The role of auction design in spectrum renewal

Spectrum auctions and market structure conference

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ECONOMICS. EXPERTS. EXPERIENCE.

It is challenging to design a spectrum auction to deliver on regulatory goals in the presence of significant asymmetries between bidders

In a spectrum award, primary goal for most regulators worldwide is an "efficient, pro-competitive allocation"

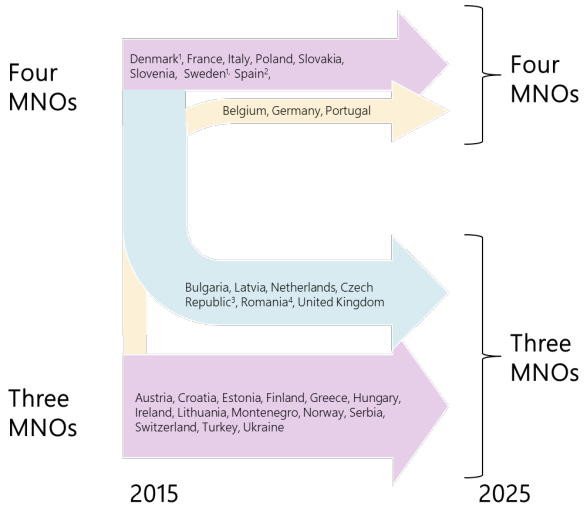
- An efficient pro-competition allocation is one where:
  - Spectrum is allocated to bidders who generate highest value for society
  - Spectrum allocation to individual operators does not constrain their ability to compete / expand in mobile market
- Spectrum renewals & new allocations provide an opportunity to revisit mobile spectrum holdings across MNOs but they are high risk events
- In this presentation, I will make the case that:
  - If bidders are highly asymmetric, a "vanilla one stage auction" design cannot be relied upon to deliver an efficient pro-competitive allocation
  - Partial renewal, for example via a two-stage auction design, may be a practical mechanism to lessen negative impact of asymmetries

*I will use the example of **Switzerland**, a mobile market with pronounced bidder asymmetries*
My presentation is based in part on work undertaken for Sunrise, a Swiss MNO facing a major licence expiry event

Regulators are rightly concerned about “undue” asymmetry in spectrum holdings amongst MNOs

Most markets worldwide have only 3 wholesale operators

- Little or no room for an MNO to fail



Growing academic literature warns us that undue asymmetry can limit downstream competition

- MNOs with larger holdings may enjoy lower expansion / marginal costs
- MNOs with smaller holdings may be deterred from competing intensively on price for fear of overloading their more modest network capacity
- Specific frequency bands embedded in network, so risk of service disruption / high re-engineering costs

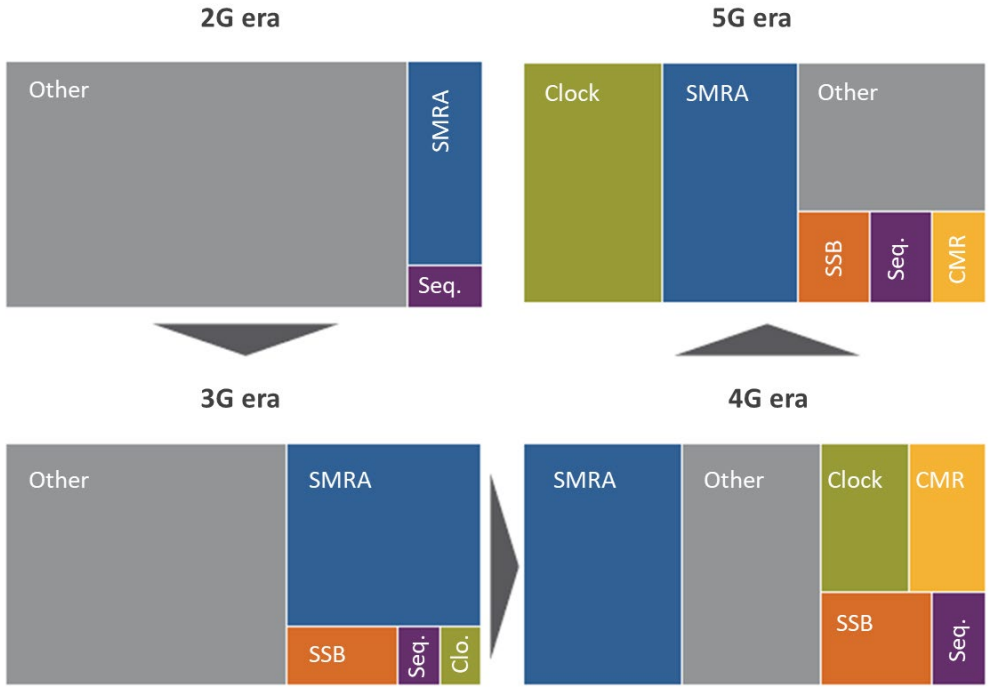
.. but this doesn’t mean that every MNO has to have identical holdings

- Similar spectrum bands are substitutable in modern networks
- Large blocks of spectrum are more efficient
- OFCOM (UK): Differences in spectrum holdings may encourage competitive differentiation

When allocating spectrum, regulators need to make a call about what level of asymmetry is acceptable in the context of their national market

In 5G era, typical approach to allocating spectrum is a clock auction with spectrum caps

Clock auctions have replaced SMRA as standard format for spectrum awards*



"Vanilla" auction design for a mobile spectrum award

- Clock auction
- Multi-band award
- Small lots (e.g. 10 MHz) packaged into generic categories
- Bidders buy quantities that can be aggregated into large blocks
- Spectrum caps to preclude "undesirable" outcomes

- This approach is popular with bidders, as associated with predictable, intuitive outcomes and modest prices
- Good all-round format but known vulnerability to **demand reduction**

Question: Can this "vanilla design" be trusted to deliver an efficient outcome in situations of high bidder asymmetry?

*Source:
Round-by-Round (2024)
By Richard Marsden

Should we be concerned about demand reduction in spectrum auctions?

Academic literature focuses on three concerns, but these do not always matter much in practice …

… but the literature generally assumes the bidders are symmetric – what if they are not?

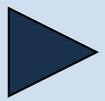
Demand reduction may lead to …	.. but these are often not primary concerns in spectrum awards …	… unless there are significant asymmetries across a small pool of bidders
1 Lower prices	*Revenue maximization not a goal* *Reserve prices can underpin revenues*	Smaller MNOs more likely to be risk adverse to high prices and subject to financial constraints
2 Reduced allocative efficiency	*Efficiency at risk only if bidders vary significantly in how they reduce demand*	Smaller bidders may be incentivized to reduce demand more than larger bidders, so efficiency at risk
3 Bigger reductions by bidders seeking larger quantities	*Incentive may act as a pro-competitive constraint on larger bidders*	Larger bidders may anticipate this weakness so incentive to moderate high demand is diminished

Regulators should be more concerned about scope for an auction to deliver an efficient pro-competitive outcome in situation of significant bidder asymmetry

Caps are the traditional tool for addressing competition concerns in spectrum auctions but they are often insufficient

- In a market with asymmetric bidders:
  – spectrum caps foreclose big MNO(s) from buying "too much" spectrum
  – they create a de facto combined reservation for smaller MNOs
- Important precautionary tool to prevent obviously bad outcomes

- But caps are much less effective in impacting bidder behaviour within auctions
- They typically do NOT:
  – Incentivize smaller MNOs to fight bigger MNOs to expand their spectrum share
  – Discourage big MNOs from bidding to cap if rivals may be financially constrained

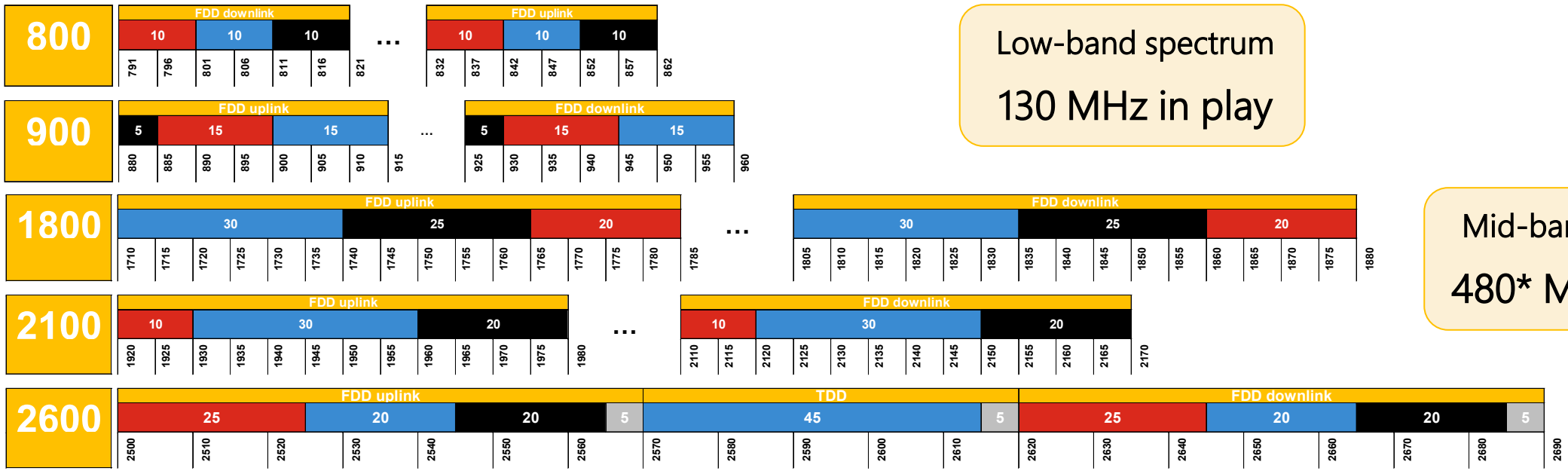


Spectrum caps are unlikely to be a sufficient intervention in auction design to encourage competition that could reduce spectrum asymmetry

Switzerland is facing a high stakes relicensing event

Licences for more than half of all core mobile spectrum are expiring

	Salt.	Sunrise	swisscom
575 MHz* Expiring	160 MHz Expiring	160 MHz Expiring	255 MHz Expiring



Low-band spectrum

130 MHz in play

Mid-band spectrum

480* MHz in play

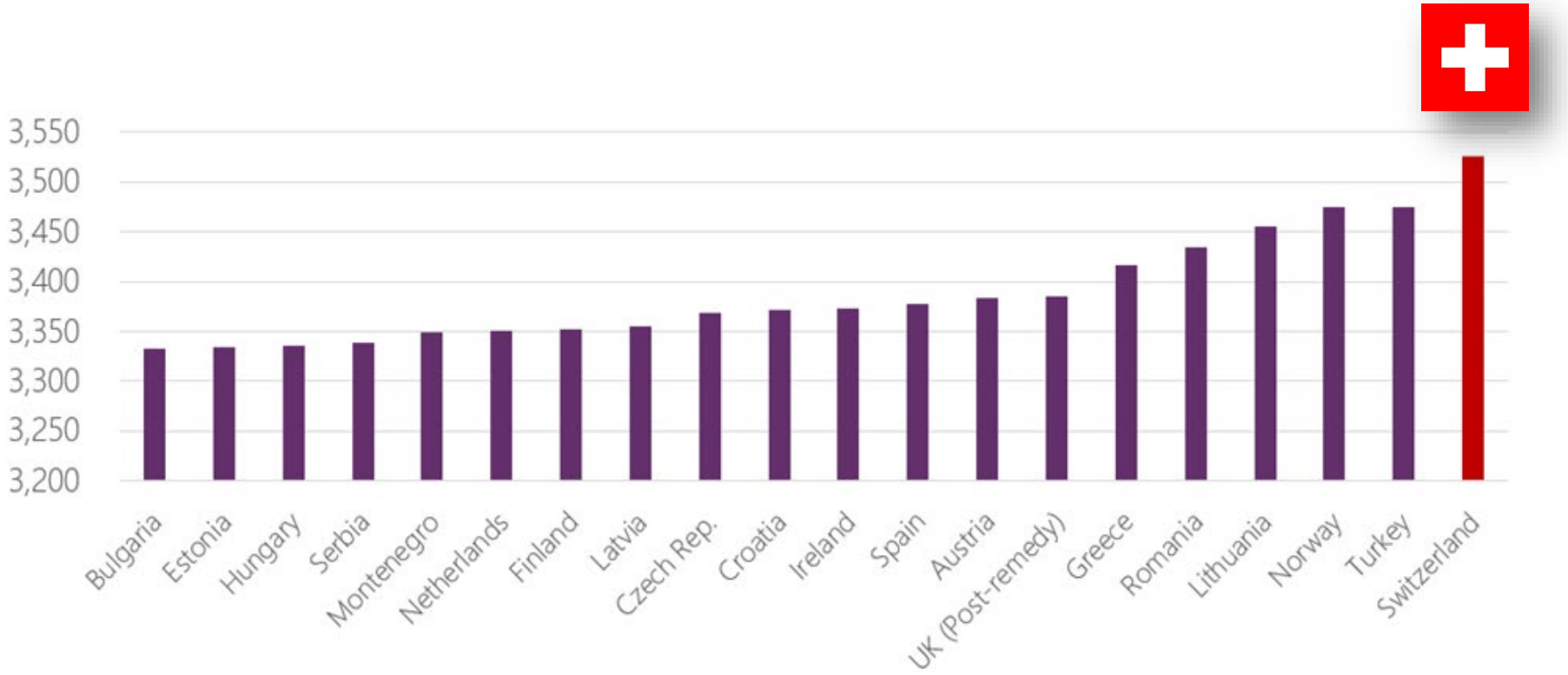
** Excludes 15 MHz in 2600 MHz which is currently unallocated, in part owing to guard band restrictions between FDD and TDD use*

Switzerland already has the most asymmetric spectrum distribution in Europe

Herfindahl-Hirschman Index (HHI) for spectrum holdings*

We measure the asymmetry of a market by comparing the HHI index, using MNO spectrum holdings as a substitute for market shares

Across all European countries with three MNOs, Switzerland has the highest concentration of MNO spectrum holdings



Depending on the design and rules of the 2028 process, asymmetry could reduce, stay the same or even increase

**Measures spectrum share concentration by summing the squares of MNO holdings of sub-4 GHz mobile spectrum for all firms in a given market*

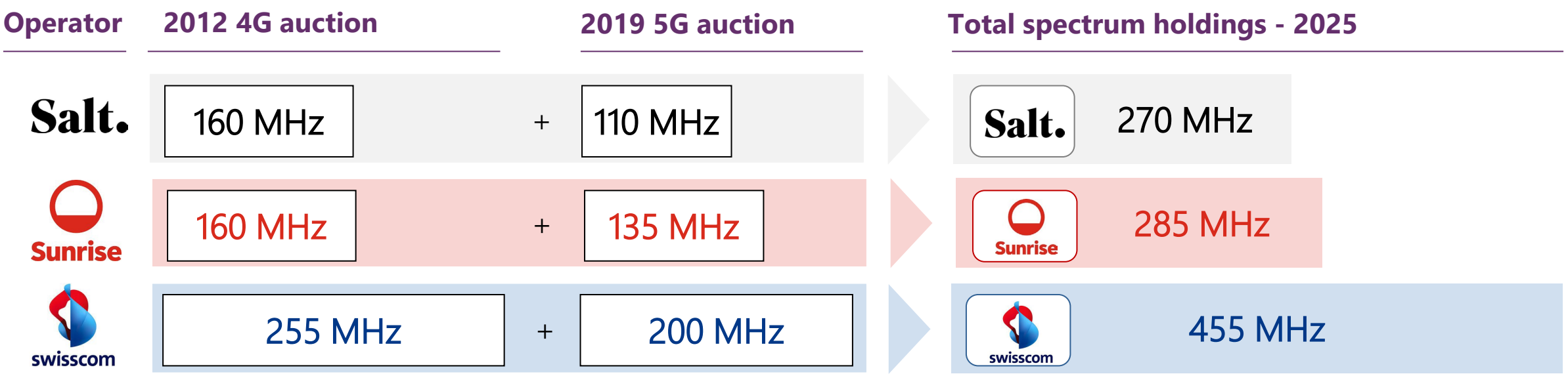
Swiss mobile market characterized by large asymmetries between MNOs

	Overall financial strength*	**Market share***	**Access to network assets****	**Traffic per site****
	Swiss mobile revenues in 2024	share of subscribers	# cell sites per MNO	traffic per site per month
Salt.	989 CHFm	18.6%	3'700	15.1 TB
Sunrise	1'385 CHFm	28.7%	3'200	25 TB
swisscom	3'331 CHFm	52.7%	6'000	16.7 TB

Switzerland exhibits the conditions where a vanilla spectrum auction design may not deliver an efficient, pro-competitive allocation

* TeleGeography or public reports from operators; **Estimates provided to NERA by Sunrise

Existing asymmetry is the cumulative outcome of two large multi-band auctions with allocations that likely were not fully efficient



CCA format

- *Weak demand reduction incentives*
- *Was outcome distorted by budget constraints in context of high bids and complex CCA design?*

+

Vanilla Clock auction

- *Strong demand reduction incentives*
- *Was outcome distorted by prudent compromises by weaker bidders who preferred to avoid a price war with stronger rival?*

In Switzerland, a vanilla format led to increased asymmetry in 2019 …
… implies a significant risk that this could happen again in 2026 without innovation in design

What steps could the Swiss regulator take to level the playing field?

Regulator has indicated preference for **auction**

- ✗ Creates uncertainty for operators
- ✓ Scope for market to explore alternative allocations
- ? May increase or decrease asymmetry

Each Swiss MNO has called for **renewal** of all spectrum

- ✓ Provides certainty for operators
- ✓ Eliminates possibility of increase in asymmetry
- ✗ No scope for market to explore new allocations

Partial renewal may be an attractive compromise

- Renew low band / core spectrum
- Vanilla auction for remaining spectrum

- ✓ Reduces risk for all bidders
- ✓ Allows market to explore marginal changes in allocation
- ✓ Reduces demand incentives for smaller MNOs

Actual or de facto partial renewals could diminish impact of bidder asymmetries

A two-stage auction could provide a practical mechanism for partial renewal

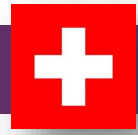
What is a two-stage auction?

A two-stage auction splits allocation of spectrum into two parts

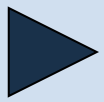
1st Stage Subset of available spectrum is allocated as X packages tailored to ensure that there will be X viable MNOs each with a competitive spectrum portfolio

2nd Stage Remaining spectrum is auctioned using vanilla auction design with spectrum caps

How could this work in Switzerland?



- X =3, to ensure three viable MNOs
- To be effective, two stage structure and caps must be tailored to local market conditions:
  - existing spectrum holdings within and outside auction
  - both 4G continuity and 5G/6G growth needs
- Design will require:
  - study of other European countries that have embraced two-stage awards (e.g. Belgium, Denmark, France)
  - consultation with industry to identify and address risks of any innovation



A two-stage auction may be a good option for Switzerland but effectiveness is likely to be highly sensitive to detailed rules

Thank you!

If you would like to learn more, please get in touch and consider reading my book!

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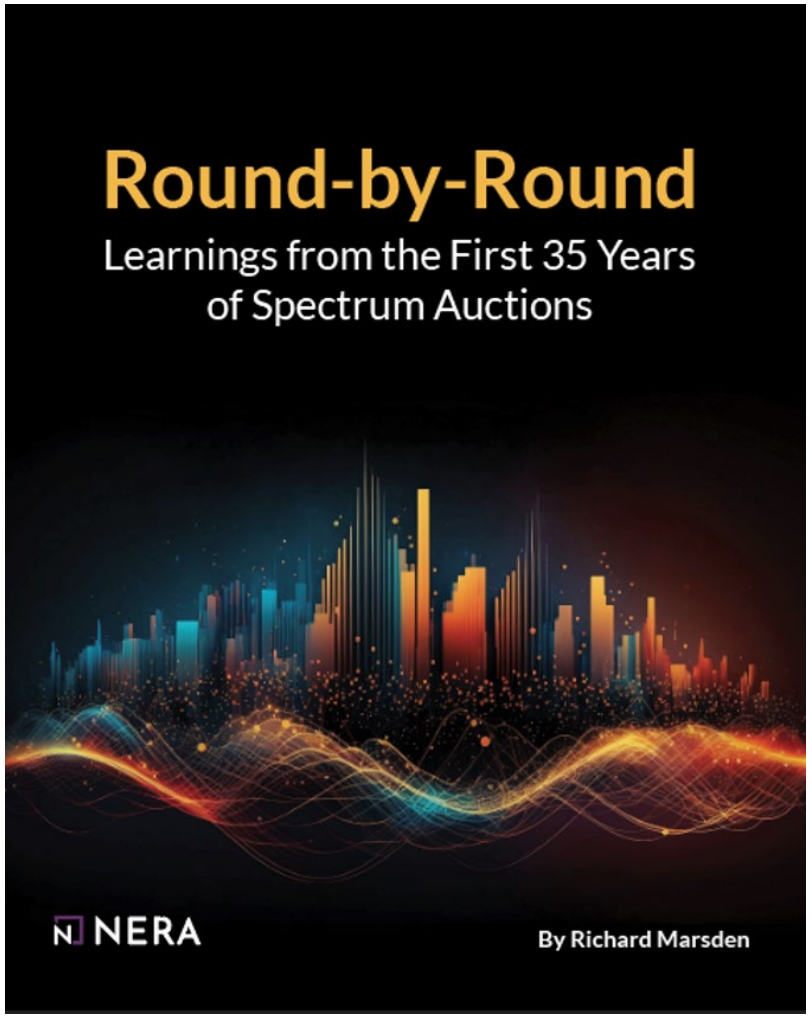

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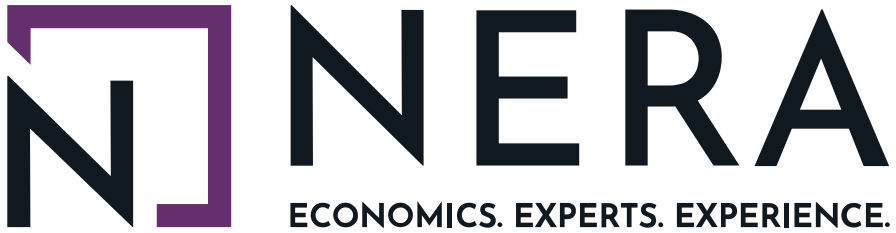
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