading should be made as straightforward as possible: potential trading partners should be free to negotiate prices in the first instance; spectrum rights should be divisible; and the costs of trading should be kept to a minimum. The third and fourth conditions raise more issues, but provisions to address them through regulation have already been laid

down by the Framework Directive. Externalities may arise from spectrum use in the form of interference between different users. Preventing this is the purpose of national and international spectrum planning regimes, and the Framework Directive requires national spectrum authorities to ensure that trades do not breach these conditions. Similarly, the Directive also requires national authorities to block trades that distort competition. Such action might be required where purchases of spectrum would enable an operator to restrict entry into, or expansion in, the provision of downstream services and thus secure a dominant position.

DIFFERENT MEANS, SAME END

The introduction of trading is not, however, the only way in which spectrum rights can be priced to encourage economic efficiency. Indeed, the RA has already employed two other methods of spectrum pricing.

- Usage charges are applied to spectrum rights used for a number of services (including the existing 2G mobile telecoms).

- Spectrum licences for the provision of 3G mobile telecoms services were sold by auction.

In both cases the objective of these approaches is the same – to deliver an efficient allocation of spectrum rights. However, these approaches may not have the same results as trading.

The existing regime of spectrum usage charges is designed to mimic the results of spectrum trading. Charges are set on the basis of estimated market prices. If these estimates were accurate, spectrum would be allocated efficiently: users who value it at less than the market price would have an incentive to surrender their rights, allowing them to be reallocated to higher-value users.

In practice such accuracy is rare. Estimation requires extensive information.. If charges are set below the true market price, they may not deliver any improvement in efficiency at all, since existing spectrum users may be happy to pay the charges even though others value the rights more highly. In this case the charges may simply serve to raise revenue. Alternatively, usage charges set above the market value may actually reduce efficiency, as users who are only prepared to pay the market price would surrender their rights and no other potential user would be prepared to take them over. In contrast, competitive spectrum trading could be expected to deliver the right price, and hence an efficient allocation, automatically. For this reason, trading is generally preferable to usage charges.

The basic rationale for spectrum auctions is the same as for trading: the bidding process allows rights to be obtained by the users who value them most highly. However, an auction results in a one-off allocation of rights. When technology is developing rapidly, it is unlikely that the valuations of different users will be constant over time. So even if an auction would result in an efficient allocation of spectrum rights at a given moment, subsequent changes in valuations may render that allocation inefficient.

Combining an auction with usage charges or trading would encourage users to respond efficiently to changes in their valuations of spectrum. Again, however, the complexities of setting usage charges would be considerable. In particular, introducing or increasing usage charges after an auction could result in a degree of "double-charging". This could damage future investment incentives – particularly with regard to future auctions. In general, the combination of an auction with subsequent trading is preferable to an auction with subsequent variations in usage charges.

CHARGING AHEAD?

While trading appears to offer a simple route to maintaining the efficient use of spectrum, it raises concerns about the "windfall gains" that may accrue to the initial owners of spectrum rights. If the regulatory regime is changed to allow trading, but "grandfather" rights are retained by the existing users (regardless of whether or not they

paid for the rights originally), then some spectrum owners may profit inappropriately from the sale of spectrum rights.

The Cave report suggests that retaining usage charges in the short to medium term might be a simple way of controlling these gains. If usage charges are attached to tradable rights then they will be reflected in the market price. For example, if a user derives £1m of value from a set of rights, but charges equivalent to £0.25m are applied over their life, then the user would not pay more than £0.75m for them. Since the usage charges affect the valuations of all users equally, they would not distort the efficiency gains from trading (unless set at so high a level as to choke off all demand entirely). However, imposing usage charges on tradable rights may simply redistribute windfall gains, as illustrated below.

Selling their grandfathers

Alphacom has grandfather rights to use certain frequencies for the next 10 years. It values them at £10m, but paid nothing to acquire them. Betatel places the same value on these rights, so if they are traded at this price, Alphacom would realise a windfall gain of £10m. The effects on this gain of different usage charges can be illustrated with three simple examples.

- A usage charge reflecting the market value of £10m over 10 years is introduced. Betatel is only prepared to pay a nominal fee for the rights and no significant windfall gains are accrued.
- A usage charge amounting to £4m over 10 years is introduced. As a result, Alphacom sells its spectrum rights to Betatel for £6m. In this case, Alphacom realises a windfall gain of £6m.
- A usage charge equivalent to the £10m over 10 years is applied to Alphacom, but is not transferred to subsequent users. In this case, Alphacom negotiates a price with Betatel of anything up to £10m. The price paid represents a windfall gain to Alphacom, while Betacom makes a gain equal to the difference between that price and its own valuation of £10m.

In deciding on the appropriate treatment of windfall gains, governments face two difficult issues. First, identifying the level of gains is not straightforward, as in many cases the spectrum values may partly reflect the investments in spectrum-using technology that users have made.[3] Second, windfall taxes must be used with caution if investment incentives are to survive unscathed.

MORE TRADING, LESS CHARGING

The efficiency properties of competitive markets provide a compelling argument for the widespread introduction of spectrum trading in the UK. While trading complements auctions the combination of trading and usage charges offers nothing in terms of efficiency. Furthermore, applying usage charges to tradable rights to address windfall gains may damage efficiency incentives without reflecting the true value of any windfall.

SOURCE	1. *Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services, 7 March 2002* 2. *The draft Communications Bill, The Stationery Office, May 2002* 3. *Indeed, in the context of UK mobile telecoms services it is far from clear that there are any "windfall gains" that need to be addressed.*
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