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inform...

are spectrum auctions ruining our grandchildren's future? Martin Cave and Tommaso Valletti

This article considers the case for auctioning spectrum and evaluates the charges made by Nicholas Negroponte against the British government for imposing an 'economically unsustainable' tax on internet technology with high licence fees raising prices to consumers, delaying the roll-out of infrastructure and discouraging operators' ability to meet non-economic social demands. The debate is couched in terms of auctions v beauty contests and outlines the modus operandi of each. It is argued that auctions are an unusually flexible means of allocating resources in ways designed to achieve a range of policy objectives, have the benefit of transparency and if laws are explicit, potential bidders know in advance the basis upon which they are competing which is efficient and equitable. The beauty contest, however, has disadvantages in terms of process and efficiency and opens the door to favouritism and corruption. The government is also implicitly asserting that it has better information about the firms' prospects than the firms themselves and there would be a squandering of public resources undesirable on distributional grounds. The article argues that the size of the licence fee does not affect prices and disputes the various attempts made to refute this argument with the conclusion that Negroponte's analysis is not in any way persuasive and that the lesson to be learned by the government is better auction design and rigorous implementation of competition policy.

The recent outspoken attack by Nicholas Negroponte on the baleful effects on posterity of UK auctions for 3G spectrum has attracted considerable attention. According to Negroponte, the effect of the £22 billion paid for the five UK licences will be to delay roll-out of the 3G

networks, raise consumer prices and cast a blight generally on wireless internet applications.

In the months following the UK auctions, the incipient panic in financial markets at the prospect that firms would have to provide several hundreds of billions of Euros to acquire licences throughout the European Union began to subside. According to the *Financial Times* of Thursday 6 July, 'Europe's third generation mobile phone bonanza is disappearing from view'. The paper notes that, because of poor design, auctions in the Netherlands and Germany failed to create an

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adequate incentive for new entrants. Operators have also responded by establishing bidding consortia.

It remains to be seen whether this revisionist view prevails. Our objective here is principally to consider the case for auctioning spectrum and to evaluate Negroponte's charges. We are assuming that the alternative to auctions is a model in which licences are allocated through a beauty contest with fees set in advance, since some assignment is necessary to avoid interference and congestion. Traditionally, fees have been set at levels designed to recover engineering and regulatory costs alone. However, as is noted below in relation to the French government's proposed allocation of UMTS licences, fees can be set at any level up to the operators' willingness to pay.

In one sense, the focus of most of the recent discussion, on licence assignment, misses the point. This is because licences are assigned to particular operators within the context of a prior allocation of spectrum across major types of usage. If this spectrum allocation is made suboptimally (as is almost certainly the case), then spectrum assigned for some purposes, such as mobile telephony, is unnecessarily scarce. One of the main culprits here are the military. In Italy, two thirds of available frequency bands are occupied by the ministry of defence at zero cost. In the UK the situation is broadly the same but an administrative charge is levied for the spectrum, the defence budget being simultaneously increased by the equivalent amount. In principle, the ministry of defence retains the budget increase even if it releases spectrum, thus saving the administrative charge.

Auctions v beauty contests

The point about a market system is that it creates an environment in which scarce resources end up in the ownership of the people who value them most highly. Households and firms demonstrate this every day through their purchases of sales of goods and services and of labour. Alternative resource allocation mechanisms, in which some central agent decides who gets what, have generally failed.

Auctions are just another means of employing the price mechanism, normally used in the allocation of a fixed number of objects – fish on a dock, old masters, oil extraction licences and, more recently, spectrum.

As in other market transactions, auctions ensure that assets gravitate towards those who place the highest value on them. In the case of

a mobile licence (and associated spectrum), this might be the operator with the greatest technical knowledge or marketing flair.

But it might also be the operator with the greatest capacity for monopolization. Consider, for example, a situation in which three mobile licences were up for auction. The three licences probably have the highest value in the hands of a single operator, which would then have the monopoly of the service. This would obviously be an undesirable outcome. It can, however, be simply remedied through appropriate auction design – in this case, a rule that any operator can only control one licence.

The auction rules could similarly be set to achieve other objectives. For example, if there is a desire to bring new entrants into the market, some licences can be reserved for them, or they might receive special benefits in the auction process (for example, by adding a notional monetary sum to their bids).

Other policy objectives can be built into an auction process by imposing appropriate licence conditions. Suppose, for example, it is an objective of policy to ensure a fast network roll-out, perhaps faster than a licensee would choose to go in its private interests. Then a licence could be allocated subject to roll-out conditions. This would presumably reduce firms' willingness to pay, but the government must have believed this to be worthwhile, as otherwise it should not have imposed the condition.

Thus auctions are an unusually flexible means of allocating resources in ways designed to achieve a range of policy objectives. They also have the great benefit of transparency. If the auction rules are explicit, potential bidders know in advance the basis upon which they are competing. This is not only efficient, because it encourages bidders to participate, but also equitable, because they are treated equally.

The mode of operation of the beauty contest is quite different. Typically, the government invites applications which are scored according to some pre-set criteria. Licences are allocated to those whom the government believes best meet the stated requirements. This has several disadvantages in terms of process and efficiency. A major subjective element is inevitably present in the comparisons, opening the door to favouritism or corruption. Moreover, the government is implicitly asserting that it has better information about the firms' prospects than the firms themselves, because it is substituting its own judgement for the judgement of commercial prospects implicit in firms' bids.

Finally, if the administrative charge for a licence is less than its market value, income which through an auction process would have accrued to the government is left with the firms'

shareholders. This does not in itself involve inefficiency, but many people would object to this squandering of public resources on distributional grounds.

Negroponte's attack

Negroponte criticized the British government for imposing what he calls an 'economically unsustainable' tax on internet technology. He evidently believes that the effect of the high licence fees will be to raise prices to consumers, to delay the roll-out of infrastructure and to discourage operators' ability to meet non-economic social demands.

We have already discussed the way in which auctions can be designed to meet side conditions, like the network roll-out and social obligations. If a government had objectives of this kind, it should choose what it considers to be the optimal targets and impose them as licence conditions. An auction process can accommodate such objectives as well as a beauty contest.

In our view, the essence of Negroponte's criticism is that higher licence fees will, other things equal, mean higher prices for consumers. The 'other things equal' condition is important, because if the reason for the high licence fee is that the government is selling a monopoly, then bids will be higher than in a competitive environment because prices are expected to be higher. But the direction of causation is different from that apparently identified by Negroponte.

To see why high licence fees do not raise prices, consider how a firm decides what to bid for a licence. It will know from the rules of the auction process how many competitors would be licensed and hence how many firms will be competing to provide service. By forming a conjecture about how the competitive process will play out, it can estimate what revenues over and above capital and operating costs it will earn. On this basis, it can calculate the maximum a licence would be worth to it and judge its bidding accordingly.

Suppose that now it has been successful. It has paid for the licence, either up-front in full or through a binding commitment to pay in instalments. As far as the firm and its competitors are concerned, the licence fee is an irrevocable sunk cost. When deciding how to set prices, the firm rationally only takes account of its own forward looking costs and revenues and the likely behaviour of other firms. Since the licence fee is a sunk cost for all firms, it falls out of the pricing equation for all of them. Hence the size of the licence fee does not affect prices.

Various attempts have been made to refute this argument. We list three here, in ascending order of credibility. The first is that even though firms

should logically maximize their profits on the basis of the comparison of forward looking costs and forward looking revenues, managers in all the licensed firms will act 'as if' the licence fee were a forward looking cost, and raise prices accordingly. The obvious flaw in this argument is that if all the licensees except one behaved in this way, the last licensee could increase its profits by undercutting the others and stealing their business.

Secondly, it is suggested that operators burdened by substantial sunk licence costs will feel themselves more vulnerable, hence more reluctant to engage in price wars and more inclined to act collusively. But this is open to the same objection as above.

Finally, it is suggested that large licence payments erode the finances of operators, requiring them to assume debts and thus reducing their credit rating. The effect is to increase the costs of borrowing for all purposes, and hence to raise the forward looking costs. This downgrading of the credit rating has been observed in the case of Vodafone.

In our opinion, this is a genuine but small risk. High licence payments do not in any way influence the systematic risk associated with a mobile phone company (the degree to which its returns are linked returns to the stock market as a whole). There is, however, potentially a small increase in bankruptcy risk, which may have the effect of modestly increasing the cost of capital, for smaller companies, although the effect on telecommunications giants would be tiny.

Short-term financing problems can be relieved by staging spectrum or licence payments. But this should not go too far. If it does, the down-payment is, in effect, merely the payment of an option, and the body issuing spectrum becomes effectively an issuer of financial instruments.

In summary, we do not regard Negroponte's analysis as being in any way persuasive. It appears to be based upon a fundamental misapprehension about how firms set their prices in order to maximize their profitability. Moreover, the alternative is both bad for efficiency and over-generous to shareholders.

The roll-out of UMTS assignments

Finally, we note the progress in the assignment of UMTS licences within Europe.

Table 1 shows a mixed picture. Finland and Spain have already made their awards through beauty contests. In Spain, France Telecom has challenged the outcome in the courts; we regard this as a natural response by unsuccessful applicants to the discretionary and subjective

Table 1: UMTS licensing.

<i>Country</i>	<i>Process</i>	<i>Status</i>
Belgium	Auction	
Denmark	Auction	
Finland	Beauty contest	Already awarded
France	Hybrid (beauty contest with flat fee)	
Germany	Auction	Already awarded
Italy	Auction	
Netherlands	Auction	Already awarded
Norway	Auction	
Portugal	Beauty contest	
Spain	Beauty contest	Already awarded
Sweden	Beauty contest	
Switzerland	Auction	
United Kingdom	Auction	Already awarded

nature of beauty contests. The success of the UK auction has elicited responses from both other governments and bidders. In particular, France has adopted a hybrid system, in which licensees are chosen through a beauty contest but charged a high fee – about half that paid in the UK auctions. Bidders have responded by quitting the contests or by forming alliances. Thus the recent German auction attracted only half the number of participants as the UK auction. There may, in some cases, be the same number of bidders as of licences. The resulting allocation of licences to what may be inefficient operators and reduction in fees paid will deprive consumers of opportunities and the government of revenue without bringing prices down. The lesson to be learnt is better auction design and rigorous implementation of competition policy.