

Auctions, Sunk Costs and Other Arcane 3G Issues

From the viewpoint of the telecommunications industry, debacle is probably not too strong a word to use to describe the outcome of the European auctioning process for third generation mobile phone licences during the summer of 2000. The UK and German governments raised close to US\$80 billion between them, and this was hailed at the time a great success. Martin Wolf, a financial journalist writing in the *Financial Times* of London, 25 June 2000, responded passionately to those who thought high auction prices would cripple the industry and burden consumers with high costs, explaining that these ‘critics are wrong: selling the spectrum is exactly what governments should do.’ Wolf’s influential article went on to present the standard arguments in favour of the auction process. ‘It is the most efficient, because licences will go to those who value them most. It is the fairest, because it ensures that the economic value goes to the community, while eliminating the favouritism and corruption inherent in bureaucratic discretion.’

Turning on critics he wrote. ‘When critics complain about such auctions, they have to be saying one (or more) of four things: that the government should have made a present of the excess profits – or, more exactly, of the scarcity value of the spectrum – to the likes of Vodafone AirTouch and British Telecommunications; that the managers and owners of these companies are incapable of working out what a licence is worth to them; that taxpayers should protect shareholders against their own irrational exuberance; or that the interests of taxpayers should be sacrificed to those relatively well-off consumers. These propositions are ridiculous, outrageous, or both.’ To drive his point home, Wolf ends his article with what appears to be an unassailable case. ‘It is perfectly possible that the victors have been over-optimistic and will suffer from the “winner’s curse”. But this should be of little concern, since the licences are “sunk costs” and are unlikely to have any long-term effect on pricing.’

It is time I came clean. I agree with Wolf when he says that critics must be saying one of those four things. I believe the second to be true, and the importance of this is that it was largely the managers and owners of these companies that decided the bidding, together with some “irrational exuberance” of shareholders – who should *not* be protected. The level of uncertainty that surrounds the business case for 3G is quite different from that of 1G or 2G or even 2.5G. In 2000, 2001 and 2002 the technology is not fully known, and nor are alternative technologies that can give rise to broadband wireless substitutes such as the 802.11 standard. It is also true that no-one within the industry or close to the industry knows what services will be available, which of them will sell, who will buy them and how revenues will be raked in along the value chain. The 3G value chain is fundamentally different from earlier mobile phone markets. 3G is a mobile access technology to broadband Internet, and the demand for access is derived from the demand for services delivered over the Internet. These services may not even be delivered to the same handheld mobile device used to make the request. Unlike voice-focused 1G and 2G, the range of services likely to be in demand is not intrinsic to the network itself.

On this basis, it is not at all clear that the owners and managers and exuberant shareholders who paid such high auction prices had really stopped to think through the

implications. What did they think they were buying when they bought a license? The right to provide access, yes, but what else? No licence is required to provide content, and in the Internet world the idea of locking customers into a 'closed garden' and thereby restricting access to the content and applications provided by a single 3G service operator is a non-starter, not to say illegal (France) or unacceptable to the regulator (UK). So, yes it seems the critics had a point.

Probably not, according to Ken Binmore, Leverhulme research professor of economics at University College, London and advisor to the UK and Hong Kong governments on auctions. 'Nobody but a fool bids more in an auction than he thinks the licence is worth' he wrote in Hong Kong's *South China Morning Post*, 26 March 2001. Had he read the frank admission by Sir Peter Bonfield, BT's CEO to the *Sunday Times*, London, 18 February 2001, 'We spent £10 billion too much'? The *Asian Wall Street Journal* 6 June, 2001 quoted Sir Christopher Gent, CEO of Vodafone, as concurring 'We wish we hadn't paid so much.' For comment the AWSJ turned to another architect of the UK auction process, Paul Klemperer (see Klemperer, 2001) of Nuffield College, Oxford, who with a hint of Machiavellian shrewdness pointed out 'At £1 billion or £10 billion the psychology is the same.' After all, designers of auctions think their job is to raise as much money as possible for their client. Less convincing was *The Economist's* hindsight on 5 May 2001, 'The real cause of the companies' troubles is that the market has changed. They did their sums before they made their bids. They knew the risks. Who else knows what the market is worth?' This nicely misses the point, as well as the irony of its own rhetorical question. If no one could know the sensible value to place on a 3G licence, then an upfront money auction, English or Anglo-Dutch¹ style, was totally inappropriate under the circumstances.

Like the *Financial Times*, *The Economist* weighed in for market solutions, as did other familiar allies. In my neck of the woods this meant the *Asian Wall Street Journal*² and notable local journalists on the *South China Morning Post*.³ Even when things turned sour for 3G licence holders the *Financial Times* found it hard to swallow. An editorial (Martin Wolf again?) on 24 November admitted, 'mobile telephone services have quickly gone from a potential pot of gold to a cauldron of ruin', but still clung to the ray of hope of the sunk cost argument, believing that 'to the extent that the per capita licence fee reflects the relative potential revenues from 3G, investment should be faster.' A final opportunity for an editorial *mea culpa* and an obituary for the UK-style of auction was

¹ The Anglo part is an open ascending auction, the Dutch part is a sealed-bid auction.

² For example see 'In Defence of Spectrum Auctions', David Hendon, Chief Executive of the UK Radiocommunications Agency, *AWSJ*, 1 August 2000, 'Spectrum Auctions are Beautiful' Stephen Brown, Kim Eng Securities Research, Hong Kong, *AWSJ* 9 August 2000. My response 'Beauty Contests Can Be Rational' appeared on the same page.

³ Martin Wolf's arguments were repeated in Hong Kong by the *South China Morning Post* columnist Jake van der Kamp who sparked off the debate with one central issue, 'simply the money involved.' *SCMP* 5 April 2000. Using a crude per capita comparison with the UK, 'an auction in Hong Kong could bring us a windfall revenue of up HK\$50 billion (US\$6.4 billion).' *SCMP* 22 May 2000. In the event, the NPV of the reserve auction price (5 per cent of attributable turnover) of US\$668 million over 15 years was between US\$200 million and US\$250 million, using WACC discount rates of 15 per cent or 12 per cent, that is twenty-five times less than the SCMP's non-discounted sum.

passed up on 11 December 2000. 'The very high prices they attracted from bidders, it will be claimed, directly led to bankruptcies in the telecoms sector and difficulties for banks. Nothing could be further from the truth. If there have been failures, it lies with the managers of telecoms companies for over-estimating the value of 3G licences, and with the shareholders for failing to curb their managers' exuberance.' It's those fallible managers again, if only auctions could be run without them.

The debate moved from the financial press to a bi-monthly interdisciplinary journal named *Info*, edited by Colin Blackman. William Melody, who for a period had taken over the editorial reins of *Telecommunications Policy* from Colin Blackman, joined *Info* to become Policy Forum editor starting with the February 2001 issue. The previous August *Info* had carried a paper by Martin Caves and Tommaso Valletti (2000) arguing the orthodox position regarding sunk costs, responding in particular to Nicholas Negroponte's assertion that the UK auction fee imposed an 'economically unsustainable' tax on mobile Internet services. Negroponte had also been the subject of Martin Wolf's repost. In Hong Kong I was already deeply engaged in the public debate, having been convinced that the UK-style upfront auction fee was totally inappropriate to the 3G issue for reasons outlined above. I responded to Caves and Tommaso in Ure (2001) and my paper was part of the first Public Forum debate edited by William Melody for *Info*.

Hong Kong's 3G Debate

In the remainder of this essay I write about the debate in Hong Kong because the Government finally adopted my own proposal for a royalty auction rather than an upfront money auction English or Dutch style. The popular view throughout the summer 2000 was for Hong Kong to follow the UK and Germany. A turning point in the debate arose on 18 September 2000 as a result of a keynote lecture given by Professor Melody⁴ to the Telecom InfoTechnology Forum, or TIF, a quarterly industrial roundtable I organize to raise funds for the Telecommunications Research Project which I direct. Both OFTA and the Information Technology and Broadcasting Bureau regularly attend TIF and frequently speak. At the forum a member of the Legislative Council (Legco) who had been leading the demand for a UK-style auction stood up to say that having heard the arguments it was now clear the issue was more complex than it had at first appeared. To win Legco away from the popular idea that the primary purpose of an auction for 3G licences should be to raise as much money as possible for the Treasury was a precondition for rational thinking on the issue.

Drawing on his experience at the FCC, Professor Melody's address covered a review of the history of thinking about how bands of spectrum should be allocated between different uses and assigned within those bands to licensed users. The purely administrative or beauty contest approach was clearly an inadequate way to achieve efficient outcomes and was usually determined by who had the best lobbyists. On the other hand, as the supply of spectrum is not market determined, and the public good aspects of spectrum require the adoption of standards, market mechanisms were unlikely

⁴ See *Third Generation (3G) Auctions for Hong Kong? The Lessons from Overseas: Summary Paper*, 18 September 2000, and related papers at www.trp.hku.hk/tif. This forum was sponsored by Sunday Communications Ltd. On 21 September 2001 they were awarded one of four 3G licences.

to solve all problems. These arguments subsequently appeared in *Info* (Melody, 2001) and they undoubtedly opened minds to my own contribution, first submitted in May 2000 in response to an OFTA Consultation Paper,⁵ with a follow up in October, and subsequently written up for *Info* in February 2001.

First, the sunk cost problem. On the one hand, it is not true that sunk cost will have no impact in a competitive market. If there is a common denominator sunk cost, namely the lowest winning bid, then it makes good sense for operators to aim to recover at least that. They will build it into their annual forward-looking costs. If one firm breaks ranks and cleans up, then its resulting market power will give it the opportunity, and therefore the incentive, to try recouping at least this amount, although unless it is entirely price inelastic market growth may slow as a consequence. On the other hand, a large overhang of debt raises the risk premium on lines of credit and cost of capital, and acts as a disincentive to build out the network to areas of marginal profitability. In Europe the build-out targets have been imposed by regulators, not investors.

As of 2001, the enormous 3G-debt overhang in Europe⁶ entirely overshadows this arcane argument between economists. The debt problem had unanticipated consequences on the restructuring of the sector as share prices plunged and the cost of equity finance put paid to IPOs. 'This is the year 1929 for the telecom industry' was how one telecoms executive put it to the *Asian Wall Street Journal* on 13 August 2001. It gives another meaning to 'telecom reform' that is very different from the one associated with William Melody's intellectual efforts. Even lending banks have faced warnings from regulators in Europe in case they too get dragged down. It is also true that this debacle coincided with a general turn towards recession in the US economy and a none too robust European economy, but the fact remains that consumer confidence has not been the principle problem facing would-be 3G operators, and their 2.5G progenitors. Consumer indifference is more the case, compounded by technological glitches that disappoint those who have tried the new mobile phones, such as WAP handsets.⁷

My royalty auction proposal aimed at achieving two objectives. To provide a guaranteed return on the use of spectrum to the community, and to avoid the large upfront costs of a 3G licence, the value of which was impossible to determine. The latter proposition is perhaps best underlined by reference to real options valuations. (See Alleman and Noam, 1999). In my model using a straightforward net present valuation of a hypothetical Hong Kong 2G operator with 20 per cent market share, and quite generous assumptions about future customer demand and average revenue per user (ARPU), the estimated value of a

⁵ See http://www.ofta.gov.hk/frameset/industry_index_eng.html. The only similar suggestion I am aware of came from John Kay writing in the *Financial Times*, 29 November 2000.

⁶ Outstanding corporate debt of BT, Deutsche Telekom, France Telecom and KPN was a staggering €185 billion as of June 2001, according to the *Financial Times*, 21 June 2001 p.24, and as their credit ratings slip to single A and triple B, their interest payments rise in tandem, the bank's so-called 'coupon step-up'.

⁷ 'One of the most influential regular studies of mobile phone use, produced by A. T. Kearney management consultants and Cambridge Business School, is due to reveal tomorrow that most consumers are utterly uninterested in surfing the internet from their mobile phone.' *Financial Times*, 'The Telecoms Crash, Part 11', 6 September 2001. 'Consumers Yawn at Dawn of 3G Future' was how the *Asian Wall Street Journal's* 'Networking' supplement put it, 22 February 2001.

3G licence turned out to be US\$72 million. This rose to US\$88 million if the capture of a 25 per cent market share by 2010 was assumed. In reality there were only four bidders for four licences and they each went for an estimated NPV reserve price of US\$50-US\$60 million, depending upon the rate of discount used. The real option value, using the Black Scholes model that requires *inter alia* data on past share price variations, came to six times these values. The collapse of share prices renders the real option exercise valueless, yet the real option underlies the idea that it is possible to value the future business, in this case on the basis of the options a 3G licence offers. Few people in the industry doubt that over the 'long term' 3G will become a successful business, but none can place a value on it. Even NPV estimation is pure guesswork based upon highly questionable assumptions about things determined largely by exogenous factors.

Under these circumstances, and if the regulatory authorities view 3G as a business that will bring wider benefits to the community and economy, for example by stimulating the sectors capable of producing content and applications, it makes sense not to second guess the future. It makes better sense to synchronize the need to pay a fee for spectrum with the ability to pay. A royalty auction does exactly that. An alternative approach is to replace the guaranteed minimum payment to the public purse with an incentive to reduce prices to consumers. This would be justified if the public externalities were considered very important.

A Model

A tax rate or royalty payment on revenue, call it X , shall be bid such that $X = x^*$ when $B \leq L$, where x^* is the auction reserve price, B is the number of bidders and L is the number of licences on offer; and $X = X^*$ when $B > L$, where X^* is the auction bid price. An alternative is to set $X = 0$ if income $Y \leq Y^*$, and $X = X^*$ when $Y \geq Y^*$, where $Y^* = P^* \cdot Q^*$, where P^* is the ceiling price offered by the licensee, and Q^* the number of subscribers at the ceiling price that triggers Y^* , and where X^* is some positive tax rate or royalty payment on revenue.

Note: $X = X^*$ if $Y \geq Y^* = P^* \cdot Q^* \leq P^\wedge \cdot Q^\wedge$,
 where $P^\wedge = P^* \cdot [(P^* - P)/P^*]$ where $[(P^* - P)/P^*] \leq 1$,
 and $Q^\wedge = Q^* \cdot [(Q - Q^*)/Q^*]$ where $[(Q - Q^*)/Q^*] \geq 1$
 so that $P^* \geq P^\wedge$, and $Q^* \leq Q^\wedge$

which says that as the licensee reduces P below the ceiling price P^* the number of subscribers required to trigger Y^* rises above Q^* . In cases where the price elasticity of demand is > 1 revenues and therefore royalty payments will increase as prices fall. In cases where the price elasticity of demand < 1 , the benefits of price reductions fall exclusively to consumers.

John Ure
 Director of the Telecommunications Research Project
 University of Hong Kong

www.trp.hku.hk

jcure@hkucc.hku.hk

References

Alleman, J. and Noam, E. (eds) (1999) *The new investment theory of real options and its implications for telecommunications economics*, Boston: Kluwer Academic Publishers

Cave, M. and Valletti, T. (2000) 'Inform – are spectrum auctions ruining our grandchildren's future?' *Info*, 2(4): 347-350

Klemperer, P. (2001) 'What Really Matters in Auction Design' Discussion Paper, University of Oxford: Nuffield College. At: <http://www.paulklemperer.org/index.htm>

Melody, W. (2001) 'Policy forum - spectrum auctions and efficient resource allocation: learning from the 3G experience in Europe', *Info*, 3(1): 005-010

Ure, J. (2001) 'Feedback – licensing third-generation mobile: a poisoned chalice?' *Info*, 3(1): 011—014. At: <http://www.trp.hku.hk/publications.html>