

This article, based in part on the newspaper article appended below “Are Auctions Always Best?” will become part of “The Biggest Auction Ever” (joint paper with Ken Binmore).

## Auctions vs Beauty Contests

### *Arguments for Auctions*

Most importantly, a well-designed auction is the method most likely to allocate resources to those who can use them most valuably.<sup>1</sup> Rather than rely on government bureaucrats to assess the merits of competing firms’ business plans, an auction forces businessmen to put their “money where their mouths are” when they make their bids. An auction can therefore extract and use information otherwise unavailable to the government.<sup>2</sup>

Secondly, the difficulty of specifying and evaluating criteria for a beauty contest<sup>3</sup> makes this a time-consuming and opaque process that leads to political and legal controversy, and the perception, if not the reality, of favoritism and corruption.<sup>4</sup> Indeed, some governments make no secret of choosing beauty contests precisely because of the possibilities for favouring their “na-

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<sup>1</sup>Allowing resale is not a perfect substitute for an efficient initial allocation, because resale is itself generally inefficient. See Myerson and Satterthwaite (1983) and Cramton, Gibbons, and Klemperer (1987).

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<sup>3</sup>Nicholas Negroponte (the technology guru who is one of the most prominent advocates of beauty contests), for example, argues that 3G licences should be allocated to those who would guarantee the lowest costs to consumers, invest the most in infrastructure, stimulate most creativity, etc. But how can firms guarantee consumer prices for 5-20 years in the future for products that we may not yet even be able to imagine? Infrastructure investment can be costed, but will it all be useful? How can the government possibly decide who will be most creative? And how could the government monitor and enforce any commitments made by firms? How should the government penalize a firm that turns out to be insufficiently creative?, and what should the government’s response be to a firm that is creative and develops a product with valuable unforeseen features but above the previously guaranteed price? It is hard to think of a more serious drag on innovation than pre-specifying future prices for products that don’t yet exist!

<sup>4</sup>The Spanish and Swedish 3G beauty contests, for example, provoked litigation and substantial and still-continuing political debate. By contrast, a losing bidder complimented the U.K. on its auction process.

tional champions” over foreign firms. But such protectionism is unlikely to benefit consumers or taxpayers.

Thirdly, of course, an auction can raise staggering sums of money to support the public finances—the UK auction yielded about two and a half per cent of GNP, or enough money to build 400 new hospitals. A beauty contest, by contrast, can give away valuable assets at a fraction of what they are worth. The winners of the UK’s previous “second-generation” licences paid “administration fees” of just £40,000. Economists argued that those who advocated beauty contests should say how they would prefer to fund the government. Did they want higher income taxes?<sup>5</sup>

Some have argued that auctions are unfair to firms who are “forced to bid”. It is true that incumbent mobile-phone operators might feel forced to win a new licence, or see the value of their previous investments sharply reduced. But in no European 3G auction have there been fewer licences than incumbents,<sup>6</sup> so the prices of licences were set by new entrants who had nothing to lose if they failed to win a license. And in the U.K., Germany, Italy and elsewhere, some licenses were won by companies who had no previous presence in those markets, proving that companies who were under no pressure to compete saw the risks as worth taking. (Indeed in the U.K. case one winner quickly re-sold a share of its licence at a 37% profit!<sup>7</sup>) Of course, the companies are taking huge risks in bidding in an auction, just as, for example, firms take huge risks when they invest in developing a new aircraft or a Channel Tunnel. They know that they are buying into a lottery that might result in huge losses or huge gains. Although the media now say that

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<sup>5</sup>Martin Feldstein (1999) recently estimated that every extra \$1 of income tax raised in the U.S. costs the economy an additional \$2 in deadweight losses caused through the disincentives to earn, and the misallocation of resources to avoid taxes. True Feldstein’s estimates may be greatly overstated—[?] 30 c in deadweight loss would be a more typical estimate—but charging companies for spectrum incurs none of these additional costs.

<sup>6</sup>although such an auction seems likely in Hong Kong.

<sup>7</sup>See Section 8.1.

the winners of the British 3G auction “paid too much”, only time will tell whether their gamble was a good one.<sup>8</sup>

### *Price Effects*

The media continues to argue that firms’ costs in the auction will be passed on to consumers in the form of higher prices. This would be at least partly true for an auction in which firms bid royalties (see Section 5.2). But the argument is mistaken for an auction in which firms make once-and-for-all lump sum payments. Like any other firms, telecom companies will charge the prices that maximise their profits, independently of what the spectrum cost them in the past.

One way to explain how sunk costs work to journalists is to imagine we are now in 2010 and the new cellular telephone services are being sold at whatever prices it turns out maximise their profits. How would these prices change if the government were to refund with interest the payments the operators made for their licences, so that the situation became the same as if the licences had been given away? Other things being equal, the prices would remain exactly the same, because a company would be irrational to lower its price below what the market will bear; the only result of the refund would be to increase the profit of the shareholders of the operating companies.

To take a more familiar example, consider housing prices. The price of new housing is no lower when the developer had the good fortune to obtain the land below its current market value (e.g. because it was bought before planning permission was available) than when the developer has paid the full market value. In either case, the price is determined by the housing market at the time the new housing is sold. There is no more sense in handing out free spectrum to the telecom companies than in handing out free land to developers in the belief that this will lead to cheaper houses.

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<sup>8</sup>It is because entrepreneurs take such risks that caution must be exercised in taxing away their profits when things turn out well.

Of course, telecom companies (and land developers) have enormous incentives to argue the opposite, because they obtain large windfall profits if they can obtain a scarce resource for free. And it is true that consumer prices can be affected (even by past lump sum payments). For example, paying auction fees could somehow create “focal points” that allow firms to tacitly co-ordinate on charging higher prices. Paying auction fees also makes firms poorer, so perhaps more willing to risk collusion, especially if they believe they are too poor to afford any fines. And an auction will, in principle, select those firms that are better able to collude (hence are more profitable). But all these effects seems small, and certainly avoidable with proper competition policy.

Much more worrying is that companies’ specious arguments may fool politicians and regulators into agreeing that the auction is a reason for allowing artificially high prices.<sup>9</sup> If we do see higher prices in countries that ran auctions, it will be because of these political effects.

#### *Investment Effects*

Another possible concern is that large auction fees may slow investment because of capital-market constraints. Giving licences away to firms at discounted prices would certainly relax firms’ capital-market constraints, just as any other state handouts would. There may perhaps be good grounds for subsidising this industry, but advocates of giveaways need to explain quite a lot: Why subsidise this industry rather than others? Why subsidise the mobile-phone operators (rather than, for example, providers of content to be transmitted over the mobile-phone networks)? Why subsidise them to this extent?

Furthermore, even a government that accepted (as the British government

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<sup>9</sup>Oftel (the U.K.’s telecoms regulator) will be doing just this if it accepts operators’ arguments that it should permit firms to set higher call-termination fees to “reflect” firms’ sunk auction costs.

did not) that auctions would have significant deleterious investment (or price) effects might find it in its own national interest to run an auction, because the auction revenues accrue only to the country itself while any investment effects apply to other countries too—the fact that Telefonica’s consortium spent over \$7 billion on a licence in Germany and almost nothing on its Spanish licence is obviously not an argument for Telefonica to invest less in Germany than in Spain.<sup>10</sup> (In fact some commentators have suggested the opposite, arguing that internal-organisational incentives will drive firms to rollout their services faster in Germany to demonstrate that they can quickly recoup their auction costs, though we doubt this effect is large.)

### *Conclusion*

Occasionally—for example, when there are too few potential bidders, or large costs of supplying necessary information to bidders—a form of structured negotiations may be better. However the general rule is that auctions treat firms fairly and transparently, and yield the greatest possible benefits for consumers and taxpayers.

### **Royalties or Lump Sum Payments?**

Payment for licences using a royalty rather than a lump-sum fee is another way of promoting entry, both because it allows the government to share the risk with an operator, and because new entrants are likely to make smaller payments for any given royalty rate, but we were unenthusiastic about using royalties. They must necessarily be levied on some genuinely observable variable, for which profit is not a candidate. They are therefore usually based on some correlate of revenue. For example, in some American oil-tract auctions, the royalty is based on an independent metering of the oil pumped to the well-head, valued at that day’s market price.

However, a royalty based on revenue corresponds to a “value added tax”

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<sup>10</sup>The Spanish government may have noticed this. It is belatedly trying to levy large fees on the winners of its beauty contest.

and so creates deadweight losses in an oligopolistic industry such as telecoms, for exactly the same reason that a sales tax makes a monopoly or oligopoly worse. A royalty of the form  $x$  cents per phone call corresponds to a specific tax and is even more distortionary.<sup>11</sup> By contrast oil has, roughly speaking, a “world price” that is largely unaffected by any one country levying a royalty.

Royalty payments also allow possible default, or attempts at renegotiation if optimistic predictions of demand turn out to be mistaken. One therefore faces the risk that a buyer may treat his purchase only as an “option to buy”. Many of the U.S. spectrum auctions suffered from this kind of behaviour—winners were not required to make payments upfront and some simply never paid—which caused the FCC much administrative difficulty and political embarrassment.

All these problems arise when royalties are pre-set by the government. If firms bid royalties, the problems are even worse: the US Department of the Interior ran a very unsuccessful experiment with royalty-based auctions for oil-tracts about 20 years ago, in which the government fixed a relatively small up-front “bonus” payment, and the companies bid percentages of their revenues. The result was that many speculators bid enormous royalty rates in order to win licences. If the oil-fields turned out to be highly productive they could make money even at the high royalty rates, but most fields were simply not developed, even when it was economically efficient to do so. (For example, a winner paying an 80 percent royalty would develop a field only if it yielded a return more than five times the production cost.)

And, of course, further distortions would be created in an oligopolistic market like telecoms if different winners paid different royalty rates.

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<sup>11</sup>To see that a proportional tax (or royalty) on revenue is less distortionary than a per-unit (specific) tax, observe that the former corresponds to the sum of (i) a non-distortionary proportional tax on profits (= revenues - costs) *plus* (ii) a distortionary proportional tax on costs. For a given amount of tax raised, this is less distortionary than a per-unit tax provided marginal costs are not too high.

(This is the original article written in October 2000, from which the El Pais article was translated.)

### **Are Auctions Always Best?**

In March 2000 the U.K. government was the first to auction third-generation mobile-phone licenses. Although analysts predicted the licenses might perhaps be worth \$5 billion, the auction actually raised around 7 times as much---around \$34 billion. Not surprisingly, the U.K.'s example has now been widely copied across the world. Even countries who had originally chosen 'beauty contests' (administrative hearings) to allocate their licenses have been having second thoughts. The rules of the Italian beauty contest turned it into an auction by another name (albeit a very badly-designed one); Hong Kong recently switched from a beauty contest to a 'hybrid' that will probably in effect be an auction; there are rumours that the Irish beauty contest may also look more like an auction; and there have been calls for the result of the Spanish beauty contest to be nullified and the licenses to be reallocated by an auction.

But are auctions the best way to allocate radiospectrum licenses?

To an economist the answer is almost always "Yes!"

#### **AUCTIONS ARE BEST**

Most important, a well-designed auction is the most likely method to allocate resources to those who can use them most valuably. Rather than rely on government bureaucrats to assess the merits of competing firms' business plans, an auction forces businessmen to put their "money where their mouths are" when they make their bids, so the auction extracts and uses information unavailable to the government.

Second, even if the government did have access to good information---and the lamentably poor government estimates of the money that spectrum auctions would raise are just one illustration of how little the government knows---allocation by bureaucrats leads to the perception, if not the reality, of favoritism and corruption. In fact some governments may well have chosen beauty contests precisely because of the possibilities for favoring, e.g., "national champions" over foreign firms. But such protectionism is unlikely to benefit consumers or taxpayers.

Third, of course, an auction can raise staggering sums of money to support the public finances---the UK 3G auction yielded about two and a half per cent of GNP, or enough money to build 400 new hospitals. A beauty contest, by contrast, can give away valuable assets at a fraction of what they are worth. Those who advocate beauty contests should say how they would prefer to fund the government. Do they prefer higher income taxes? (The distinguished economist Martin Feldstein recently estimated that every extra \$1 of income tax raised in the U.S. costs the economy an additional \$2 in deadweight losses caused through the disincentives to earn, and the misallocation of resources to avoid taxes. True Feldstein's estimates may be overstated, but charging companies for spectrum incurs none of these additional costs.)

Some have argued that firms' costs in the auction will be passed through to consumers in the form of higher prices, and this would probably be at least partly true for an auction in which firms bid royalties. But the argument is mistaken for an auction in which firms make once-and-for-all lump sum payments. Like any other firms, telecom companies will charge the prices that maximize their profits, independent of what the spectrum cost them in the past. To take a more familiar example, consider housing prices. The price of new housing is no lower when the

developer had the good fortune to obtain the land below its current market value (e.g. because it was bought before planning permission was available) than when the developer has paid the full market value. In either case, the price is determined by the housing market at the time the new housing is sold. There is no more sense in handing out free spectrum to the telecom companies than in handing out free land to developers in the belief that this will lead to cheaper houses.

Of course, telecom companies (and land developers) have enormous incentives to argue the opposite, because they obtain large windfall profits if they can obtain a scarce resource for free. And it is true that consumer prices could be affected (even by past lump sum payments) if, for example, an auction somehow allows firms to tacitly coordinate on higher prices, or the companies' specious arguments fool politicians and regulators into agreeing that the auction is a reason for allowing artificially high prices, e.g. through permitting collusion. But with intelligent regulation these effects should be small.

Finally, how practical is a beauty contest? Technology guru Nicholas Negroponte, for example, has argued that winners should be chosen according to who would guarantee the lowest costs to consumers, invest the most in infrastructure, stimulate most creativity, etc. But how can firms guarantee consumer prices for 5-20 years in the future for products that we may not yet even be able to imagine? Infrastructure investment can be costed, but will it all be useful? How can the government possibly decide who will be most creative? And how could the government monitor and enforce any commitments made by firms? How should the government penalize a firm that turns out to be insufficiently creative?, and what should the government's response be to a firm that is creative and develops a product with valuable unforeseen features but above the previously guaranteed price? It is hard to think of a more serious drag on innovation than pre-specifying future prices for products that don't yet exist!

And the difficulty of specifying and evaluating the criteria for a beauty contest make this a time-consuming and opaque process relative to the rapidity and transparency of an auction. So even a well-run beauty contest is more likely to generate a legal challenge after the fact.

Of course, the companies are taking huge risks in bidding in an auction, just as, for example, firms take huge risks when they invest in developing a new aircraft or a Channel Tunnel. The companies might come huge croppers; or they might make huge fortunes. Only time will tell. But in the U.K., Germany, and Italy, some licenses were won by companies who had no previous presence in those markets, proving that companies who were under no pressure to compete saw the risks as worth taking. (Indeed in the U.K. case one winner has already sold a share of its license at a profit!) Whether the large license costs will speed or slow investment is ambiguous---arguments can be made in both directions. But what is clear is that the companies have invested in licenses because they believe that it is in their own business interests to do so.

### ...BUT AUCTIONS DO NEED CAREFUL DESIGN

Certainly an auction needs careful design to work well, and must be tailored to the specific country's context---auction design is a matter of 'horses for courses', NOT 'one size fits all'. (See my paper 'What Really Matters in Auction Design' at [www.nuff.ox.ac.uk/economics/people/klemperer.htm](http://www.nuff.ox.ac.uk/economics/people/klemperer.htm).)

The Netherlands and Italian auction designs, for example, both foolishly aped the U.K.'s ascending-auction rules in contexts in which the U.K. system was clearly inappropriate. The crucial difference is that there were far fewer bidders in Holland and Italy. Both the Netherlands and Italian auctions would have been much more successful if bidders had been forced to



make sealed "best and final" offers rather than participating in an ascending auction---and this was predictable (and predicted) in advance.

Last week, in Italy, for example, there were just six bidders for five licenses. Because one of the bidders, Blu, looked weak, the other bidders did not need to bid aggressively in the ascending auction which always allowed them to come back and top any bid that Blu made. When Blu dropped out just a few rounds after the auction began, the result was per capita revenues below 40% of the British and German levels. But if the government had asked for sealed, final offers that the bidders could not revise, the other bidders could not have taken the risk of bidding so low. They would have felt forced to make serious offers in case Blu had turned out to bid more strongly (e.g., Blu might just have been pretending weakness), so the government would have raised much more money. Indeed, Blu itself might perhaps have made a reasonable offer even if---as was the case---it didn't feel able to bid up to the level required to be a winner in the ascending auction. And this possibility would also have encouraged more aggressive bidding from the others. In addition, a sealed-bid design might have attracted more entry into the Italian auction, and further improved the outcome.

It has been alleged that the Italian auction also suffered from collusion. That may or may not turn out to be true. But if it was the case, it is yet another reason why a sealed-bid auction (in conjunction with proper anti-collusion measures) would probably have worked better---an ascending design facilitates collusion by making it easier for firms to check that their collaborators are sticking to the collusive agreement.

The Netherlands also had just six bidders, one of whom seemed very weak, for five licenses, with results similar to Italy's; in fact, the Netherlands per capita revenues were less than 30% of the U.K. levels.

But even the badly-designed Netherlands and Italian auctions probably performed no worse than beauty contests which would most likely have yielded the same winners and no more revenue for the government. Very occasionally---for example, when there are too few potential bidders, or large costs of supplying necessary information to bidders---a form of structured negotiations may be better. However the general rule is that auctions treat firms fairly and transparently, and yield the greatest possible benefits for consumers and taxpayers.

.....Paul Klemperer was the principal auction theorist advising the U.K. government (the first in the world to run a third-generation mobile-phone license auction) on its auction design. He is Edgeworth Professor of Economics at Oxford University, and also advises the U.S. Federal Trade Commission on antitrust matters. His papers on auctions can be found at [www.nuff.ox.ac.uk/economics/people/klemperer.htm](http://www.nuff.ox.ac.uk/economics/people/klemperer.htm) .