The political economy of electricity market liberalization: a cross-country approach

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The paper is the third paper of 3-paper format PhD thesis focusing on electricity market reforms.

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- Conceptual framework
- Data & methodology
- Results
- Conclusion

\[a\] The first paper has already been published in *Energy Policy.*

- The impact of power market reforms on electricity price-cost margins and cross-subsidy levels: A cross country panel data analysis

\[b\] The second paper is in progress.
1.1 Motivation

More than half of the countries in the world have introduced a reform process in their power sectors. Main motivation

We attempt to discover the impact of political economy variables on the liberalization process in electricity markets.

Ideological considerations, political composition of governments, educational/professional background of leaders and so on have played and will play a crucial role throughout the reform process.

Empirical models are developed and analyzed using panel data from 55 developed and developing countries covering the period 1975–2010.
1.2 Research Questions

**Question #1**
Does foreign influence resulting from the dependence on foreign financial support have an influence on the electricity market liberalization process?

**Question #2**
Does domestic political structure of a country affect the reforms in its electricity market?

**Question #3**
Are variables below important determinants of the reform progress? If yes, what is the direction of the influences originated from these variables?
- Government structure (single party or coalition government)
- Political stability
- Economic policy orientation of the ruling party (left, center or right ideology)
- Electoral system (presidential or majoritarian)
- Professional/educational background of the head of executive (prime minister, president and so on)
1.3 Hypotheses

Hypothesis 1
Holding everything else constant, countries with a larger industry sector, a lower rural population, and a lower income inequality are more likely to liberalize their electricity industry. These effects are stronger in more democratic countries.

Hypothesis 2
Foreign financial aid and/or assistance make liberalization more likely.

Hypothesis 3
Countries with right-wing (or center) governments are more likely to liberalize their electricity markets. Similarly, single-party governments (rather than coalition governments) and countries with presidential regimes (rather than parliamentary ones) are expected to liberalize more. Likewise, as the number of years the chief executive has been in office (i.e. political stability) increases, so does reform progress.

Hypothesis 4
Educational and professional backgrounds of head of executive branch (prime minister, president and so on) are important determinants of electricity market liberalization.
1.4 Previous literature

To best of our knowledge, this study constitutes one of the first empirical applied investigations of political economy of electricity market reform. Applied evidence from other infrastructure industries (especially from telecommunications industry) by Chang & Berdiev (2011), Cubbin & Stern (2006), Duso & Seldeslachts (2010), Gasmi et al. (2009), Gasmi & Recuero Virto (2010), Li & Xu (2002).

2.1 Data (1/2)

Data Characteristics

Maximum number of observations for each variable: 1,540

- 55 countries (30 OECD & 25 developing countries)
- 1975-2010 period
- Unbalanced panel
2.1 Data (2/2)

![Graph showing electricity market closeness index in 2007 and 1989 for various countries.]

- United States
- United Kingdom
- Turkey
- Switzerland
- Sweden
- Spain
- Slovak Republic
- Portugal
- Poland
- Norway
- New Zealand
- Netherlands
- Mexico
- Luxembourg
- Korea
- Japan
- Italy
- Ireland
- Iceland
- Hungary
- Greece
- Germany
- France
- Finland
- Denmark
- Czech Republic
- Canada
- Belgium
- Austria
- Australia
- Uzbekistan
- Ukraine
- Turkmenistan
- Tajikistan
- Slovenia
- Serbia
- Russian Federation
- Romania
- Montenegro
- Mongolia
- Moldova
- Lithuania
- Latvia
- Kyrgyz Republic
- Kazakhstan
- Georgia
- FYR Macedonia
- Estonia
- Croatia
- Bulgaria
- Bosnia and Herzegovina
- Belarus
- Azerbaijan
- Armenia
- Albania

Electricity market closeness index in 2007
Electricity market closeness index in 1989
## 2.2 Variables

### Dependent Variables
- Entry barriers in electricity market (0-6)
- Public ownership in electricity market (0-6)
- Vertical integration in electricity market (0-6)
- Overall electricity market closeness index (0-6)

### Explanatory Variables
- Industry value added (% of GDP)
- Rural population (% of total population)
- Gini coefficient (0-100)
- Polity score (-10,+10)
- Net official development assistance and official aid received (billion US$)
- Party Structure (single-party or coalition)
- The years the chief executive has been in office
- Party orientation with respect to economic policy (Right, Left, Center)
- Electoral system (parliamentary or presidential regimes)
- Professional & educational background of head of executive

### Control Variables
- EU & OECD member
- Existence of electricity market reform idea
- Population density (people per sq. km of land)
- Electricity consumption (MWh per capita)
- GDP per capita (PPP, current thousand int. $)
- Average # of years of adult (15+) education
- Imports of goods and services (% of GDP)
2.3 Methodology (1/2)

We specify our dependent variables (i.e., reform indicators) as a function of:

- Political economy variables
- A set of controls
- Country-specific effects
- Other unobserved variables
2.3 Methodology (2/2)

- Hausman test
- Breusch and Pagan Lagrangian Multiplier (BPLM) test

Fixed Effects (FE) or Random Effects (RE) regression

\[ Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \sum_{p=1}^{s} \gamma_p Z_{pi} + \delta t + \varepsilon_{it} \]

\[ Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \alpha_i + \delta t + \varepsilon_{it} \]
3 Results

Three main groups of models (one for each research question)

Each main group includes two sub-groups of models

In total, we estimate 18 models

- One sub-group for sub-indicators (entry barriers, public ownership and vertical integration in OECD countries)
- Another sub-group for overall indicator (OECD countries, non-OECD countries, all countries)
3 Results

Group 1
Results from the models testing Hypothesis 1

Group 2
Results from the models testing Hypothesis 2

Group 3
Results from the models testing Hypothesis 3

Group 4
Results from the models testing Hypothesis 4

Group 5
Results from the control variables

Results from the control variables
3.1 Results, Group 1

1. An inverse relationship between the size of the industry sector and electricity market liberalization process.

2. Urbanization and income equality have almost no impact on reform process.

3. A negative relationship, in most cases, between polity score and electricity market liberalization process in OECD countries.
3.1 Results, Group 2

01 “Countries receiving foreign financial assistance/aid tend to liberalize their electricity market more than a country without any aid”

02 “The tendency of liberalization in OECD countries is towards reducing entry barriers to electricity markets”

03 “No statistically significant impact of assistance/aid on public ownership or vertical integration”
3.1 Results, Group 3

1. No statistically significant result for the impact of government structure (single party or coalition) or electoral system (majoritarian or presidential) on overall electricity market liberalization process.

2. Right wing governments do not have a statistically significant overall effect on reform process; but, they reduce vertical integration in OECD countries.

3. Left wing governments speed up the reform process in OECD countries.

4. As the number of years the chief executive has been in office (i.e. political stability) increases, the reform progress slows down in OECD countries.
3.1 Results, Group 4

The professional and educational background of head of executives are important for the reform process in OECD countries. For non-OECD countries, there is no statistically significant relationship.

Leaders with a background in economics or natural sciences increase vertical integration; while those with a background in natural sciences also increase public ownership.

Leaders with a background as scientist (other than economist) have a tendency to increase entry barriers but to reduce public ownership.

Heads of executive with a professional background as politician decreases public ownership but increases entry barriers and vertical integration.

Leaders with a businessmen background speed up the regulatory reform in OECD countries while scientists (economists) and politicians slow the liberalization process down.
3.1 Results, Group 5

- Out of 18 models, 12 models suggest that being an EU member country considerably contributes to efforts for electricity market liberalization.

- The results from 12 models imply that being an OECD country slows down electricity market liberalization process.

- The existence of electricity market reform idea limits the reform progress, which implies that the early reformers had an advantage over the late comers.

- Densely populated countries with higher per capita electricity consumption tend to liberalize their electricity markets less.

- Per capita income, education level and imports of goods and services (% of GDP) tend to have a positive correlation with liberalization process.

- Country specific features tend to have a high power in explaining regulatory reform in electricity industries.
3.1 Results

Holding everything else constant, countries with a larger industry sector, a lower rural population, and a lower income inequality are more likely to liberalize their electricity industry. These effects are stronger in more democratic countries.

Hypothesis 1

Foreign financial aid and/or assistance make liberalization more likely.

Hypothesis 2

Countries with right-wing (or center) governments are more likely to liberalize their electricity markets. Similarly, single-party governments (rather than coalition governments) and countries with presidential regimes (rather than parliamentary ones) are expected to liberalize more. Likewise, as the number of years the chief executive has been in office (i.e., political stability) increases, so do reform progress.

Educational and professional backgrounds of head of executive branch (prime minister, president and so on) are important determinants of electricity market liberalization.
3.2 Limitations

- **Issue of endogeneity**
  (dealt to some extent with inclusion of country and year fixed effects)

- **Qualitative nature of data collection process**
  (moderated by use of indicators constructed by OECD and EBRD)

- **Possibility of sample selection bias**
  (if the countries making this data available (55 countries) have differing results for the dependent variables than those which do not make data available)

- **Any measurement error and omission of explanatory variables**
  (mitigated by inclusion of country-specific effects)
Political Structure
The structure of political economic system matters for the implementation of the reforms.

Foreign Influence
Countries receiving foreign financial support are more likely to liberalize their electricity markets (Reforms may not be always voluntary!)

Politicians & Political Stability
- Politicians’ education and profession matter for the electricity market reforms
- No strong link between political stability and reform progress

Main Contributions

Industrial Consumers
Countries with a larger industrial sectors are less likely to liberalize their power industry
(Industrial consumers seem to prefer guaranteed subsidized prices in a closed market rather than the possibility of future reduced prices in a liberal market)

Democracy
Democracy negatively affects the pace of reforms, maybe, by magnifying the voices of anti-reform interest groups

Main Conclusion
Future reforms should give due attention to the political economic environment of the countries
Thank You!

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