

# ***Energy Liberalisation in Historical Context***

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# Background

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- Acknowledgments:
  - Peter Pearson and Roger Fouquet
  - Conference on ‘Past and Prospective Energy Transitions: Insights from experience’, Cardiff, 18-20 April, 2011.
  - Not all literature can be covered, apologies!
- Economic Policy Analysts vs Economic Historians
- The key issues are:
  - What has been learned from this recent period?
  - How significant is it in the light of an energy transition to low carbon energy system by 2050?

# Outline

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- Timeline of the energy liberalisation era
- Background to energy liberalisation
- Evidence on impact of energy liberalisation
- Assessment of its historical significance
- Relevance of period to low carbon economy

# Characterising the Era

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- The energy sector substantially consists of oil, gas, coal, electricity and related emissions (of, for example, carbon and sulphur) markets.
- Liberalisation may be characterised as:
  - The privatisation of state owned energy assets.
  - The introduction of competition via structural changes to the organisation of energy sectors.
  - The establishment of independent energy sector regulators.

# Key Dates

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- Oil and upstream gas:
  - privatisation of BP, 1977. Major sales 80s-90s.
- Electricity and gas supply:
  - Privatisation and reorganisation of Chilean electricity industry 1982, British Gas 1986.
- Coal liberalisation:
  - run down in DE, PL, ES, UK (privatised 1994).
  - privately owned coal from Australia and SA.
- Emissions markets:
  - SO<sub>2</sub> in US from 1995, CO<sub>2</sub> in EU from 2005.

# Liberalisation only partial...

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- NOCs in the Middle East dominate.
- 25 of 39 leading countries still have substantial state ownership within their electricity sectors.
- In the downstream gas sector, 16 out of 39 leading countries have public ownership of 50% or more in the largest gas distribution company.
- State ownership of coal remains significant in largest coal market, China.
- Some reform elements pre-existed (e.g. independent regulation in US), others co-exist happily (e.g. competition with public ownership in Norway, AUS, NZ).
- EUETS only max 5% of global CO<sub>2</sub> (from 2013).

# The End of Liberalisation?

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- 1980s Thatcher – Reagan era important...
- By 2000 rising environmental concern
- 2000-1 California Electricity Crisis
- 2011 UK Electricity Market Reform

# More Liberalisation?

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- Oil and upstream gas markets continue to be extremely competitive and dynamic.
- China is an increasing participant in global coal markets.
- The promotion of competitive electricity and gas markets key issue in EU.
- EU Emissions trading market is due to be substantially extended in scope in 2013.
- The financial crisis means many governments may be forced to privatise.

# The motivation for liberalisation

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- Marsh (1991) and Moore (1992) give reasons for the UK privatisation (and liberalisation) programme:
  - the desire to reduce government involvement
  - increasing the efficiency of the companies
  - reducing public sector borrowing
  - curbing trade union power by break up
  - wider share ownership
  - gaining political advantage for the government

# Drivers of government involvement since WW2

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- Rising oil import dependence and exploitation of domestic natural gas.
- Financing requirements of technological change in electricity generation and transmission.
- Network extension of local gas distribution.
- Mineworkers powerful, boosted by oil price hikes.
- Environmental regulation on rise, but early emissions trading from 1974.

# Drivers of liberalisation

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- Fiscal pressure and privatisation:
  - energy assets 60% of UK sales: 1979-96.
  - electricity 1/3 of Argentine sales: 1990-94.
- Markets for Power possible:
  - Joskow and Schmalensee, 1983
- EU single market 1986 consequences:
  - recognition could be extended to energy 1988.
- Competitive markets with public ownership:
  - increases private involvement e.g. NZ, France.

# Measuring liberalisation impact

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- **Performance metric regressions** examine the impact of privatisation/liberalisation variables on panel data of performance (e.g. Steiner, 2001).
- **Statistical tests of before and after performance** conduct a t-test for significant differences in performance metrics before and after privatisation (following D'Souza and Megginson, 1999).
- **Social cost benefit analyses** of reform (following Jones et al., 1990) look at reform as an investment which has costs and benefits.
- **Macro studies** of reform attempt to find impacts using general equilibrium models of the economy. These studies track the impact of lower prices and costs in reformed industries on GDP (e.g. Chisari et al., 1999).

# Impact: Oil, upstream gas and coal

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- Wolf and Pollitt (2008) look at a **sample of 60 privatisation events of 28 national oil companies**, between BP (UK) in 1977 and Inpex (Japan) in 2004. Comparing the 3 years after with the 3 years before privatisation. Profits, output, capital expenditure and labour productivity rise substantially, by 3.6 per cent, 40%, 47% and 50% respectively.
- Wolf and Pollitt (2009) conduct a **social cost benefit analysis of the partial privatisation of Norway's Statoil in 2001**. They find a substantially positive net present value from part privatisation.
- Bridgman et al. (2011) show that **the threat of liberalisation was significant for Brazil's Petrobras**. It lost its legal monopoly in 1995, but faced no effective competition, but TFP doubled in the following six years.

# Downstream Gas

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- Waddams Price and Weyman-Jones (1996) examined the effect of the **1986 privatisation on the productivity of the twelve regions of British Gas**, they found that productivity improved significantly.
- Rossi (2001) found **significant TFP growth following the breakup and privatisation of Argentine gas distribution.**
- Copenhagen Economics (2005) found **industrial prices fell across the EU by 1% in the short run and 4-5% in the long run following liberalisation.**
- Garcia (2006) show that the **margin paid by Spanish industrial customers fell by 50% following competition.**
- Brau et al. (2010) find **no household price reduction impact from reform in EU-15.**

# Impact: Electricity

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- Compared with oil and upstream gas, simultaneity of reforms makes assessing the impact difficult.
- For the EU: Steiner (2001), Hattori and Tsutsui (2004), Fiorio et al. (2007) find evidence of modest productivity improvements. However the impact on prices of the different reform elements is ambiguous.
- Jamasb et al. (2004) highlight the positive experiences of the UK, Chile, Argentina, Peru, Philippines, Brazil and Colombia with electricity reform.
- Pollitt (2009a), after examining the econometric studies from developing countries concludes that, in general:
  - privatisation improves efficiency with independent regulation;
  - privatisation/regulation have no significant effect on prices;
  - private investment is stimulated by independent regulation.

# Impact: Social cost benefit studies Electricity ...

Table 1: Social Cost Benefit Analyses of Restructuring and Privatisation

<i>Authors</i>	<i>Reform and Company/Date/Country Studied</i>	<i>Measured impact of reform (central estimate)</i>	<i>Key distributional impacts identified</i>
Galal et al. (1994)	Privatisation of CHILGENER – generation and transmission /1981-1986/Chile	Permanent gain in welfare of 2.1% of 1986 sales	2/3 of aggregate gains go to foreign share holders.
Galal et al. (1994)	Privatisation of ENERSIS – distribution /1986/Chile	Permanent gain in welfare of 5% of 1986 sales	Paying consumers gain an amount almost equal to the aggregate impact
Newbery and Pollitt (1997)	Privatisation and breakup of CEGB - Generation and Transmission monopoly/1990/UK	Permanent gain of 6% of 1995 turnover	Consumers lose initially and overall, CO2 and SO2 benefits significant
Domah and Pollitt (2001)	Privatisation of 12 Regional Electricity Distribution Companies/1990/UK	Permanent gain of 9% of 1995 turnover	Consumers lose initially
Toba (2002)	Privatisation of distribution company – Meralco/1986/Philippines	Permanent gain of 6.5% of 1999 sales	Most of net gain is reduction in CO2 and NOX, consumers do gain by more than 50% of aggregate gain
Mota (2003)	Privatisation of distribution companies/1995-2000/Brazil	One off gain equal to 2.5% of GDP	Producers gain around 2/3 of aggregate benefit
Toba (2007)	Introduction of Power Purchase Agreements with Independent Power Producers by incumbent generator, NPC/1990-93/Philippines	One off gain of around 13% of GDP	Economy wide benefit due to earlier ending of power crisis
Anaya (2010)	Privatisation of 2 Distribution and Retailing Companies/1994/Peru	Permanent gain of 27% of costs when earlier connection included	Existing consumers lose, new consumers gain earlier connection

# Impact: US electricity reforms

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- Fabrizio et al. (2007) use time series econometrics of US power plants to show that **reform is associated with up to 5% reduction in plant level non-fuel generation costs.**
- Joskow (2006b) used time series econometrics to find that competitive wholesale and retail markets **reduced prices (relative to their absence) by 5-10% for residential customers and 5% for industrial customers.**
- Barmack et al. (2007) look at the **wholesale power market in New England and find a net gain of 2% of costs.**
- Kwoka and Pollitt (2010) show that **unbundling appears to raise electricity distribution costs**, relative to not unbundling.
- Triebs et al. (2010) show **losses on distribution unbundling are more than offset by gains on generation costs.**

# Reform remains unpopular...

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- Both in Europe and in Latin America **dissatisfaction with privatisation remains strong** (Fiorio and Florio, 11, Checchi et al., 09).
- Ugaz and Waddams Price (2003) note that in Latin America there was substantial tariff rebalancing post privatisation which led to **significant price increases for the poorest customers**.
- Zelner et al. (2009) find that for a sample of 62 developed and developing countries over the period 1989-2001, there is a **positive correlation between increased negative sentiment and the renegotiation of the terms of private power generation projects** (i.e. reduction in the rate of return).
- Nagayama (2009) examines the behaviour of prices from 1985-2003 the finding of a **positive correlation between reform and prices** suggests a background of rising prices.
- There have also been **some very well publicised failed reforms** such as in the Ukraine or California (see Besant-Jones, 2006).

# Impact: Emissions Markets

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- Ellerman et al. (2003) on US sulphur dioxide scheme
  - reduced annual emissions by 85% in course of 10 years
  - saved around \$350m p.a. on command and control alternative
- The EU Emissions Trading market for CO<sub>2</sub> has had a much more colourful experience since it began in 2005.
- During the first period 2005-2007 the initial allocation of permits was too generous and prices fell to close to zero by the end of the first trading period.
- Demonstrated the value of a market based instrument in facilitating area wide agreement on environmental targets.
- Contrast with the failure of any country, with the possible exception of Sweden (Australia?), to implement a reasonably comprehensive carbon tax.



# Putting it in historical context

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- Fouquet and Pearson (2006) examine the price of lighting services from the 1300s to 2000 in England and Wales.
  - The technology of production changes significantly: it changes from candle power, to kerosene, to gaslight and finally to electricity.
  - In 2000 the real price per lumen was 1/3000 what it had been in 1800.
  - The demand for lighting (lumens per capita) had risen 6500 times.
  - **Technological progress was key to both.**
- Key issue for liberalisation – its impact on longer run technological progress. Clearly, **the impact on this *could* significantly outweigh the short run impact on efficiency.**
  - Jamasb and Pollitt (2008) show that theoretically liberalisation could be expected to reduce research and development (R&D).
- Note: Renewable subsidies substantially worsen TFP in electricity, even if long run impact positive.

# Putting it in historical context

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- Millward (2010) reviews the history of public and private ownership in utility sectors in the western world over the period c.1830 to 2000. He notes that the period of public ownership in the post-World War 2 period was characterised by rapid productivity growth and that ‘there is no evidence that privatisation raised productivity’ (p.17).
- Problems with the argument:
  - Millward’s **basic counterfactual is that TFP growth should have been the same** between 1950-73 and the later period 1973-95.
  - **TFP trend is a suspect measure to look for performance impacts of liberalisation.** If revenue is falling due to increased competition or regulation then falling input growth (due to efficiency) may be offset by falling revenue growth and TFP may appear to grow slowly, when efficiency is accelerating.
  - **environmental benefits need to be accounted for** in any assessment of liberalisation (Newbery and Pollitt, 1997 in SCBA and Sueyoshi et al., 2010, US power plant efficiency).

# Conclusions

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- **Energy liberalisation is a large part of economy wide liberalisation.**
- **Small overall welfare benefits** but not, perhaps, for households.
- Associated **improvements in governance, competition, innovation and environment.**
- **Liberalisation not as historically significant as historians would expect.**
- **Not clear liberalisation is the issue in transition to low carbon economy.**

# Research Gaps

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- No studies of coal reform impacts (only comparisons for Chinese coal).
- Little work done on impact of gas reform, relative to electricity. More needed on oil and upstream gas.
- Price impacts of reforms poorly understood, but clearly worthy of more study and linkage to tax system.
- Counterfactuals of what would have happened in absence of reform need to be better formulated.
- What combination of policies works best in what context is not understood and needs to be linked up with new institutional economics understanding of second best policy (Roderik, 2004).

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