Fundación Naturgy

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Energy Prospectives

COMPASS LEXECON

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The Integration of Renewable Energy Sources in Liberalized Wholesale Electricity Markets

An Economist's Perspective

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Why liberalizing wholesale electricity markets?

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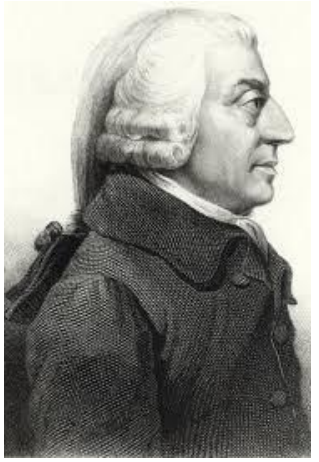
THE INVISIBLE HAND

Competitive markets produce “desirable” outcomes.

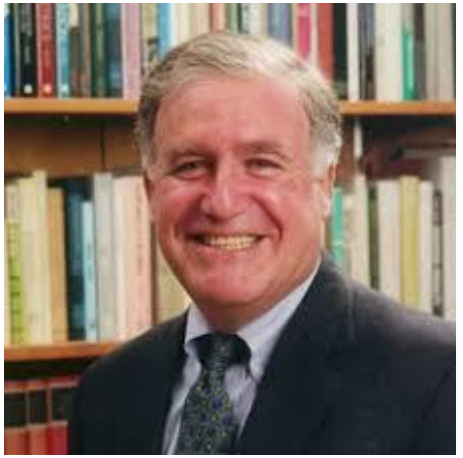
- Allocative efficiencies: low prices and large output.
- Productive efficiencies: demand is served at minimum cost.
- X – efficiencies: increased incentives to cut costs.
- Dynamic efficiencies: more investment and innovation.



REGULATORY FAILURE

Regulated electricity markets produced “undesirable” outcomes.

- Allocative inefficiencies: high prices.
- Productive inefficiencies: demand not served at minimum cost.
- X – inefficiencies: limited incentives to cut costs.
- Dynamic inefficiencies: from excess capacity to insufficient capacity and incorrect technology choices



DRIVERS OF LIBERALIZATION

Liberalization is made possibly by **technological change**

Multiple **goals** of liberalized electricity markets.

- Allocative efficiency
- Productive efficiency
- X – efficiency
- Dynamic efficiency

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Goal: reduce the price of electricity

Alternative: better regulation

Challenge for regulation: cost uncertainty and capture

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Alternative: privatization / better regulation

Challenge for privatization: market power

Challenge for regulation: as above

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Multiple **goals** of liberalized electricity markets.

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Goal: optimal investment

Alternative: better planning

Challenge for alternative: demand uncertainty, technological uncertainty, soft-budget constraints, capture

DYNAMIC EFFICIENCY

Optimal investment maximises **total welfare**

This means investing in new capacity up to the point where the incremental cost of new capacity equals the product of the Value of Lost Load (VOLL), net of the cost of producing the electricity, and the probability of not having load served (LOLP)

In competitive markets, firms invest up to that optimal level of capacity and cover exactly the discounted investment costs.

Challenges faced by liberalization

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MARKET FAILURE

Markets may produce “undesirable” outcomes.

Taxonomy of sources of *market failure*:

- Market power
- Other market failures
  - Imperfect information
  - Informational asymmetries
  - Externalities
  - Bounded rationality
  - Public goods

INITIAL REGULATORY RESPONSES

Market power

- Price caps

Public goods

- Capacity payments
- Uniform pricing

Externalities

- Subsidies to industrial customers
- Subsidies to national sources of energy

- Allocative efficiency
- Dynamic efficiency
- Territorial policy
- Industrial policy
- Industrial policy
- Environmental policy

Liberalization objectives

MORE RECENT REGULATORY RESPONSES

Market power

- Ex post price regulation
- Reduction in capacity payments
- Barriers to exit

- Allocative efficiency

Externalities

- Subsidies to renewable energy sources

- Environmental policy

A PROBLEM OF TRUST

Regulation and distrust

TABLE II
DISTRUST AND DEMAND FOR REGULATION

Dependent variables (rows)	Explanatory variables: Distrust others	Distrust civil servants	Distrust companies
(1) Competition is harmful	0.100***	0.079***	0.392***
	(0.030)	(0.023)	(0.049)
N	73,607	71,779	60,611
(2) Government should take more responsibility	0.159***	0.026	0.198***
	(0.039)	(0.040)	(0.057)
N	73,389	75,331	63,749
(3) The economic system runs badly in democracies	0.130***	0.073***	0.027**
	(0.017)	(0.014)	(0.013)
N	40,566	40,368	28,062

Notes. The dependent variables come from the answers to the following questions: (1) "Competition is good: it stimulates people to work hard and develop new ideas. Or competition is harmful: it brings out the worst in people." The variable takes on values from 1 to 10, a higher score indicating a higher level of distrust of competition. (2) "People should take more responsibility to provide for themselves or the government should take more responsibility." The variable ranges from 1 to 10, with a higher score indicating a stronger support for government intervention. (3) "In democracy, the economic system runs necessarily badly. Could you please tell me if you agree strongly, agree, disagree, or disagree strongly?" The variable is equal to 1 if the answer is strongly agree or agree, and 0 otherwise. The main explanatory variables are distrust others in column (1), distrust civil servants in column (2), distrust companies in column (3). Additional controls: age, gender, education, income and country fixed effects. OLS regressions with robust standard errors clustered at the country level. Coefficient is statistically different from 0 at the *** .01, ** .05, and * .10 levels.

Source. World Values Surveys. Waves: 1980, 1990, 1995, 2000. The OECD countries and the transition economies.

Implications for market performance

SHORT TERM IMPLICATIONS

Market outcomes

- Excess capacity
- Low average prices
- Price volatility
  - In day ahead market, but also
  - In ancillary markets

Gas and coal production

- Reduced production for gas and coal plants
- Financial distress
- Repressed exit
- Underinvestment

LONGER TERM IMPLICATIONS

- **Market dynamics**
  - Increased renewable capacity will depress average wholesale prices further
  - Exit of thermal plants likely to increase price volatility
  - Reduced prices and limited output niche will place gas plants at risk
  - Demand likely to grow, especially in Southern Europe due to global warming

- **Security of supply**
  - Storage is not an option for the time being
  - Gas plants will be needed to ensure security of supply

What do we do with natural gas plants?

CCGTS

- **Option 1: Nothing**
  - Fairness: Because they made too much money in the past
  - Opportunism: Excess capacity
  - Bounded rationality: Hyperbolic discounting
  - Efficiency: Energy-only markets will suffice
- **Option 2: Capacity payments**
  - Which amount?
  - Which mechanism?
  - Which degree of commitment?
- **Option 3: Über regulation**

CAPACITY REMUNERATION MECHANISMS

- Which amount / mechanism?
  - Interrelated questions
  - Capacity payments
  - Capacity auctions
  - Capacity obligations
  - Reliability options
- Which degree of commitment?
  - Commitment is key, but
  - Uncertainty is high and hyperbolic discounting is in our and the governments' nature
  - Need for mechanisms that penalise breaches of regulatory commitments

ÜBER REGULATION

- Marginal prices constrained by subsidised plants, price caps and ex post regulation
- Dispatch driven by environmental considerations
- Prices no longer serve as a signal for investment
- Barriers to exit generate artificial demand-supply balances
- So,
  - DO WE STILL BELIEVE IN LIBERALIZED MARKETS?
  - SHOULDN'T WE REGULATE EVERYTHING THAT MOVES?

Where do I stand?

A CALL FOR MODERATION

- Need to restore the credibility of the market as the right mechanism to drive investment
  - Does not mean lack of flexibility to take into account other objectives, such as global warming control
  - But it means governments need to be prepared to moderate regulatory uncertainty and control the temptation to expropriate rents ex post
  - And requires abandoning the short-run marginal cost ideology that has characterised intervention in the recent past
  - Energy-only markets only work in exceptional circumstances, so we need to design appropriate capacity remuneration mechanisms
- If we are not prepared to do any of the above and insist in marginal cost pricing, then I anticipate aggravated financial distress, market instability, price volatility and possible security of supply problems and a return to some form of RoR

THANK YOU!

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