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Departamento
Economía

The Rise of Renewables and Competition in Electricity Markets

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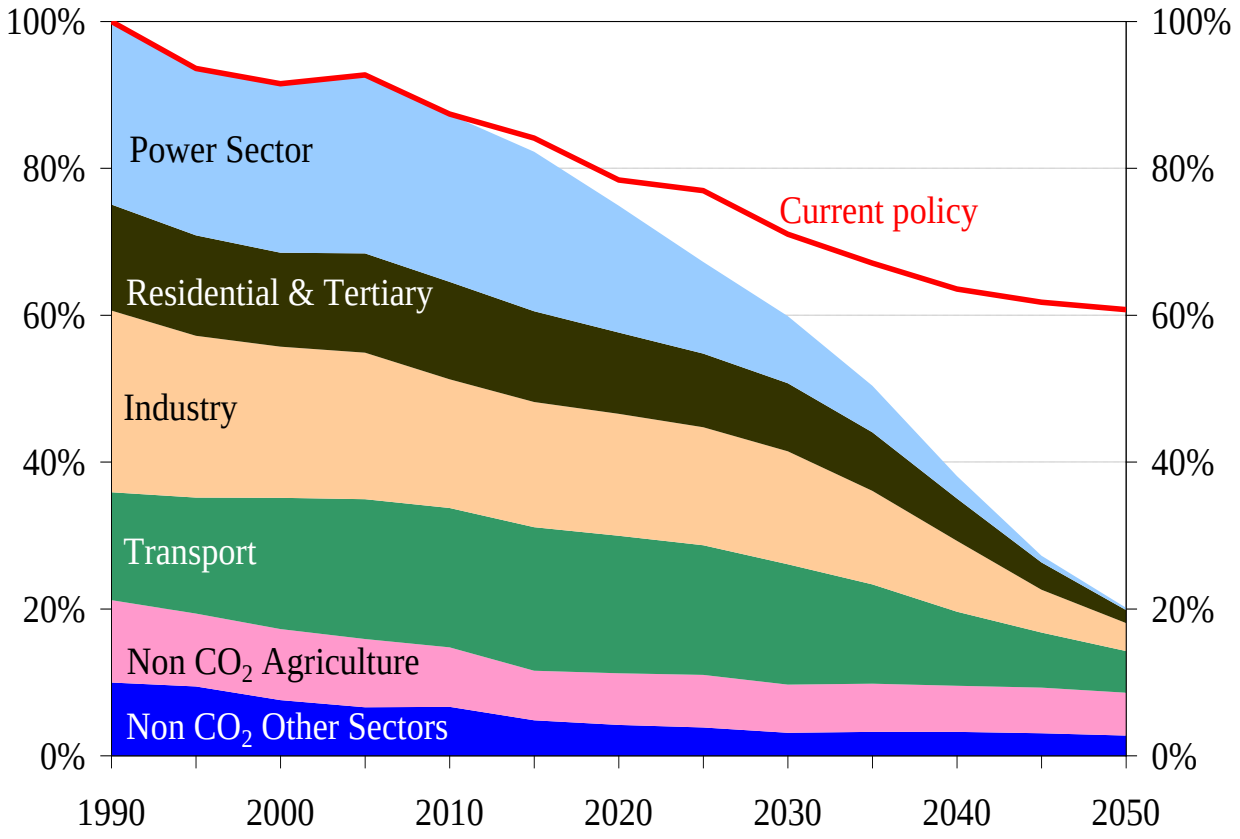
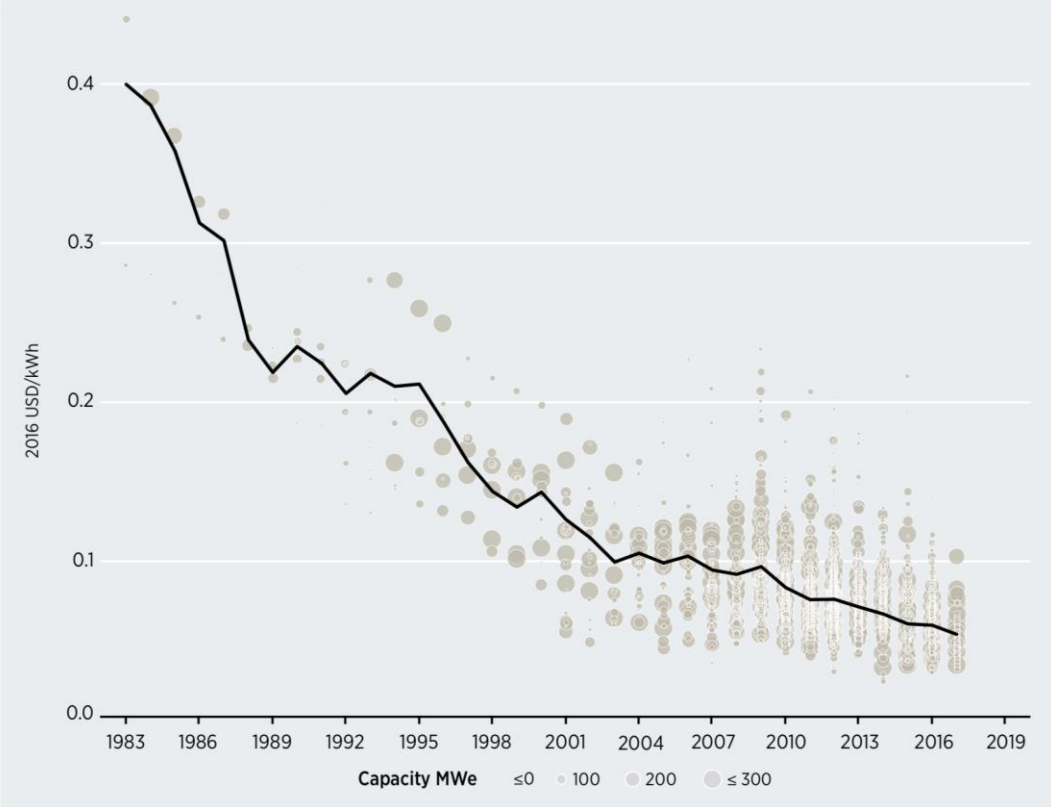
Decarbonising our economies



Roadmap for moving to a competitive low carbon economy

Source: EC (2011)

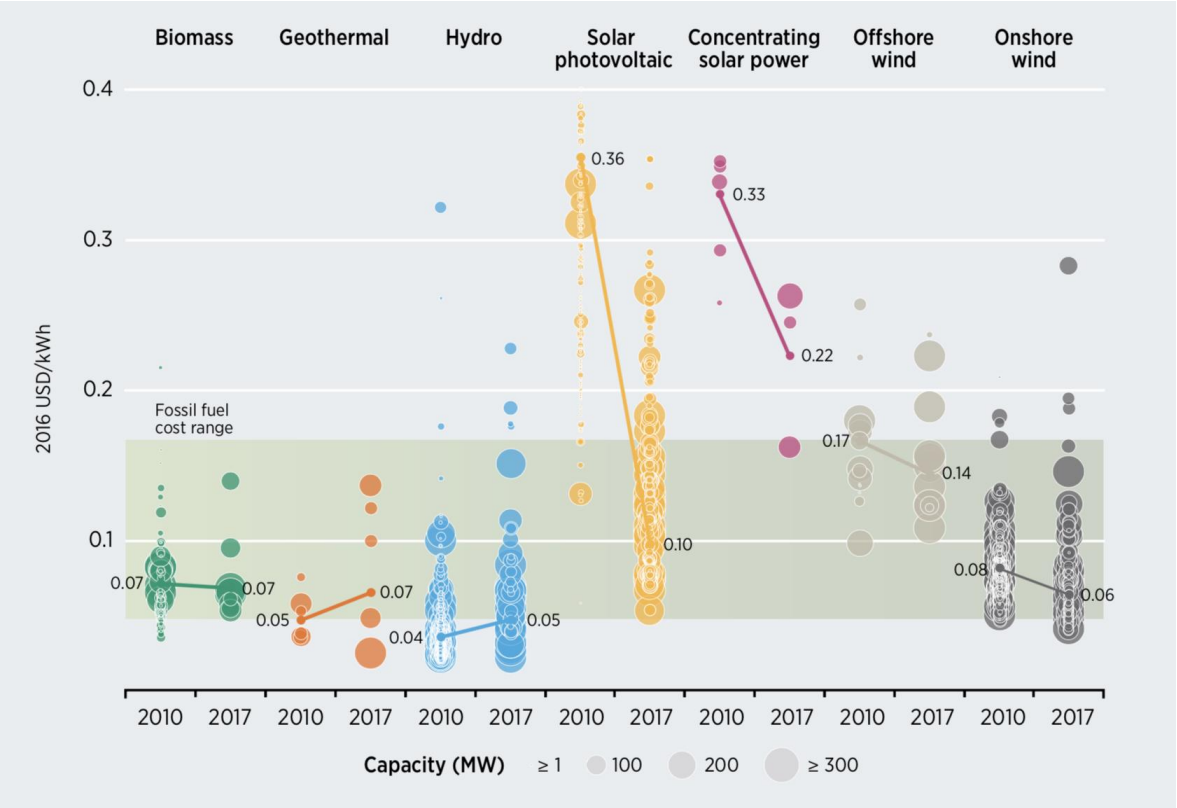
Steep cost reductions for onshore wind



Global levelised average costs of electricity from large-scale onshore wind 1983-2017

Source: IRENA (2017)

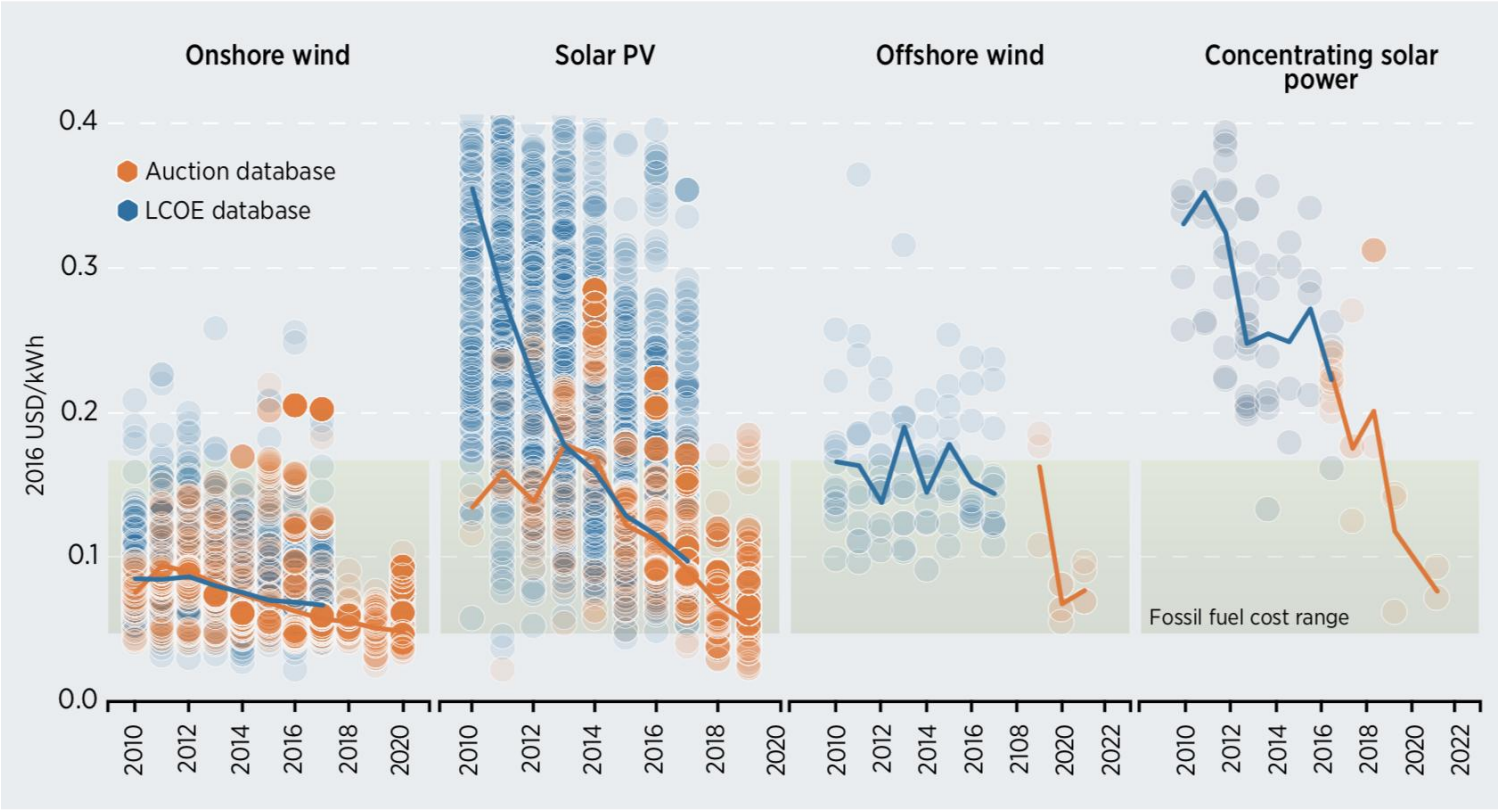
Electricity from renewables has become competitive with most fossil fuels



Global levelised costs of electricity for large-scale renewables 2010-2017

Source: IRENA (2017)

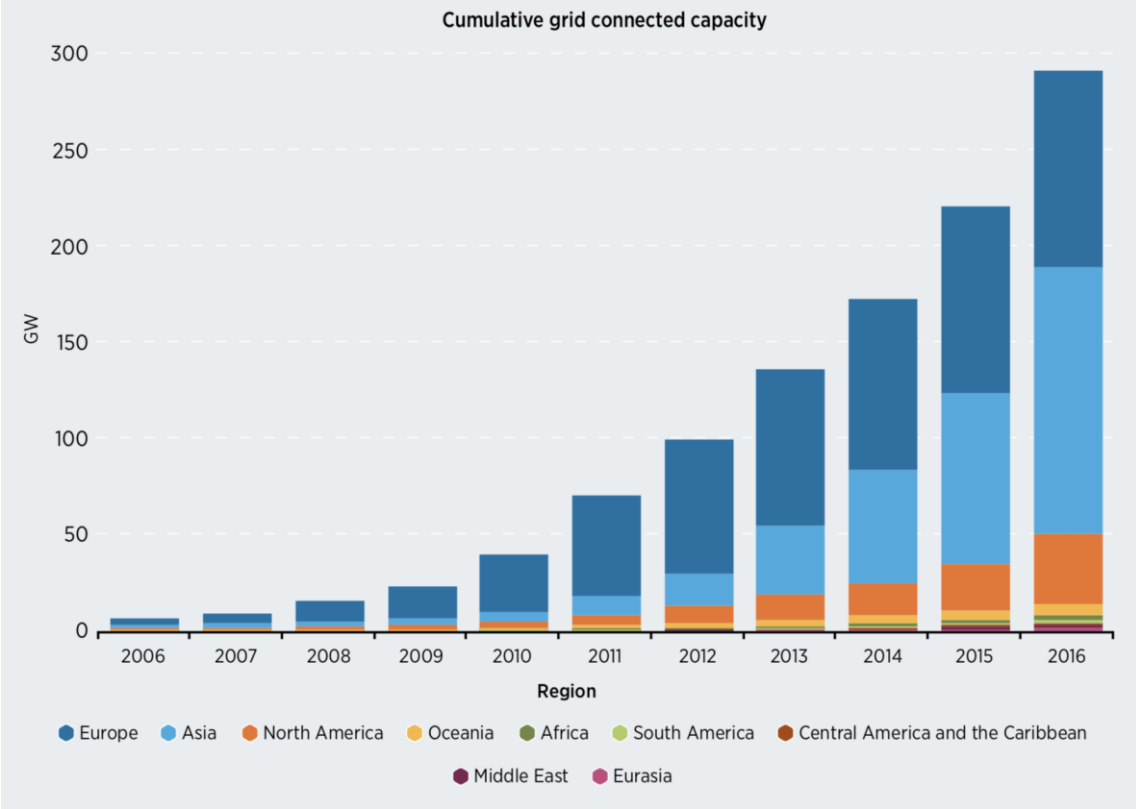
Future costs reductions expected



Levelised costs of electricity for wind, solar and concentrating solar, 2010-2020

Source: IRENA (2017)

Renewables are growing everywhere



Cumulative solar PV capacity by region, 2006-2016

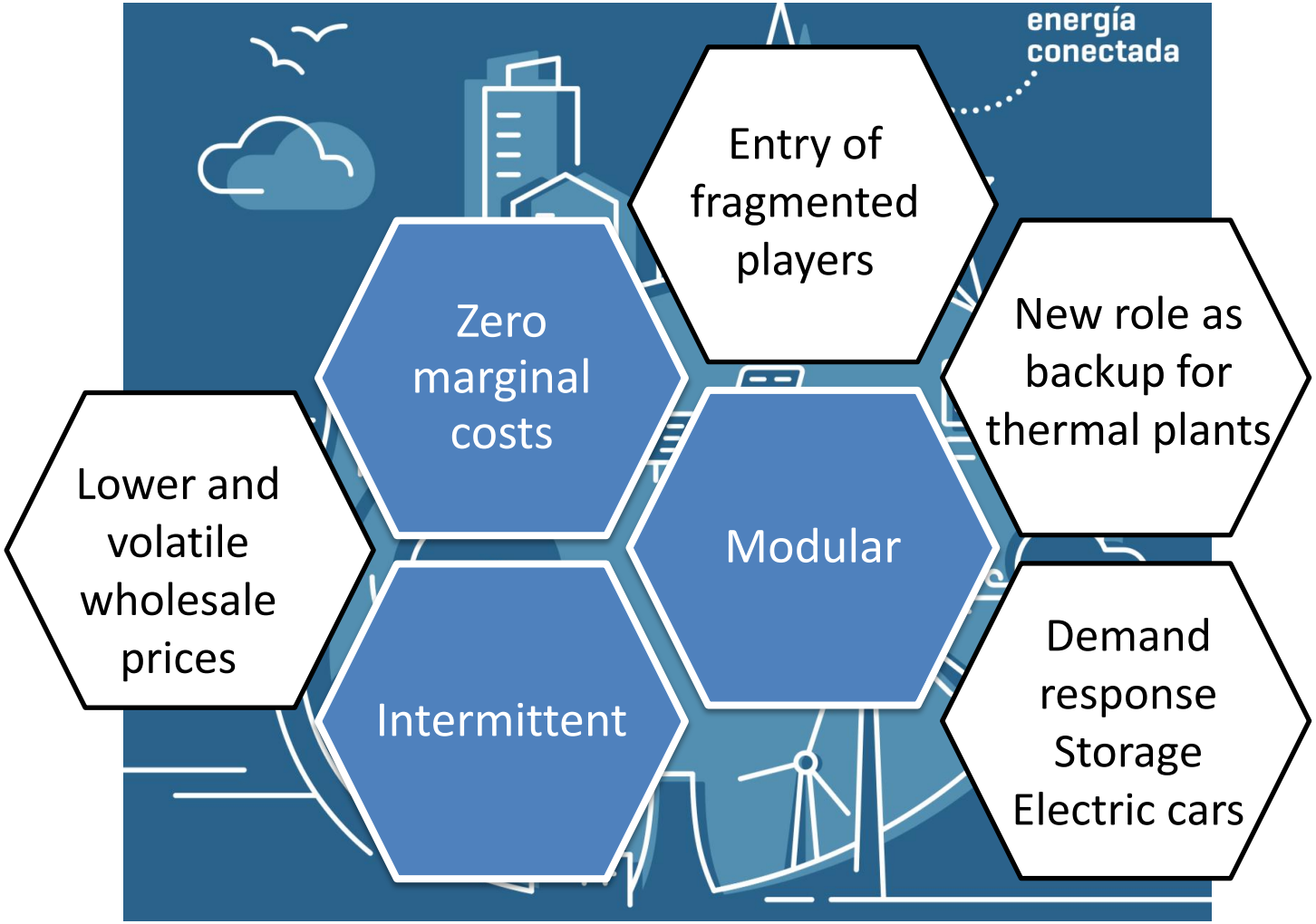
Source: IRENA (2017)

This Talk

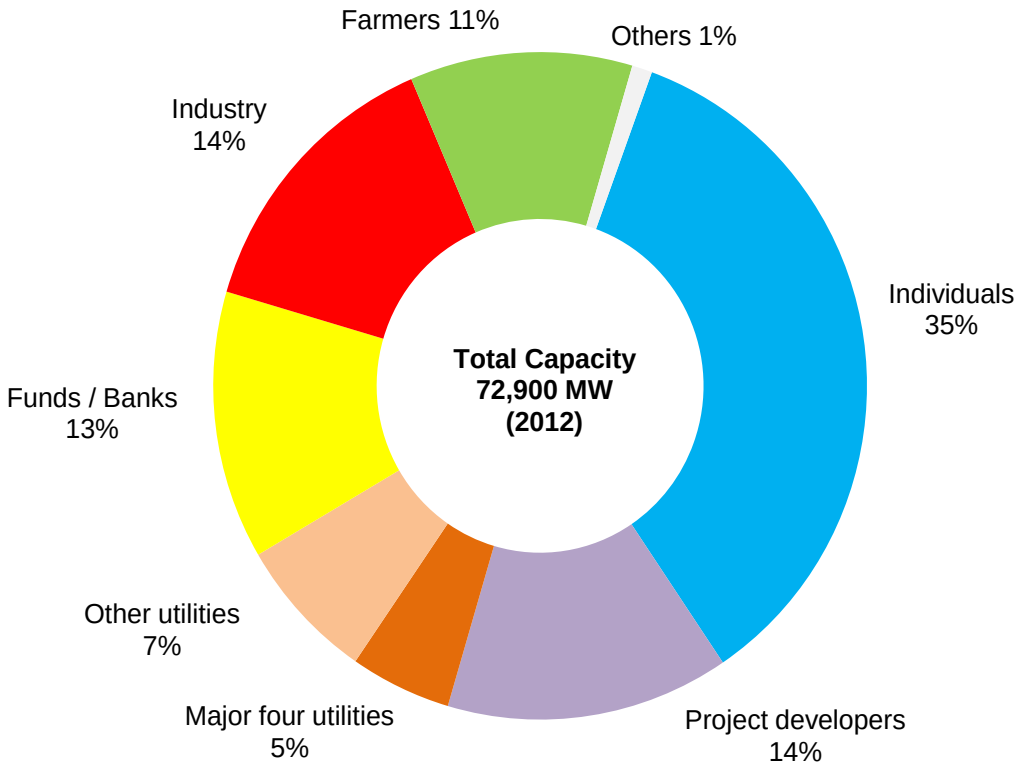
- Renewables: a game changer
- Impact of renewables on competition
- The need for a new market design
- Designing electricity auctions

The new challenges introduced by renewables require (more-than-ever) a **close interaction between regulatory and competition agencies**

Renewables: a game changer



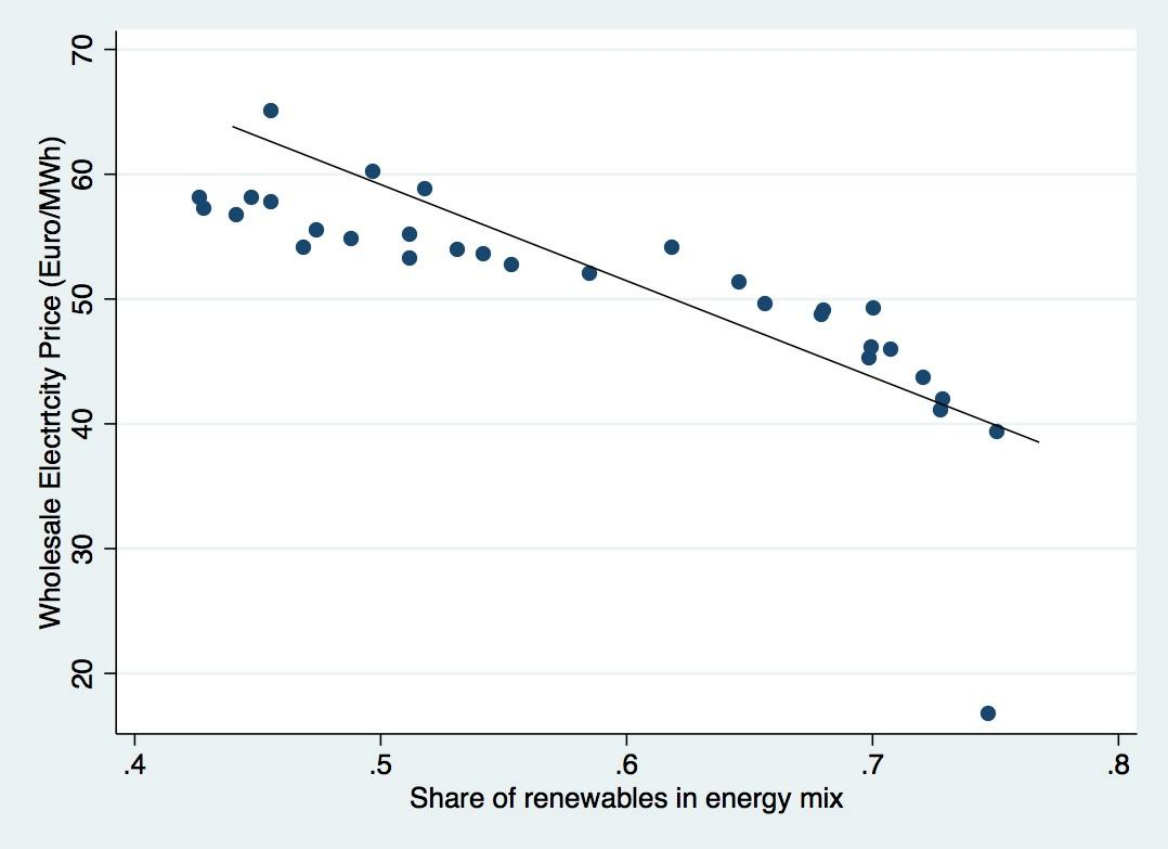
A more fragmented market structure



Breakdown of ownership patterns for renewable generation capacities in Germany, 2012

Source: Fabra et al. (2014)

Renewables depress electricity prices



Wholesale electricity prices in MIBEL versus the share of renewables in the mix, January 2018

Renewables depress electricity prices

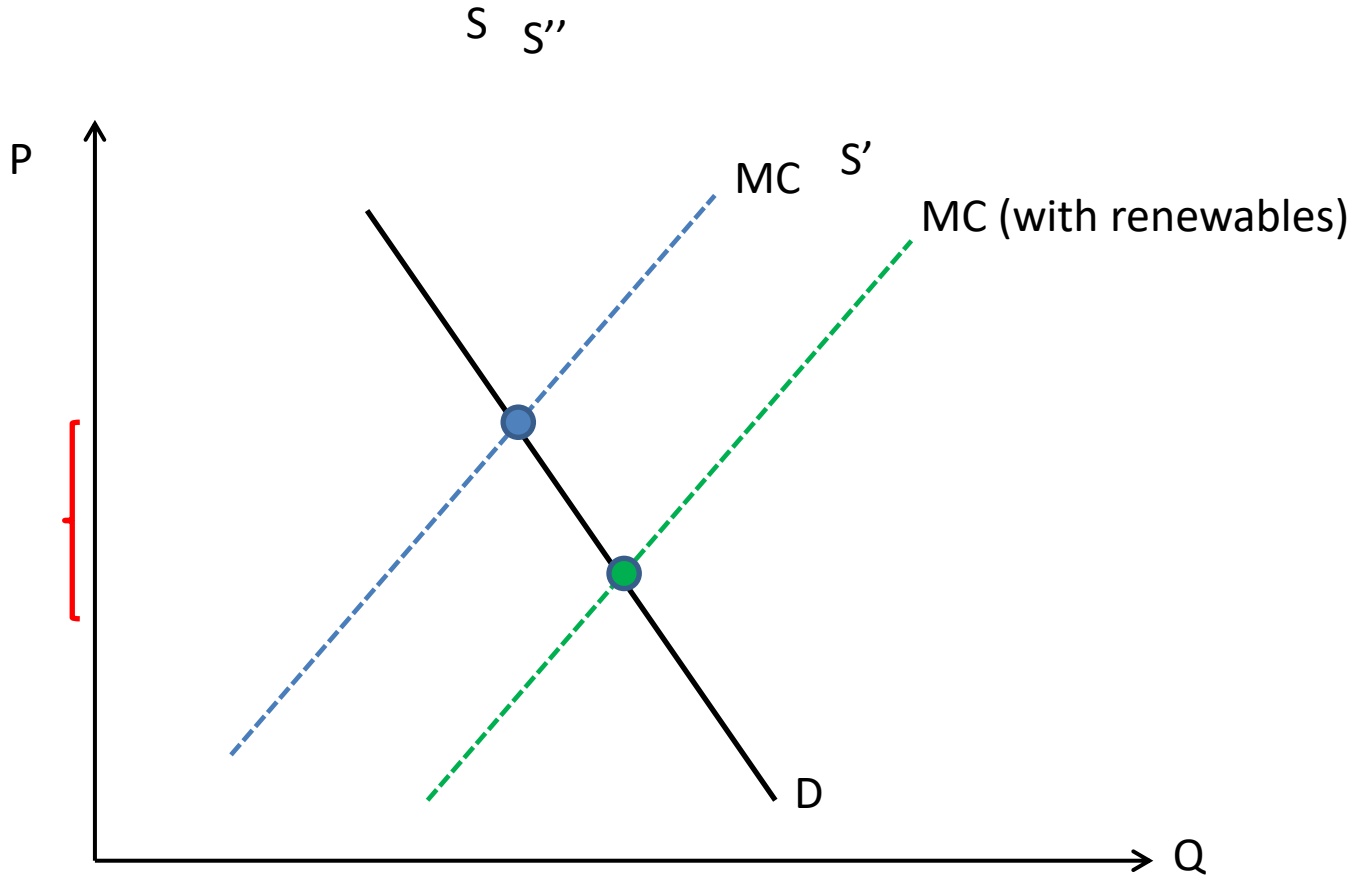
Which are the drivers of electricity market prices?

	MODEL 1		MODEL 2	
Variable	**Day-ahead prices**	**Day-ahead prices**	**Day-ahead prices**	**Day-ahead prices**
Carbon price	0.22***	0.22***	0.19***	0.19***
Natural gas price	0.42***	0.42***		
Share of renewables	-0.09***	-0.11***	-0.10***	-0.12***
Import	0.16***	0.16***	0.15***	0.18***
Electricity demand	0.23***	0.24**	0.44***	0.54***
Oil price			0.33***	0.39***
R2	65%	68%	51%	64%
Country Fixed Effects	YES	YES	YES	YES
Estimation Method	FMOLS	DOLS	FMOLS	DOLS

Day-ahead Electricity Prices in 13 EU countries, 2007-2014

Source: European Commission (2015)

Which part of the price reduction is due to stronger competition?



The price reduction depends on the impact of renewables on market power

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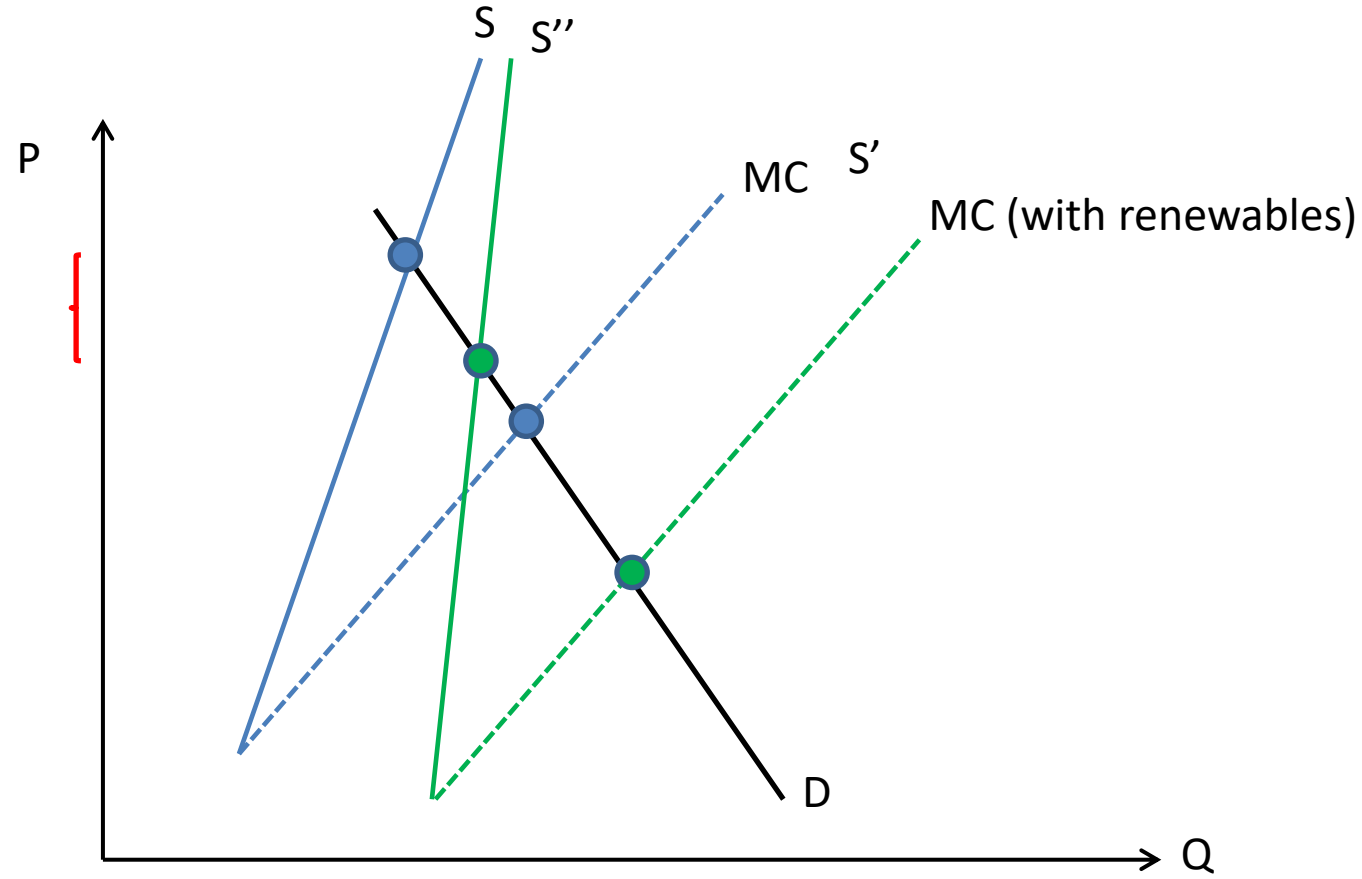

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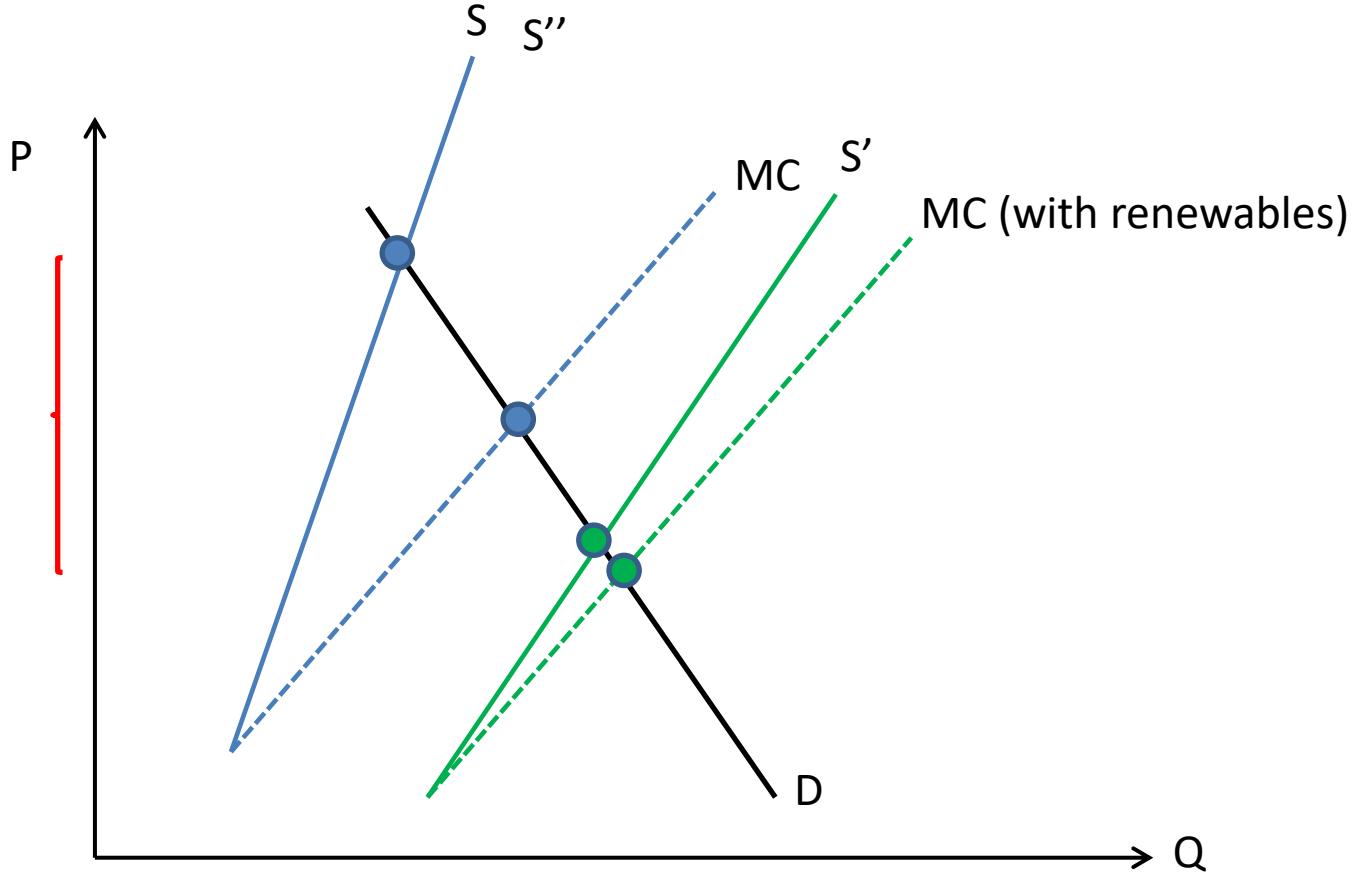


The price reduction depends on the impact of renewables on market power

Effects of renewables on competition

- Research hypotheses:
  - Renewables mitigate market power because of…
    - More fragmented market structure
    - Uncertainty about which plant will set the market price (pivotality status)
  - Potential countervailing effects because of…
    - Risk aversion
    - Adverser selection (winner's curse)

Renewables mitigate incumbents' market power in sequential markets

Ito and Reguant (2016) "Sequential Markets, Market Power and Arbitrage"

- Ito and Reguant (2016) study MIBEL
- Forward price premium between day-ahead and intraday markets
- Role of renewables in arbitraging price differences and mitigating incumbents' ability to exercise market power across markets

Foward premium in MIBEL: day-ahead vs intraday markets

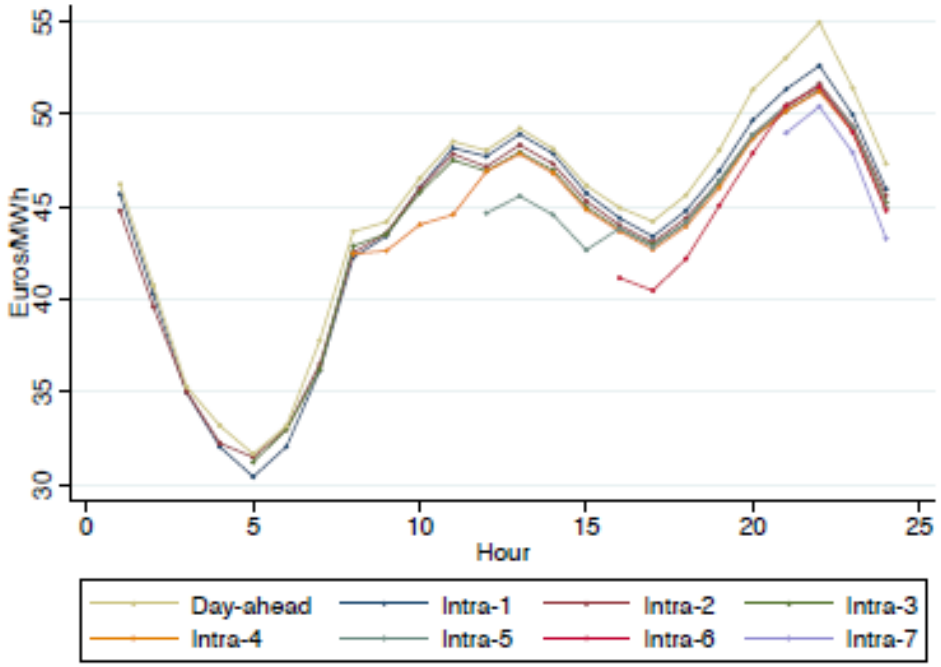
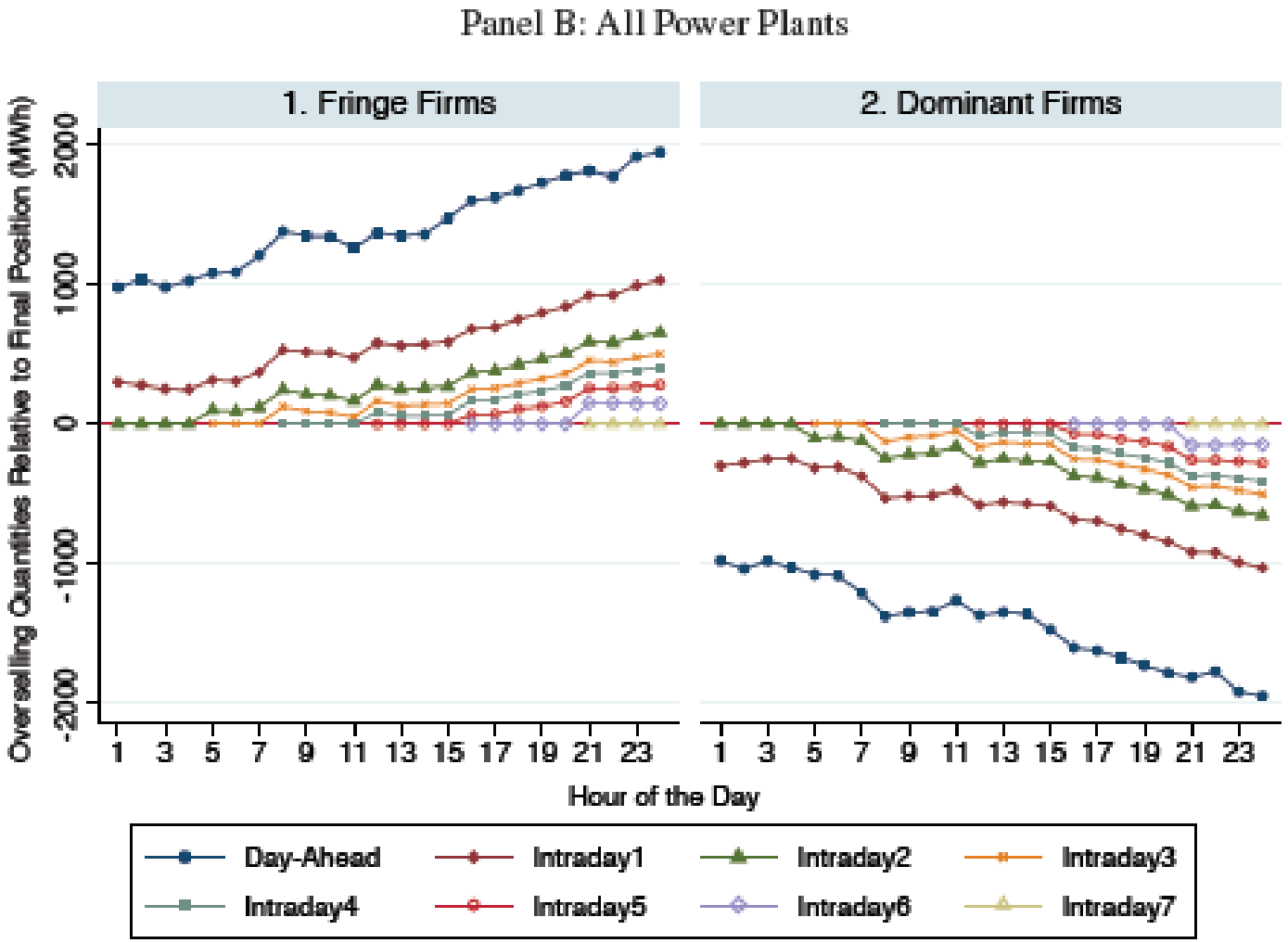


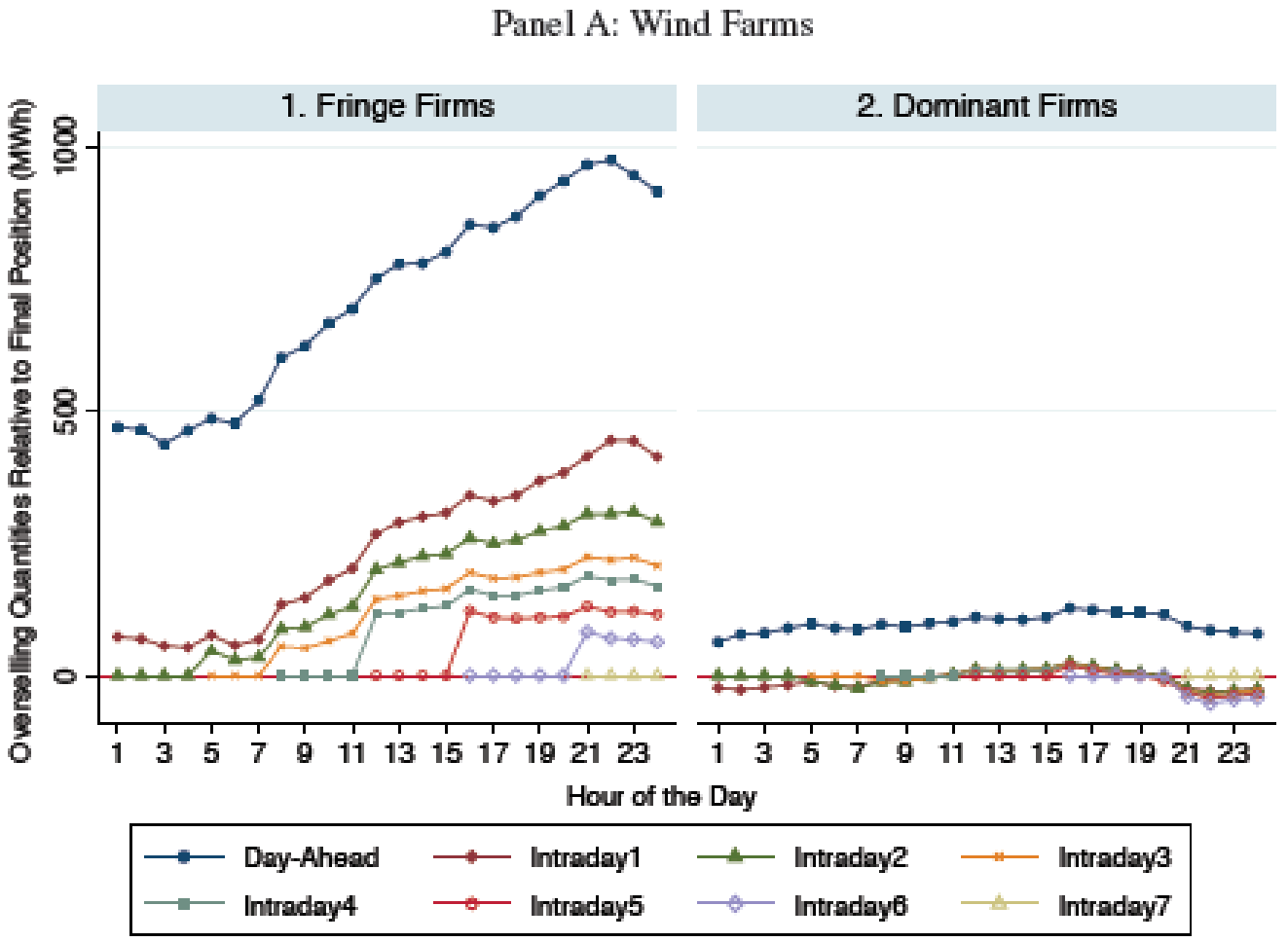
Figure 3: Market Clearing Price in the Day-ahead and Intra-day Markets

This figure shows the average market clearing price (Euro per MWh) in the day-ahead and intra-day markets, in which the horizontal axis shows hours for electricity delivery. Day-ahead market tends to exhibit prices that are on average higher than in the subsequent sequential markets.

Over-selling/buying day-ahead: fringe firms versus dominant firms



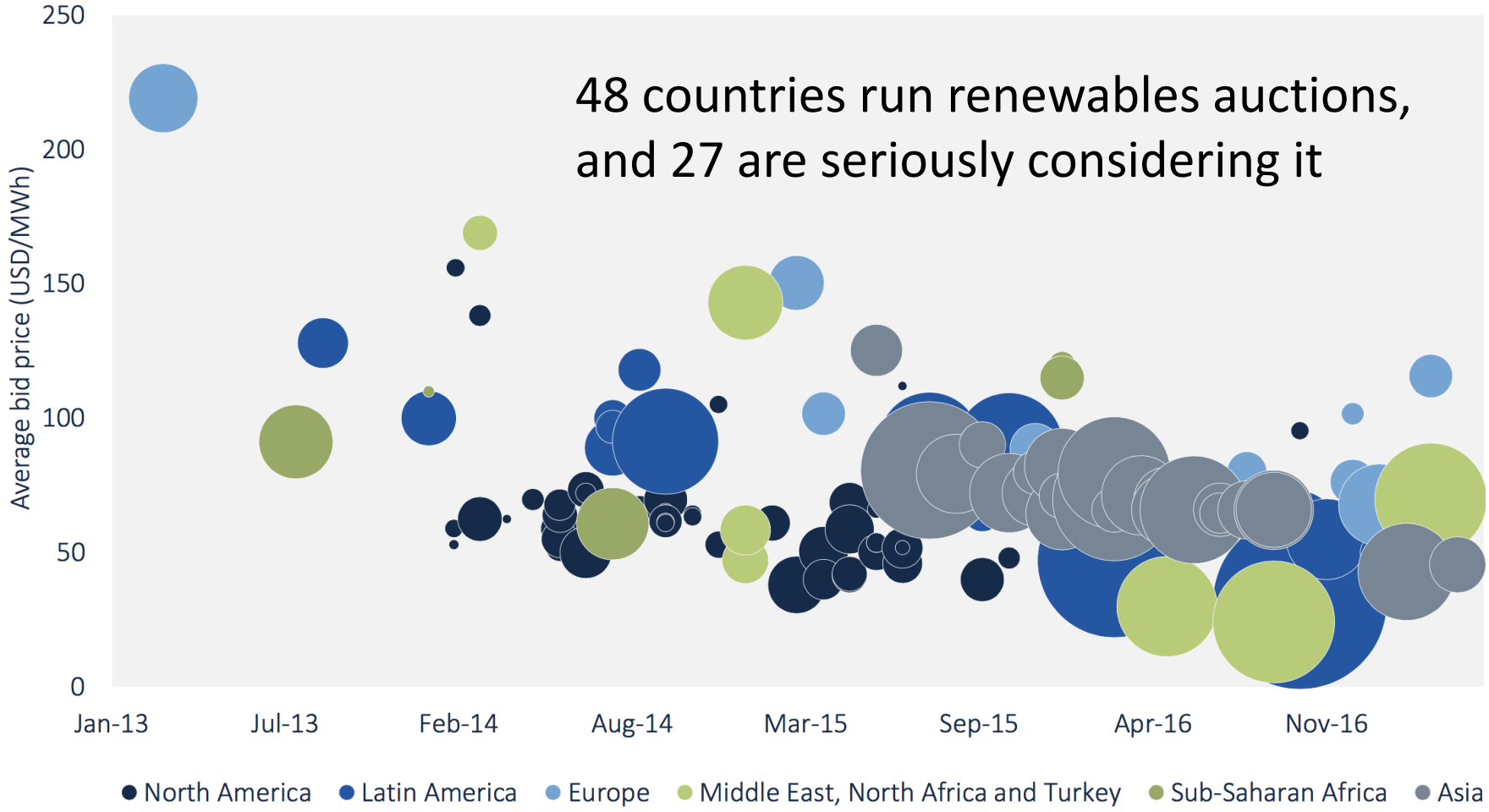
Over-selling/buying day-ahead by wind farms: fringe firms versus dominant firms



Need to re-think market design

- Shift of focus from the short to the long-run
- Need to de-risk investments
- Auctions for long-term contracts
  - Renewable energy
  - Back up capacity
- Liquid spot markets
- Important role for System Operators
- Market integration through interconnections

The renewable auction revolution



Global Tendered Projects by Bid Price and Capacity, 2014-2016

Source: GTM Research

The design of auctions for renewables can have a strong impact on competition

Auction design choices impact competition both in the auction as well as when bidding in the wholesale market

1. Which **contract** for renewables?
- Feed-in-tariffs versus fee-in-premia
- Differences in price exposure imply differences in:
  - cost of capital, types of bidders, impact on wholesale bidding…
2. Which **technologies** should compete? Technology neutrality?
3. Which **auction format**?
4. Which **participation requirements**?
5. Which **penalties** for default?

Regulation and Competition

- Market design decisions typically adopted by regulators
- Sub-optimal focus on competition concerns
- If design flaws lead to weak competition (e.g. markets in congested areas), competition authorithies can do little to limit abuse

This calls for a **closer interaction between regulatory and competition agencies** when desigining markets

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