

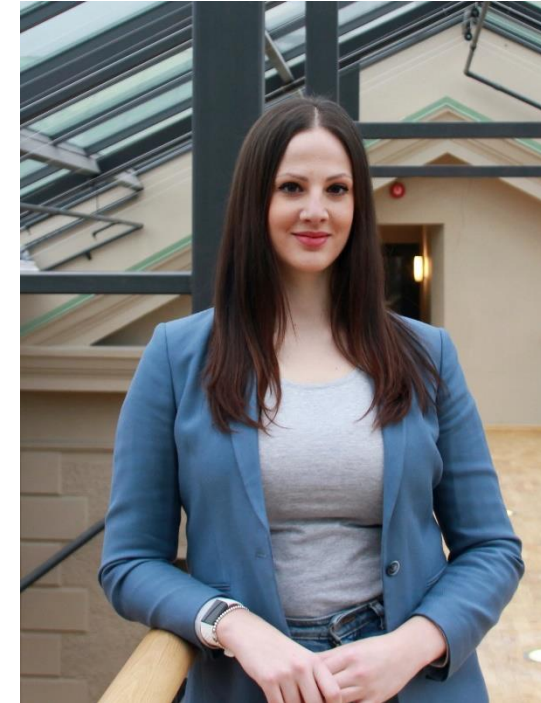
ANALYSING THE C-BAND SPECTRUM AUCTIONS FOR 5G IN EUROPE:

Achieving efficiency and fair decisions in radio spectrum management



Agnieszka Kuś

Faculty of Economic Sciences
Pope John Paul II University of Applied Sciences
Biała Podlaska, Poland

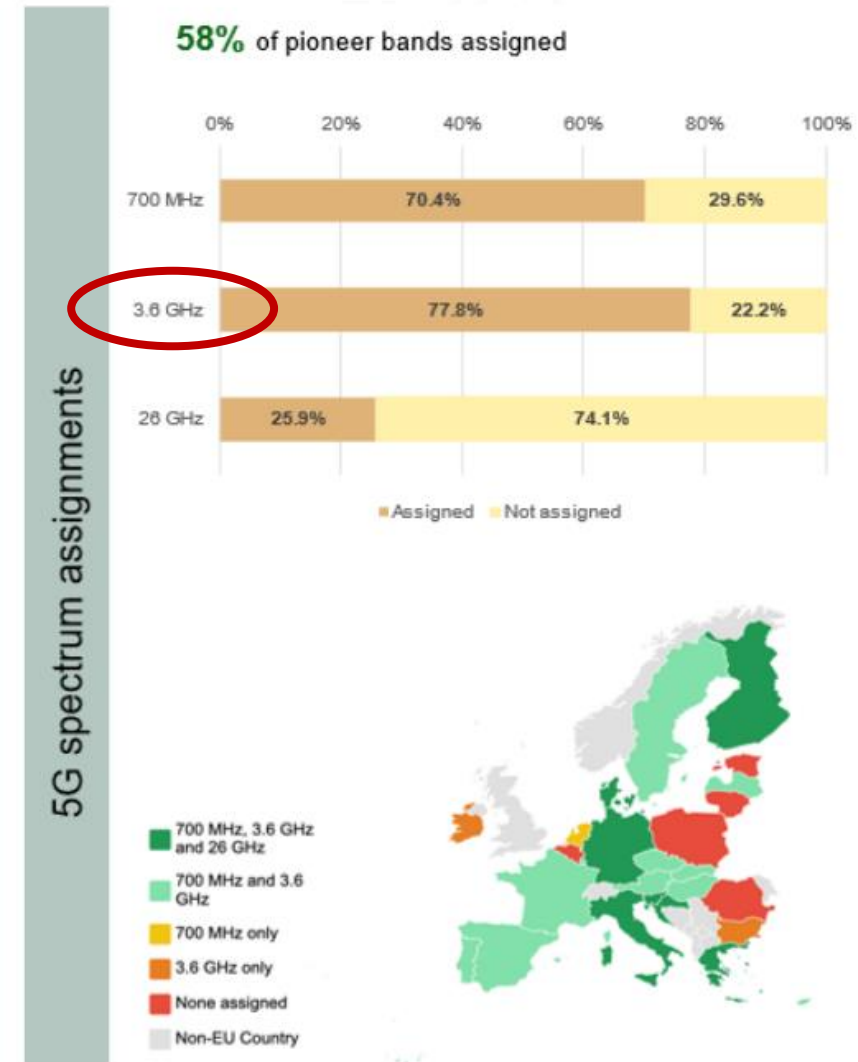


Maria Massaro

Regulation Specialist
Volvo Group
Gothenburg, Sweden

BACKGROUND

- C-band globally recognised as primary band for 5G
- International attention at WRC-2015, C-band harmonised for mobile use in Europe much earlier.
- EU member states to grant access to the C-band for 5G by 31 Dec. 2020
- As of Jan. 2022, C-band assigned in 21 EU member states according to latest 5G Observatory Quarterly Report.
- For the **C-band**: from 51.7% in Dec. 2020 to 77.8% in Jan. 2022.



PURPOSE & DATA

- Efficiency as overriding principle in spectrum management because spectrum finite but demand increasing (Cave & Nicholls, 2017)
- Fairness, justice and equitable outcomes increasingly important (Cave & Martin, 2010)

- How a country balances efficiency and fairness objectives in spectrum auctions
- Data on instruments to promote efficient and fair/equitable outcomes collected from 16 auctions (14 states) for the C-band in the EU and UK between 2017-2020 for 5G

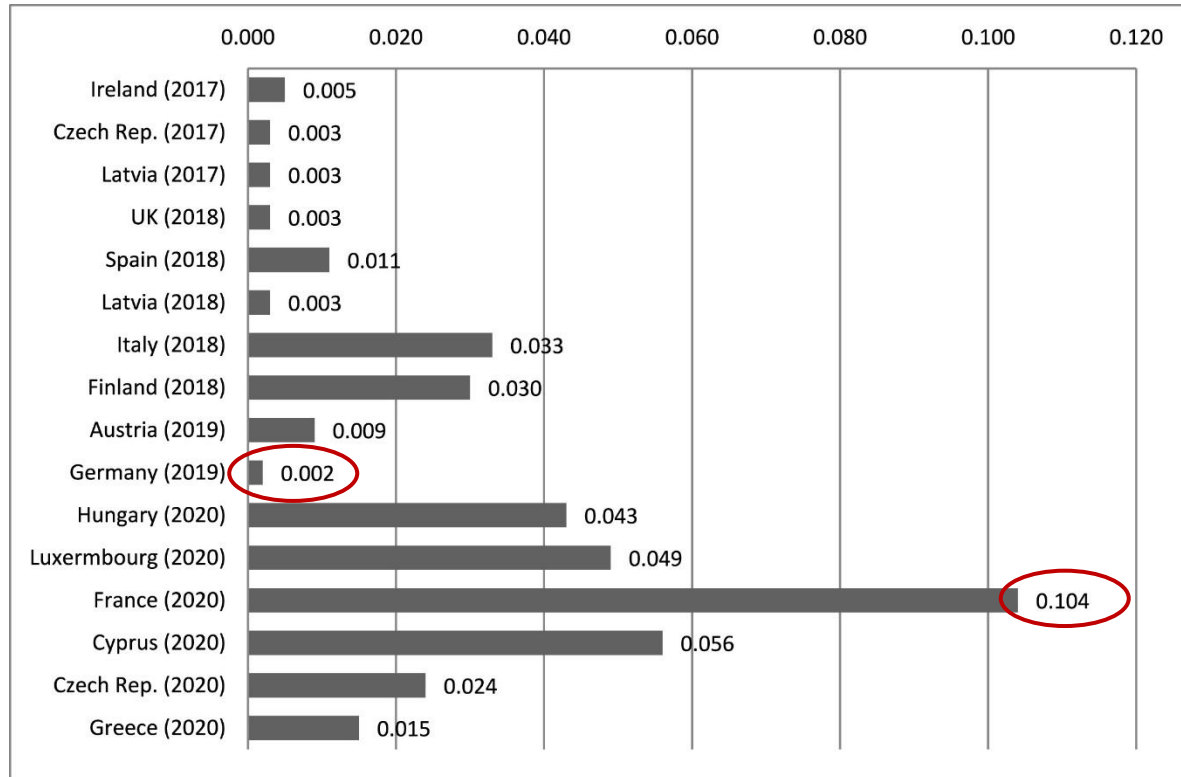
Instruments	Efficiency	Equity
Spectrum packaging	X	
Spectrum caps	X	X
Geographical scope	X	X
Licence duration	X	
Licence obligations	X	X
Reserve price	X	
Auction format	X	

OBSERVATIONS

Countries	Spectrum Packaging	Spectrum Caps	Geographical scope	Licence Duration (y)	Licence Obligations	Reserve price (EUR/MHz/POP)	Auction format
Austria (2019)	Generic	X	Regional	20	X	0.009	CA
Cyprus (2020)	Generic	X	Nationwide	20	X	0.056	CA
Czech Rep. (2017)	Generic	X	Nationwide	15	X	0.003	SMRA
Czech Rep. (2020)	Generic	X	Nationwide	12	X	0.024	SMRA
Finland (2018)	Specific	X	Nationwide	15	X	0.03	SMRA
France (2020)	Generic	X	Nationwide	15+5	X	0.104	CA
Germany (2019)	Gen./Spe.		Nationwide	20	X	0.002	SMRA
Greece (2020)	Gen./Spe.	X	Nationwide	15+5	X	0.015	SMRA
Hungary (2020)	Generic	X	Nationwide	15+5	X	0.043	CA
Ireland (2017)	Gen./Spe.	X	Regional	15	X	0.005	CCA
Italy (2018)	Gen./Spe.	X	Nationwide	19	X	0.033	SMRA
Latvia (2017)	Specific	X	Nationwide	10	X	0.003	SMRA
Latvia (2018)	Specific	X	Nationwide	10	X	0.003	SMRA
Luxembourg (2020)	Generic	X	Nationwide	15+5	X	0.049	Hybrid
Spain (2018)	Generic	X	Nationwide	20	X	0.11	SMRA
UK (2018)	Generic	X	Nationwide	20 (initial)		0.003	Hybrid
Summary	Mostly generic	All but one	Nationwide	10-20	All but one	0.002-0.104	SMRA/CA

No common pattern observed with respect to the choices made by the national regulators

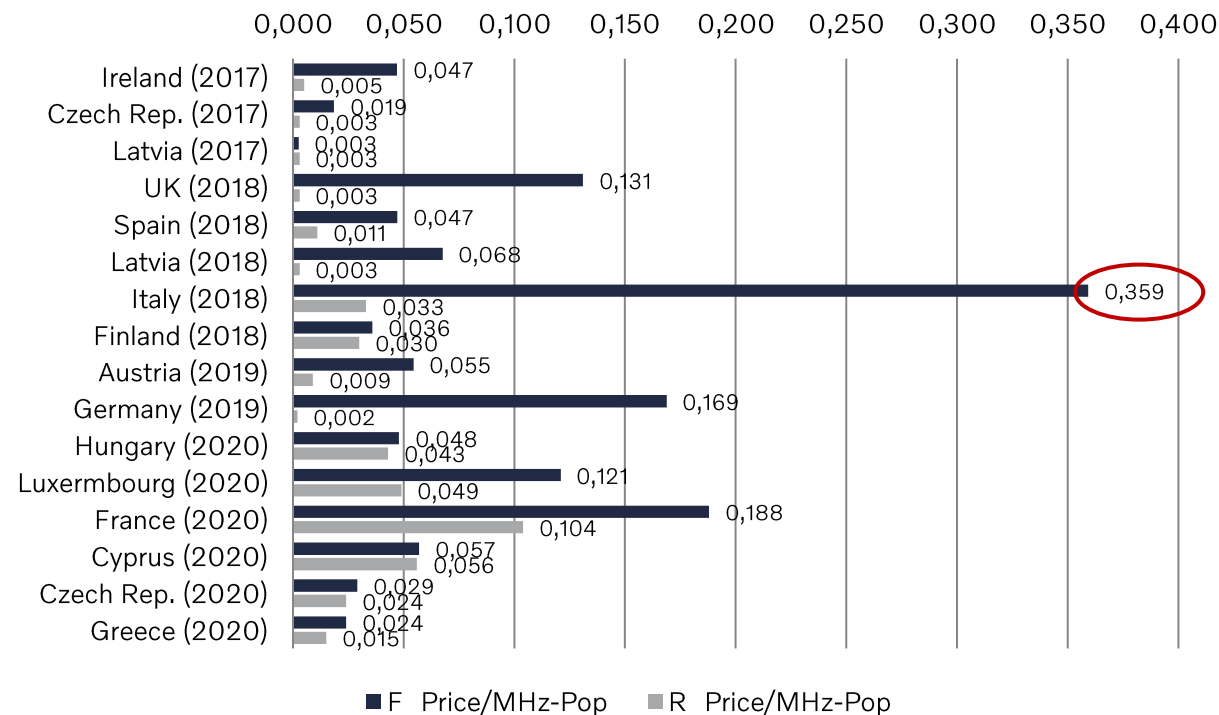
RESERVE PRICES



- High variation in reserve prices, possibly due to uncertainty over 5G use cases, business models and network performance.
- In countries with the highest reserve prices, no new entrant in the market. Finland and the UK pointed out facilitating new entry not an objective

HIGH COST OF SPECTRUM IMPACTING ON 5G DEPLOYMENT

- Financial burden on operators to be reduced by regulators to speed up 5G network deployment. Reducing cost of spectrum an important part. E.g. Hungary offers discounts on annual spectrum usage fees.



- High cost of spectrum contributing to delays in network roll-out in many countries, e.g. Italy.

COVERAGE OBLIGATIONS

- Most countries specified very detailed coverage obligations, indicating clear geographical areas, transport routes to be covered within a strict timeframe.
- Uncertain whether coverage obligations will be met especially because of the high cost of 5G network deployment (ECA, 2022) and operators' declining revenues (Analysys Mason, 2020).
- According to a recent study for the European Union, only 11 Member States likely to achieve uninterrupted 5G coverage in urban areas and along major terrestrial transport paths by 2025, deadline set by the EU 5G Action plan (ECA, 2022).
- Risk of exacerbating the digital divide.

ACCESS OBLIGATIONS, USE-IT OR LEASE-IT & SPECTRUM FOR LOCAL NETWORKS

- In some countries, licensees obliged to provide access to their networks to third parties e.g. virtual mobile network operators and providers of private networks or to lease unused spectrum
- **Germany (2019)** reserved 100 MHz, between 3700-3800 MHz, to industrial applications. As of March 2022, 201 licences have been assigned to private operators.
- Local 5G network operators will play a key role, especially with respect to finding killer applications in vertical industries. The phenomenon of private networking deserves to be further explored.
- Still uncertain whether (and when) the promised enhanced 5G connectivity capabilities and industrial changes will materialise.

THANK YOU!

REFERENCES

- Analysys Mason (2020). COVID-19 will lead telecoms revenue to decline by 3.4% in developed markets in 2020, 15 April, <https://www.analysysmason.com/research/content/short-reports/covid-19-operator-revenue-impact/>.
- Cave, M. & Martin, I. (2010). Motives and means for public investment in nationwide next generation networks. Telecommunications Policy, 34, 505-512
- Cave, M. & Nicholls, R. (2017). The use of spectrum auctions to attain multiple objectives: Policy implications. Telecommunications Policy, 41(5-6), 367-378.
- European Court of Auditors (2022). 5G roll-out in the EU: delays in deployment of networks with security issues remaining unresolved.
- Kus, A. & Massaro, M. (2022). Analysing the C-band spectrum auctions for 5G in Europe: Achieving efficiency and fair decisions in radio spectrum management. Telecommunications Policy, 46(4).