

Presentation to BEREC/RSPG

“Facilitating access to radio spectrum – lessons learned after 20 years of awards”

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Auctions have been a great success

- Now dominant methodology for spectrum awards
- Even NRAs sceptical about auctions in the 1990s now use auctions as their default methodology
- Significant advantages for NRAs
 - Avoids challengeable administrative decisions
 - Promotes efficient use of spectrum
 - Clarity about measures to promote competition
 - Other policy objectives can be incorporated, such as coverage (e.g. Danish 800MHz auction with “not-spots”)

Changing nature of spectrum auctions over the last decades

- 2000/2001 wave of 3G auctions
 - Single band
 - Typically spectrum pre-packaged with 1 lot = 1 licensee
 - Strong competition in some auctions (e.g. UK, Germany)
- Recent 4G multiband auctions
 - Multiband
 - Determine how much spectrum is won, not just who wins
 - Background of industry consolidation
 - Bidders often just the incumbents

Little practical impact from disputes

- Incentives to bring speculative disputes due to high value of spectrum
- Reservations will often be controversial
- However, few *successful* disputes have been brought
- Focus on debating rules in advance of an auction
- Ex-post disputes typically legally difficult providing procedures followed

Adverse impact on downstream competition?

- Early concerns that auctions might lead to concentration have not been borne out
 - For example, German 3G auction saw much comment prior to auction about potential for valuations to be endogenous given market structure and incentives for concentration
 - ... but the outcome involved 6 winners, two of which proved unsustainable
- Avoid sustained and significant asymmetries across groupings of substitutable bands, rather than requiring symmetry band-by-band
- Opportunities for affecting market structure hopefully decreasing due to new bands

Structure vs. format

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- Structure
 - Lots and bands
 - Caps
 - Reservation
 - Geographical structure
 - Fungible supply / multiple band-plans
- Format
 - SMRA
 - Clock
 - CCA
 - Sealed bid combinatorial

Benefits of simple structure

- Any format can be undermined by inappropriate design of the lot structure
 - Create aggregation risks across lots
 - Impede switching by distinguishing similar lots
 - Create gaming opportunities
 - Create excessive complexity for bidders

Two examples of “structural” issues **dot.econ**

- Spanish multiband auction
 - Some spectrum carved out to offer in regional lots
 - Strong aggregation risks created for regional lots
 - Once bidding on regional lots, difficult to switch to national (given spectrum caps and standing high bids)
 - Exposure risks and price differentials
- UK 4G auction
 - Provision for shared use in the 2.6GHz band
 - Provided opportunity to drive up clock prices for high-power exclusive use in the 2.6GHz band ...
 - ... which might provide an informational benefit to budget constrained bidders (but is unlikely to have affected the outcome)

Five key issues for choice of auction format

- Aggregation risks
- Impediments to switching
- Common value uncertainty
- Lack of competition and competitive asymmetry
- Opportunities for strategic behaviour

- Aggregation risks be strong when using “slice and recombine” to allow market determination of the amount of spectrum won
 - Minimum bandwidth (important with LTE)
 - Carrier sizing
- Maximising potential for entrants may require opportunities to combine spectrum across bands
- Challenge for auction design is that bidders may have *differing* patterns of complementarity

- Bidders should be able to switch fluidly across lots that are substitutes
- In practice, many auctions fail to maximise switching fluidity
 - Lot may be unnecessarily distinguished
 - Activity rules may inhibit back-and-forth switching
 - Switching groups of complementary lots may expose bidders to aggregation risks

- Early spectrum auctions were often subject to significant common value uncertainty ...
- ... favouring open auctions to allow price discovery
- For many current auctions common value uncertainty is likely to be less important ...
- ... and with limited number of bidders, information about bids of others may be of limited value ...
- ... so there may be a greater role for sealed bid auctions that has not been fully considered by NRAs

Lack of competition

- Many spectrum auctions now struggle to gain participants beyond the existing MNOs ...
- ... and even where there are participating entrants, they are often in a relatively weak position
- MNOs have strong incentives to lobby for formats that soften competition for spectrum
- Potential for entry need to be maintained through lot structure and format choices

- Most complex auctions will demonstrate some opportunities for gaming
- Comparative evaluation of formats needs to consider context of each award
- Difficulties can arise from unanticipated interaction between structural choices and auction rules
- Details of rules are very important (e.g. Finnish auction that struggled to finish)
- Practical testing is useful for avoiding failures

SMRA vs. CCA

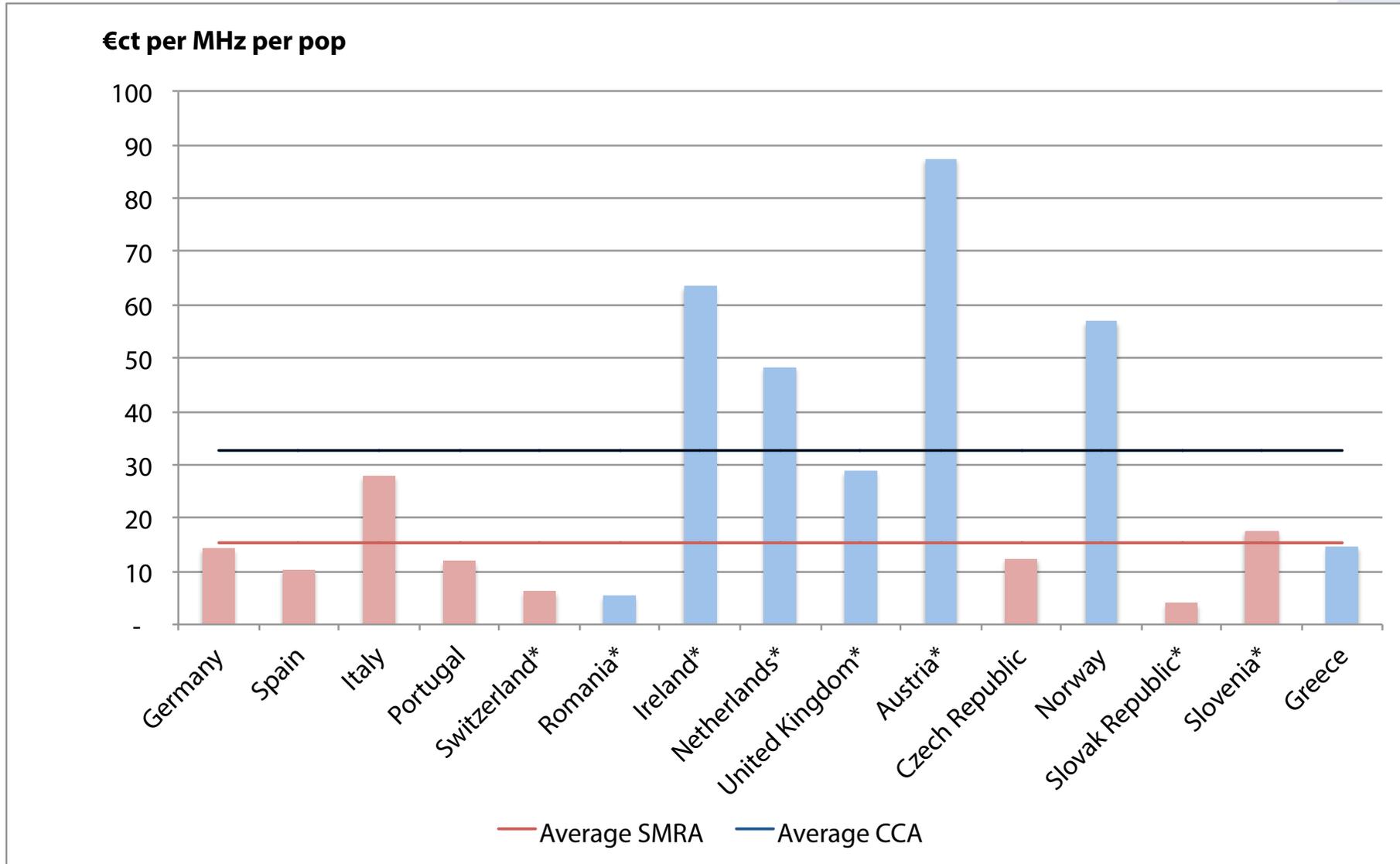
SMRA

- Simplicity of rules
- Aggregation risks may be substantial
- Switching impediments related to aggregation risks
- Importance of eligibility point choices
- Possible complex bidding decisions requiring expectations to be formed about others
- Potential for gaming through territory sharing and predatory strategies
- Incentives for strategic demand reduction to limit competition

CCA

- Complexity of rules
- Aggregation risks absent
- Fluid switching possible with revealed preference activity rules
- Second pricing rule prioritises incentives to reveal relative value for efficiency-relevant packages over price uniformity
- Possible to use simple bidding strategies without needing to form expectations about others
- Gaming in clock round to secure position in supplementary round
- Competition over amount of spectrum won may be intense even with limited participation 15

Prices in EU multi-band auctions



* CCA ;
shaded In red are auctions with one third or less of the paired spectrum being below 1GHz

- CCAs to date have used opportunity cost pricing
 - Winning price set by competition from bids of other
 - Prices set on a package basis, not by lot category
- If A competes for B's lots, but B does not compete for A's, then A may pay less (assuming few bidders)
- Is this policy relevant?
 - Price uniformity not an objective *per se*
 - No efficiency impact, but may represent lost revenue
 - Arguably might advantage incumbents relative to entrants ...
 - ... but then what measures should be used promote entry?

When are combinatorial auctions useful?

- Difficulties in spectrum auction design come primarily from bidders having *differing* patterns of complementarity ...
- ... as *common* patterns can be handled by combining lots (or using rules such as bids being uncommitting if minimum quantities not reached)
- If there were many bidders, this could be ignored with limited welfare loss (Shapley-Folkman theorem)
- Few bidders with strong, differing complementarities suggest use of combinatorial formats

- The SMRA is largely mature and no major structural developments in the pipeline ...
- ... though tweaks can partially address aggregation risks
 - phasing
 - withdrawals
 - minimum quantities
- The CCA still undergoing development
 - Fluid switching possible with advanced activity rules (e.g. Irish multiband auction)
 - Concerns about price uniform can be reduced by making it more SMRA-like, with a pricing rule based on what a bidder might at maximum need to pay

Summary

- Auctions have been a great success
- Need to expect limits on competition in future auctions
- MNOs may press for approaches that allow competition to be softened
- Possibilities for entrant participation (even if unlikely) should be maintained
- Choices about lot structure and implementation associated policy goals may at least as important as format choices
- Detailed rules are very important to avoid failure