QUELS SOUTIENS AUX ÉNERGIES RENOUVELABLES ÉLECTRIQUES ?

Revue française d'économie
2015/4, p. 105-140

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Electricity from renewables & nuclear, World, 1996-2015

Source: BP Statistical Review of World Energy June 2016
3 main policy instruments for renewables in electricity

• **Feed-In-Tariffs (FIT)**
  – Electricity bought at a guaranteed price for 10-20 years
  – Boosted wind & PV in Denmark, Germany, Spain, France...
  – More & more limited to small-scale PV

• **Feed-In-Premium (FIP)**
  – Per-unit subsidy added to the market price
  – Germany, France moving to FIP (wind)

• ** Tradable Renewable Quota (TRQ)**
  – Minimum share of renewables in the power mix; renewable power producers sell "green certificates"
  – Aka "Tradable Green Certificates" (TGC), "Renewable Portfolio Standards" (RPS)
  – Some US states, Korea, Sweden...
Outline

1. FIT vs. FIP vs. TRQ wrt.
   1. Uncertainty
   2. Electricity price variation through time
   3. Imperfect competition
   4. Transaction costs

2. ≠ support levels for ≠ market segments?

3. How to fund the subsidies?

4. Auctions in the EU
1.1. Uncertainty (1)
1.1. Uncertainty (2)

- **Schmalensee 2012**: FIT vs. TRQ
  - No explicit externality $\rightarrow$ same exp. renewable prod.
  - Uncertain ren. cost
  - Same Expected social cost
  - FIT: lower variance for ren. producers
  - Variance in social cost depends on parameters, likely lower for TRQ
  - Decreasing marginal fossil cost & perfect competition: ?

- **Narita & Requate 2014**: FIT vs. TRQ
  - Externality: CO$_2$ emissions but internalised by CO$_2$ tax
  - Uncertain fossil cost: TRQ $>$ FIT... but because price cap!
  - Uncertain ren. cost: depends on parameters
1.1. Uncertainty (3)

- **Cornago & Foucart 2014:**
  - TRQ vs. absolute ren. quota vs. fossil quota.
  - Externality: CO$_2$ emissions
  - fossil quota $>\text{ren. quota} > \text{TRQ (share of ren.)}$

- **Marschinsiki & Quirion 2014:**
  - FIT vs. FIP vs. TRQ
  - Externality: induced technical progress
  - Uncertainty over fossil cost, ren. cost or elec. demand
  - Numerical application to the US
  - General result: FIT $>\text{TRQ, FIP} > \text{TRQ}$
1.1. Uncertainty (4)

• Lecuyer & Quirion 2016:
  – Externality: CO$_2$ emissions
  – Interaction with EU ETS; ETS emission cap may bind or not
  – Uncertainty over fossil cost, ren. cost or elec. demand
  – Numerical application to the EU
  – General result: FIT > FIP > TRQ
1.1. Uncertainty (5)

- Risk for ren. producers
  - Lower with FIT: Couture & Gagnon 2010, Fagiani et al. 2013, Kitzing 2014, Marschinski & Quirion 2014, Schmalensee 2012...
  - Gavard 2016, wind in Dk:
    FIP @ 27 €/MWh ~ FIT support @ 21€/MWh
- Lower risk → investment by smaller players
- But risk for conventional producers higher with FIT (Marschinski & Quirion 2014)
1.2. Electricity price variation (1)

• Negative prices:
  – Few occurrences
  – Social cost only if Abs[price] > fossil externality
  – Can be tackled by any support scheme
1.2. Electricity price variation (2)

- Schmidt et al. 2013, Roques et al. 2010, Reichelstein & Sahoo 2015: production maximisation ≠ value maximisation
- Implies FIP > (fixed) FIT
1.3. Imperfect competition

• Dressler 2015; Tamás et al. 2010
  – FIP vs. FIT, Cournot oligopoly
  – FIP may increase market power

• Verbruggen 2009 (Belgium), Tanaka & Chen 2013
  – TRQ: distortions on green certificates market
  – Interaction between electricity and green certificates markets → more distortions
  – ~ Reclaim in 2000-1 (Kolstad & Wolak 2008)
1.4. Transaction costs

• Langniss 2003, Finon & Perez 2007: FIT > TRQ
  – German FIT: 1.3%, Texas TRQ: 2.9%
  – Swedish TRQ: 18% (Mundaca 2013)

• FIP: transaction costs for selling power (Gawel & Purkus 2013: 460 million € in Germany).

• Clear ranking: FIT > FIP > TRQ
2. ≠ support levels for ≠ market segments?

- Market segment: techno, location, size...
- EU guidelines: “technology neutral”
- Practice: differentiation (exchange rates or separate targets for TRQ)
- Dilemma:
  - Tech neutral → differential rent
  - Differentiation → higher social cost (Requate 2015)
- Empirical studies: higher rent for TRQ
- My viewpoint: differentiation unavoidable but should be based on clear principles
3. How to fund the subsidies?

• Most cases in Europe: tax on electricity
  – Clearly more cost-effective than public budget (Goulder 2013)
  – Lower tax rate for electricity-intensive industry (competitiveness concerns)
  – More efficient tools exist (e.g. tax on consumption of energy-intensive goods)
4. Auctions in the EU (1)

- Late 1990s: first auctions in Ireland, France & the UK
- Abandoned: low realisation rate & high transaction costs (Menanteau et al. 2003)
- “Back to the future” (del Río et Linares 2014): Auctions in most European & many developing countries
4. Auctions in the EU (2)

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Tariff Fixed/ Premium set administratively
Tariff set under auction mechanism
Liberalization of the electricity market
Change of the system
Quota

Source: European Commission, 2013; IRENA, 2012

4. Auctions in the EU (3)

- EU 2014 guidelines:
  - from 2017, “aid is granted in a competitive bidding process on the basis of clear, \textit{transparent} and \textit{non-discriminatory} criteria”
  - “aid is granted as a \textit{premium} in addition to the market price”
  - aim: “\textit{cost-effective} delivery through market-based mechanisms”

- \textbf{Non-discriminatory}? French auctions for offshore wind & PV include clear protectionist rules

- \textbf{Transparent}? Little information on prices & realisation rate; ½ of criteria qualitative.

- \textbf{Cost-effective}? For offshore, “competitive dialogue” to avoid duplication of feasibility studies. High transaction costs.

- \textbf{Cost-effective}? For offshore, potentially distorting risk mitigation features.

- \textbf{Cost-effective}? Premium rather than tariff
Conclusion

• Tradable renewable quota dominated by tariff or premium for many reasons
• Move from premium to tariff questionable
• Details may matter more (funding, differentiation...)
• Move towards auctions questionable for onshore wind & PV in Europe