Topics in spectrum management

Reserve prices in spectrum auctions: why size matters

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Auctions have proved to be a popular tool among governments and regulators for the assignment of scarce spectrum resources for mobile use. While the economic rationale for auctions is sound, the actual implementation has at times been flawed and the implications costly. This Insight looks at spectrum auction trends over the last decade, focusing on reserve prices in particular, and the issues to consider in setting them.

The ascension of auctions

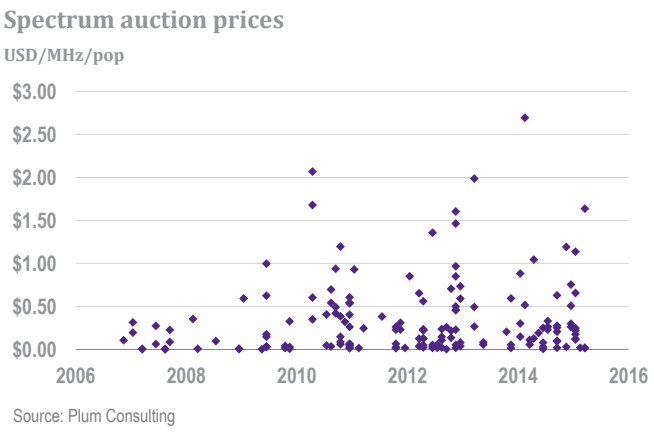
The first spectrum auction was held in the US more than 20 years ago. Today, auctions are widely accepted as a market-based policy instrument in the field of spectrum management. Despite some criticism, especially in the wake of the European 3G auctions and the dotcom bust[1], auctions are now used in many countries, particularly for mobile spectrum assignments.

The rationale for auctions is a simple one – where supply is limited, an auction is likely to be the most efficient way to ensure that scarce public resources are awarded in a transparent manner to those who value it the most. At the same time they provide governments a fair return for a valuable public asset.

Spectrum values on the rise

The primary driver of growth and change in the mobile telecoms sector over the last decade has been the rapid smartphone take-up and mobile data traffic growth. The start of 4G rollout has coincided with a flurry of spectrum auctions in recent years with billions being spent by mobile network operators. In general spectrum prices have been on the rise in recently, with some[2] approaching the sort of levels not seen since the 3G auctions in 2000.

Although country- and auction-specific differences make comparisons tricky, it is clear that prices in general have climbed significantly although the range of prices has also widened. This is illustrated in the following chart which is based on a sample of 160 auctions for mobile bands[3] across 56 countries.



Source: Plum Consulting

These prices reflects the growing importance of wireless connectivity in society today and of spectrum as the essential input to mobile networks and services. Yet while consumers have benefited hugely from mobile-driven innovation and services, mobile operators' revenue growth has been sluggish in recent years due to maturing markets and competitive pressures and GSMA has forecast slow growth through to 2020.[4] Mobile operators, already facing pressure to develop new business models and revenue streams and to invest in deploying 4G networks, are thus being further squeezed by rising spectrum prices.

Fretting over reserve prices

A perennial worry of mobile operators is the reserve prices for spectrum auctions; in recent years there has been a marked tendency towards higher reserve prices. There are several reasons for this. First, the availability of more market information on spectrum prices has given governments and regulators the impression that spectrum value is heading only

[1] The common objections to auctions were that they could lead to higher consumer prices, reduced investment and negative effects on the market value of telecoms companies. See P Klemperer (2004). Auctions: theory and practice.
[2] Notably Canada 700 MHz (2014) and the US AWS-3 (2015)
[3] 700, 800, 900, 1800, 1900, 2100, 2600 MHz bands

[4] GSMA. Global Mobile Economy Report 2015. http://www.gsmamobileeconomy.com/GSMA_Global_Mobile_Economy_Report_2015.pdf

in one direction – up. However, this impression is misleading as benchmarking alone only provides a partial picture. Prices vary significantly across countries and depend very much on specific market circumstances and future expectations. This is why a robust approach to valuation which incorporates different methodologies is needed.[5]

Second, in recent years there appears to be a growing emphasis, explicit or otherwise, on generating public revenue through auctions although policy objectives such as facilitating market entry, deterring collusion and promoting industry development continue to be important goals. And a simple way to increase revenue is to raise reserve prices.

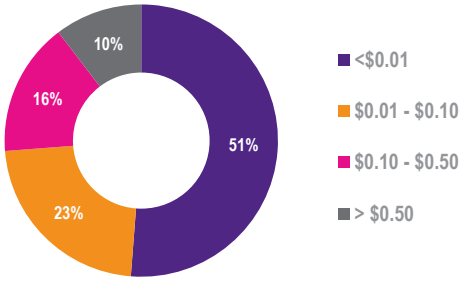
Consequences of a risky gambit

The reserve price, in a sense, represents the seller's own bid for the item being sold. However, as governments themselves do not have the means or the intention to make use of this spectrum, high reserve prices are potentially problematic for several reasons. If set above the opportunity cost, they could price out of potential market entrants, distort the price discovery mechanism of an auction, and increase the likelihood of unsold spectrum and thus inefficient outcomes.[6]

In seeking to extract receipts from potential buyers of spectrum through reserve prices, governments inadvertently increase the risks of incurring social costs and creating inefficiencies in post-auction output markets.[7] Such unintended consequences could include delays to network rollout, poorer coverage and service quality, higher prices and negative impacts on investment and innovation.

A high-level analysis of the same set of auctions suggests there this may well be the case for a number of auctions. While it is difficult to draw definitive conclusions, two things are worth noting.

Auctions over last 10 years – breakdown by gap between auction and reserve price ($/MHz/pop)

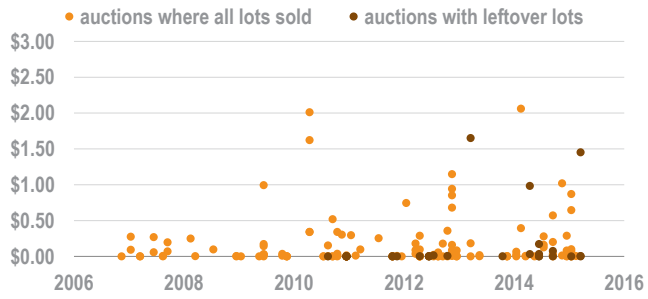


Source: Plum Consulting

First, there is a high proportion of auctions (51%) for which the gap between auction and reserve prices is negligible, suggesting reserve prices may be too high in these cases. These uncompetitive auctions are in effect direct awards at fixed prices. While there may be other factors beyond reserve price alone, such as spectrum caps and bidding restrictions, the fact that so many auctions end without competitive bidding raises concerns as to whether such "auctions" lead to optimal outcomes. That markets for spectrum have tended to be "thin" markets with few buyers exacerbates this risk.

Gap between auction and reserve prices

US$/MHz/pop



Source: Plum Consulting

Second, and more worryingly, a significant number of recent auctions have ended up with unsold spectrum lots as shown above. Such outcomes are undesirable as less available spectrum means reduced benefits to consumers and society. Though one might argue that unsold spectrum simply reflects a lack of demand in a particular market, this is hard to substantiate in reality, particularly for spectrum which is globally harmonised and widely implemented.

What to bear in mind

By virtue of spectrum scarcity and the mobile data growth phenomenon, mobile operators face sufficient incentives to utilise spectrum efficiently. They face a constant trade-off between efficient use of spectrum, capital expenditure and acquisition of new spectrum, arguably irrespective of the price they pay for spectrum.[8]

Having a clear idea of spectrum value is crucial. In this challenging climate for operators and with 5G on the horizon, pricing spectrum beyond the ability of operators to pay thus represents an asymmetric risk whereby the potential social costs of delay or reduction in spectrum availability outweigh any projected government revenues. This ought to the fundamental consideration for all governments and regulators when designing spectrum auctions.

[5] Plum Insight. Delivering spectrum for mobile broadband: the role of spectrum value, August 2013.
[6] RSPG. Efficient awards and efficient use of spectrum. February 2016.
[7] TW Hazlett, RE Munoz and DB Avanzini (2012). What really matters in spectrum allocation design.

[8] Plum. Annual licence fees – you cannot have your cake and eat it. Study report for EE, January 2014.