An Institutional Perspective on Electricity Industry Reforms

Muyi Yang

A thesis submitted to the University of Technology, Sydney
in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

Faculty of Engineering and Information Technology

2016

CERTIFICATE OF AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree, nor has it been submitted as part of the requirements for a degree, except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Candidate

_____

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my supervisor, Professor Deepak Sharma, for his insightful feedback and constant encouragement throughout the entire period of this research. Without his superb comments and valuable support, this dissertation would not have been possible.

I would also like to acknowledge the financial support provided by the Faculty of Engineering and IT, of the University of Technology, Sydney (UTS). I also acknowledge the help and support of the Graduate Research School of the UTS.

Special thanks also go to: Dr. Prasad Tadipatri, for his support during the course of developing this thesis; and Dr. Suwin Sandu, for his helpful discussions on econometric analysis.

To the PhD students in the Centre for Energy Policy, I really appreciated your companionship, encouragement and assistance, during all those enjoyable and frustrating movements of this research.

To my family, I am forever indebted to the incredible support you have given me in completing this research. The constant love and understanding I have received from my family have been invaluable to me throughout this research and life in general. My wife, Xiwei Xu, deserves very special thanks, for the years of support and encouragement.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This research develops an institutional perspective on electricity reform, with specific emphasis on understanding the reasons for the disparity between expectations from reform and its actual outcomes, and (hence) for identifying ways to reduce this disparity. The backdrop for this research is as follows. There is a significant, and global, disparity between expected and actual outcomes of reform. The discussion about the reasons for this disparity and how to reduce it has primarily been confined to the economic aspects of electricity reform, particularly its structural (market design) and implementational (role of government) aspects. This perspective (*i.e.*, exclusively economic) – this research contends – is deficient because it is unappreciative of the influence of socio-economic and political factors (that define the role of electricity in wider socio-economic context of human lives) on shaping the contours of electricity reform including its direction, depth, and pace. This research is accordingly founded on the premise that real understanding of the reasons for the disparity and ways to reduce it could only be developed from an institutional perspective on electricity reform that recognises the influence of socio-political-cultural factors on shaping the reform program.

The approach employed in this research is a combination of two approaches, namely, an amended *combined institutional approach* (as proposed by North 1990 and 2005), and an approach for *analysing political power structures*. The *combined institutional approach* analyses how changes in the configuration of the electricity industry (i.e., its structure, ownership, and regulation) are influenced by the underlying formal and informal institutions. It also analyses how these institutions in turn are shaped by the pursuit of interests of diverse socio-political players driven by a range of cultural, socio-economic and political considerations and beliefs. The approach for *analysing political power structures* examines the capacity of these socio-political players to influence each other, in order to pursue their interests.

The case-in-point context for this research is provided by 15 selected developed and developing countries, covering a wide spectrum of cultural, socio-economic and political characteristics. This selection constitutes a sound base for understanding the influence of institutions on shaping electricity reform, and for generalizing the insights gained from this research

The analyses in this research suggest that the configuration of the electricity industry is shaped by the underlying formal (*e.g.,* legislation, socio-economic structure, and developmental-orientation) and informal (*e.g.,* norms, ideologies, and beliefs) institutions. The contours of these institutions in turn are shaped by dominant political interests of the time. These interests are well entrenched in the underlying political power structures. These political power structures typically change slowly; they thus have a lasting grip on the shape and direction of electricity reform. This viewpoint on electricity reform therefore suggests that electricity reform is merely a process of serving dominant political interests of the time. By implication, it also suggests that these political interests translate into the overall objectives of electricity reform. Contemporary analysis of electricity reform, which tends to view reform almost exclusively from an economic perspective, may therefore be inappropriate means to achieve the overall objectives of the electricity industry, and hence incapable of preventing the ever widening disparity between expectations from reform and its actual outcomes. This research accordingly suggests that prerequisites for reducing this disparity are: i) appreciating the influence of underlying political interests on shaping the contours of reform; and ii) adopting more flexible approaches to reform that are able to accommodate conflicting interests in a balanced manner.

ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CCGT	Combined Cycle Gas Turbine
CCP	Chinese Communist Party
CDF	Comprehensive Development Framework
CEGB	Central Electricity Generating Board in England
EAP&L	East African Power and Lighting in Kenya
EBRD	European Bank for Reconstruction and Development
ECG	Electricity Company of Ghana
ECNSW	Electricity Commission of New South Wales in Australia
EDM	Electricidade de Mocambique in Mozambique
EGAT	Electricity Generating Authority of Thailand
EPIRA	Electric Power Industry Reform Act
EPU	Economic Planning Unit in Malaysia
ESCOM	Electricity Supply Commission in South Africa
EU	European Union
GHG	Greenhouse Gas
IDB	Inter-American Development Bank
IPPs	Independent Power Producers
MEPI	Ministry of Electric Power Industry in China

MERT	Mandatory Renewable Energy Target in Australia
METP	Ministry of Energy, Telecommunications and Posts
NDRC	National Development and Reform Commission in China
NEB	National Electricity Board in Malaysia
NEPAD	New Partnership for Africa's Development
NEPO	National Energy Policy Office in Thailand
OTC market	Over-the-counter market
PPAs	Power Purchase Agreements
RTOs	Regional Transmission Organisations
SAPs	Structural Adjustment Programs
SDPC	State Development Planning Commission in China
SEBs	State Electricity Boards in India
SERCs	State Electricity Regulatory Boards in India
SERCs	State Electricity Regulatory Commission in China
Solar PV	Solar Photovoltaic
SPC	State Power Corporation in China
WESM	Wholesale Electricity Spot Market in the Philippines

1 INTRODUCTION

1.1 Electricity industry reforms: A backdrop

The modern day society is heavily reliant on electricity. The provision of affordable, reliable, and sufficient amount of electricity is therefore viewed as a vital prerequisite for economic growth and social prosperity for any country. In recognition of the importance of electricity, the development of electricity industry has long been accorded a high priority by countries around the world. For example, in 2013 alone, around $650 billion was invested in the electricity industry worldwide. This accounted for more than 40% of total global energy investments, and was nearly 120% higher in real terms than investments in the electricity industry in 2000. Over the next 20 years, more than $16 trillion of investments are expected to be made globally in the electricity industry in order to meet rising electricity demand (IEA 2014).

Prior to the 1980s, electricity industries around the world were structured as monopolies. All components of the electricity industry – generation, transmission, distribution and retail – were typically integrated within single electric utilities. These utilities, either publicly owned (*e.g.*, in Australia, China, and Malaysia), or privately owned (*e.g.*, in the United States), were granted exclusive concessions for supplying electricity services to their franchised areas. They were also subject to tight government regulation for tariffs, investments, service quality, and so on (Joskow 1998).

In the 1980s, reforms began to be undertaken by both developed and developing countries to change the monopolistic structures of their electricity industries. Chile was the first country in the world to implement electricity reform. It began to reform its electricity industry in 1982 (Raineri 2006). In the late 1980s, England and Wales also initiated electricity reform programs (Newbery and Pollitt 1996). By the end of the 1990s, a vast majority of developed countries and over 70 developing countries had undertaken steps to reform their electricity industries (Besant-Jones 2006).

Rationale for reform

These reforms are attributable to a number of factors, and there is a sharp contrast between the factors that motivated reforms in developed and developing countries. Accordingly, the expected outcomes of reform are quite different in these countries.

In developed countries, for example, the immediate pressures for reform came from the growing concerns about the inefficiencies of the electricity industries, as electricity prices began to rise significantly in the 1980s (Williams and Ghanadan 2006). For example, in Australia, real electricity prices rose significantly in the early 1980s, from about 10 cent per kWh in 1980, to about 13 cent per kWh in 1984 (Cigre 1996). In the United States, average end-use electricity prices increased by almost 19 per cent in 1980, 15 per cent in 1981, and 12 per cent in 1982 (EIA 1996).

In addition, electricity reforms were generally viewed in these countries as an integral aspect of the economy-wide reform programs. These economy-wide reforms, in turn, were driven by several factors including, for example, globalisation of the world economy and pressure to improve international competitiveness of the national economy, emerging belief in neoclassical ideology, and trends towards small governments (Henisz *et al*. 2005).

The reforms in these countries were therefore expected to improve the overall efficiency of electricity supply, to drive down electricity prices, and to provide appropriate signals for system expansion. These, in turn, were expected to provide economy-wide benefits that will enhance the domestic and international competitiveness of the national economies. This enhancement will further contribute to economic growth, and improve the social well-being of the people (Sharma 2003).

In most developing countries, on the other hand, the main impetus to reform the electricity industries was provided by endemic power shortages in the 1980s and early 1990s. For example, in Argentina, blackouts were widespread in the 1980s, amounting to losses of 1 million MWh a year (Dyner *et al*. 2006). Similar situation was witnessed in many other Latin American countries, such as, Brazil, Chile, and Colombia (Jannuzzi 2005, Larsen *et al*. 2004, Pollitt 2004). In China, power shortages were around 700 TWh in 1986, accounting for more than 15 per cent of the country's annual electricity consumption (Zhang and Heller 2009). In India, there were peaking electricity shortages in many parts of the country in the early 1990s, and more than 15 per cent of peaking electricity demand was unmet (IEA 1995). In the Philippines, brownouts averaging up to 10 hours a day were commonplace in the early 1990s, and the existing capacity was only sufficient to meet about 52 per cent of total electricity demand (Sharma 2005).

Endemic power shortages were exacerbated in some developing countries by the very high and deteriorating transmission and distribution losses. For example, in Brazil, transmission and distribution losses increased significantly in the 1980s and reached about 19 per cent of final electricity consumption in 1992 (IEA 1995). In South Asian countries (*e.g.*, Bangladesh, India, and Pakistan), transmission and distribution losses for many public-owned electric utilities exceeded 20 per cent in the early 1990s (World Bank 2009).

Besides, public-owned electric utilities in most developing countries were debt-ridden, and were unable to generate sufficient funds to finance necessary capacity addition and system maintenance (Joskow 2006). For example, In Argentina, three largest public owned electric utilities registered average annual financial losses of $800 million over the period 1980-1987 (Soto 1999). In Brazil, the financial losses of the electricity industry reached about 150 per cent of average revenues for the industry in 1989 (Spiller and Martorell 1996). In India, the average rate of return for the State Electricity Boards (SEBs) had declined from negative 11 per cent in 1985/86 to negative 14 per cent in 1991/92 (IEA 1995).

Also, the governments were unable to provide sufficient financial support to these utilities, as they themselves had accumulated large foreign debts while promoting social and economic progress in the 1980s, and were under tremendous pressure for debt repayments (Henisz and Zelner 2002). In response, they sought assistance from multilateral financial organisations, particularly the IMF and the World Bank. These organisations, driven by their resurging faith in neoliberalism, began to make their lending conditional to these countries accepting reforms that included privatisation, restructuring and re-regulation of the electricity industries (Sharma 2005). For example, the World Bank changed its lending policy in the early 1990s, and made the implementation of macro-economic Structural Adjustment Programs (SAPs) a prerequisite for receiving loans and financial aid. The SAPs called for market reforms in the electricity industry in favour of private ownership, market competition, and sector-specific regulation. This change was followed by other multilateral financial organisations, such as, the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), and the Inter-American Development Bank (IDB) (Williams and Dubash 2004).

The combination of internal and external pressures (as noted above) led to the implementation of electricity reform in developing countries. The main expectations from these reforms were to facilitate private participation in the electricity industry, with a view to alleviate immediate power shortages and to finance necessary system maintenance. These, in turn, were expected to reduce the governments' financial burden of supporting public-owned electric utilities and hence improving their capacity to invest in other priority programs such as, health, education, and poverty reduction (Williams and Ghanadan 2006).

Table 1.1 provides a summary of main expected outcomes from electricity reforms in both developed and developing countries.

Table 1.1: Main expected outcomes from electricity reforms

	Main expected outcomes from electricity reforms
Developed countries	- Higher efficiency of electricity supply - Lower electricity prices - Sufficient and timely investments in new capacity - Economy-wide benefits and social well-being improvement arising from these benefits
Developing countries	- Encouragement of private participation - Elimination of power shortages - Better service quality - Release of governments' financial resources for other priority programs

Source: Developed by the author, based on the discussion presented in Section 1.1.

Approach to reform: A 'standard textbook model'

Despite sharp contrasts between the rationale for reforms and associated expectations from reforms in developed and developing countries, the reform programs implemented by these countries were essentially guided by the same model. This model is called the 'standard textbook model' (Littlechild 2006). It derives its philosophical imprimatur

from the neoliberal ideology (Sharma 2005). Based on this ideology, the performance problems in the electricity industries in the 1980s (*e.g.*, inefficiencies of the electricity industries in developed countries, and endemic power shortages, high network losses, and high financial losses of public electric utilities in developing countries) were ultimately attributable to excessive government interventions in the industry, such as, encouraging the use of expensive domestic fuels for power generation to support local industries (Newbery and Green 1996), and subsidising targeted consumer groups by lower electricity tariffs (Joskow 1998). Accordingly, a drastic reduction of government intervention in the industry (through restructuring, privatisation and re-regulation) was suggested as the means of redressing these problems (Joskow 2006).

Restructuring involves vertical separation of potentially competitive segments (generation and retail) from regulated segments (transmission and distribution), and the creation of competitive markets for electricity trading at both wholesale and retail levels. It also requires horizontal unbundling of generation and retail segments to create an adequate number of competing generators and retailers. This, it is argued, would contribute to the mitigation of market power and thus promote competition in the electricity markets (Littlechild 2006). Market competition, in turn, will provide strong incentives for improving the efficiency of electricity supply and service quality (Bacon and Besant-Jones 2001).

Privatisation encompasses commercialisation, corporatisation and privatisation of existing government-owned electricity companies, and the opening-up of electricity businesses to private investors (Hunt 2002). This, it is argued, would restore financial discipline in the electricity industry and consequently provide strong incentives for cost reduction and efficiency improvement. This would also make it difficult for the governments to intervene in the operation of the power companies to pursue their costly political agendas (Kessides 2012).

Re-regulation includes the establishment of a sector-specific regulator that operates independently from the influence of the government, electricity suppliers, or consumers. The role of the regulator is to protect public interest, for example, by preventing anti-competition behaviour, ensuring non-discriminatory access to network services, and promoting incentive regulation of transmission and distribution networks (Joskow 2006).

Progress of reform: A significant variation

The actual progress in implementing the reform programs as envisaged in the standard textbook model has however varied significantly across countries. For example, in most developed countries, comprehensive reforms have been implemented. The competitive segments of the electricity industry (generation and retail) have been separated from the natural monopoly segments (transmission and distribution). The privatisation process has been successful in several countries (*e.g.*, England and Wales); in others mixed public-private ownership patterns have emerged. Independent regulatory bodies have been established with a high degree of autonomy. These bodies have been made responsible for monitoring system operation, dispute resolution, enforcement of market rules and regulating network services (Boltz 2013, Kim 2013, Moran and Sood 2013).

Wholesale markets have also been established in these countries. The market is generally organised in the form of a pool market or a power exchange. The electricity markets in Australia, Britain (before 2001), for example, are organised as pool markets. In a pool market, electricity generators submit their bids for electricity supply to the market operator who then dispatches generators based on their bids (Aghdam 2006; Millan 2006; Newbery 2006). The electricity markets in Germany, Britain (after 2001), and the United States, are organised as voluntary power exchanges with physical bilateral contracts traded on the over-the-counter (OTC) market. This market model allows the generators and buyers to freely reach bilateral agreements on power supply. The system operator is only responsible for maintaining the balance of supply-demand and the reliability of the system (Brunekreeft and Bauknecht 2006, Newbery 2006, Bowring 2006).

In most developed countries, market competition has also been extended to the retail levels. But retail markets in these countries are still in their infancy, and in many countries the incumbent utility still acts as the monopoly supplier for small consumers, procuring electricity from the wholesale market and retailing it at regulated prices (Ranci and Cervigni 2013).

In contrast, the actual progress of electricity reforms has shown a significant variation across developing countries. In some countries (*e.g.*, Chile), the reform programs have been implemented with relative ease; yet in others (*e.g.*, Thailand, Malaysia and India) there has been a strong resistance. For example, the reforms of the electricity industries

in many Latin American countries typically went through two phases. In the first phase (1980s and 90s), electricity reforms largely followed the standard textbook model. These reforms resulted in extensive privatisation and restructuring of the public owned electric utilities. These utilities were divided into several generation and network companies, and most of these companies were sold to private investors. Public ownership was only limited to nuclear and large-scale hydro power companies (de Araujo 2006; Pollitt 2008; Raineri 2006). Limited competition was also introduced into the electricity industries of these countries. This mainly involved a centralised pool market in which producers and purchasers sell and procure electricity, and a long-term bilateral contract market (Millan 2006). In the centralised pool markets in these countries, suppliers are not required to make bids. Instead, they are required to provide information regarding their availability and fuel costs for power production to the system operator several months before actual dispatch. The system operator then determines the electricity prices based on this information (de Araujo 2006; Raineri 2006).

In the second phase (the 2000s), some countries in this region (such as, Brazil, Chile, and Colombia) modified their electricity markets with the introduction of long-term contract auctions. This modification was mainly made in response to the energy shortages of the late 1990s and early 2000s (Mastropietro *et al*. 2013). Argentina is an exception. After the macroeconomic crisis of 2001, it suspended the electricity markets, and froze electricity prices (Pollitt 2008).

Limited progress has been made by Asian countries to reform their electricity industries. The generation segments have generally been separated from the conventional vertically-integrated electric utilities. Private investors have also been encouraged to participate in the generation business in the form of independent power producers (IPPs). The remaining segments of the electricity industries (namely, transmission, distribution and retail) are still largely undertaken by vertically-integrated entities which normally act as the 'single buyers' of electricity, and supply electricity to the consumers (Wattana 2010; Zhang and Heller 2009).

In addition, in these countries, the ownership of the public utilities has been partially transferred to the private sector, and the governments continue to have significant ownership of the utilities. For example, in Malaysia, the government corporatised the

National Electricity Board in 1990 into Tenaga. In 1992, the Malaysian government further privatised Tenaga by floating the company onto the Kuala Lumpur Stock Exchange. But the government remained the dominant shareholder of the company (Rector 2005).

Some countries in the region have also expressed their intention to deepen the reform, but the actual progress has been rather slow, due mainly to strong public and industry resistance. For example, in India, the government introduced a new Electricity Act in 2003. This Act aimed to progress the development of competitive markets for electricity trading. However, the progress of implementing the measures in the Act has been rather slow and fragmented, with regional politics acting as major obstacles to the process of reform (Sen and Jamasb 2013).

In some African countries, the electricity industries have been partially unbundled and corporatized, and most are still government-owned, under unified managements. Private participation has also been encouraged, especially in the generation segment. But the progress has been rather slow, and private ownership plays only a minor role, at the margin of the industry, predominantly taking the form of IPPs (such as, in Kenya and Mozambique) and concessionary management (such as, in Uganda and Namibia) (Cumbe 2008, Kapika and Eberhard 2013, Mbogho 2007).

In others (*e.g.,* South Africa and Ghana), plans for reforming the electricity industry have been announced. But the implementation of these plans has been quite slow, due largely to strong political resistance to reform. For example, in Ghana, the government announced a comprehensive plan for reforming the electricity industry in 1997. However, this plan was not implemented due to strong opposition from the country's major electric utility (Volta River Authority) (Jamasb *et al*. 2014).

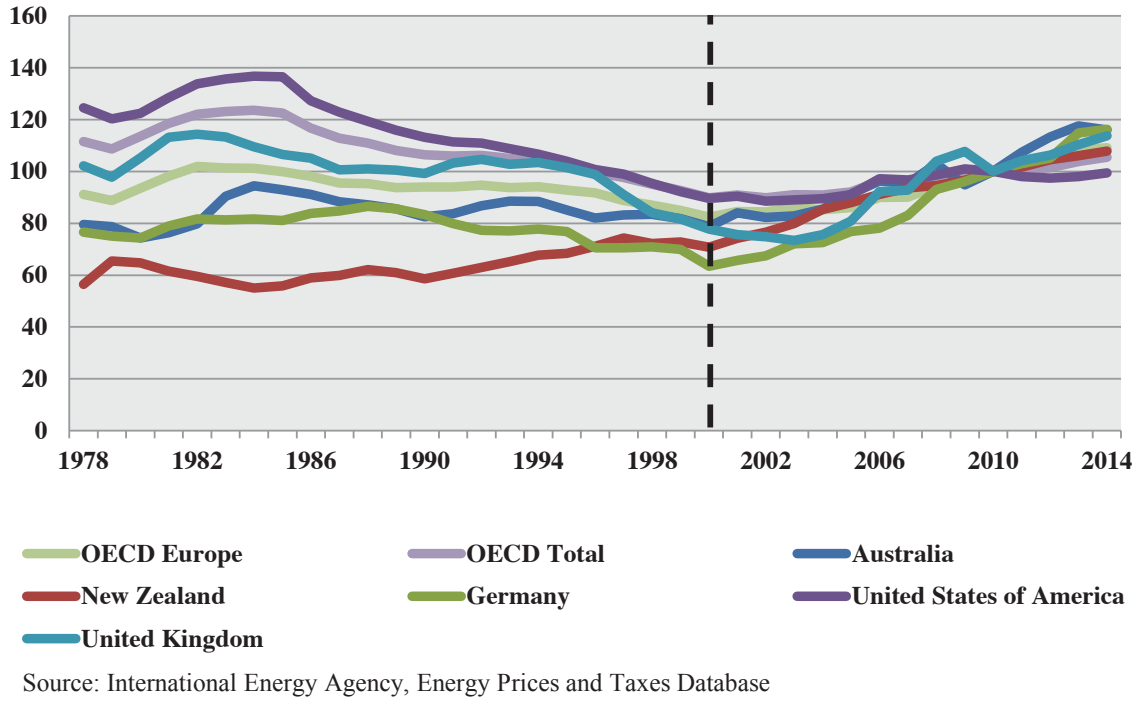
Outcomes of reform: Significantly different from the expectations

The outcomes of electricity reforms till date have been markedly different to what was expected. For example, as noted in Table 1.1, in developed countries, reforms were expected to improve the overall efficiency of electricity supply, to lower electricity prices for the end-users, to encourage timely and sufficient investments in capacity additions. These were also expected to bring out economy-wide benefits, which in turn would contribute to economic growth and improved social well-being. The emerging

evidence however suggests that these expectations have not always been fully realised. Some explanation to support this observation is provided as follows.

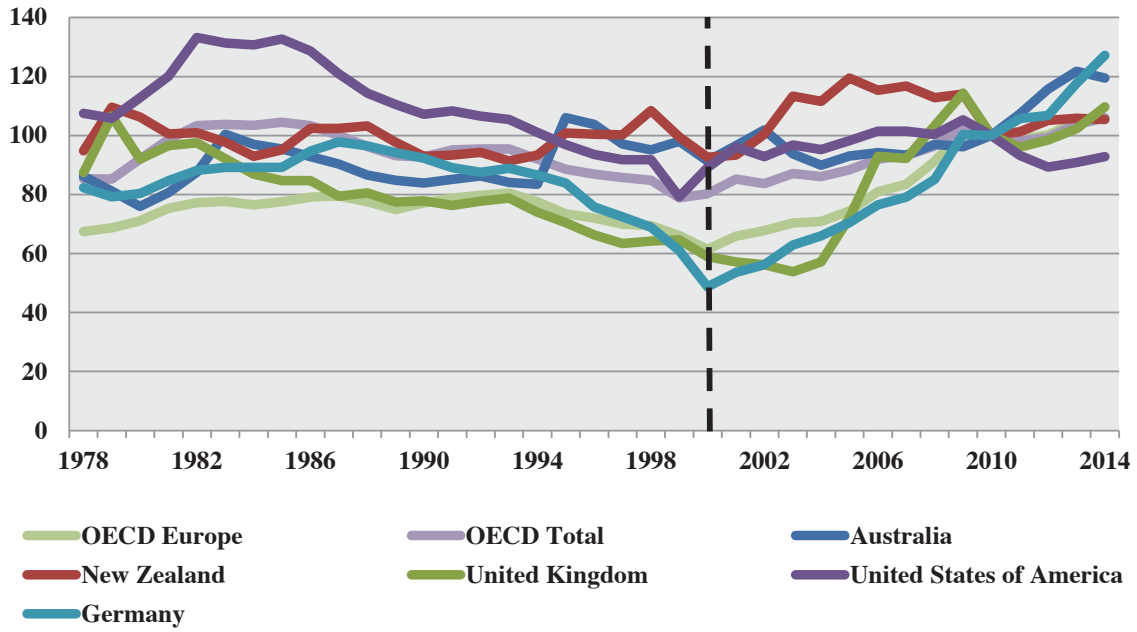
Some efficiency gains: In these countries, electricity reforms seemed to have resulted in higher efficiency of electricity supply. For example, according to Erdogdu (2011) and Steiner (2001), electricity reforms in major developed countries have resulted in improved utilisation of generation capacity, more optimal reserve levels, and higher generation per employee, indicating higher efficiency of electricity supply.

Increased electricity prices: The economic benefits arising from these efficiency gains were however mainly assumed by large electricity companies, and were not fully passed to the end-users (especially households) through lower electricity prices (Bertram 2013). For example, electricity reform in England and Wales did result in significant efficiency gains (*i.e.*, 5% cost reductions per annum in generation) (Newbery and Pollitt 1997). But most benefits resulting from these efficiency gains were kept by large generation companies. Electricity prices were actually much higher (12 to 25%) than they would have been without reform (Yarrow 1992, Branston 2000). This observation gets further substantiated by a review of the electricity price trends in these countries, as shown in Figures 1.1 and 1.2. These figures show that both real electricity household and industry prices began to decrease in the mid-1980s. This decrease however came to an end in the late 1990s when heightened reform activities were observed in these countries, and electricity prices have steadily increase since then.



Source: International Energy Agency, Energy Prices and Taxes Database

Figure 1.1: Real household electricity price index (2010 = 100)



Source: International Energy Agency, Energy Prices and Taxes Database

Figure 1.2: Real industry electricity price index (2010 = 100)

A growing concern about supply adequacy: In these countries, the reforms have largely failed to deliver adequate and timely investments for capacity expansion. This, along with the gradual exhaustion of excess generating capacity, has resulted in a growing

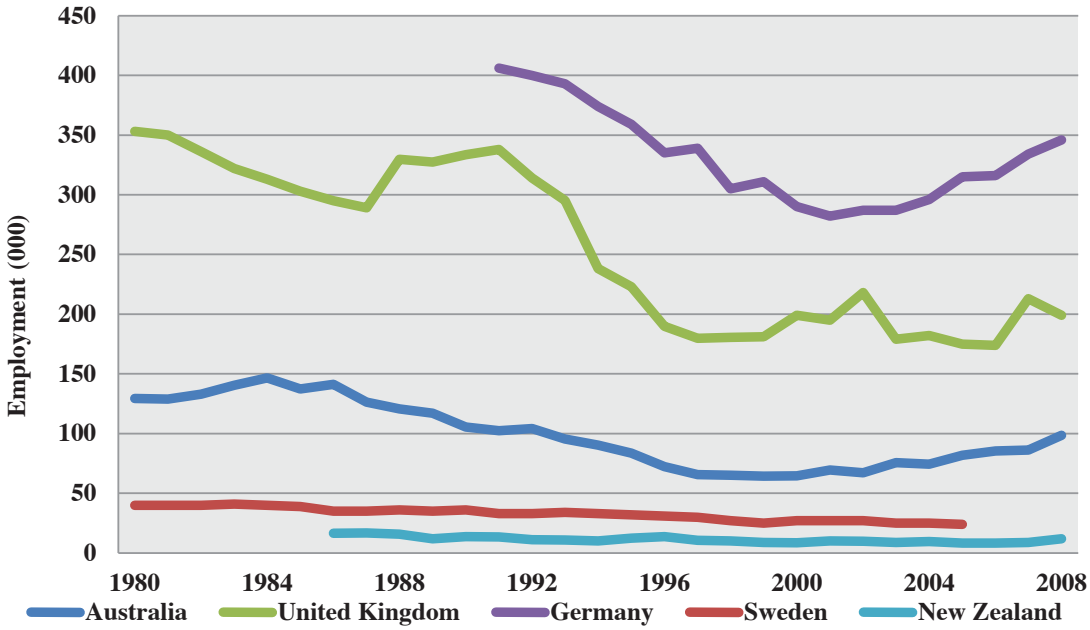
concern about supply adequacy in many developed countries in recent years, such as, New Zealand, the Nordic countries, and New Jersey and Maryland in the United States (Amundsen *et al*. 2006, Bertram 2006, and Briggs and Kleit 2013). This concern may appear surprising if one looks at the reform experience of many developed countries. For instance, in the United States, over 220,000 MW of new capacity was installed over the period 1999–2006, resulting in about a 30 per cent increase in the nation's generating capacity (Joskow 2008). In England and Wales, substantial private investments were made following the allowance of free entry for private investors in 1990. Contracts were signed to build 5 GW of natural gas based plants (Newbery 2006).

A closer assessment of the investment experience in these countries however suggests that macro-level investment trends mask the underlying dynamics of investment. For example, in the United State, annual generating capacity additions, after peaking at 55,000 MW in 2002, increased only by 15,000 MW by 2005. Further, most of this new capacity was built either for municipal utilities that had not been subject to market reforms, or wind projects that benefited from special subsidies and contractual arrangements (Joskow 2006). In England and Wales, during the 1990s, most of the private investment in new generating capacity was made to replace existing inefficient old coal-based generation capacity. In reality, the installed capacity in 2005 was not much greater than it was in 1990 (Newbery 2006).

*A modest contribution to economic growth***:** In many developed countries, electricity reforms did bring out some economy-wide benefits, which in turn contributed to economic growth at large. For instance, it is suggested by several studies (*e.g*., Quiggin 2001, Whiteman 1999, and Short *et al*. 2001) that electricity reform in Australia has had a modest macro-impact, leading to increase in GDP ranging from 1.3% to 0.08% in the 1990s. Aghdam *et al*. (2013) found that electricity reforms in 19 OECD countries and seven Australian states have made a modest contribution (0.06%) to real GDP growth.

But it is arguable that this economic growth contributed to social well-being improvement, especially if one takes note of the fact that employment in the electricity industry has continued to decline ever since the onset of electricity reforms in the late 1980s (see Figure 1.3). These job losses in electricity, it is further argued, were not offset by job creation in other sectors of the economy. Also, it is well acknowledged

that prolonged unemployment could cause poverty traps, which in turn would affect the social well-being of the people (Sharma 2003).



Note: Employment numbers also inlcude water and gas supply.

Figure 1.3: Employment in the electricity industry

In most developing countries, electricity reforms were primarily expected to attract private investments to finance necessary capacity expansion and system maintenance. They were also expected to save government funds that could then be spent on other priority programs (*e.g.*, education, health, and poverty reduction) (see Table 1.1). Most of these expectations have however failed to realise. Some explanation to support this observation is provided as follows.

1) Latin American countries

Short-lived success in private investment: In these countries, electricity reforms seem to have delivered some initial success in terms of private participation. According to Millan (2006), after reform, the Latin American countries received the largest share of world's total private investment in power projects (around 40 per cent), and some countries in this region (specifically, Argentina, Brazil and Colombia) are among the top ten developing countries in terms of attracting private investments. For example, between 1990 and 1999, private investments in power projects in Brazil were $29 billion, accounting for nearly 15 per cent of total private investments in developing

countries. The corresponding figures for Argentina and Colombia were $12 and $6 billion. These investments did contribute to a rapid expansion of generation capacity in the region. For instance, over the period 1992-2002, installed capacity in Argentina increased by 4.9 per cent per year, from 13,267 MW in 1992, to 22,831 MW in 2002 (Pollitt 2008).

In spite of this initial success, private investors' interest in the region rapidly diminished in the late 1990s, following the collapse of Enron and California energy crisis (Millan 2006). In response, the governments resumed their role as the main investor in the electricity industry in many countries in the region. This ambiguity in the roles of the state and the private sector, together with frequent government interventions, implied that the governments in these countries largely failed to provide a level playing field for private and public electricity companies. This further discouraged private participation in power projects in these countries. As a result, in most Latin American countries, private participation has considerably slowed down, and the public sector still controls a sizeable proportion of generation capacity and continues to act as the main investor in the industry (Millan 2007).

Mixed outcomes in improving quality of supply: In some countries (Argentina and Chile, for example), electricity reforms resulted in significant improvements in quality of electricity supply. For instance, in Argentina's Greater Buenos Aires area, the hours of supply lost per year decreased from 21 in 1988, to 17 in 1993/94, and to 5 in 2000/01. The annual failure rate in the country's transmission system also dropped from 1.48 in 1994, to 0.57 in 2002 (Pollitt 2008). In Chile, after reform, network losses fell from 20 per cent in 1987, to 6 per cent in 2003 (Pollitt 2004).

But, in many others, privatised network companies have struggled to control losses, especially in some economically disadvantaged areas and urban slums, where power theft is widespread. The payment collection is also difficult in these areas, which in turn contributed to worsening the financial outlook of these network companies, and further dampening their ability to improve technical performance (*e.g.*, lower network losses) (Millan 2006).

Some fiscal benefits for the governments: Electricity reforms (especially, the privatisation of public-owned electric utilities) led to some fiscal benefits for the governments in the region. Between 1990 and 2002, for example, divestitures of public-

owned electricity assets yielded around $60 billion in the most successful nine countries (particularly, Argentina, Brazil, Chile, Colombia, and Peru) in the region, which contributed to a significant reduction in their public debt (Besant-Jones 2006). Additional fiscal benefits also came from taxes paid to the governments, and reduced subsidies to the electricity industry. For example, in Bolivia, profit taxes from the electricity industry increased by 247 per cent, from $17 million in 1994, to about $42 million in 1997. In Peru, before reform, the government needed to frequently provide financial supports to the electric utilities, costing the treasury of about $300 million in 1990. After reform, the industry became a main source for government income, providing around $300 million in profit taxes in 1998 (Besant-Jone 2006).

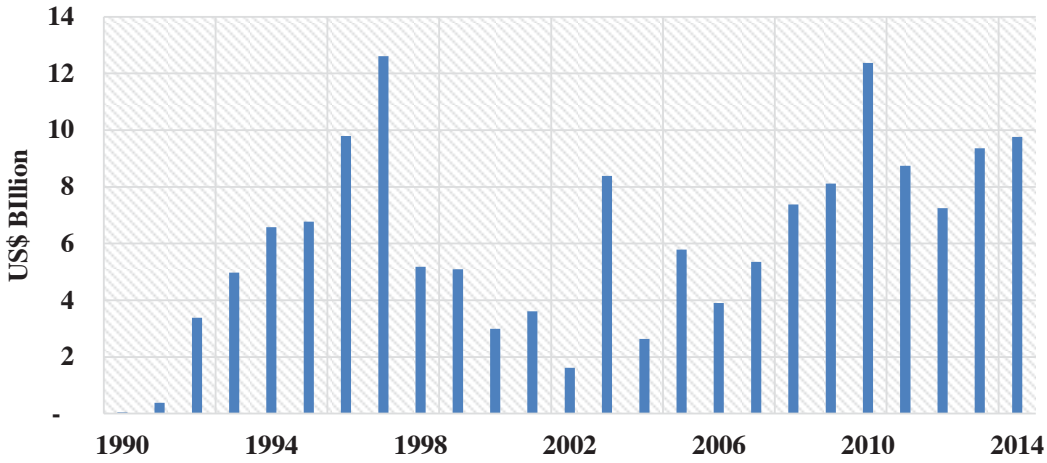
In spite of these fiscal benefits, the early 2000s saw growing concerns in the region about the efficacy of privatising public-owned electricity assets, with the argument that the government, and thus society at large, actually lost from this privatisation, as the governments often under-priced the electricity assets and provided additional guarantees (*e.g.*, the government as guarantor for external financial borrowing) to ensure that privatisation was successful (Birdsall and Nellis 2003, Chong and Lopez-de-Silanes 2005). This argument has been extended by some claim that privatisation has effectively resulted in privatisation of gains and a socialisation of losses, as the governments frequently provided financial support (*e.g.*, bailouts) to save bankrupted private electricity companies (see, for example, Pinheiro and Schneider 1994). Mckenzie and Mookherjee (2003: 1-2) has the following to say: 'the supposed failure of privatisation in Latin America has recently become the source of street riots, protect demonstrations, and adverse news coverage…These adverse opinions are not restricted to a handful of protesters. Latinobarometer opinion polls show that a clear majority disapprove of the privatisation process, a pattern that is uniform across countries, age, gender and socioeconomic classes. The opinions appear to be becoming increasingly adverse over time'.

2) Southeast and East Asian countries

Short-lived success in private investment: In some countries (*e.g.*, China, Malaysia, the Philippines, and Thailand), electricity reforms have been initially successful, attracting significant amounts of private investments in power generation. Between 1990 and 1997, for example, total private investments in the electricity industry amounted to

around $49.7 billion in the region, accounting for about 38 per cent of world total private investment in the industry (Wamukonya 2003). For instance, in China, investments from non-central government sources (including, for example, local governments, local private investors and foreign investors) resulted in capacity additions of 226 GW over the period 1986-2000. This led to nearly a three-and-a-half times increase in total capacity in the country, from 94 GW in 1986, to 325 GW in 2000 (Zhang and Heller 2009). In Thailand, seven IPPs contracts were signed by 1997 for a total capacity of 5,994 MW. This capacity accounted for around 30 per cent of the country's total installed capacity (Greacen and Greacen 2004). In Malaysia, in 1993, five major IPP projects were commissioned, adding a total capacity of 4,517 MW. This capacity represented around 40 per cent of the country's total generating capacity (Rector 2005). In the Philippines, a number of major IPP projects were developed in the 1990s, notably Pagbilao (700 MW), Sual (1,200 MW) and Quezon (460 MW). These projects resulted in a substantial increase (around 70%) in generating capacity, from 7 GW in 1990, to 12 GW in 1997 (Woodhouse 2005).

But this success was short-lived, and private investors' interest in the region rapidly diminished in the late 1990s, following the 1997 Asian Financial Crisis (see Figure 1.4). This crisis caused economic slowdown, and substantially decreased electricity demand in these countries, most of which had signed power purchase agreements (PPAs) with IPPs to purchase large quantities of expensive electricity from these IPPs (Williams and Dubash 2004). In response, the governments either re-negotiated PPAs with IPPs, (*e.g.*, the Philippines and Thailand), or simply dishonoured the PPAs (*e.g.*, China, Indonesia, and Malaysia) (Rector 2005, Woo 2005, Woodhouse 2005,). This in turn discouraged private investors from investing in the electricity industry. As a result, the public sector continues to control a sizeable amount of generation capacity in these countries, and continues to act as the main investor in the industry, even though private investors' interest in the region has started to recover in recent years. For example, in 2010, the central government-owned power companies in China still controlled about 60 percent of the total installed capacity. Private involvement in the electricity industry was relatively small, and most of this involvement took the form of joint ventures (Wang and Chen 2012). In Thailand, EGAT continues to play a dominant role in electricity generation, controlling more than 40 percent of the country's total generating capacity (Department of Alternative Energy Development and Efficiency 2010).



Source: World Bank Private Participation in Infrastructure (PPI) Database

Figure 1.4: Private investments in Southeast and East Asian developing countries

Drain on government resources: Emerging evidence suggests that private participation in electricity in these countries did not actually result in relieving the governments of the need to mobilise additional resources, as the governments still needed to provide financial support to fund expensive private power projects (Wamukonya 2003). For example, private investments in the 1990s were encouraged based on generous power purchase agreements (PPAs) with take-or-pay and guaranteed rate-of-return clauses. These PPAs however placed excessive risks on public utilities. When the financial crisis broke out in 1997, these utilities were stuck with expensive take-or-pay PPAs, often denominated in hard currency. This further increased the financial burden on the governments (Williams and Ghanadan 2006).

3) South Asian countries

Limited private participation: In these countries (*e.g.*, Bangladesh, India, and Pakistan), private investors initially showed some interest in adding generation capacity. But much of this interest did not materialise into real capacity, due to continuous public disquiet about issues associated with private projects, for example, their social and environmental costs, transparency, and investment environment. For example, in 1991, the Indian government amended the 1948 Electricity (Supply) Act, to allow private investors to establish, operate and maintain power plants (Dubash and Rajan 2001). Shortly after making this legislative change, eight showcase Independent Power Producer (IPP) projects were assigned by the government with 'fast track clearance', which allowed these projects to leap over licensing hurdles in order to expeditiously

address the power shortages. As encouraged by these reforms, private investors made about 190 proposals for IPPs by 1996. If completed, these projects would add over 75,000 MW of generation capacity. But most of these proposed projects did not materialise, partially due to local unrest about these projects (Kale 2004). In fact, in the 1990s, public sector capacity actually grew at a rate double that of IPPs, indicating an obvious failure of attracting private investments in the country (Tongia 2009).

Continued power shortages: South Asian countries did not attract any significant investments for capacity expansion to meet rising electricity demand. As a result, these countries continued to suffer from severe power shortages. For instance, it is estimated by Andres *et al*. (2013) that South Asia has enormous infrastructure deficiencies (especially in the electricity industry), and investments between $1.4 and $2.1 trillion (at 2010 prices) are needed to reduce these deficiencies by 2020. This amount of investments accounts for between 6.6 and 9.9 per cent of 2010 annual GDP of South Asia.

Poor quality of supply: Electricity supply remains highly unreliable in these countries, causing significant economic losses. For example, in India, about one fifth of households with electricity reported electricity outages of up to four hours a day. The state of Bihar and Uttar Pradesh had the worst supply reliability in the country, having average electricity outages of 16 and 20 hours per day, respectively. In response to this unreliable electricity supply, most households (around 70 per cent) use backup generators for lighting, costing them an average of Rs. 26 per month (Banerjee *et al*. 2015). Economic losses arising from this unreliable electricity supply is estimated to be around 1.5% of the country's GDP (Srivastava *et al*. 2013). Similarly, power outages and supply interruption were commonplace in Bangladesh. This is estimated to cost the country about $1 billion per annum, which is equivalent to a 0.5 per cent reduction in the country's annual GDP growth (Nissanke and van Huellen 2014).

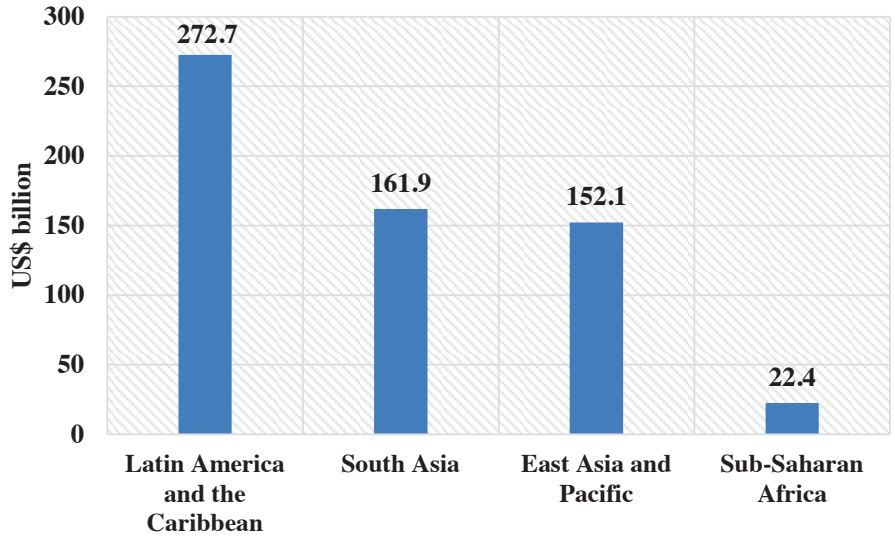
Drain on government resources: In some countries (*e.g*., India), electricity generated from the IPPs is much more expensive than that from public utilities, and most of these IPPs are designed to meet base-load demand even though peak demand is the most pressing need of the time. This, together with take-or-pay clause, meant that power plants with lower costs have been frequently replaced by IPPs with higher costs to meet base-load demand. This has further increased the fiscal pressures on the governments,

because public electric utilities are normally not allowed to fully pass the cost of electricity supply to the end-users (Dubash and Rajan 2001).

4) Sub-Saharan African countries

Lack of private investments: Sub-Saharan Africa lags far behind other regions in terms of attracting private investments. By 2014, total private investments in Sub-Saharan Africa were only $22.4 billion, compared with $272.7 billion in Latin America and the Caribbean, $152.1 in East Asia and the Pacific, and $161.9 in South Asia (Figure 1.5). This lack of private investments resulted in a slowdown in the development of generating capacity in the region. In 2005, total generating capacity for the entire Sub-Saharan Africa was only 68 GW, which was equivalent to that of Spain. This capacity would drop to 28 GW if South Africa was excluded (Eberhard *et al*. 2011).

This lack of private investments, together with rising electricity demand, led to severe power shortages in the region. In response, countries in the region frequently entered into short-term leases with specialized operators who could install new generating capacity (typically in shipping containers) within a few weeks, which was much faster than a traditional generation projects. These leases would last for a few months to a few years, after which the operators would remove the plant. These temporary generators accounted for a significant proportion of total generating capacity (around 14 per cent) in the region. They were quite expensive, costing a considerable percentage of GDP, such as, 1.90% in Ghana, 1.45% in Kenya, and 3.29% in Uganda (Eberhard *et al*. 2011).



Source: World Bank Private Participation in Infrastructure (PPI) Database

Figure 1.5: Private investments in the electricity industry by region, over 1990-2014

Poor quality of supply: In most African countries, power supply is still highly unreliable after reform, causing significant economic losses. For example, most Sub-Saharan African countries experienced more than 20 days of power outages in 2007 (Eberhard *et al*. 2011). These power outages, as estimated by Eberhard and Shkaratan (2012), costed these countries an average of 2.1 per cent of GDP. It is also argued that these power shortages led to damaged equipment and caused significant losses for business (6 to 16 per cent of its turnover) (Foster and Steinbuks 2008). In response to this unreliable electricity supply, many large business consumers built their own backup generators. These generators accounted for a significant proportion of generating capacity in the region. For example, in the Democratic Republic of Congo, Equatorial Guinea and Mauritania, backup generators accounted for more than half of their generating capacity. These backup generators were very costly, resulting in considerable economic losses for these consumers (Eberhard *et al*. 2011).

Continued public financial support: While increased private participation in the electricity industry often implies that government does not have to provide financial support to the industry, many African governments have continued to provide this financial support. For example, in Mali and Ghana, government was the financial guarantor for foreign loans borrowed by the private investors. In Tanzania, the

government guaranteed IPP investors with generous power purchase agreements (PPAs) and has to give ongoing monthly payments to these investors that the public-owned electric utility could not afford (Clark *et al*. 2005).

Besides, in theory, corporatised or private electricity companies need to pay taxes (and dividends where the government continues to be a shareholder) to the governments. In reality, however, many African countries have granted tax deferments and waived dividend payments. For example, in South Africa, Eskom was corporatised in 2001, but in each subsequent year the government allowed substantial deferment of taxes and flexible dividend payments for this company. In Ghana, Electricity Company of Ghana (ECG) should pay taxes to the government. But it did not have sufficient profit to warrant this (Clark *et al*. 2005).

Based on the above discussion, it can be argued that there is a global, and significant, disparity between expected and actual outcomes of reform. A summary reflecting the general nature of this disparity is presented in Table 1.2.

Table 1.2: Expected and actual outcomes of reform: A significant disparity

	Expected outcomes	Actual outcomes
Developed countries	Higher efficiency of electricity supply	- Some efficiency gains - Benefits of higher efficiency mainly confined to large electricity companies and large consumers
	Lower electricity prices	- Generally Rising electricity prices (especially for small consumers)
	Sufficient and timely investments	- Lack of investments (especially in base-load capacity) - Growing concerns over supply adequacy
	Economy-wide benefits	- Modest contribution to economic growth - Contribution accompanied with significant job losses
Latin American countries	More private investments	- Initially increased private investments in the 1990s, but decline since the early 2000s - Public sector continues to be the main investor
	Better reliability of supply	- Mixed outcomes - Improved reliability in some countries (*e.g.*, Argentina) - Poor reliability in many others
	Fiscal benefits to the government	- Some benefits - Continued government financial supports to private investors (*e.g.*, sovereign guarantee for foreign loans)
Southeast and East Asian countries	More private investments	- Significant private investments in the 1990s - Sharp drop in private investment since the early 2000s - Public sector continues to dominate the industry
	Fiscal benefits to the government	- Limited benefits - Continued government financial support to fund expensive private power projects (*e.g.*, generous PPAs)
South Asian countries	More private investments	- Significantly lack of investments
	Better reliability of supply	- Frequent power outages - Prevalent use of backup power
	Fiscal benefits to the government	- Drain on government resources
Sub-Saharan African countries	More private investments	- Far behind other regions in terms of attracting private investments - Frequent use of emergency power
	Better reliability of supply	- Frequent power outages - Prevalent use of backup power
	Fiscal benefits to the government	- Limited benefits - Continued government financial support (*e.g.*, tax deferments and waived dividend payments)

Source: Developed by the author, based on the discussion presented in Section 1.1.

Further quantification for the disparity between expected and actual outcomes of reform

This part of the section develops a quantitative analysis of the disparity between expected and actual outcomes of reform, for 40 selected countries. These countries are classified into four groups, namely, *developed countries* (Australia, Canada, Denmark, Finland, France, Germany, Japan, Netherlands, New Zealand, Norway, Sweden, United Kingdom, and United States); *Latin American countries* (Argentina, Brazil, Bolivia, Chile, Colombia, Paraguay, Peru, Uruguay, and Venezuela); *Asian countries* (Bangladesh, Cambodia, China, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam); and *African countries* (Cameroon, Kenya, Mali, Mozambique, South Africa, Uganda, and Zambia). This classification is based on the degree to which electricity reforms have been progressed in different countries (as noted earlier in this section).

The main purpose of this quantitative analysis is to lend credence to the observations made in the preceding discussion, namely, that disparity between expected and actual outcomes of reform is indeed significant and global (not just confined to isolated countries or cases). Further, this analysis is based on the application of two econometric models, that assess the individual and simultaneous effects of various elements of reform on the performance of the industry, respectively. The performance of the industry is measured in terms of indicators that directly or indirectly reflect expectations from reform. For example, for developed countries, the impact of reform on the efficiency of electricity supply is assessed in terms of two indicators, namely, differences between actual and optimal reserve margins, and capacity utilisation rates. This selection of indicators is based on the ground that reserve margin is a measure of available capacity over the capacity required to meet peak electricity demand. An efficient power system is typically required to maintain an optimal reserve margin of around 15%, as insurance against system contingencies, such as, sudden breakdown in part of the power system. Prior to reform, however, actual reserve margins in major developed countries were much higher than optimal level (see Table 1.3), due largely to inefficient investment decisions made by electric utilities (Gilbert *et al*. 1996). Electricity reforms were accordingly expected to improve the efficiency of investment

decisions, and hence a narrowing of the differences between actual and optimal reserve margins (Steiner 2001).

Table 1.3: Reserve margins[1] in major developed countries (%)

	1970	1980	1990
Australia	-	36.6	42.0
Germany	20.4	39.2	42.8
New Zealand	33.6	52.3	37.9
Sweden	43.0	58.0	45.0
United Kingdom	27.6	33.1	20.2
United States	19.3	30.4	22.7

Note 1: reserve margin = (available capacity – peak demand)/peak demand.

Source: Gilbert *et al*. 1996

Capacity utilisation rate is a measure of the intensity with which electricity industry uses its production capacity. Higher capacity utilisation rates imply higher efficiency of electricity supply, as many developed countries have rated capacity levels that are considerably higher than available capacity, and thus higher utilisation rate should closely reflect improvements in availability (Erdogdu 2011).

For developing countries, in contrast, the impact of reform is assessed in this research in terms of increased investments – the main motive for reform, also considered as a means to overcome chronic power shortages, and to reduce the need for mobilising government funds for capacity expansion. A proxy indicator is used in this research, namely installed capacity per capita, due to the paucity of data on investments. A detailed discussion on indicators of performance, elements of reform and formulae of econometric models is provided in Appendix A. The results of economic analysis is presented in Tables 1.4 and 1.5. The main points are summarised as follows:

Table 1.4: Impact of reform on efficiency of electricity supply in developed countries

	Differences between actual and optimal reserve margins	Capacity utilisation rates
Introduction of IPPs	-	↓(-0.040)
Privatisation of public utilities	↓(-0.201)	↓(-0.050)
Introduction of wholesale competition	-	↑(0.047)
Introduction of retail competition	-	↓(-0.063)
Establishment of independent regulator	-	↑(0.037)
Introduction of IPPs + regulator	-	-
Privatisation + regulator	↓(-0.223)	-
Wholesale competition + regulator	-	-
Retail competition + regulator	-	-

Notes:

1. '-' means that the coefficient is not statistically significant even at 10% level
2. '↑' means positive impacts with statistically significant at 10% level or above
3. '↓' means negative impacts with statistically significant at 10% level or above

Source: Appendix C

Table 1.5: Impact of reform on installed capacity per capita in developing countries

	Latin American countries	Asian countries	African countries
Introduction of IPPs	↓(-0.125)	-	↓(-0.024)
Privatisation of public utilities	↓(-0.074)	↑(0.044)	-
Introduction of wholesale competition	-	↓(-0.096)	-
Introduction of retail competition	-	-	-
Establishment of independent regulator	↓(-0.101)	-	-
Introduction of IPPs + regulator	-	-	↓(-0.042)
Privatisation + regulator	-	↑(0.041)	-
Wholesale competition + regulator	-	↓(-0.093)	-
Retail competition + regulator	-	-	-

Notes:

1. '-' means that the coefficient is not statistically significant even at 10% level
2. '↑' means positive impacts with statistically significant at 10% level or above
3. '↓' means negative impacts with statistically significant at 10% level or above

Source: Appendix C

a) Table 1.4 shows suggests that privatisation of public utilities has negative impact on the differences between actual and optimal reserve margins. This impact could become deeper (as the coefficient increase from -0.201 to -0.223) if privatisation coexists with the establishment of independent regulator. This inverse relationship between electricity reform and differences between actual and optimal reserve margins, this research argues, cannot be simply interpreted as an improvement in the efficiency of electricity supply. Rather, they are more likely to support the argument made previously in this section that electricity reform resulted in under-investment in generating capacity (hence lower reserve margins), as most new power plants were built to replace old less-efficient ones. The current total generating capacity is not much greater than it was before the reform, even though electricity demand steadily increased after reform (see Table 1.2).

b) Besides, as shown in Table 1.4, there is an inverse relationship between capacity utilisation rates and privatisation (namely, introduction of IPPs and privatisation of public utilities). This inverse relationship, this research argues, reflects inefficient investment decisions made by power companies for capacity expansion, because the reform tends to focus the attention of power companies on short-term benefits. It is therefore less attractive for private investors to build large-scale base-load capacity, because the long-term nature of this capacity. Instead, private investors are more likely to build power plants with low capital costs and high flexibility, such as, Combined Cycle Gas Turbine (CCGT). This type of capacity usually operates during medium- and peak-load hours, thereby giving lower utilisation rates.

c) In addition, Table 1.4 shows that capacity utilisation rates are positively impacted in developed countries by the introduction of wholesale competition (0.047) and the establishment of independent regulator (0.037). This implies that electricity reform did result in some efficiency gains.

d) A review of Table 1.5 suggests that electricity reform has negative impacts on installed capacity per capita in Latin American and African countries. This implies that electricity reform failed to attract sufficient investments for capacity expansion in these countries.

e) The results are mixed in Asian countries. For example, in these countries, privatisation of public utilities has positive impact on installed capacity per capita (0.044). This can be explained by the fact that privatisation of public utilities in these countries normally took the form of floating shares at the stock market, driven by the consideration of broadening financial resources for these utilities. This will consequently enhance the capacity of these utilities to invest in new generating capacity to meet rising electricity demand (hence higher installed capacity per capita) (see, for example, Woo 2005).

f) In contrast, wholesale competition in these countries has negative impact on installed capacity per capita (-0.096), implying that electricity reform failed to deliver expected outcomes of more investments for capacity expansion. This is probably due to the fact that even though wholesale competition has been introduced in some Asian countries (*e.g.*, India and the Philippines), the market development has been quite slow due to continued government interference. Private investors frequently complained about the lack of market development and continued government interference in the market. This has consequently discouraged private investments in the electricity industry (hence lower installed capacity per capita) (Roxas and Santiago 2010, Sen and Jamasb 2013).

The foregoing results suggest that the disparity between expected and actual outcomes of reform is global, and significant. It is important to understand the reasons for this disparity, because electricity is a critical infrastructure, and a well performing electricity industry is therefore an essential ingredient for economic growth and social development. Failures of reform therefore cause significant damage not only for the industry itself, but also the wider economy and the entire society. A detailed discussion on the reasons for the disparity as suggested by existing studies is presented in the next section.

1.2 Reasons for the disparity between expected and actual outcomes of reform

Over the past a few years, several studies have been undertaken to analyse the reasons for this disparity. These studies can be categorised into two groups. While one group of studies tends to attribute this disparity to the selection of the model to reform (*i.e.*, the 'standard textbook model'), others attribute it to the implementation of the reform

programs. These two viewpoints accordingly suggest different ways of reducing the disparity. Some discussion on these two viewpoints is provided as follows.

Flaws in the 'standard textbook model' to reform

This group of studies attributes the disparity between expectations and actual outcomes of reform to the selection of a 'wrong' model for reforming the electricity industry. Some of these studies arrive at this attribution based on theoretical arguments (see, for example, Green and Newbery 1992, Joskow and Tirole 2000, and Ranci and Cervigni 2013). Other studies (*e.g.*, Adib and Hurlbut 2008, Borenstein 2000, and Finon 2006) base their arguments on a review of the actual experience of reform in countries where comprehensive electricity reform has been implemented. The 'standard textbook model' to reform, this group essentially argues, is flawed, because it is unappreciative of the underlying economic and technical characteristics of electricity demand and electricity systems, for example, low price elasticity of electricity demand and supply, the need to balance supply and demand for electricity in real-time, and the non-storability of electricity. These characteristics could cause market imperfections, which in turn prevent electricity market reform from delivering its promised outcomes (Joskow 2006).

The electricity industry, for example, is quite susceptible to the abuse of market power because of extremely low price elasticity of electricity demand and supply (Cervigni and Perekhodtsev 2013). Most consumers are unlikely to respond to high electricity prices by reducing their consumption because there is no immediate substitute for electricity. This means that electricity consumers cannot refuse high electricity prices caused by market manipulation. Also, capacity constraints on generation facilities cannot be breached for significant periods without the risks of costly damage. This may put some power suppliers in a very strong position to exercise market power under tight supply conditions because other suppliers cannot increase their production appreciably (Cervigni and Perekhodtsev 2013). The market power problem may be further exacerbated by tight transmission capacity constraints, and highly concentrated generation ownership, as these factors may further reduce the scope for competition, and thus provide some electricity suppliers with interest and ability to manipulate electricity prices (Adib and Hurlbut 2008).

The instances of the abuse of market power by dominant generating companies, and manipulation of electricity prices to get excessive profits, have been noticed in many

electricity markets including, Alberta, California, England and Wales, New Zealand, PJM, Texas (Adib and Hurlbut 2008, Joskow 2006). This has therefore contributed to the inability of electricity reform from delivering its promised outcomes (*i.e.,* lower electricity prices), thus also affecting the interests of consumers. For example, dominant generation companies exercised increasing market power in the England and Wales wholesale electricity market in the 1990s (Sweeting 2007). This resulted in electricity prices that were significantly higher than the marginal cost of electricity supply (Wolfram 1999). In California, the abuse of market power by major power companies played an important role in creating considerable price spikes in 2000-2001 (Borenstein *et al*. 2002). In New Zealand, the abuse of market power by four largest power companies (namely, Contact, Genesis, Mighty River Power and Meridian) resulted in higher electricity prices over the period 2001-2007, which in turn led to substantial wealth transfers (about $4.3 billion), from consumers to producers. This accounted for 18 per cent of the total wholesale market revenues received by all generators in the market (Wolak 2009).

In addition, the system operators in electricity markets very often have to resort to out-of-market measures to meet reliability standards (Joskow 2008). These reliability measures are needed because electricity supply and demand needs to be balanced in real-time, and there is limited demand response in the market that can be effectively used by the system operator to deal with system emergencies, such as, sudden loss of generation capacity. These measures may however prevent the market prices from rising high enough to attract sufficient investments for capacity additions (Adib *et al*. 2008). In fact, in many electricity markets (such as, Chile, England & Wales, Nordic countries, and United States), prices paid to electricity suppliers are substantially below the levels required to stimulate sufficient amounts of new investments for capacity expansion (Amundsen *et al*. 2006, Joskow 2007).

This group of studies accordingly suggests that to redress these market imperfections requires an incorporation of the economic characteristics of the electricity industry into the design of the reform model. This would normally involve, for example, a more elaborate design of market mechanisms for electricity trading, for example, the use of forward markets to support spot markets) and more active government regulations to supplement electricity markets. For example, market power problem caused by low

price elasticity of electricity supply and demand can be mitigated by supplementing spot markets with forward markets. In forward markets, market participants can lock in prices and quantities of electricity sales based on forward contracts before entering the spot markets. This can reduce incentives for power companies to exercise market power because they will not receive higher spot prices for electricity they have already sold through forward contracts (Ausubel and Cramton 2010).

In addition, electricity markets can be strengthened by regulatory measures to support needed investments in new capacity. These measures could include, for example, capacity payments, and forward capacity obligations. Capacity payments refer to administratively set payments for available capacity. Generators receive these payments from the system operator for making capacity available, regardless of whether it is dispatched to run. They are widely used in Latin American countries (*e.g.*, Argentina, Chile, Peru, and Colombia), and in some European countries (*e.g.*, Spain and Italy) (Adib *et al*. 2008). Forward capacity obligations are capacity targets set by the system operator. These targets need to be achieved by acquiring forward contracts backed by physical capacity. Some variations of this method are used in electricity markets, such as, Brazil, Colombia, Italy, and the PJM (Cervigni *et al*. 2013).

Flaws in the implementation of reform

Another group of studies attributes the disparity between expected and actual outcomes of reform to the implementation of reform program. While most of these studies focus on individual case studies (see, for example, Dubash and Rajan 2001, Greacen and Greacen 2004, Joseph 2010, Sirasoontorn and Quiggin 2007, Yeh and Lewis 2004), some develop cross-country comparative analyses (*e.g.*, Bhattacharyya 2007, Williams and Dubash 2004). This group of studies views electricity reform as an inherently political process. In this process, the governments usually have to deal with opposition from the losers under reform. These losers may include, for example, protected public utilities, unionised labour force, politicians with short-term horizons, and electricity consumers that have traditionally received subsidised electricity (Besant-Jones 2006). Such opposition, this perspective argues, may cause delays in the implementation of reforms, or in some cases, postponement or even an abandonment of reforms, thus preventing reforms from delivering promised outcomes (Bhattacharyya 2007).

Electricity reform, for example, was expected to establish the primacy of pricing mechanism in the industry. This mechanism, it was argued, would result in cost-reflective prices, and help to improve the finances of the electric utilities (Jamasb 2006). In many countries (*e.g.*, Ghana, India, Indonesia, Kenya and Pakistan), however, electricity tariffs have traditionally been heavily subsidised, benefiting some interest groups, such as, peasants, households and small businesses (Kojima *et al*. 2014). These groups have constituted significant electoral bases for the governments. The governments have therefore been reluctant to reduce their subsidies. As a result, the electric utilities in these countries have continued to suffer from financial losses, because of the prevalence of subsidised, below cost, electricity tariffs (Diop 2014, Tongia 2009). It is estimated by IMF (2013) that world energy subsidies (including, electricity) were $480 billion in 2011, accounting for 0.7 per cent of world GDP, or 2 per cent of total government revenues.

Besides, in many countries (*e.g.*, Australia, France and United States), retail market is still at its early stage of development, and retail price controls (*e.g.*, regulated default service prices) are still prevalent in these countries, due largely to the political sensitivity of retail prices (Joskow 2006). These price controls however reduce the responsiveness of demand to price, thus distorting the electricity markets (Creti and Poletti 2013).

In addition, in many countries (*e.g.*, Thailand and Malaysia), the privatisation of public-owned electric utilities promised to instil financial discipline, to reduce government debt, and to enable the governments to allocate their scarce capital for improving health, education and other basic services (Sharma 2005). The privatisation of these utilities was however strongly opposed by their employees who were concerned about the loss of jobs and other benefits. As a result, the privatisation process in these countries has been quite slow, and has largely failed to deliver promised outcomes (Smith 2003, Wattana 2010).

In general, this group of studies attributes the disparity between expected and actual outcomes of reform to the lack of depth of reform, caused by strong political opposition to reform. Accordingly, a strong political commitment to reform is suggested by these studies as the remedy to rectify the situation, because this commitment can overcome

political opposition to reform, and ensure a smooth implementation of the reform programs (Besant-Jones 2006).

Limitations of existing studies

The foregoing discussion suggests that existing studies tend to look for the reasons for the disparity between expected and actual outcomes of reform within the immediate confines of the electricity industry, in this instance, in the structure of reform model and processes of implementing this model. These studies accordingly seek remedies to reduce the disparity within the structural and implementational aspects of the reform programs. The typical remedies are therefore to deepen the reform in a way that will accommodate the specific technico-economic characteristics of the industry by, for example, treating electricity as a tradeable market commodity and then facilitate trade through normal market mechanisms (*e.g.*, through financial equivalents of physical electricity market), and to remove political opposition to reform, preferably by taking the industry outside the purview of the government through , for example, privatisation and independent regulation.

These perspectives on the reasons for the disparity between expected and actual outcomes of reform, and remedies to reduce disparity – this research contends – are deficient, because it does not consider the influence on the shape and direction of reform, of the factors/drivers (cultural, socio-economic, and political) that define the role of electricity in the wider socio-economic domain of human lives.

Premise of this research

This research is founded on the premise that a fuller understanding of the reasons for the disparity between expected and actual outcomes of reform and ways of reducing it can be developed from an institutional perspective that recognises the influence of cultural-socio-political factors (as noted above) on shaping reform. Institutions are defined as constraints that shape the decisions made by human beings, through a variety of human interactions (North 1990). Institutions can be formal (*e.g.*, market rules, ownership, regulations and wider socio-economic structure) or informal (*e.g.*, norms, ideology, and beliefs) (Davis and North 1970). Further, formal institutions essentially reflect the underlying priorities for socio-economic development, which derive their legitimacy from the underlying informal institutions (*i.e.*, how the socio-economic development ought to be structured). Given the central role electricity plays in promoting socio-

economic development, electricity industry is generally viewed as a tool to support the developmental priorities. The institutional arrangements of the electricity industry (*i.e.*, ownership, structure and regulation) are accordingly a reflection of the influence of the wider formal and informal institutions (see further discussion in Section 2.5).

Further, the arrangements of the electricity industry are subject to continuous changes, as influenced by the interaction between wider formal and informal institutions (see discussion in Section 2.2). These changes are referred to as institutional change processes in this research. It is in the understanding of these institutional change processes, this research argues, reside the understanding of what is the role of electricity in our lives, why electricity systems evolved the way they did, what factors (cultural, ideological, historical, and socio-political) created the push for reform, why particular model of reform was selected, why opposition to the reform emerged, and hence what should be done to overcome this opposition and engender strong political will for reform. It is in this understanding, this research further argues, reside a real understanding of the fundamental reasons for the disparity between expected and actual outcomes of reform, and hence remedies to reduce this disparity.

1.3 Research objectives

Against the above backdrop, the primary objective of this research is to develop an institutional perspective on electricity reform, with specific emphasis on understanding the reasons for the disparity between expectations and the outcomes of reform, and for identifying ways to reduce this disparity. In order to achieve this objective, three specific objectives have been set in this research. These are as follows:

Objective 1: To review existing approaches for analysing *institutional change processes*, with a view to identify the most appropriate approach for this research.

Objective 2: To apply the approach identified in objective 1 to analyse the institutional change processes in the electricity industry, with a view to gain insights into how these processes are shaped by the interactions between formal and informal institutions, and to develop a deeper understanding about the reasons for the disparity between expected and actual outcomes of

reform.

Objective 3: To demonstrate how insights gained from objective 2 could contribute to developing policy prescriptions that may reduce the disparity between expected and actual outcomes of reform.

1.4 Research methodology

The approach adopted in this research to analyse the institutional change processes in the electricity industry essentially draws upon the basic tenets of the *combined institutional approach* and the approaches for *analysing political power structure*. While salient points of this approach are explained in this section, fuller details will be presented in Chapter 2.

This approach views the arrangements of the electricity industry in terms of the institutions of ownership, structure and regulation. These arrangements reflect the macro-level formal institutions at both national and global levels, which are in turn informed by the underlying socio-economic developmental orientations. These developmental orientations are informed by the underlying political bargaining processes. In these processes, various socio-political players pursue their interests through the exercise of political power to influence other players. The political power held by a socio-political player is primarily derived from the power assets (*i.e.*, utilitarian, coercive and persuasive) that this player has. The outcome of this (pursuit of interest) is what gives rise to the development orientation of the time. As these underpinning factors change, new developmental orientations emerge. This will then (by the logic presented above) lead to changes in the institutional arrangements of the electricity industry.

Besides, in the political bargaining processes, socio-political players control different amounts of power assets, and have therefore quite different political power to pursue their interests. At the global level, the political power is normally concentrated in the hands of a few. At the national level, the distribution of political power varies from country to country. While it could be concentrated in the hand of a small group of business leaders and top politicians in some countries, it could also be distributed more evenly in others where liberal democracies prevail. Accordingly, the socio-economic development orientations are more likely to reflect the interests of powerful socio-

political players, who have more political power (*e.g.*, control of military forces) to influence other players.

1.5 Scope of this research

This research considers electricity reforms in 15 countries including, Argentina, Australia, Brazil, Chile, China, Germany, India, Kenya, Malaysia, Mozambique, Philippines, South Africa, Thailand, United Kingdom, and United States. This country selection covers a wide spectrum of cultural, ideological, socio-economic and political factors (see Table 1.6). This selection, accordingly, it is argued, provides a sound base for understanding the institutional contexts and their effects on shaping the institutional change processes in the electricity industry.

The analysis of the institutional change processes (as noted above) is carried out in this research from the time of the introduction of electricity in the late 19th century to the present time. This timeframe encompasses major changes in the institutions of the electricity industry, which have prompted the development of various institutional models for the industry including, for example, *laissez-faire* model (late 19th century to 1930s), state-centric model (1940s to 1970s), and market-oriented model (1980s to the present). This timeframe therefore allows a meaningful understanding to be developed of the institutional change processes in the electricity industry.

1.6 Data considerations

This research has required an extensive range of data about the institutional change processes in the electricity industry, and the cultural, socio-economic and political factors in shaping these processes. The aforesaid data have typically been embedded in historical and evolutionary accounts of the electricity industries, and the countries' cultural and socio-political backgrounds and settings. These data have been collected from a variety of sources including, for example, the electricity companies (such as, EGAT in Thailand), government agencies (*e.g.*, Ministry of Energy), energy regulators (*e.g.*, Australian Energy Regulator), international development organisations (*e.g.*, the World Bank, Asian Development Bank, and African Development Bank), and relevant literature (*e.g.*, research papers, books, and journal articles).

Table 1.6: Cultural, political and socio-economic contexts

	Culture	Polity			Society		Economy	
	Cultural Diversity[1]	Political Rights[2]	Civil Rights[2]	Corruption Score[3]	Population (million) in 2012	Rural population as a % of total population in 2012	GDP per capita (current US$) in 2012	GINI Index[4]
Argentina	0.000	2	2	34	41	8.7	14,680	43.6
Australia	0.147	1	1	80	23	11.0	67,512	-
Brazil	0.020	2	2	43	199	15.1	11,320	52.7
Chile	0.167	1	1	73	17	11.0	15,245	50.8
China	0.154	7	6	36	1,351	48.1	6,093	37.0
Germany	0.090	1	1	79	80	25.3	43,932	30.6
India	0.667	2	3	38	1,237	68.4	1,484	33.6
Kenya	0.601	4	4	25	43	75.6	1,166	47.7
Malaysia	0.564	4	4	52	29	27.5	10,440	46.2
Mozambique	0.285	4	3	31	25	68.6	593	45.7
Philippines	0.116	3	3	38	97	55.2	2,588	43.0
South Africa	0.530	2	2	44	52	36.7	7,592	65.0
Thailand	0.431	6	5	38	67	53.3	5,480	39.4
United Kingdom	0.184	1	1	78	64	18.2	41,051	38.0
United States	0.271	1	1	74	314	18.9	51,496	41.1

Notes:
1. Cultural diversity – measures the similarity between languages in a country, varying from 1 (the population speaks two or more unrelated languages), to 0 (the entire population speaks the same language).
2. Political and civil rights – represent political rights and liberties enjoyed by the citizens on a 0 (the most free) to 7 (the least free).
3. Corruption score – measures the perceived levels of public sector corruption on a 0 (worst) to 100 (best) scale.
4. GINI Index – measures the extent to which the income distribution among individuals within an economy deviates from a perfectly equal distribution. A GINI index of 0 represents perfect equality, while an index of 100 implies perfect inequality.

Sources: Freedom House (2015); Fearon (2003); Transparency International (2014); and World Bank database.

1.7 Organisation of this thesis

This thesis consists of six chapters.

Chapter 2 reviews various approaches available for analysing institutional change processes. The approaches adopted in this research to analyse the institutional change processes in the electricity industry are also discussed in this chapter.

Chapter 3 analyses the institutional change processes in the electricity industry in the pre-reform period (late 19th century to 1970s).

Chapter 4 analyses the institutional change processes in the electricity industry in the post-reform period (1980s to the present).

Chapter 5 demonstrates, with the help of selected examples, how insights gained from analyses in Chapters 3 and 4 can be applied to improve the efficacy of electricity reform.

Chapter 6 presents the main conclusions of this research. It also makes recommendations for future research.

2 APPROACHES FOR ANALYSING INSTITUTIONAL CHANGE PROCESSES

2.1 Introduction

As noted in Chapter 1, this research develops an institutional perspective on electricity reform. This perspective views the arrangements of the electricity industry in terms of the institutions of ownership, structure, and regulation. Prior to reform, these institutions took the form of public ownership, vertically-integrated utilities, and tight government regulation. Electricity reform was viewed as a process of changing these institutions to private ownership, functionally unbundled utilities, and light-handed regulation, with the argument that this change will lead to higher efficiency of electricity supply, lower electricity prices and wider socio-economic benefits. The main objective of this chapter is to review available approaches for analysing institutional change processes, and to identify the most suitable approach for analysing institutional change processes in the electricity industry.

This chapter is organised as follows. In section 2.2, the definition of institutions is reviewed. Section 2.3 reviews approaches for analysing institutional change processes. These approaches include: intentionally-created approach, evolutionary approach, and combined institutional approach. Based on this review, the combined institutional approach is selected as the most suitable approach for this research, because it combines the analysis of various types of institutions into an integrated framework, and can provide deeper insights into the institutional change process in the electricity industry. This approach is however still limited, as it does not consider the influence of the underlying political power structures on the shaping of the institutional change processes. In response, section 2.4 reviews approaches for analysing political power structure, with a view to overcome the limitations of the combined institutional approach (as noted above). Section 2.5 presents the main features of the overall approach applied in this research to analyse the institutional change processes in the electricity industry. This approach essentially draws upon the basic tenets of the combined institutional approach and the approaches for analysing political power

structure (as noted above). In section 2.6, the main points of this chapter are summarised.

2.2 Definition of institutions

Before reviewing the conventional approaches for analysing institutional change processes, it will be useful to review the definition of institutions in the literature, and to define what we mean by institutions in the context of this research. In the broadest sense, institutions are defined in the literature as the 'rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction' (North 1990: 3). Based on this definition, institutions can be considered as constraints that shape the decisions made by individuals with respect to a particular human interaction (*e.g.*, economic, political and social). They narrow an otherwise unbounded number of options for individuals in their interaction with others. They also help individuals predict the behaviour of other individuals when making decisions (Heywood 2000).

Most scholars also distinguish between formal and informal institutions (Kingston and Caballero 2009). Formal institutions often refer to rules that are made explicit or written down. They include, for example, constitution (Shepsle 1979), regulations and market rules (Williamson 1975, 1985, and 1993), and property rights (Alchian and Demsetz 1973, Libcap 1989). These institutions are usually enforced by actors with specialised roles, such as, market operator, regulator and the courts (Kingston and Caballero 2009). Informal institutions are socially shared norms of behaviour (*e.g.*, beliefs, customs, conventions, ideologies, and traditions) that produce regularities in behaviour with respect to particular human interaction (Parsons 1937, Schmid 1972, Schotter 1981, Veblen 1899). These institutions are usually self-enforced by the individuals of the relevant community through mechanisms, such as, obligation, ostracism and shaming (de Soysa and Jutting 2007).

According to Davis and North (1970) and North and Thomas (1973), formal institutions can be further sub-divided into two types, namely, macro-level and micro-level institutions. The macro-level institutions (or institutional environment in North's words) refer to the set of fundamental political, social and legal ground rules that establishes the basis for economic interactions (*e.g.*, production, exchange and consumption). Examples of these institutions include: political structure for policy-making, regulatory

arrangements for accessing international financial markets, and legal system for enforcing the law (Henisz 2000). The micro-level institutions (or institutional arrangements in North's words) refer to the arrangements that structure the ways in which economic players can cooperate or compete. These institutions include, for example, market mechanisms (*e.g.*, long-term contract market and spot market), and the ownership structure (Williamson 1985).

Williamson (2000) further defines the linkages between formal and informal institutions (see Figure 2.1). Based on this definition, formal and informal institutions constitute a complex institutional system that shapes the decisions made by individuals with respect to particular human interactions. This system is made up of institutions at three different levels. The highest level is the social embeddedness level. Informal institutions (*e.g.*, social norms, conventions and customs) are located at this level. Formal institutions (*i.e.*, macro-level and micro-level institutions) are situated at levels 2 and 3 (Williamson 2000). These formal institutions normally derive their meaning and legitimacy from the underlying informal institutions. For example, modern capitalistic institutions are shaped by a range of informal institutions such as, reciprocity and risk sharing (Boyer and Hollingsworth 1997).

Besides, these three levels of institutions are also subject to change. While the first level institutions (*i.e.*, informal institutions) change slowly, the lower level institutions (*i.e.*, formal institutions) are able to change relatively quickly (Williamson 2000). In addition, changes in formal institutions normally show strong path dependence, and can only occur incrementally, as informal institutions only change slowly and have a lasting grip on the direction and scope of the changes in the formal institutions (David 1994). However, dramatic changes in formal institutions occasionally occur, due to exceptional turbulence such as, revolution, military occupations, and civil wars (Ullah 2015).

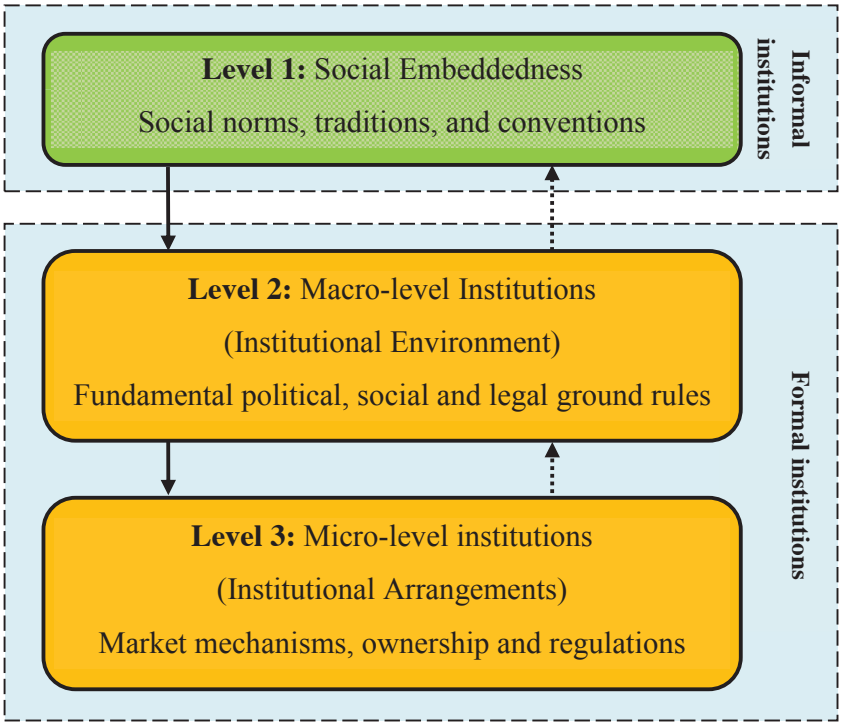


Figure 2.1: Levels of institutions (Williamson 1993 and 2000)

Institutions of the electricity industry

As discussed above, existing literature views institutions as constraints that shape the decisions made by individuals in their interaction with others. There are formal (*e.g.*, market rules, ownership, regulations and wider socio-economic structure) and informal (*e.g.*, norms, ideology, and beliefs) institutions. These formal and informal institutions are closely linked to each other in a hierarchical institutional system. Consistent with this view, this research defines institutions as a hierarchical institutional system covering both formal and informal institutions. This institutional system consists of two sub-systems, namely, national-level and global-level (see Figure 2.2).

At the national level, this research views the arrangements of the electricity industry in terms of the institutions of ownership, structure, and regulation. These institutions shape the decisions made by electricity companies, such as, level of investments, generation technology-mix and fuel-mix, *etc*. These decisions influence the performance of the industry (such as, prices, supply adequacy and service quality) and wider socio-economic outcomes.

These institutions are essentially reflective of the macro-level formal institutions at the national level (*i.e.*, institutions for structuring socio-economic development). These

macro-level institutions in turn are informed by the informal institutions at the national level (*i.e.*, how the national socio-economic development ought to be structured). For example, in the 1950s and 60s, the public-owned electric utilities in many countries were assigned with the task of extending electricity supply to the wider population. This was part of the larger efforts made by the governments to improve people's living standards. These efforts further reflected a widely held belief in these countries that electrification is a symbol of a good life as electricity represented a life style that was only enjoyed by a small group of wealthy people (Williams and Dubash 2004).

Besides, this national-level institutional system is also influenced by the global-level formal institutions (*i.e.*, institutions for structuring socio-economic development at the global level), which in turn is shaped by the informal institutions at the global stage (*e.g.*, how the global socio-economic development ought to be structured). For example, in the post-war years, electricity industry was structured based on the institutions that were typified by public ownership, vertically-integrated utilities and tight government regulations, reflecting the developmental ideal of the times that viewed government intervention as the best means of promoting social and economic progress (Williams and Dubash 2004).

In addition, this research views electricity reform as a process of changing the micro-level institutions for the electricity industry (*i.e.*, ownership, structure and regulation), with the wider institutional system, covering both formal and informal institutions at national and global levels, acting as the major drivers for change. These formal and informal institutions are also subject to change, but at different paces. While formal institutions could change relatively quickly, informal institutions are only able to change slowly (Williamson 2000). The interaction between these fast-changing and slow-changing institutions shapes the direction and scope of changes in the institutions for the electricity industry (Roland 2004). It is in the understanding of this interaction and its impacts on shaping electricity reform, this research argues, resides a fuller understanding of why electricity reform has failed to deliver its promised outcomes, and what could be done to rectify the situation. In the next section, approaches for analysing changes in the institutions are reviewed, with the aim of identifying a suitable approach for this research.

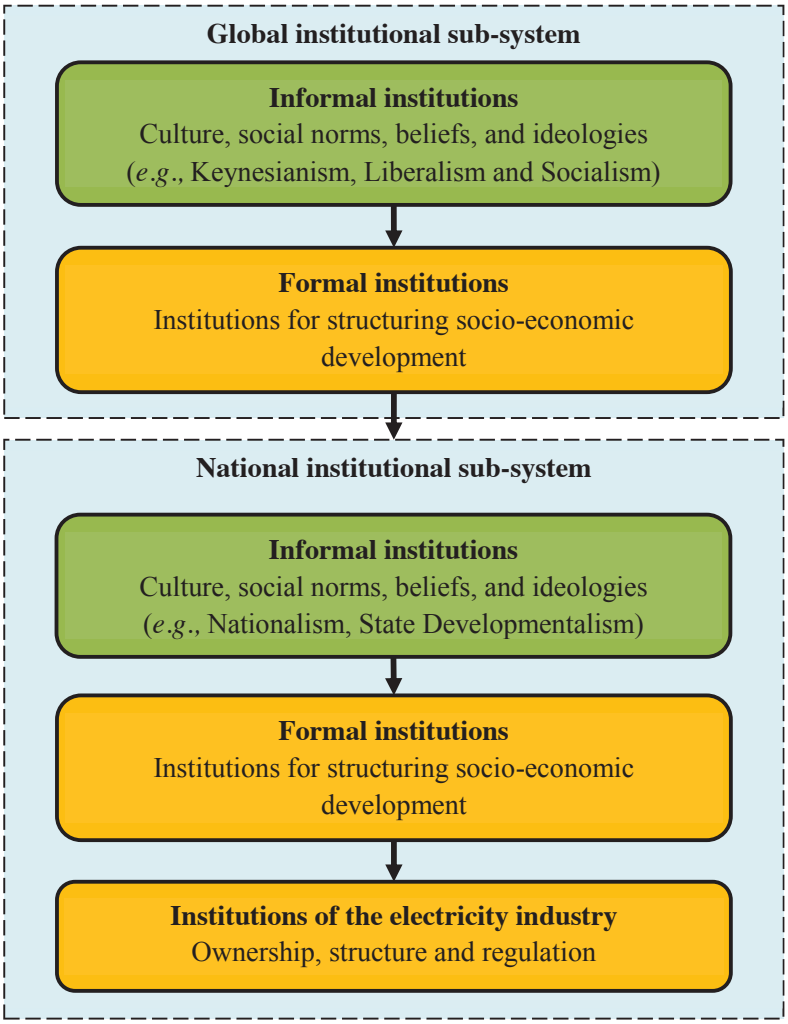


Figure 2.2: A hierarchical institutional system for the electricity industry

2.3 Approaches for analysing institutional change processes

As discussed in the previous section, the arrangements of the electricity industry are viewed in this research in terms of the institutions of ownership, structure, and regulation. These institutions, this research contends, are subject to continuous changes, as influenced by the interaction between wider formal and informal institutions at both national and global levels. These changes are referred to as institutional change processes (Davis and North 1970). In the literature, three broad types of approaches for analysing institutional change processes can be identified, namely, evolutionary approach, intentionally-created approach, and combined institutional approach (Kingston and Caballero 2009, Groenewegen *et al*. 1995). These approaches are discussed in details in the following sub-sections.

2.3.1 Evolutionary approach

The evolutionary approach is built on *Old Institutionalism* that contains the economic thoughts of Thorstein Veblen, Wesley Mitchell, John R. Commons, Clarence Ayres, and many others (Groenewegen *et al*. 1995). This school of thought strongly criticises the 'rational economic agent' assumption of mainstream economics, which views the decisions made by an economic agent as being exclusively driven by the considerations of utility/profit maximisation and optimisation. Instead, it suggests that these decisions are continually affected by changing socio-cultural institutions, such as, norms, traditions and beliefs (Hodgson 1993). It also suggests that these socio-cultural institutions change in an evolutionary process as part of the broader process of cultural development (Hamilton 1919). Some key thoughts on this evolutionary process of institutional change are discussed as follows.

Veblen focuses on informal institutions or 'prevalent habits of thought with respect to particular relations and particular functions of the individual and of the community' (Veblen 1899: 190). Veblen suggests that institutional change process is an evolutionary process of 'natural selection of the fittest habits of thought', and of 'enforced adaptation of individuals to an environment which has progressively changed with the growth of the community and with the changing institutions under which men have lived'. Veblen further suggests that 'institutions are themselves the result of a selective and adaptive process which shapes the prevailing or dominant types of spiritual attitudes and aptitudes'. This leads to 'a further selection of individuals endowed with the fittest temperament, and a further adaptation of individual temperament and habits to the changing environment through the formation of new institutions' (Veblen 1899: 188).

Hayek focuses on informal institutions that are defined as 'a state of affairs in which a multiplicity of elements of various kinds are so related to each other that we may learn from our acquaintance with some spatial or temporal part of the whole to form correct expectations concerning the rest, or at least expectations which have a good chance of proving correct' (Hayek 1973: 36). Hayek argues that 'as members of society, we depend for the effective pursuit of our aims clearly on the correspondence of the expectations concerning the actions of others on which our plans are based with what they will really do'. 'This matching of the intentions and expectations', it is argued, 'determine the actions of different individuals', and 'is the form in which order

manifests itself in social life' (Hayek 1937: 36). Accordingly, it is suggested by Hayek that 'many of the institutions of society which are indispensable conditions for the successful pursuit of our conscious aims are in fact the result of customs, habits or practices which have been neither invented nor are observed with any such purpose in view'. Instead, institutional change process is a process of group selection 'in which practices, which had first been adopted for other reasons, or even purely accidentally, were preserved because they enabled the group in which they had arisen to prevail over others' (Hayek 1973: 10-11).

Hodgson (2002) seeks to explain the evolution of informal social institutions. In this study, a society is considered as a complex system that comprises of a number of sub-systems. It argues that Darwinism offers a theoretical framework and ontological principle for the understanding of this complex social system and its evolution. In this framework, it is argued that 'there is no uncaused cause', and 'all outcomes have to be explained in an interlinked causal process'. To understand this complex process therefore requires 'detailed and complete causal explanations of everything from human intentions to evolution itself'.

In general, the evolutionary approach for analysing institutional change process mainly focuses on informal institutions, such as, social norms, tradition, and beliefs. It models institutional change as a decentralised evolutionary process (Kingston and Caballero 2009). This process follows the Darwinist framework of natural selection. It involves three components, namely, variation, selection, and inheritance (Hayek 1973; Hodgson 2002; Veblen 1899). Significant variations in institutional settings exist as a result of mutation or deliberate design. Such variations provide a basis for natural selection. The criteria for selection are set up by the external environment (*e.g.*, technology, socio-economic conditions). The society will progressively select the fittest institutions as the people of this society gradually adapt to the changing external environment through replication of selected behaviours. The selected institutions will then be inherited by the following generations.

2.3.2 Intentionally-created approach

The intentionally-created approach is built on *New Institutionalism* that traces its origins to Coase's analysis of transaction costs in firms (Coase 1937) and the allocation of scarce resources (Coase 1960), along with contributions by Alchian and Demsetz

(1973), North (1990), Williamson (1975 and 1985) and others. This school of thought strongly criticises the assumption of complete information and full rationality that underlie the mainstream economics. Instead, it suggests that individuals may not always have access to all information required for making decisions in their interaction with others, and they may also not have full mental capability of processing this information, because significant costs are involved in acquiring necessary information for making decisions and in processing this information (Ullah 2015). This gives rise to significant uncertainty in human interactions. Institutions are created to reduce this uncertainty, as they reduce an otherwise unbounded number of options available for interactions between individuals, and help individuals predict the behaviour of other individuals when making decisions (Heywood 2000). Accordingly, this school of thought views changes in institutions as being intentionally-created to reduce the uncertainty in human interaction. Major studies about this intentionally-created process of institutional change are discussed as follows.

Alston and Mueller (2004) focuses on the institutions of property rights as a means for using and transferring scarce resources. This study develops a demand and supply framework to analysing change in the institutions of property rights. In this framework, demanders for changing or sustaining the current property rights include winners who could benefit from this change, and losers who could only benefit from the status quo. The suppliers of changing property rights are political actors who will respond to the incentives from demanders of changing or sustaining the existing property rights. When a resource becomes scarcer, this study argues, the potential rent generated from this resource will increase, and will gradually reach a point at which it is more beneficial to have formally defined and enforced property rights.

Demsetz (1967) focuses on property rights that are defined as ‘an instrument of society’ that ‘specifies how persons may be benefited and harmed, and, therefore, who must pay whom to modify the actions taken by persons’. Demsetz is of the view that property rights are mainly created to internalise these beneficial and harmful effects. The emergence of new beneficial and harmful effects will give rise to changes in the property rights when the gains of internalising these effects become larger than the cost.

Libecap (1989) focuses on property rights that define or delimit the range of privileges granted to individuals to specific assets, such as parcels of land or water. In this study,

the change of the property rights is viewed as being shaped by political bargaining among many competing interest groups. These interest groups hold different bargaining stands that are mainly dependent upon how they view their welfare under the new property rights relative to the status quo. Each of these groups will attempt to shape the direction of institutional change in ways that maximise their share of the aggregate returns.

Ostrom (2004) and Ostrom and Basurto (2011) focus on the institutions of 'shared understandings' that humans use to 'organise all forms of repetitive and structured interactions'. *An Institutional Analysis and Development (IAD) Framework* is developed in these studies to analyse the change of these institutions. In this framework, the basic unit of analysis is an 'action arena' that refers to the 'social space where individuals interact, exchange goods and services, solve problems, dominate one another, feel guilty, or fight'. There are three factors that inform the action arena including, the rules used by participants to order the actions, the physical conditions that are acted upon the action arenas, and the attributes of the community within which the action arenas are placed. These studies further distinguish three levels of rules that cumulatively affect the action arenas. These rules include: operational rules, collective-choice rules, and constitutional-choice rules. Operational rules structure the action arenas within which day-to-day decisions are made by participants. The decisions on changing the operational rules are made by individuals in the action arenas that are structured by collective-choice rules. Constitutional rules structure the action arena where individuals select or change the collective-choice rules, and in turn have an influence on the operational rules.

Transaction cost economics (TCE) was developed in Williamson (1975, 1985 and 1991) as an approach that views economic transaction as the basic unit of analysis and examines different modes of governance structure that could be used to govern these transactions. The governance structure is defined by the TCE as the institutional arrangement between economic units that governs the ways in which these units can cooperate and/or compete. TCE contends that transaction costs emerge from the transactions between economic units due to bounded rationality and opportunistic behaviour. Depending on the attributes of a particular transaction in question, some modes of governance structure will be more efficient to govern this transaction than

others. TCE holds the view that the most efficient mode of governance structure will emerge as a result of economic units economising on transaction costs.

In general, the intentionally-created approach mainly focuses on formal institutions. It views institutions as being purposefully designed to achieve certain objectives. For example, they could be created to delimit the rights of using scarce resources (Alston and Mueller 2004; Libecap 1989), to internalise beneficial and harmful effects (Demsetz 1967), or to economise transaction cost (Williamson 1975, 1985, and 1991). Accordingly, this approach models the institutional change as a centralised process. In this process, the change of institutions is caused by the changes in the objectives underlying the existing institutions as a response to external environmental changes (*e.g.,* technological improvements, economic crises, and socio-political conditions) (Kingston and Caballero 2009). This process could be either a formal political bargaining process (Alston and Mueller 2004; Libecap 1989), or an informal private negotiation process among economic units (Demsetz 1967; Williamson 1975, 1985, 1991). It could be implemented either by a single individual (such as, for example, a manager in a company implements a new organisational structure), or several individuals or groups, who lobby, bargain, vote, or otherwise compete to try to implement institutional changes which they perceive as beneficial to themselves, or to block those they view as undesirable. The outcomes would be therefore either a change in existing institutions according to new objectives, or maintenance of the status quo (Kingston and Caballero 2009).

2.3.3 Combined institutional approach

The approach for analysing institutional change process proposed by North (1990, 2005) combines the analysis of both formal and informal institutions into an integrated framework. This framework is referred to as combined institutional approach in this research. This framework comprises three key components, namely, environment, organisations, and institutions (*i.e.,* formal and informal). It is the interactions between these components that shape the evolution of institutions (see Figure 2.3). This section will discuss the influence that these three components and their interactions have on shaping the institutional change process.

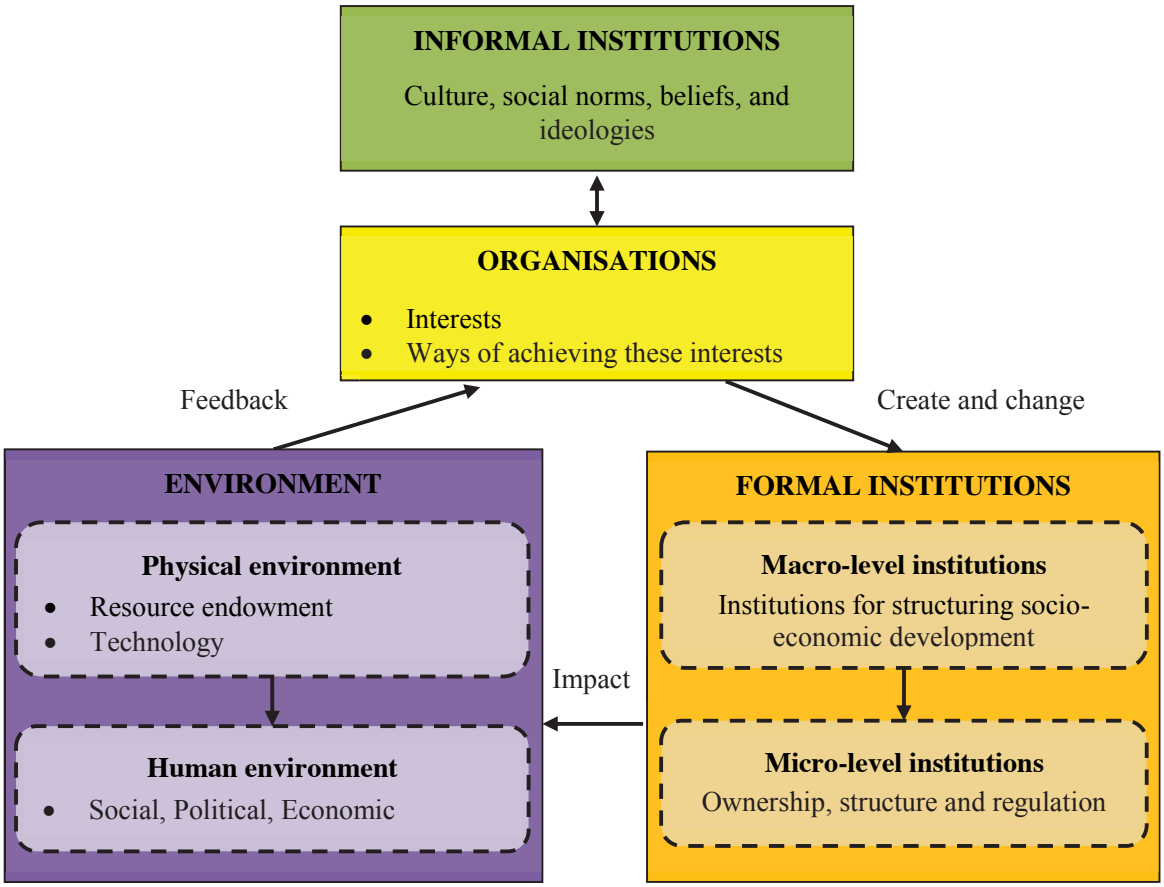


Figure 2.3: Combined institutional approach

Environment refers to the physical (*e.g.*, resource endowment and technology) and human surroundings, *i.e.*, social, political, and economic surroundings human beings live in (North 2005: Chapter 2). Further, the environment (*i.e.*, physical and human) is assumed to be characterised as uncertain – a condition in which it is impossible to derive a probability distribution of outcomes (Knight 1921).

North holds the view that uncertainty associated with the physical environment can be reduced with scientific progress that enables us to better understand how the physical environment works. This is mainly because the physical environment is largely characterised as ergodic. An ergodic environment is constant and therefore timeless (North 2005: Chapter 2). If past observations were large enough, we could derive a single universally valid theory to explain the physical environment and to correctly predict its behaviour in future (Davidson 2003).

Further, this framework assumes that the human environment is non-ergodic. This means that it is subject to a continuous, novel, change. For example, the introduction of market competition in the electricity industry may lead to market failures in the industry which did not exist in the past when the industry was tightly regulated by the governments. This therefore changed the underlying economic, and likely social and political, surroundings. It is however impossible to develop a single theory that could precisely explain the human environment and correctly predict its behaviour in future. To understand such an environment that is continuously evolving requires a new theory, or at least modification of that which we possess (North 2005: Chapter 3).

Organisations are groups of individuals bound together by some common interests (North 1990: Chapter 9). They may include, for example, political parties which aim to win an election, business associations endeavouring to maximise profits, or labour unions fighting for more social welfare benefits. They are players who participate in changing or maintaining existing institutions based on their own interests. These organisations are assumed to have *bounded rationality* because they always have limited access to (complete) information required to make optimal decisions, and have restricted cognitive capacity to process the information (Simon 1957).

Institutions (both formal and informal) are the humanly devised constraints that shape human interactions (North 1990: 3). They are created to achieve the fundamental objective of human beings, namely, to reduce the uncertainty in the human environment (North 2005: Chapter 3). To create institutions to achieve this objective requires a thorough understanding of the ways the human environment works. Human beings develop informal institutions (*e.g.*, cultures, social norms, beliefs and ideologies) about how the human environment ought to work. These informal institutions act as a lens through which people interpret the human environment, and identify their interests and the ways of achieving them (normally through the creation or re-creation of formal institutions that would reduce the uncertainty of pursuing these interests) (North 2005: Chapter 3). People having common interests usually work together as an organisation in pursuit of their interests. They compete or cooperate with each other in a political bargaining process to shape the institutions in line with their own interests (North 1990: Chapter 9).

There are two main stimuli for changes in institutions (North 1990, 2005).

1) The first stimulus comes from the continually-changing human environment. Assume that human beings have full rationality and will perceive the human environment as it really is. They can therefore develop perfect informal institutions regarding how the human environment works, and uncertainty in the human environment will then be reduced to zero. However, as the human environment is characterised as non-ergodic, there will always emerge some novel problems that have never happened before. This will change the state of uncertainty in the human environment, and thus make the prevailing informal institutions redundant. This will necessitate the development of new informal institutions, or a modification of the existing informal institutions, to interpret the newly-emerged features of the human environment. Formal institutions would therefore have to change as a response.

2) The second motivation comes from the imperfection of the informal institutions. Because of the bounded rationality of human beings, it is impossible for them to develop a perfect understanding of the exact nature of the human environment. The informal institutions developed based on such an imperfect understanding would be also imperfect. Human beings use the imperfect informal institutions to process the information from the human environment and to make their choices on the institutions for governing this environment. This will cause the development of imperfect formal institutions to reduce the uncertainty of human interactions. The performance problems of the imperfect informal institutions will be feedback to the human beings to correct these institutions. Any correction in the informal institutions will give stimuli for further institutional change.

2.3.4 Some observations and further comment

The previous sections reviewed three major approaches for analysing institutional change processes in the literature. The salient points of these approaches are summarised in Table 2.1. This review suggests that these three approaches focus on different types of institutions, and accordingly model the institutional change processes quite differently in terms of its causes, processes, and outcomes.`

a) Informal institutions, for example, are the main focus of evolutionary approach. These institutions are considered to change as a product of decentralised evolutionary process. In contrast, intentionally-created approach tends to focus on the analysis of formal institutions, and views changes in these institutions as the

outcome of a centralised collective choice process. The combined institutional approach tends to combine the analysis of formal and informal institutions into an integrated approach. It models the change of formal institutions, as a centralised political bargaining process. In this process, various political players pursue their interests. This (pursuit of interests) is what give rise to the formal institutions of the times. Further, it suggests that the interests of political players are shaped by the underlying informal institutions (*e.g.*, ideology and culture). These informal institutions will only change slowly as an evolutionary process, resulting in strong path dependence of changes in formal institutions.

b) Based on the above discussion, this research argues that the combined institutional approach would be the most appropriate approach in the context of this research. This is mainly because that the focus of this research – institutional change process for the electricity industry – involves both formal and informal institutions (see Section 2.2). The combined institutional approach, referred to above, combines the analysis of both formal and informal institutions. It can, this research argues, provide a much fuller understanding of the institutional change process for the electricity industry, which in turn will contribute to a deeper understanding of why electricity reform has failed to deliver its promised outcomes, and what could be done to rectify the situation.

c) But, the combined institutional approach, this research contends, is still limited, as it fails to acknowledge that different organisations may have quite different interests in structuring a specific human interaction. They may accordingly prefer different types of formal institutions to structure this interaction. This necessitates the development of an understanding about whose preferences matter and to what extent. This, this research contends, requires an understanding of the underlying political power structure, as this structure shapes the capacity of political actors to pursue their interests, which will in turn shape the institutional change process. More detailed discussions about approaches for analysing political power structure will be provided in section 2.4.

Table 2.1: Approaches for analysing institutional change processes

Approaches	Focus	Causes	Process	Outcomes
Evolutionary	Informal institutions	Changes in selection criteria for the fittest institutions, caused by external environmental change	Decentralised natural selection process	Selection and replication of fittest institutions
Intentionally-created	Formal institutions	Changes in objectives of existing institutions, due to external environmental change	Centralised collective choice process	Changing or sustaining existing institutions
Combined institutional	Formal and informal institutions	Changes in objectives of existing institutions, due to external environmental change or changes in informal institutions (*e.g.*, ideology and culture)	Centralised political bargaining process, driven by changes in the underlying informal institutions	Incremental change in formal institutions, as shaped by the underlying informal institutions that only change slowly

Source: Developed by the author, based on the discussion presented in Section 2.3

2.4 Approaches for analysing political power structure

2.4.1 Meaning of political power

Power is a relationship among people. It is a mutual relationship between those who exercise power and those over whom it is exercised (Dahl 1957). It enables the former to influence the actions or preferences of the latter (Morgenthau 1966). This relationship is described in Dahl (1957) as that 'A has power over B to the extent that he can get B to do something that B would not otherwise do'. Both A and B are actors in a power relationship. These actors may include, for example, individuals, groups, governments, and nation-states.

A power relationship is a causal relationship (Simon 1953, Nagel 1975). This definition emphasises the effects involved in a power relationship, especially intentional effects (Dahl 1976). As argued in Russell (1975), power is 'the production of intended effects'. Put differently, power is a relationship in which an actor (one or a group of people) tries to get what he wants, or at least tries to get closer to what he wants, by influencing other actors' actions or preferences (Dahl 1976).

Power is a universal phenomenon in human interactions. For example, it may exist in human interactions in which a father exercises power over his children, a master over a slave, a teacher over his students, an employer over his employees, a general over his lieutenants, a creditor over his debtors, and so on (Bierstedt 1950). Political power is accordingly power that underpins political interaction in a society. It is a causal relationship, in which a political actor influences other political actors' actions or preferences, in order to get or at least try to get what he/she wants.

2.4.2 Approaches for analysing political power structure

As defined above, political power is the capacity of a political actor to influence others' actions or preferences. It is derived from the power assets that a political actor has. There are three types of power assets: utilitarian, coercive, and persuasive. *Utilitarian assets* refer to material goods and the natural resources that may be applied or exchanged in such a fashion as to allow the actor who possesses them to bring other actors to support its line of action. These assets include, for example, wealth, labour, and so on. *Coercive assets* are weapons, installations, and manpower which the military, the police, or similar agencies use. *Persuasive assets* concern values, ideologies, and

beliefs which are appealing to the peoples' sentiments (Etzioni 1968). These assets act as the power base or potential of their holders, and could be converted into political power but are not necessarily so used (Etzioni 1968).

Many studies have been undertaken to analyse the political power structure at the global level (see, for example, Joffe 2009, Kennedy 1989, Krauthammer 1990, Nye 2004, 2011, Posen 2003). These studies suggest that the global political power assets are not evenly distributed; rather they are concentrated in the hands of a few countries, which dominate the political decision making processes at the global stage. The dominance of these countries is usually built on their economic, military, and ideological strengths (assets) over other countries. These power bases are not constant; but are subject to change. Their changes always lead to a re-distribution of political influences among countries, and new global political power structures emerge as a result.

There are also several studies that seek to analyse the distribution of political influences at the national level. These studies usually seek to answer the question asked by Aristotle: *who rules, the one, the few, or the many?* (Hicks and Lechner 2005)

Elite Theory's answer to Aristotle's question is 'the few' (Higley 2010). It posits that a small group of powerful elites, consisting of business leaders and top politicians, holds most of the political power in a country and this power is independent of a country's democratic processes. The power base of the ruling elites may come from their material, intellectual, moral superiority over non-elites (Mosca 1939), their inherited wealth and family connections (Pareto 1916), or their control of funds, information flows, promotions, and other aspects of organisational functioning (Michels 1915).

Recent developments in elite theory also acknowledge that the group of ruling elites is not homogeneous. Rather, there may be sharp internal differentiations within this group (Domhoff 1967, Mills 1956). Different factions of the elite group share little common interests. They often resort to violent struggles for dominance that have a zero-sum character. The dominant faction always exerts significant political power through their control of military and police forces. Other factions that struggle for dominance necessarily view political change in terms of removing or altering the group that effectively commands the coercive forces. In their eyes and the eyes of their opponents, power flows from gaining at least temporary control over the principal means of coercion. Attempts to seize government executive power by force are seen by all as

plausible, even probable, eventualities. The political oscillations between dictatorship and democracy in Latin American countries in the 20th century provide a good example for this type of disunited elites (Higley 2010).

Further, the disunited elites could be united through a single party or other hierarchically organised movement upholding a single ideology or belief system. There may exists conflicting interests inside the elites group, but forced adherence to a single ideology, sometimes through coercion, prevent the elites from taking conflicting positions in public about current policies and political decisions. Such an ideology is also sold to the non-elites with the aim of winning their support. It always promises a brighter future towards which society is allegedly moving (Higley 2010).

The disunited elites could also be united through a consensual settlement. In the consensually united elite, there is no single and defined ideology to which all must adhere. Instead, elites with power and influence take clearly divergent positions on public matters, as in the long conflicts between conservatives and liberals in Britain during the 19th century, and the subsequent conflicts between liberals and socialists during the first half of the 20th century. Although elite members disagree and oppose each other in limited struggles for ascendancy, power is distributed so that they have enough influence on political decisions to deter them from translating their opposition into attempts to seize government by force (Field and Higley 1980, Higley and Burton 2006).

Pluralist Theory's answer to Aristotle's question is 'the many' (Higley 2010). It claims that political power is exercised by, or on behalf of, either the whole of a population or at least a wide range of the population's sub-groups (Hick and Lechner 2005). This theory views the political decision-making process as a marketplace that involves a range of competitors (such as, trade unions, business associations, and political parties). These competitors compete with each other to pursue their interests. Political power is assumed by pluralist theory to be dispersed among them, and no competitor can have its interests win consistently over others. In addition, the pluralist theory assumes that the government is neutral in the political decision-making process (McFarland 2007).

In the 1950s and 60s, the pluralist theory was criticized as it failed to acknowledge that political power is not evenly dispersed among competitors in the political decision-making process. Some competitors, such as, large business and labour unions, could be

well-organised and well-financed. They could therefore have more power to shape the political decision-making process than other competitors (*e.g.*, poor people). In addition, the government is not neutral in the political decision-making process. Instead, it may have its own interests (McFarland 2007). For example, electricity reform in Thailand was strongly advocated by the National Energy Policy Office which was headed by several pro-market directors in the 1980s and 90s (Greacen and Greacen 2004).

These criticisms led to a transformation of the pluralist theory in the 1970s. This transformation resulted in the development of neo-pluralist theory. Neo-pluralist theory admits that some competitors (*e.g.*, business associations) may have more power than others in the political decision-making process. As a result, these competitors will dominate the political decision-making process (Smith 1990). Besides, the neo-pluralist theory also recognises that the government is not a passive mediator between the demands of different interests groups. Instead, it is a relatively autonomous political actor that forges and looks after its own interests (Clement 1997).

2.5 Overall approach for analysing institutional change processes in electricity

This section presents a detailed description of the approach adopted in this research for analysing institutional change processes for the electricity industry. This approach essentially draws upon the basic tenets of the combined institutional approach (as discussed in section 2.3.3) and the approaches for analysing political power structure (as discussed in section 2.4). This approach is shown in Figure 2.4. A detailed description of this approach is provided in the following paragraphs.

This approach views the arrangement of the electricity industry in terms of the institutions of ownership, structure, and regulation. Before reform, for example, the electricity industries around the world were mainly arranged based on the institutions of public ownership, vertically-integrated utilities, and tight government regulation. Electricity reforms in the 1980s and 90s were expected to change these institutions to private ownership, functionally unbundled utilities, and light-handed regulation, with the argument that this change will lead to higher efficiency of electricity supply, lower electricity prices and wider socio-economic benefits.

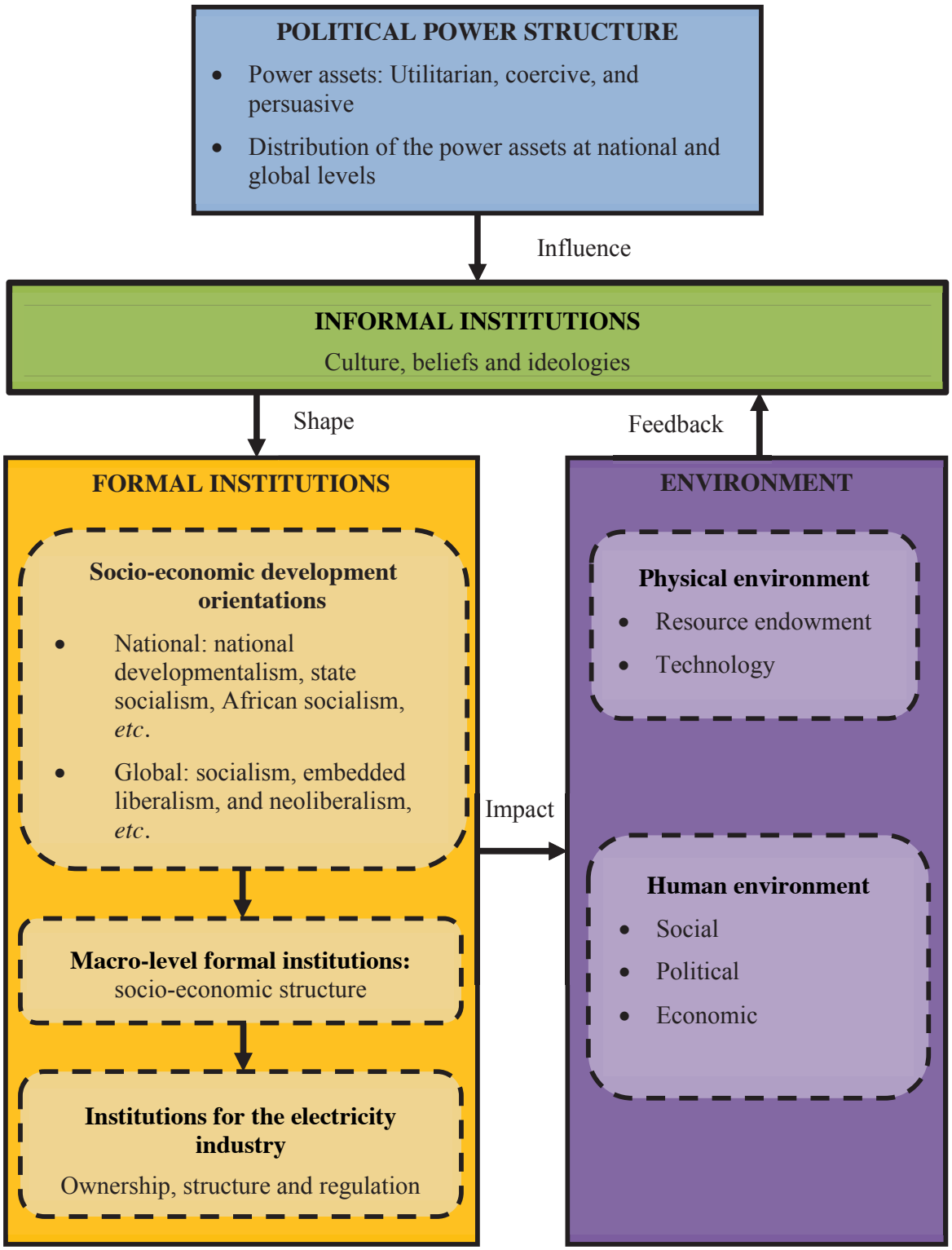


Figure 2.4: Approach for analysing institutional change processeses in the electricity industry

The arrangements of the institutions for the electricity industry essentially reflect the underlying macro-level formal institutions (*i.e.*, institutions for structuring socio-economic development). For example, electricity reforms were implemented in many countries with specific emphasis on privatisation, introduction of market competition and re-regulation. These reforms were driven by a shift in the global socio-economic development orientation in the 1980s and 90s towards neoliberalism. This shift resulted in the initiation of the economy-wide reform in these countries. Electricity reforms therefore became an integral part of this economy-wide reform. Hence, new arrangements for the electricity industry emerged (Henisz *et al*. 2005).

These macro-level formal institutions for structuring socio-economic development are informed by the underlying socio-economic development orientations (as noted above), which are in turn determined by the political bargaining processes. In these processes, socio-political players pursue their interests through the exercise of political power to influence other players. The political power of a political player is primarily derived from the power assets (*i.e.*, utilitarian, coercive and persuasive) that this player has (see Section 2.4.2). The outcome of this (pursuit of interest) is what gives rise to the development orientation of the time. As these underpinning factors change, new development orientation emerge. This will then (by the logic presented above) lead to changes in the institutions for the electricity industry. Accordingly, rather than engaging in a comprehensive, but less than useful, consideration of 'apparent' macro-level formal institutions, the approach adopted in this research focuses on how these macro-level formal institutions are shaped by the prevalent socio-economic development orientations, and how these socio-economic development orientations are shaped by the underlying political bargaining processes.

In the political bargaining processes, socio-political players control different amounts of power assets, and have therefore quite different political power to pursue their interests. At the global level, for example, the political power is normally concentrated in the hands of a few countries (Joffe 2009; Kennedy 1989; Krauthammer 1990; Nye 2004; 2011; Posen 2003). For example, in the early 20th century, the world politics was dominated by a handful of industrialised countries, most notably, the United Kingdom, the United States, and some major European countries. This high concentration of political power was further strengthened in the 1950s and 60s, when two countries

(namely, the United States and the Soviet Union) began to dominate the world politics. Other major countries were either exhausted by the war (*e.g.*, Great Britain and France), or defeated in the war (*e.g.*, Germany, Italy, and Japan), and thus gradually fell from the apex of world power (Kennedy 1988). In the early 1990s, the United States became the only super power in the world, following the collapse of Soviet Union. The United States, together with its close allies (including, major European countries and Japan), dominated the world politics until now, even though its political dominance began to gradually decline recently due primarily to the rise of several major developing countries, such as, Brazil, China, and India (Krauthammer 1990, Nye 2011).

At the national level, the distribution of political power varies from country to country. While it could be concentrated in a small group of business leaders and top politicians in some countries, it could also be distributed more evenly in others where liberal democracies prevail. For example, in several Southeast Asian countries (*e.g.*, Thailand), the political power in the 1950s and 60s was concentrated in a small group of top political and business leaders (Raquiza 2012). During the same time, however, the political power was more evenly distributed in many Latin American countries (*e.g.*, Argentina, Brazil, and Chile), and the national politics of these countries were largely controlled by a group of urban coalitions comprising small- and medium-sized industrialists, urban professionals, and workers (Kaufman and Stallings 1991).

Accordingly, the socio-economic development orientations are more likely to reflect the interests of powerful socio-political players, who have more political power (*e.g.*, the control of military forces) to influence other players. These powerful players could also explain and legitimise their preferred development orientations to other players by a deliberate interpretation of the human environment based on the underlying informal institutions (*e.g.*, culture, ideologies and beliefs). For example, in many countries (*e.g.*, Thailand), the domestic business sector strongly opposed any attempts to deepen neoliberal reforms in the late 1990s, with the argument that further market opening would increase the level of competition and consequently affect their profits. This opposition was also legitimised in the eyes of the mass population by presenting them with strong nationalist sentiments that these reforms would lead to the inflow of large amounts of foreign investments and threaten the sovereignty of the country (see, for example, Greacen and Greacen 2004).

Hence, it is not entirely true that informal institutions totally shape the interests of socio-political players, which in turn inform the orientations for socio-economic development (as suggested by North). Rather, these informal institutions are deliberately used by powerful socio-political players to legitimise their preferred development orientations in the eyes of other players (Stanfield 1999). As noted by Ayres, the formal institutions essentially reflect the interests of powerful socio-political players, which 'is not backed by sheer force but more importantly by custom or a cluster of mores' (Ayres 1952: 43).

The approach adopted in this research to analyse the institutional change processes in the electricity industry (as discussed above) calls for an examination of how the underlying political power structures have shaped the formal and informal institutions at the national and global levels, and how these formal and informal institutions have shaped the institutional change process in the electricity industry. It is in the understanding of these underpinning factors and their influences on shaping institutional change processes in the electricity industry – this research contends – resides the understanding of why electricity reform has failed to deliver its promised outcomes, and what could be done to rectify the situation.

2.6 Summary

The main objective of this chapter was to review available approaches for analysing institutional change processes, and to identify the most suitable approach for analysing institutional change processes in the electricity industry. Besides, as argued at the beginning of this chapter, before this review, a discussion on the definition of institutions was considered to be useful. Main points of this chapter are summarised as follows:

Definition of institutions

- In the broadest sense, institutions are defined as 'the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction' (North 1990: 3). Most scholars also distinguish between formal and informal institutions. While formal institutions refer to rules that are made explicit or written down, informal institutions are socially-shared norms of behaviour that produce regularities in behaviour with respect to particular human interaction.

- Formal institutions can be further sub-divided into two types, namely, macro-level and micro-level institutions. The macro-level institutions refer to the set of fundamental political, social and legal ground rules that establishes the basis for economic interactions (*e.g.*, production, exchange and consumption). The micro-level institutions refer to the arrangements that structure the ways in which economic players can cooperate or compete.
- Macro-level formal institutions derive their meaning and legitimacy from the underlying informal institutions. These macro-level formal institutions further inform the micro-level formal institutions.
- In the context of this research, institutions are defined as a hierarchical institutional systems covering both formal and informal institutions. These institutional systems consist of two sub-systems, namely, national-level and global-level. At the national level, this research views the arrangements of the electricity industry in terms of the institutions of ownership, structure and regulation. These institutions shape the decisions made by electricity companies (*e.g.*, investments), which in turn influence the performance of the industry (*e.g.*, prices) and wider socio-economic outcomes. These institutions are essentially reflective of the underlying macro-level formal institutions, which are in turn shaped by the informal institutions at the national level. This national-level institutional system is also influenced by the global formal and informal institutions.

Conventional approaches for analysing institutional change processes

- Three broad approaches can be identified in the literature for analysing the institutional change process. These approaches include, evolutionary approach, intentionally-created approach, and combined institutional approach. These approaches focus on the analysis of different types of institutions, and accordingly model the institutional change process quite differently in terms of its causes, processes, and outcomes.
    - Informal institutions are the main focus of evolutionary approach. According to this approach, institutions change as a result of changes in the selection criteria for the fittest institutions; the changes in the selection criteria in turn are caused by changes in external social, political and economic environment. This change

normally happens in a decentralised natural selection process, and broadly follows the Darwinist framework of natural selection (*i.e.*, variation, selection and inheritance).

- Intentionally-created approach focuses on the analysis of formal institutions. It views changes in the institutions as the outcome of a centralised collective choice process, driven by changes in the objectives underlying the existing institutions as a response to external environment changes (*e.g.*, economic crises).
- The combined institutional approach tends to combine the analysis of formal and informal institutions into an integrated approach. It models the change of formal institutions as a centralised political bargaining process. In this process, various socio-political players pursue their interests. This (pursuit of interests) is what gives rise to the formal institutions of the time. Further, it suggests that the interests of socio-political players are informed by the underlying informal institutions.

- The combined institutional approach is the most appropriate approach for this research, because it combines the analysis of formal and informal institutions, and can provide a much fuller insights into the institutional change process in the electricity industry, which is considered to involve both formal and informal institutions.

Limitations of conventional approaches

- But this approach still has limitations. It fails to acknowledge that different socio-political players may have quite different interests in structuring a specific human interaction. They may accordingly prefer different types of formal institutions to structure this interaction. This necessitates the development of an understanding about whose preferences matter and to what extent. This, this research contends, requires an understanding of the underlying political power structure, as this structure shapes the capacity of political actors to pursue their interests, which will in turn shape the institutional change process.
- Political power is power that underpins political interaction in a society. It is a causal relationship, in which a political player influences other players, with a view

to get or at least try to get what he/she wants. Political power is derived from three types of power assets, namely, utilitarian, coercive and persuasive.

- At the global level, political power is concentrated in the hands of a few countries, which dominate the political decision-making processes at the global stage. The political dominance of these countries is usually built on their military, economic and ideological strengths (assets) over other countries.
- Several theories are developed to analyse the political power structure at the national level. For example:
  - Elite theory posits that a small group of powerful elites, consisting of members of the business leaders and top politicians, holds the most political influences in a country and these influences are independent of a country's democratic process.
  - Recent developments in elite theory also acknowledge that the group of ruling elites is not homogeneous. Rather, there may have internal differentiation within this group. Different factions of the elite could be united through either a single party, a single ideology or belief system, or a consensual settlement.
  - Pluralist theory claims that political power is exercised by, or on behalf of, either the whole of a population or at least a wide range of the population's sub-groups.
  - This theory has also been transformed in the 1950s and 1960s. This transformation has led to the development of Neo-pluralism. It admits that some political players (*e.g.*, business associations) may have more political power than others in the political decision-making processes, because they are well-organised and well-financed. Besides, it also recognises that the government is not a passive mediator between the demands of different interests groups; instead it is a relatively autonomous political player that forges and looks after its own interests.

Overall approach for analysing institutional change processes in electricity

- The overall approach adopted in this research essentially draws upon the basic tenets of the combined institutional approach and the approaches for analysing political power structure. This approach views the arrangements of the electricity industry in terms of the institutions of ownership, structure and regulation. These arrangements

reflect the macro-level formal institutions at both national and global levels, which are in turn informed by the underlying orientations for structuring socio-economic development.

- These development orientations are determined by the political bargaining processes. In these processes, various socio-political players pursue their interests through the exercise of political power to influence other players. The political power of a political player is primarily derived from the power assets (*i.e.*, utilitarian, coercive and persuasive) that this player has. The outcome of this (pursuit of interest) is what gives rise to the development orientation of the time. As these underpinning factors change, new development orientation emerges. This will then (by the logic presented above) lead to changes in the institutions for the electricity industry.
- Besides, in the political bargaining processes, socio-political players control different amounts of power assets, and have therefore quite different political power to pursue their interests. At the global level, the political power is normally concentrated in the hands of a few. At the national level, the distribution of political power varies from country to country. While it could be concentrated in a small group of business leaders and top politicians in some countries, it could also be distributed more evenly in others where liberal democracies prevail.
- Accordingly, the socio-economic development orientations are more likely to reflect the interests of powerful socio-political players, who have more political power (*e.g.*, the control of military forces) to influence other players. These powerful players could also explain and legitimise their preferred development orientations to other players by a deliberate interpretation of the human environment based on the underlying informal institutions (*e.g.*, culture, ideology and belief). As a result, it is not the informal institutions that shape the interests of socio-political players, which in turn inform the orientations for socio-economic development (as suggested by North). Rather, these informal institutions are deliberately used by powerful socio-political players to legitimise their preferred development orientations in the eyes of other players.
- Against this backdrop, the overall approach adopted in this research to analyse the institutional change processes in the electricity industry calls for an examination of

how the underlying political power structures have shaped the formal and informal institutions at the national and global levels, and how these formal and informal institutions have shaped the institutional change processes in the electricity industry. It is in the understanding of these underpinning factors and their influence on shaping institutional change process in the electricity industry – this research contends – resides the understanding of why electricity reform failed to deliver its promised outcomes, and what could be done to rectify the situation.

3 INSTITUTIONAL CHANGE PROCESSES IN THE ELECTRICITY INDUSTRY IN THE PRE-REFORM ERA

3.1 Introduction

In the previous chapter, an approach is developed for analysing institutional change processes in the electricity industry, with the premise that it is in the understanding of these processes resides a fuller understanding of the reasons for the disparity between expected and actual outcomes of reform, and the policy prescriptions that could be used to reduce this disparity. In this approach, the configuration of the electricity industry is defined in terms of the institutions of ownership, structure and regulation. This institutional configuration is essentially shaped by the underlying socio-economic development orientations at both national and global levels, which in turn are shaped by the underlying political power structures.

This approach is applied in this chapter to analyse how political power structures have shaped the national and global development orientations, and how these orientations in turn have shaped the institutional configuration of the electricity industry. This analysis mainly focuses at the pre-reform era (late 19th century to the 1970s). It aims to identify the ideological, political, and socio-economic underpinnings of the pre-reform institutional configuration of the electricity industry. It is important to identify these underpinnings because some of them, this research argues, have remained unchanged in the post-reform era (*i.e.*, the 1980s to present). This in turn has created an institutional lock-in in the electricity industry, because of which certain elements of reform have either never been implemented or implemented only partially.

For this analysis, the history of the pre-reform changes in the institutional configuration of the electricity industry is partitioned into two periods, namely, early years of the electricity industry (late 19th century to the 1930s), and the years of state interventionism (the 1940s to the 1970s). The changes in the institutional configuration of the electricity industry in each of these periods are discussed in terms of the changes in underlying institutions of ownership, structure, and regulation.

Further, a description is provided in this chapter for each time period, of the changes in the institutional configuration for the electricity industry, as a result of changing

political power structures and informal institutions, in the backdrop of the arguments provided earlier, (*i.e.*, that changes in the institutional configuration of the electricity industry are shaped by the national and global development orientations, and that these orientations are the outcome of the changes in the underlying political power structures and informal institutions).

The analysis in this chapter covers 15 countries. These countries are: Argentina, Australia, Brazil, Chile, China, Germany, India, Kenya, Malaysia, Mozambique, Philippines, South Africa, Thailand, United Kingdom, and United States. This selection covers countries with a wide spectrum of ideological and cultural backgrounds, political systems and the underlying political power structures, and socio-economic conditions (see Table 1.4 in Chapter 1). This coverage could enable an analysis to be made of how national and global development orientations have varied across the countries, and how such variations have affected changes in the institutional configuration for electricity.

This chapter is organised as follows. Sections 3.2 and 3.3 discuss the pre-reform global and national orientations for socio-economic development; factors that gave rise to these orientations; and the impacts of these orientations on institutional configuration of the electricity industry. Section 3.4 provides a summary of the major findings of this chapter.

3.2 Early years of the electricity industry (late 19th century – the 1930s)

3.2.1 Global orientation: *laissez faire* Capitalism

The global orientation for structuring socio-economic development in the imperial period (late 19th century to the 1930s) is referred to as *laissez faire* Capitalism in this research. This development orientation was initially proclaimed by the Physiocrats in the 18th century in response to growing economic activities (*e.g.*, trade) and increasing concerns that excessive government regulations would undermine these activities. It gradually took shape in the 19th century as international trading became intensified (Sidney 1964). This orientation emphasises a 'natural economic order' under which individuals can freely pursue their self-interests with minimum governmental interference. This, it is believed, will contribute to general good for the society. Accordingly, this development orientation strongly favours free trade policies and the removal of governmental interferences (such as, import tariffs and quotas) in the free movement of products and capitals (Encyclopaedia Britannica 2014).

Further, this development orientation (*i.e.*, *laissez faire* Capitalism) was mainly determined by a handful of industrialised countries, most notably, the United Kingdom, the United States, and some major Western European countries (*e.g.*, France and Germany). The political power in these countries was primarily built on their relative economic strengths as compared with other regions in the world (Kennedy 1989). For example, as shown in Table 3.1, between 1870 and 1913, major industrialised countries had experienced a rapid economic growth, with annual average GDP increasing at 4.6 per cent, compared to 1.6 per cent for the rest of the world. As a result of such a rapid growth, they collectively accounted for more than 60 per cent of the world GDP in 1913 (Maddison 2007). In addition, advanced technology (*e.g.*, steam engines and rifled guns) had given these countries a decisive military advantage over other regions of the world that still largely relied on older weaponry. Such military supremacy further reinforced the political dominance of these countries (Kennedy 1988).

Table 3.1: Economic growth: 1870 to 1913

	GDP (billion 1990 international dollars)		Percentage of world total (%)		Annual average GDP growth rates (%)
	1870	**1913**	**1870**	**1913**	**1870 - 1913**
Industrialised[1]	575	1,724	52	63	4.6
Non-industrialised[2]	474	808	43	30	1.6
World	1,113	2,732	-	-	3.4

Notes:

1: Industrialised countries include Western European countries, Russia, the United States, and Japan

2: Non-industrialised countries include Latin American, African, and Asian (excluding Japan) countries

Source: Maddison 2003

The *laissez faire* Capitalism was essentially inspired by three major considerations and beliefs held by these countries.

1) *Trade as an economic necessity*. Insightful discussion on this argument is provided in Bukharin 1917, Hilferding 1910, Hobson 1902, and Lenin 1916. These studies suggest that, in the late 19th century, the wealth of major industrialised countries had

become increasingly concentrated into a few monopolist organisations (such as, manufacturers' associations, cartels, and syndicates). This uneven distribution of wealth hindered the development of mass population's purchasing power, and in turn limited the growth of domestic demand. The lack of domestic demand growth created initial stimulus for these countries to export capital and products to the less developed regions of the world.

2) *Nationalistic and patriotic sentiments in major industrialised countries*. For example, according to Callinicos (2009), by the beginning of the 20th century, the economic benefits that leading imperial powers derived from their controlled areas, created a fear in Germany that it would be locked out of export markets and raw material supplies, by the division of the world among protectionist trading zones dominated by Britain, the United States, France, and Russia. As a response, Germany sought to construct its own imperial zones to secure its needs for export markets and raw materials in competition with other major industrial powers.

3) *A feeling of cultural superiority of industrialised countries*. Many people of these countries believed that Western culture was superior to the cultures of the colonial peoples. As a result, it was an important mission of them to impose Western customs and traditions on the people they colonised. This would, they believed, further bring about order, education, peace, and prosperity to the colonised people (O'Brien and Williams 2010).

3.2.2 National orientation: Classical Liberalism

During the imperial period (late 19th century ~ the 1930s), a coherent national development orientation, namely, Classical Liberalism, took shape in major industrialised countries (*e.g.*, England, Western Europe, and the America) (Hudelson 1999). This orientation originated from the Enlightenment in the 18th century and the ideology held by several prominent philosophers of the time (such as, John Locke and Thomas Hobbes) that individual freedom is 'God-given' or a 'law of human nature' (Sally 1998). Accordingly, this orientation makes strong commitment to individual liberty including freedom of religion, speech, press, and assembly, and takes the view that the government should assume the role of protecting the liberties of individual citizens. Additionally, it commits to a system of *laissez-faire* and private ownership as the best way to organise economic activities (Hudelson 1999).

Classical Liberalism was largely developed as a response to the Industrial Revolution, urbanisation, and the emerging industrial and financial interests in these countries throughout the imperial period. It was also supported by the growing working class and urban professionals, whose existence and prosperity were closely linked to accelerated urbanisation and industrialisation (Hobson 1902). The main losers in this orientation were rural interests who would suffer higher labour costs and higher competitive pressures from international markets due to lower barriers for international trade (*e.g.*, reduced import tariffs). But their discontent was at least partially mitigated through their growing involvement in the manufacturing and financial sectors (Connell and Irving 1980).

Major industrialised countries also imposed Classical Liberalism on many under-developed regions in the world, as part of their global development orientation of *laissez faire* Capitalism (as discussed in Section 3.2.1). This resulted in the opening up of domestic markets in these under-developed regions to their foreign rulers, who controlled these regions through either direct colonial rule (*e.g.*, French rule in Africa), or indirect military and political influence (*e.g.*, British rule in Latin America) (Bill 2009).

In addition, foreign imperial rule was also assisted by domestic support in these less-developed regions. This support mainly came from the owners of land and mines, and to a lesser extent, those who took leading part in the export business. The wealth of this group of people was closely linked to the export of raw materials and agricultural products. They had therefore every incentive to support further incorporation into international trading regimes dominated by major industrialised countries (see, for example, Bakewell 2004 and Nadeau 2008).

3.2.3 *Laissez faire* model for electricity

At the global level, the *laissez faire* Capitalism phase (as noted above) contributed, through imperial expropriation, to a division of the world into economic territories. The imperial expropriation meant that relatively developed countries gradually gained control over the people, wealth, natural resources, and decision-making power of less developed countries, either through direct political control (such as, British rule in India and Malaysia), or indirect political influence (such as, British influence in Latin America) (Bill 2009). For example, between 1880 and 1914, led by Great Britain,

France, Germany, the Netherlands, Belgium, and the United States, and later Russia and Japan, major world powers divided Asia into informal zones of influence, and carved up the Pacific and Africa into new territorial, and mostly colonial, units (Goucher *et al*. 1998).

At the national levels, *laissez faire* policies, which were essentially in line with the national orientation of Classical Liberalism, were adopted by these economic territories, to facilitate international trading between the core of industrial powers and the periphery of raw material suppliers. In these economic territories, large amounts of investments were made to build basic infrastructures (such as, electricity) that were needed for the international production and trading to function (Frieden 1994). For example, between 1865 and 1914, more than half of British overseas investments were directed to railroads and other infrastructure (Fishlow 1985).

Consistent with the wider *laissez faire* policies, between late 19th century and the 1930s, the electricity industry worldwide, this research argues, was organised based on a *laissez faire* model. Under this model, private investors were given freedom to exploit potential business opportunities associated with electricity. The government only assumed a passive role in regulating the sector. This regulatory role mainly comprised granting concessions for power projects, and price regulation. Electricity prices were normally regulated based on rate-of-return principles, and were usually determined on a case-by-case basis. For example, in 1925, the Chilean government established the first regulation for tariff-setting providing investors with an assured return of 15 per cent on their investments (Soto 1999). Similar regulatory arrangements were made in several other countries (*e.g*., India) (Tongia 2009).

Besides, under this model, the electricity industries in major industrialised countries developed as highly fragmented systems comprising a large number of undertakings of electricity supply. Initially, the power systems developed mainly in large cities and major towns where industry and population were at their greatest density. Later, power stations were also built to serve the rural areas. Private capital started much of the activity. For example, in 1906, there were 46 electric light and power stations across Australia. 28 of these stations were operated by private interests with the remaining run by local governments (CIGRE 1996). In Germany, by 1900, all but one out of 25 regional power stations were run by private investors (Muller and Stahl 1996).

Around the 1920s, some efforts were made by the governments of these countries to centralise the operation of their power systems as encouraged by the advent of long distance transmission technology with low resistance losses. The governments began to construct national grids, and encouraged all private and public electricity undertakings to connect to the grid. As a result, some electricity undertakings became economically unviable as cheaper electricity could be sourced from other electricity undertakings through the grid. They therefore had to close down production, surviving only on distribution activities. However, power production continued to be largely local. The linkages between electricity supplies existed but served mainly to satisfy emergency demands rather than to pool power generation (see, for example, Muller and Stahl 1996; Newbery and Green 1996).

In less-developed regions, foreign investors usually took the lead in developing electricity industry. In these regions, the electricity industries were mainly developed in big cities and industrial centres where modern economy concentrated. Smaller rural towns and villages were largely untouched by this new technology. This was mainly due to the profit-orientation of foreign investors who were only interested in building power projects in areas where electricity businesses were considered economically viable. For example, the electricity industry in Brazil was dominated by two foreign companies, namely, Light and AMFORP. These two companies supplied electricity mainly to the most populated areas in the country especially, Sao Paulo and its surrounding areas (Hesla 2011). Similarly, in China, the electricity industry in the early 20th century consisted of several scattered power systems. These systems were predominately owned by foreign investors, and mainly supplied electricity to big cities (such as, Shanghai, Tianjin, Beijing, and Wuhan), where foreign business interests concentrated (Zhang and Heller 2009). In Malaysia, the overall annual electricity production in the late 1920s was 230 GWh. More than 90 per cent of this was consumed by foreign-owned mining companies for producing tin – one of the major export products for Malaysia (Kinloch 1966).

3.3 Era of state interventionism (1940s – 1970s)

3.3.1 Global orientation: Embedded Liberalism and Socialism

The early-to-mid 20th century experienced considerable turmoil in the global socio-economic and political landscapes such as, the Great Depression and two World Wars.

Two distinctive political orientations (namely, Embedded Liberalism and Socialism) emerged out from this turmoil, and informed the global socio-economic development in the post-war period (1940s to 1970s).

Embedded Liberalism

The term 'Embedded Liberalism' was coined by John Gerard Ruggie in 1982. It refers to a global economic system that emphasizes two main aspects. One, belief in free international trade with the aim of reviving the world economy that had been damaged by the two World Wars and the Great Depression of the 1930s. Two, need for state intervention to achieve specific, locally-defined, goals (*e.g.,* full employment and poverty reduction). These two aspects were in fact conflicting, as state interventionism was viewed as incompatible with free trade. The ideology of Embedded Liberalism of the times was therefore a compromise between these two conflicting aspects – it encouraged an open system of international trade in goods and services, but also 'embedded' the market forces into a framework where they could be controlled by the national governments (Ruggie 1982).

The nature of the Embedded Liberalism was mainly determined by the United States, who, together with the Soviet Union, dominated the world politics in the post-war period. Other major powers were either exhausted by the war (*e.g.*, Great Britain and France), or defeated in the war (*e.g.*, Germany, Italy, and Japan), and thus gradually fell from the apex of world power (Kennedy 1989). The political dominance of these two superpowers was largely based on their economic supremacy over other major global powers (Kennedy 1989). For example, these two countries were the two largest economies in the world; they together accounted for more than 30 per cent of the world GDP (see Table 3.2). In addition, their political dominance also came from their superior military powers, in comparison with other major powers of the time (Kennedy 1989).

Table 3.2: Economic growth: 1950-1980

	GDP (billion 1990 international dollar)			Percentage of world total (%)		
	1950	**1960**	**1980**	**1950**	**1960**	**1980**
United States	1,456	2,047	4,231	27	24	21
USSR	510	843	1,709	10	10	9
Japan	161	375	1,569	3	4	8
Germany	265	559	1,105	5	6	6
United Kingdom	348	453	728	7	5	4
France	221	345	814	4	4	4
China	240	449	1,047	5	5	5
India	222	327	637	4	4	3
World	5,330	8,440	20,048	-	-	-

Source: Maddison 2003

Further, Embedded Liberalism of this era was heavily informed by a combination of economic, geo-political, and ideological considerations and beliefs that shaped America's intentions of structuring the post-war global development. These considerations and beliefs are discussed as follows.

1) The development orientation of Embedded Liberalism was considered as a potential contributor to the reinforcement of America's economic supremacy (Callinicos 2009). Given the US economic dominance in the post-war period, an open system of international trade could enable US products and capital to freely exploit business opportunities beyond their national boundaries, which had previously been banished by other colonial powers. As suggested in Callinicos (2009: 148) 'based on the assumption of what Brooks Adams called 'America's economic supremacy', the policy of the open door was designed to clear the way and establish the conditions under which America's preponderant economic power would extend the American system throughout the world without the embarrassment or inefficiency of traditional colonialism'.

   This view also received significant support from a group of export-oriented US companies (mainly, car and consumer electronics companies) whose products were

considered as extremely competitive in the world markets, and financial organisations whose business mainly involved financing America's international investment and trade (Schwartz 2010).

2) This development orientation was built on America's intention to protect its national security. From the US perspective, its national security would be threatened if the Soviet Union captured or co-opted technology, industrial strength, natural resources, and skilled labour of advanced industrialised countries (especially, Western European countries and Japan) and less developed countries (Leffler 1992). As articulated by President Harry S. Truman in his annual message to Congress in 1951, 'our own national security is deeply involved with that of the other free nations…if Western Europe were to fall to Soviet Russia it would double the Soviet supply of coal and triple the Soviet supply of steel. If the free nations of Asia and Africa should fall to Soviet Russia, we would lose the sources of many of our most vital raw materials, including uranium, which is the basis of our atomic power. And Soviet command of the manpower of the free nations of Europe and Asia would confront us with military forces which we could never hope to equal' (Leffler 1992: 12-13).

   The growing communist and leftist influences, and rising nationalist movements in Europe, Japan, and many less developed countries, had given further intensification to the US trepidation over its national security. The US was frightened that the Soviet Union might take advantage of the social unrest in these countries and seize control of them. It held the belief that stagnated economic growth was the root cause of social unrest in these countries. A rapid economic growth was therefore considered as the only way to resolve these problems. Further, it was believed that economic growth would be revived if an open system of international trade could be set up, where countries could find what they needed for development from each other (*e.g.*, raw materials, technology, and capital). Besides, it was argued that national governments should be given freedom to intervene in their socio-economic development, so that such a development could be directed in a locally-desirable way (Leffler 1992).

3) The ideological underpinnings of Embedded Liberalism of these times came from Keynesianism. Keynesianism examined the social turmoils following the two World

Wars and the Great Depressions of the 1930s, and attributed them to the inability of *laissez faire* policies to deliver satisfactory levels of social outcomes (such as, full employment and better social welfare). It then suggested active state interventionism as the means of resolving these problems. Fiscal policies (*e.g.*, government spending on infrastructure) were one of the main tools, suggested by Keynes, for state intervention (de Angelis 2000).

Socialism

Socialism, the other distinctive political orientation of these years, as noted earlier, refers to an economic and political system that is typified by a dictatorship of the proletariat, public ownership of the means of production, and the coordination of production and consumption through centralised economic planning (Kornai 1992). It originated from the ideas of German philosopher Karl Marx and his collaborator Friedrich Engels that capitalism is built on the exploitation of the proletariat. The accumulation of capital is therefore accompanied by increasing poverty of the proletariat. This will eventually lead to proletarian revolution, and the creation of a socialist society (Kornai 1992). Marxist socialism was further developed by Vladimir Lenin in the early 20th century. Central to Lenin's thoughts included: 1) capitalism could only be overthrown with revolution; 2) this revolution should be led by a 'vanguard party' or the most resolute section of the proletariat; and 3) this party would assume political leadership to ensure the proletarian dictatorship (Trachtenberg 2010).

The first socialist country (*i.e.*, Soviet Russia) was established following the overthrow of the Russian Empire in 1917 by the Russian Communist Party led by Vladimir Lenin (Kornai 1992). After the World War II, socialism spread to many other countries through the Council for Mutual Economic Assistance (Comecon). The Comecon was established in 1949 by the Soviet Union, in response to the establishment of the Committee of European Economic Cooperation in Western Europe in 1948. It mainly comprised eastern European countries such as, Bulgaria, Czechoslovakia, Poland and Romania, which were later turned into satellite countries of the Union of Soviet Socialist Republics (USSR) (Dragomir 2012).

Besides, socialism also had significant influence on shaping the post-war socio-economic development in many other countries such as China and India. In China, the adoption of socialism was determined by the ruling Chinese Communist Party and the

Party's strong belief in Marxism (Ollman 1998). In India, socialism was adopted due mainly to the fact that it provided an alternative to capitalism which was considered as incompatible with the moral values of traditional Indian society (Frankel 2005).

3.3.2 National orientation: State Interventionism

As discussed above, the early-to-mid 20th century experienced considerable turbulence in the global political economic landscape. Some of the most important events included: the Great Depression, two World Wars, the onset of cold war confrontation, and growing communist and leftist influence. Two global development orientations emerged out of this experience, namely, Embedded Liberalism and Socialism. These orientations strongly criticised the pre-war capitalism doctrine of *laissez faire*, and argued for a more active role for the government in reviving the social and economic progress of war-damaged economies. Accordingly, these two development orientations led to the emergence of a development form in which state interventionism for promoting national socio-economic development played a key role (Yang and Sharma 2014).

There were however different types of state interventionisms across countries. These differences, this research argues, were informed by the underlying political power structures and informal institutions (*e.g.*, culture, belief and ideology) and that varied significantly across the countries (see Table 3.3). The following paragraphs provide a detailed discussion on these state interventionisms, and the underpinning factors that gave rise to them.

Table 3.3: State interventionism and underlying political interests

	Developed countries	Latin America	Southeast Asia	India	China	Kenya and Mozambique	South Africa
Type of state interventionism	**Social Liberalism** Strong commitment to welfare society and full employment Belief in the government as the best means to fulfil these commitments	**National Developmentalism** Import-substitution Industrialisation Public investments in infrastructure Wealth re-distribution	**National Developmentalism** Import-substitution Industrialisation Public investments in infrastructure Poverty reduction	**Nehruvian Socialism** Social harmony Consensus building Public investments in infrastructure Protection of infant industry in the 1950s and 60s Agricultural development in the 1970s	**State Socialism** Public ownership Central planning Rapid industrialisation with specific emphasis on heavy industry	**African Socialism** Revive Africa's traditional social values of sharing economic resources in an egalitarian way	**Apartheid** Maintain white population's economic and social privileges
Key political players and their interests	**Business sector** Enhance the legitimacy of the capitalist system A solid base for economic growth **Labour organisations** Income redistribution from business to labour	**Urban coalition** Anti-foreign feeling Supportive of import-substitution industrialisation A compromise between industrialists and workers regarding wealth re-distribution	**Political leaders** Financial and technical support from the United States **Business sector** Demand the government to assume a supportive role in the economy **Poor people** Poverty reduction	**National Congress Party** Belief in Gandhism and Socialism Industrialists and workers support public investments in infrastructure Peasants demand lower electricity prices	**The Communist Party** Belief in Marxism	**Nationalist leaders** Consolidation of political power Incorporation of other socio-political groups into the political decision-making process	**White population** Reinforce their political dominance Strengthen their economic and social privileges

Source: Developed by the author, based on the discussion presented in Sections 3.3.2.

Social Liberalism

In developed countries (*e.g.*, Australia, Britain, Germany, and the United States), the post-war period (1940s ~ 1970s) witnessed the emergence of a new socio-economic development orientation. This development orientation is referred to as Social Liberalism (Schlesinger 1956). It made strong commitments to social justice (*e.g.*, welfare society and full employment), and accepted the legitimate role of government for achieving it (Schlesinger 1956).

Further, the Social Liberalism of the times was developed as a consequence of political change in the post-war period. During this period, for example, a range of societal interest groups (especially, labour unions) was incorporated into the political decision-making processes in these countries. The governments did more than consult with these interest groups; they actually brought them into the decision-making and implementation processes and often gave them formal representation in the state's various policy and regulatory agencies (Wiarda 1997).

The incorporation of labour unions into political decision-making processes meant that their interests would be reflected in the formation of socio-economic development orientation. The resultant post-war development orientation was therefore largely built on a compromise in these countries between the labour and the business. This compromise insisted that the capitalist system should be maintained, but it had to be modified with more active redistribution of income from capital to labour. For business, this compromise could enhance the legitimacy of the capitalist system that had been severely damaged during the 1930s, and it persuaded labour to accept basic capitalist principles such as private ownership and the rights of the management to organise production and work. For labour, their endorsement of capitalism was to be compensated with full employment, better welfare, and rising wages. In addition, this compromise also provided a strong basis for the post-war expansion of aggregate demand and employment which was central to the post-war Keynesian macro-economic system. On the basis of that, the economy generated not only rising wages and employment, but also rising profits for the business (Bell 1997).

National Developmentalism

In Latin American countries (*e.g.*, Argentina, Brazil, and Chile), the post-war socio-economic development orientation is called National Developmentalism (Bresser-

Pereira 2009). Key elements of this orientation included: protection of the infant national industry (or import-substitution industrialisation), public investment in infrastructure and in certain basic industries whose capital requirements and risks were large, and wealth re-distribution (Bresser-Pereira 2009).

This orientation was largely formulated in these countries as a response to the break-up of the international imperial economic relationships in the 1930s, and the following economic, social, and political consequences.

Prior to 1930, these countries were part of the international imperial economic relationships within which they were trapped as low-wage producers of primary commodities, and major industrialised countries produced manufactured products (Prebisch 1950). The Great Depressions and the subsequent World War II resulted in a collapse of international demand and prices for primary commodities and a disruption of the supply of manufacturing products. The economies of these countries therefore immediately stepped into recession (Bulmer-Thomas 1994). The economic crisis, rising levels of inflation, and soaring unemployment unleashed long accumulated anti-foreign feelings in these countries, and set the stage for developmental changes toward public ownership and nationalisation.

In addition, the economic recession of the 1930s also weakened the political influence of traditional rural interests as their economic base had been severely damaged. This further paved the way for the emerging urban coalition (including small- and medium-sized industrialists, urban professionals, and workers) to gain control of political power in these countries. This coalition was generally led by paternalistic, personalistic, charismatic leaders such as Peron in Argentina, and Vargas in Brazil, and politically isolated traditional rural interests, foreign enterprises, and large-scale domestic industrialists (Kaufman and Stallings 1991).

The ideology of National Developmentalism was reflective of the interests of this urban coalition. The industrialists largely supported import-substitution industrialisation programs as their prosperity was closely tied to industrial growth. Industrialisation was also supported by urban workers and professionals because industrial growth meant more employment opportunities for them (Kingstone 2011). But there seemed to be some disagreement regarding the wealth re-distribution programs, especially between workers and industrialists. Workers usually demanded wealth re-distribution and better

social welfare provisions. But these were against the interest of industrialists. In the 1950s and 60s, as long as economic growth continued, and the expansion of internal markets allowed further accumulation, the industrialists were willing to compromise on this issue. They viewed the wealth re-distribution as the costs they had to pay to ally with urban workers, so as to balance the political influence of traditional rural interests (Ward 1997).

Similarly, some Southeast Asian countries (especially, Thailand, Malaysia, and the Philippines) also adopted National Developmentalism as the guide for their socio-economic development in the post-war years. Key elements of this orientation included: the encouragement of private-led import-substitution industrialisation, government involvement in macroeconomic planning and the provision of necessary infrastructure for industrialisation (such as, electricity), and poverty alleviation (especially, after the early 1970s) (Raquiza 2012).

National Developmentalism was largely formulated in these countries on the basis of the interests of both external and internal players, and the geo-political, economic, and social considerations that had shaped their interests.

Externally, the onset of cold war confrontation and the growing communism in the Southeast Asian region prompted the United States to develop alliance with these countries which could be used for containing the spread of communism (Abueva 1988). In order to facilitate this, the United States and some US-led international development organisations (such as, the World Bank) provided significant technical, economic, and financial assistance to these countries, which would potentially have important implications on the developmental trajectories of these countries. In Thailand, for example, the World Bank initiated an advisory mission in 1957 to study the country's economic situation and to provide recommendations for its development. The World Bank's advices included: centralised planning, emphasis on public investment in basic infrastructure (*e.g.*, electricity), and the encouragement for private investment. This advice was broadly adhered to by the government of Thailand (Wattana *et al*. 2007).

Internally, National Developmentalism was also supported by powerful local business leaders who had developed close relationship with the countries' top political leaders (Hewison 2006, Raquiza 2012, Teik 2006). The business leaders demanded the government to assume a supportive role in the economy, and to provide favourable

conditions for their prosperity, including, for example, the provision of necessary infrastructure. As argued by the Bangkok Chamber of Commerce, 'free private enterprises would still be the best course for Thailand, … This does not mean that the State should not enter the field of business… nor are public and private enterprise incompatible… on the contrary, if public authorities are extended into the orthodox areas such as, the supply of water, electricity, light, bus or rail transport, harbours, and so on, private enterprises can certainly live happily together with public monopolies' (Hewison 1985).

In addition, growing social unrest was witnessed in these countries in the early 1970s as poor people became increasingly unhappy about chronic poverty and rising inequities, and began to actively fight for their interests. For example, in Thailand, farmers began to organise in the early 1970s to express their grievances against landlords, moneylenders and corrupt officials who for generations had exploited them. They engaged in large-scale demonstrations in Bangkok, demanding higher prices for their rice. They also submitted petitions for return of their land, which they believed had wrongfully been taken from them (Neher 1984).

Similarly, in Malaysia, severe racial riots broke out in Kuala Lumpur in 1969. This was a product of the increasing disagreement between the country's Malay and non-Malay population. Malay peasantry sought release from poverty, indebtedness, and landlessness. A coalition of Malay bureaucrats and the middle class wanted concerted government assistance and economic parity with the Chinese capital. The non-Malay middle and working class refused to accept that their opportunities for employment, education, and upward mobility could be prejudiced by constitutional safeguards of the special position of the Malays (Teik 2006).

In response to the growing social unrest, the governments of these countries began to put more efforts into poverty reduction as a mean to win support from previously disadvantaged population. This, it was believed, would contribute to political stability.

Nehruvian Socialism

In India, the orientation for post-war socio-economic development is referred to as Nehruvian Socialism in this research. Central to this orientation included: social harmony, consensus building, self-sufficiency, a system of centralised planning, and a mixed economy in which a government-owned public sector would dominate basic

industry and infrastructure and the state would control, regulate, and protect the private sector from foreign competition (Mitra 2011).

Nehruvian Socialism mainly resulted from the ideologies held by the then Indian political leaders, and the consensus building nature of the Indian politics. The ideological motivation for Nehruvian Socialism mainly came from Gandhism. Gandhism criticises market capitalism for its absence of the moral basis of Hindu society, and seeks to develop an alternative model for India's development. It views social harmony, self-sufficiency, and consensus building as an alternative to competition as well as class conflicts. It also emphasises the eradication of poverty, social conflicts, and backwardness in India (Frankel 2005).

Gandhism laid the ideological basis for the post-war development in India, by focusing the attentions of Indian political leaders on the moral aspects of development. But the practical guidance for Indian development mainly came from Socialism. Socialism has two features that were particularly attractive to Indian leaders in those times. First, it provided a scientific alternative to market capitalism for organising economic activities – that is largely absent in Gandhism. Second, similar to Gandhism, Socialism also held a critical view regarding market capitalism, and stressed the importance of moral aspects of development (Frankel 2005).

In addition, the Nehruvian Socialism also reflects the consensus building nature of the Indian politics. Indian society is highly fragmented, and is made up of social groups that are defined on the basis of traditional caste system (*e.g.*, Brahmins, Kshatriyas, Vaishyas and Shudras), region (*e.g.*, North India, North East India, Deccan and South India), religion (*e.g.*, Hindu, Muslim, Christian, Buddhist, Jain and Sikh), language (*e.g.*, Hindi, Tamil and Telugu), and occupations (*e.g.*, workers, professionals and farmers). After Independence, as guided by the principle of social harmony and consensus building, Indian leaders sought to develop a political system that could accommodate all the major sections and interests of society. This was achieved through the creation of the National Congress Party (NCP). There was a duality in the nature of the National Congress Party: it was, at one level, a single political party; but, in fact, inside, it was a coalition. The Party is actually a power broker among a multiplicity of social groups providing the right balance between central direction and respect for regional and local autonomy (Mitra 2011).

Besides, Nehruvian Socialism could also be explained by the interests of various social groups in India. Indigenous Indian capitalists largely supported the idea that the state should hold the commanding heights of the economy, investing in essential infrastructure such as electricity. Anticipating independence in 1944, eight prominent Indian industrialists formalised this position in the Bombay Plan, which advocated public ownership of basic industries, including electricity (Kale 2004). Public support for industrialisation through the provision of essential infrastructure was also advocated by industry workers and urban professionals whose prosperity was closely tied to industrial growth and urbanisation (Mitra 2011).

As a result, in the 1950s, the Indian government placed priority on the development of the industrial sector. Other economic sectors (especially, agriculture) were largely ignored. This was based on the expectation that land reforms and cooperative farming would significantly improve the productivity of agricultural production which would in turn result in the production of enough food for the population. But this expectation failed to materialise. In the 1960s, chronic food shortages were commonplace (Mukherji 2009). This further gave rise to mounting democratic activism, especially by previously quiet social groups (*e.g.*, peasants). This consequently pushed the government to move the development priority towards the agricultural sector with the aim of maintaining political stability (Dubash and Rajan 2001).

State Socialism

The post-war period socio-economic development orientation in China is referred as State Socialism (Teiwes 2010). Central to this orientation were: public ownership of the means of production, central planning for economic exchange and distribution, and rapid industrialisation (especially heavy industry) (Teiwes 2010).

The adoption of this orientation was largely determined by the ruling Chinese Communist Party (CCP) and the Party's belief in Marxism. From the 1950s, China was ruled by the CCP that derived its support from the proletariat, mainly workers and peasants. Other social groups (for example, the bureaucratic capitalists and landlords) were politically isolated. This power structure was well presented in Mao Zedong's writings, 'at the present stage in China, they (the People), are the working class, the peasant class, the petty bourgeoisie and the national capitalists. Under the leadership of the Communist Party, these classes unite together to form their own state and elect their

own government to maintain dictatorship over the lackeys of imperialism – the landlord class, the bureaucratic capitalist class and the Kuomintang reactionaries and their henchmen representing these classes – to oppress them, to enable them to behave properly and not permit them to talk and act wildly' (Steiner 1950).

The Party leaders had a strong belief in Marxism. They accordingly shaped the country's post-war development orientation based on Marxism principles, such as, public ownership of the means of production, and centralised economic planning (Lawler *et al*. 1998).

African Socialism

In the 1960s and 70s, as the nationalist movement in Africa intensified, Western colonisers began to offer decolonisation to the African countries. Kenya attained independence from Britain in 1963, and Mozambique from Portugal in 1975. The post-independence development orientation of these two countries is described as African Socialism (Fenner 1963). This orientation emphasised the restoration of Africa's traditional social values of sharing economic resources in an egalitarian African way (Fenner 1963). An elaborate explanation of this value is provided in Fenner (1963: 25):

> 'The principle of the State as a father, which is the basis of socialism, is what we have here in our clans or tribes which are in fact extended families. In our society, the collective wealth of the extended family is used for the welfare of the family as a whole. The extended families take on the functions of social insurance, and if a member of the family falls into debt, all the others help him to pay it; if he is ill, they look after him; if there is a bright boy in the family whom the immediate parents cannot afford to educate, the others help in educating him. Property, especially land, often belongs to the whole extended family. There are abuses in the extended family system, but its basic pattern, when enlarged to embrace the state, is virtually what is meant by socialism'.

The adoption of this orientation in these two countries (*i.e*., Kenya and Mozambique) can be explained by their post-independence political power structures. The political influence in these countries was largely concentrated at the hands of a small group of nationalist leaders. After seizing power, these leaders sought to consolidate their political control through the incorporation of other social groups into the political decision-making system. For example, in Kenya, the political power was largely

centralised around the president and his close advisors. But the leaders of the country's major interest groups (ethnic, regional, class, occupational) were also included in the policy-making process. Similarly, in Mozambique, the FRELIMO party, mainly comprising members of the nationalist movement, assumed the political leadership of the country. It also sought to win political support from the mass population (especially, indigenous poor African people) (Allen 1995, Chazan *et al*. 1988).

Apartheid

Unlike other African countries, South Africa was granted political independence by Britain in 1910, and the white population (Western settlers originally from Britain and Netherlands) assumed the political leadership of the country. Once in power, the white population began to maintain and further reinforce their political dominance and economic and social privileges (Turok and Maxey 1976). This resulted in the formation of a development orientation based on Apartheid (Thompson 2001). Central tenets of apartheid included: 1) whites, as the civilised racial group, were entitled to have absolute control over the state; and 2) white interests should prevail over black interests, and the state was not obliged to provide equal facilities for the subordinate races (Thompson 2001).

3.3.3 State-centric model for electricity

As discussed above, the post-war period witnessed a radical shift in global orientation towards Embedded Liberalism and Socialism as a consequence of the Great Depression, two World Wars, the onset of cold war confrontation, and growing communist and leftist influence. This shift resulted in the emergence of a development model in which state interventionism for promoting national socio-economic development played a key role. This development model, in the context of the electricity industry, meant the government assuming the lead in the development of the electricity industry.

Also, public investments in the electricity industry were strongly encouraged by the United States, through different types of financial aid and international lending practices. For example, with the help of US financial assistance, provided through the Marshall Plan, Britain and France nationalised their electricity industries in 1946 and 1948, respectively, and soon recovered their power production to the pre-war levels. In many developing countries, American-dominated Bretton Woods organisations (*e.g*., the World Bank) played an important role in promoting public investments in power

projects, through the provision of loans and technical advice (Williams and Dubash 2004).

In addition, state interventionism in the electricity industry was strongly supported by technological developments in the industry. These developments included 1) increased efficiency of power supply as the size of power plants increased; and 2) increased capacity of transmission line with higher voltages and lower losses. These developments established the national monopoly structure of the electricity industry. A single company could supply electricity at lower costs than that could be achieved by more than one company. This is mainly because having one firm supply all electricity in a geographical area could avoid wasteful duplication of transmission and distribution networks, and also allow the exploitation of scale economies (Belyaev 2011).

As influenced by the factors noted above, the governments around the world began to structure their electricity industries based on a state-centric model. Under this model, all components of the electricity industry – generation, transmission, distribution and retail – were integrated within single electric utilities. These utilities were granted exclusive concessions for supplying electricity services to their franchised areas. They were also placed under tight government control through either direct ownership (*e.g.*, in Australia, China, and Malaysia) or indirect government regulations (*e.g.*, in Germany, and the United States). A more detailed discussion about the state-centric model adopted by various countries is provided as follows.

1) In some ***developed countries*** (*e.g.*, Australia and Britain), for example, the electricity industries were organised in the form of Statutory Authorities, such as, the Electricity Commission of New South Wales (ECNSW) in the state of NSW in Australia, and the Central Electricity Generating Board (CEGB) in England. A Statutory Authority is an independent statutory body of the government established by a specific Act of the Parliament (Johnson and Rix 1991). These authorities were made responsible for managing assets and/or other functions of the government (such as, regulation), in line with the government guidance or instructions. They were largely independent, for their day-to-day operation, of governmental interference (Sharma 2004).

   In others (*e.g.*, Germany and the United States), the electricity industries were mainly organised as corporations that were owned by private or public-private

interests. These corporations were given some freedom to decide their optimal price/output strategy. They were however still under tight government regulation. The regulatory arrangements governing these companies usually comprised three basic features. First, they defined the exclusive franchise boundaries between vertically-integrated electricity companies that enjoyed monopolistic statue in their franchised territories. Second, they limited excessive prices, with the intention of controlling monopoly profits for power companies. Third, they obliged power companies to serve customers (Gilbert and Kahn 1996, Muller and Stahl 1996).

2) In ***Latin American countries***, the governments initially sought to tighten the regulation of electricity tariffs. Foreign investors responded to this tightening by curtailing investment. The electricity demand however continued to increase due to industrialisation, urbanisation, and economic growth. Power shortages followed this propelled the governments to channel public funding to the power sector. A number of public-owned electric utilities were created to manage the increasing public investment portfolios in the electricity industry, such as, AyEE in Argentina, Eletrobras in Brazil, and Endesa in Chile (Soto 1999).

3) In ***Southeast Asian countries***, the electricity industries were mainly established as public-owned electric utilities. Private participation in the electricity industries, although not legally prohibited, was quite limited and mainly concentrated in distribution activities. The public-owned electric utilities were under tight government control with limited autonomy. There existed a large number of government agencies with substantial roles in the areas of planning, investment and pricing policies for these utilities. For example, in Malaysia, the investment plans proposed by the National Electricity Board (NEB) were subject to government approval of the Economic Planning Unit (EPU) and the Ministry of Finance. The electricity tariffs were regulated by the Ministry of Energy, Telecommunications and Posts (METP) (Naidu 1998).

4) In ***India***, Nehruvian Socialism shaped the major economic and social policies of the government after Independence. As influenced by this orientation, the Indian government enacted the Electricity Supply Act of 1948, which brought into public purview all new power generation, transmission, and distribution facilities. Nearly

every state and territory organised its own publicly-owned vertically-integrated electric utility – the State Electricity Board (SEBs) (Dubash and Rajan 2001).

5) In ***China***, as part of the country's socialist development, the government nationalised all electricity assets in the country, and established a number of government owned electric utilities that were made responsible for electricity generation, transmission, and distribution. A centralised planning system was also established to govern the electricity industry. In this system, the State Development Planning Commission (SDPC), China's chief macro-economic planner, was made responsible for determining electricity policies and development plans, to set electricity tariffs, to plan new power projects, and to arrange funding for these projects. The Ministry of Electric Power Industry (MEPI) assumed the role of developing rules and regulations for the electricity industry, and together with its subordinates at the local level, the Bureau of Electric Power, of supervising the operation of electric utilities. The electric utilities only acted as 'production units' that followed the operational plans developed by MEPI and Bureau of Electric Power (Zhang and Heller 2009).

6) After independence, the government began to play a major role in the development of electricity industries in the ***African countries***. Public owned national electric utilities were established, such as, East African Power and Lighting (EAP&L) in Kenya, Electricidade de Mocambique (EDM) in Mozambique, and Electricity Supply Commission (ESCOM) in South Africa. These electric utilities gradually took over all private electricity assets, and controlled most of the power plants and high voltage transmission lines in these countries. They also controlled a significant proportion of the distribution (Cumbe 2008, Eberhard 2009, Mbogho 2007).

Underlying political influence

In summary, the electricity industries in the post-war period were typified by a tight government control, through either direct ownership or tight government regulation. This tight control by the government meant that the electricity industries were more likely to reflect the prevalent political objectives rather than the considerations of economic efficiency and cost minimisation. The political objectives varied significantly across countries, and were essentially informed by the national orientations for socio-

economic development prevalent in those times. A detailed discussion about these political objectives and their influence on the electricity industry is provided as follows.

1) In ***developed countries*** included in this research, a strong commitment to welfare society and full employment, and the belief in government intervention as the best way of fulfilling this commitment had important influence on the development of their electricity industries. The creation of welfare society meant the provision of sufficient power supply to meet all reasonable public demand for electricity. Power shortages were therefore perceived by the government as a potential threat to the creation of a welfare society. Further, price regulation, based on rate-of-return principles, meant that the penalties for overinvestment would not be particularly severe. The incentives to overinvest in generation capacity were thus clear. As a result, electric utilities in these countries tended to have 'positive estimations' of the future electricity demand, and overinvested in new power projects (Gilbert *et al*. 1996).

   In addition, the commitment to full employment encouraged the governments of these countries to protect certain industries (such as, coal) from international competition. As a result, electric utilities were usually required to purchase expensive domestic fuel (coal) for power generation rather than to import fuel from international market at relatively cheap prices (Gilbert and Kahn 1996). For example, in Britain, given that the Labour Party derived substantial political support from the trade unions, which in turn were dominated by the unions in the large nationalised industry such as coal, the Central Electricity Generating Board (CEGB) was encouraged to choose coal-fired technology for new generation capacity, despite the existence of cheaper options. In 1958 when a surplus in coal production was anticipated, implying redundancies if additional markets could not be found, the British government required the CEGB to build more coal-fired power generation, with the aim of providing additional markets for the surplus coal production (Newbery and Green 1996).

2) In ***Latin American countries***, the electricity industries were frequently used by the governments as tools to support their wider developmental goals of employment creation, wealth re-distribution and industrialisation.

Investments in new power projects, for example, usually served the country's larger social goals of full employment and wealth re-distribution. As public agencies, rather than for-profit private firms, officials of public-owned electric utilities were usually encouraged to hire more workers without efficiency or competitiveness considerations, to pay them higher salaries than their productivity warranted, and to offer them generous welfare benefits. As a result, in these countries, the investment levels in the electricity industry usually exceeded necessary levels to satisfy demand. For example, in Argentina, with repeatedly optimistic projections for demand growth, the public-owned electric utilities continued to expand their capacity until, in 1989, the nominal reserve margin peaked at over 45 per cent as compared to industry standard levels of 15 to 20 per cent (Soto 1999).

Also, electricity tariffs were manipulated in these countries to support their industrialisation programs. For example, in Brazil, a uniform pricing policy was instituted in 1974, implying that end-user prices were independent of costs. This policy was claimed by the governments to help the poor regions of the country. But in reality the main beneficiaries of this policy were richer regions, where most industry was situated, as most of the hydro-generating capacity (the country's main power source) was concentrated in the poor regions, and thus lower costs of supply in these regions (Pires and Braga 1991).

In addition, these countries frequently froze electricity tariffs during periods of high inflation which was largely perceived by the governments of these countries as a threat to their political goals of creating welfare society. This drastically decreased real price of electricity sold, while real prices of inputs for electricity production sharply increased. For example, as fuel costs soared in the 1970s and early 1980s, real sale prices of electricity in Argentina fell by almost one quarter. The Chilean government also pursued similar policies during the hyperinflation years of 1971 to 1973. Beginning with the first oil shock in 1973, control over electricity prices became one of the Brazilian government's primary anti-inflationary tools (Baer and Mcdonald 1998). This contributed to growing government debts in these countries, and the level of public debts became increasingly unmanageable in the early 1980s. Debt reduction therefore became one of the primary objectives for reforming electricity industries in these countries in the 1980s (see Section 5.2.2).

3) In ***Southeast Asian countries***, the public-owned electric utilities were largely used to support their industrialisation programs in the 1950s and 60s. As a result, the electricity industries were mainly confined to urban areas where most industry was concentrated. But many rural areas lacked electricity supply. In the 1970s, in response to the rising rural unrest, the governments of these countries began to accelerate rural electrification. For example, in Thailand, a National Plan for Total Electrification was developed in 1973. This resulted in an increased coverage of electricity services in rural areas, from 181,000 in 1970, to around 2.5 million in 1982 (World Bank 1985). In Malaysia, a number of rural electrification programs were implemented since the 1970s, resulting in an increased coverage of electricity services in rural areas, from 345,600 households in 1970, to 790,000 in 1980, to 1.6 million in 1990 (Naidu and Lee 1997).

4) In the 1960s and 70s, public-owned electric utilities in ***India*** were required to provide industrial consumers with low electricity tariffs. This was consistent with the country's development emphasis on rapid industrialisation (Dubash and Rajan 2001). In the 1970s, mounting democratic activism by previously quiet social groups (*e.g.*, peasants) was observed. This consequently pushed the government to move the development priority towards the agricultural sector with the aim of maintaining political stability. In the context of the electricity industry, this priority resulted in the government heavily subsidising electricity tariffs for the peasants, even though the costs of serving remote rural areas were rather high. For example, in the 1977 elections, the Congress Party in the southern state of Andhra Pradesh offered flat-rate tariffs (tariffs based on capacity of the pump rather than on measured consumption) to farmers as an election promise to get re-elected (Dubash and Rajan 2001).

5) In ***China***, the government gave priority to industrialisation (especially heavy industry), and viewed electricity as a vital input for supporting the country's massive industrialisation program. As a result, the electricity industry received strong financial and material support from the central government and expanded rapidly. For example, generation capacity increased from 2,000 MW in 1949, to 80,000 MW in 1978 (World Bank 1981). In 1979, 79 per cent of total electricity in the country was consumed by industry, with heavy industry alone consuming 64 per

cent - a range of 40 to 60 per cent was more common at the time in other Asian developing countries such as Thailand, Malaysia, and the Philippines (World Bank 1981).

6) In some ***African countries*** included in this research (*e.g.*, Kenya and Mozambique), the relatively inclusive nature of the post-independence political power structure implied that government resources had to be allocated in a more egalitarian way for the country's development. As part of this egalitarian development, the governments of these countries planned to promote universal access to electricity. Public owned electric utilities were established and were made responsible for implementing the country's electrification programs. But the governments of these countries largely failed to extend electricity services to the large majority living in the rural areas mainly due to financial constraints. The civil war in Mozambique further reduced the government's ability to develop the electricity industry (Cumbe 2008, Mbogho 2007).

   In South Africa, the development of power sector of the time was largely consistent with the government's intention of maintaining economic and social privileges of the white population. Public owned electric utility (Eskom) was established to assume the functions of electricity generation, transmission, and distribution in the country. Eskom was made responsible for supporting the country's industrialisation programs - largely controlled by the white population. It also assumed the responsibility of providing electricity to the white population. In the 1980s, nearly all white South Africans, including remote farms, had electricity connections. But few black households had access to electricity at the time (Eberhard 2009).

3.4 Summary

This chapter showed that the institutional configuration for the electricity industry in the pre-reform years (late 19th century to the 1970s) was primarily informed by the underlying national and global development orientations, underpinned by specific national and global political power structures. The following is a summary of the main findings of this chapter.

- The late 19th century saw the emergence of the electricity industry around the world. At that time, the institutions for the industry mainly emphasised furtherance of

investors' business interests, through recourse to *laissez faire* precepts. Government involvement in the industry was limited, and was mainly confined to granting concessions for power projects, and price regulation based on cost-of-service principles.

- These institutions were consistent with the belief in the reigning ideology of the times, namely, *laissez faire* and private ownership, as the best way to promote economic and social progress. This belief initially developed in major industrialised countries, as a response to Industrial Revolution, urbanisation, and the emergent industrial and financial interests in the mid-to-late 19th century. It also received substantial support from the growing urban workers and professionals in these countries, whose existence and prosperity were closely linked to accelerated urbanisation and industrialisation.

- Later, this belief spread to many less-developed countries through the colonisation process. In this process, major industrialised countries divided the world into economic territories, either under their direct colonial rule, or subjected to their indirect political influence. *Laissez fair* policies were largely adopted in these economic territories to facilitate free movements of capital and products between the core of industrialised countries and the periphery of less-developed countries.

- This colonisation process was driven by the considerations and beliefs held by major industrialised countries, which dominated the world politics over the period of late 19th century to the 1930s. These considerations and beliefs included: the needs to find markets for their excessively surplus production capacity and capital caused by highly uneven distribution of domestic wealth; lack of growth in the mass population's purchasing power; and its crippling influence on domestic demand.

  Further, these considerations and beliefs were strongly supported by growing nationalistic and patriotic sentiments in these countries, driven by the belief that market expansion (especially into the less-developed countries) was vital to their economic and social prosperity, and these countries could not be therefore left out in the battle for new markets.

  In addition, a feeling of cultural superiority in these countries gave further justification to the colonisation process of the times. It was widely believed in these

countries that their culture was superior to that of the less-developed countries, and it was therefore their responsibility to disseminate their culture. This would, they believed, bring about order, education, peace, and prosperity to the people of the less-developed countries.

- The early-to-mid 20th century saw considerable turbulence in the global economic political landscape. Some of the most important events included two World Wars, the Great Depression, the onset of cold war confrontation, and growing communist and leftist influence. Two schools of thought (namely, Keynesianism and Socialism) emerged from this turbulence. These two schools of thought held the belief that *laissez faire* and private ownership were incapable of reviving the economic and social progress of the war-damaged economies. Rather, the government would have to be substantially involved to achieve such progress. Consistent with this belief, the governments around the world began to take lead in developing electricity industries. The institutions for the electricity industry in those times were accordingly typified by public ownership, vertically-integrated electric utilities, and tight government regulation.

- Further, this belief was strongly supported by a range of technological, economic, and geo-political interests. One, the electricity industry was widely considered as capital-intensive because to build large-scale power plants and long-distance high-voltage transmission lines required large investments. It was widely believed that investments of such magnitude could only be effectively financed by the governments, because the government was the most creditworthy entity and was therefore able to borrow money at lowest rates.

  Two, the electricity industry was widely considered as a 'natural monopoly'. This meant that a single company that integrated all components of electricity industry will be able to supply electricity at the lowest costs, as it will avoid wasteful duplication, especially of transmission and distribution networks. But the behaviour of this vertically-integrated electric utility will need to be tightly regulated by the government in order to prevent it from abusing its monopoly power.

  Three, public investments in power projects were strongly encouraged by the United States, through different types of financial aid and international lending practices. This was further driven by the US's concern about its national security, which it

even argued would be threatened if the Soviet Union captured or co-opted technology, industrial strength, and skilled labour of advanced industrialised countries (including, Western European countries and Japan), and natural resources of less developed countries. It was strongly believed by the US that the appeal of communism would be significantly reduced in these countries if their economic progress could be revived. Government interventionism, it was believed, was an effective way of achieving such progress.

- State interventionism in the electricity industry implied that the industry development was more likely to reflect the prevalent political objectives rather than considerations of economic efficiency and cost minimisation. These political objectives varied significantly across the countries, and were largely informed by the underlying interests of major socio-political players.

  1) In the case of developed countries included in this research, these objectives mainly involved the creation of welfare society and ensuring full employment. These objectives were further determined based on a powerful consensus in these countries between the labour and the business. The consensus was that the capitalist system should be maintained, but it must be modified with more active redistribution of income from capital to labour. In order to achieve these objectives, the electricity industries of these countries were required to provide sufficient electricity to meet all reasonable public demand for electricity, and to procure domestic fuels to protect certain industries (coal) from international competition.

  2) In the case of Latin American countries (*e.g.*, Argentina, Brazil, and Chile), the post-war development mainly prioritised import-substitution industrialisation, wealth re-distribution, welfare society, and employment creation. These priorities were largely reflective of the interests of the urban coalition (comprising industrialists, urban professionals, and workers), which assumed political leadership in the post-war period. Import-substitution industrialisation would promote domestic industry, and create employment opportunities for urban professionals and factory workers. More equitable wealth distribution and better social welfare provisions will also be in the interest of factory workers,

and they will be viewed by the industrialists as costs they need to pay to obtain the loyalty of the workers.

Consistent with these priorities, public electric utilities deliberately encouraged overinvestment in the electricity industry. They also hired more workers than needed, and paid them high salaries and generous welfare benefits than their productivity warranted. In addition, electricity price freezes were frequently used in the periods of high inflation that was largely considered in these countries as a threat to welfare society.

3) In Southeast Asian countries (including, Thailand, Malaysia, and the Philippines), public electric utilities were largely used to support their industrialisation programs in the 1960s and 70s. This was mainly based on the World Bank's advice, and the interests of politically-connected domestic local business sector. Beginning in the early 1970s, as a response to the growing communist movement in the region, and the increasing social mobilisation of the rural population, the governments in these countries began to accelerate rural electrification, as a means to win support from previously disadvantaged population, and to maintain political stability.

4) In India, the socio-economic development orientation of the 1950s and 60s emphasised consensus building and industrialisation. This orientation was largely informed by Gandhism that was strongly critical of capitalism for its neglect of social aspects of development (*e.g.*, cooperation, social harmony, and poverty eradication). The practical guidance of this orientation mainly came from Soviet Socialism that provided a scientific way for organising social and economic development in line with Gandhism.

   In line with the Indian government's broader social and economic development orientation, the electricity industry was used as a tool to support the country's industrialisation programs in the 1950s and 60s. In the 1970s, the Indian government began to put development priority on the agricultural sector, as a result of political change in the late 1960s, when mounting democratic activism by previously quiet social groups (*e.g.*, peasants) was observed. As a response, the government began to set lower electricity tariffs for agricultural consumers, even though the cost of serving remote rural areas was much higher.

5) China's orientation in post-war socio-economic development emphasised rapid industrialisation (especially focusing on heavy industry). This orientation was largely informed by the ruling Chinese Communist Party (CCP) and the Party's belief in Marxism. Electricity was viewed as a vital input to support the country's massive industrialisation program. The Chinese government provided strong financial and material support to develop the electricity industry to achieve this objective.

6) In some African countries (*e.g.*, Kenya and Mozambique), the governments promoted universal access to electricity, as part of their commitment to egalitarian development. This development was supported by a small group of nationalist leaders who intended to consolidate their political control, through winning the support of major social, ethnic and regional groups.

7) In South Africa, the electricity industry was used as a vehicle for implementing the wider national development strategy, namely, of maintaining and reinforcing the economic and social privileges of the white South Africa. As a result, the public electric utility was made responsible for supporting the country's industrialisation programs - largely controlled by the white population, and for providing electricity to the entire white population.

The above discussion shows that the governments around the world gradually realised the political appeal of the electricity in the 1940s, and started to actively intervene in the electricity industry, to support their development priorities including, for example, rapid industrialisation, employment creation, wealth re-distribution, and poverty reduction. These priorities essentially reflected the interests held by key national socio-political players. The use of electricity industry to support these priorities in the post-war era (1940s to 1970s), this research argues, ingrained the interests behind these priorities into the foundations of the electricity industry. These interests, the argument continues (and is discussed in the next chapter), have remained largely unchanged in the post-reform period (1980s to present). For example, sufficient and affordable electricity supply is still considered in the post-reform era as an important ingredient for socio-economic progress. This is expected to contribute to satisfying the interests of poor (mainly, poverty reduction). Contemporary electricity reform, however, could not fully satisfy these interests, because private investors are primarily interested in commercially-viable

investments. As a result, electricity reforms have showed strong path dependence, notably in the form of a continuation of frequent government interference in the industry to satisfy these interests (*e.g.*, poverty reduction) as prevalent in the pre-reform era of 1950s to 70s. These arguments are discussed in Chapter 4 of this thesis.

4 INSTITUTIONAL CHANGE PROCESSES IN THE ELECTRICITY INDUSTRY IN THE POST-REFORM ERA

4.1 Introduction

As shown in the previous chapter, the electricity industries were usually used in the post-war years as tools by the governments to support their development priorities such as poverty reduction, wealth re-distribution, and industrialisation. This, this research argues, has ingrained the interests behind these priorities into the foundations of the electricity industry. These interests, it is argued in this chapter, have remained largely unchanged in the post-reform era. This in turn has created an institutional lock-in in the electricity industry, and consequently affected changes in the institutions of the industry in the era of contemporary market reform.

This argument is examined in this chapter, through an analysis of changes in the institutional arrangements of the electricity industry in the post-reform period, as shaped by the underlying national and global developmental orientations, which in turn were informed by the underlying political power structure. For this analysis, post-reform changes in the institutions of the electricity industry are partitioned into two periods, namely, neoliberal reform period (1980s and 1990s), and re-reform period (early 2000s to the present). Each of these periods is marked by significant changes in the institutions for the electricity industry in terms of ownership, structure and regulation.

This chapter is organised as follows. Section 4.2 and 4.3 discuss post-reform global and national orientations for socio-economic development, the underlying political power structures that gave rise to these orientations, and the impacts of these orientations on the institutional configuration of the electricity industry. Section 4.4 provides a summary of the major findings of this chapter.

4.2 Neoliberal reform period (1980s - 1990s)

4.2.1 Global orientation: Neoliberalism

The 1980s saw a global re-orientation of socio-economic development towards Neoliberalism. This orientation emphasised the efficiency of market competition in determining economic outcomes and advocates minimal government intervention. It

also advocated private ownership as a means to enhance economic productivity and efficiency. It argued that the role of the government in the economy should be confined to the provision of regulations that are necessary for the well-functioning of a market economy (*e.g.*, antitrust legislation), and monetary policies that aims at price stabilisation (*e.g.*, anti-inflation) (Harvey 2005).

This development orientation was mainly determined by the United States and its allies (including, major European countries and Japan), which dominated the global politics in an increasingly unipolar system in the 1980s and 90s, following the collapse of the Soviet Union (Krauthammer 1990). America's global political dominance was largely built on its economic superiority over other countries (Krauthammer 1990). For example, the US accounted for more than one fourth of the world GDP in the 1980s and 90s. This was about two times the size of the second-ranked economy, Japan. Only European Union (EU) had similar economic size. But internal conflicts among member states implied that it could not be considered as a single economic unit at the global stage at that time (Krauthammer 1990). In addition, America's superior military strength and their popular culture also contributed to the reinforcement of its global political dominance (Nye 2004, Posen 2003).

The Neoliberalism of those times was essentially shaped by a blend of economic, ideological and ethical considerations and beliefs held by the United States and its allies.

1) There were two important economic developments in the 1970s that have shaped the intentions of the US and its allies to re-orient the world development towards neo-liberalism. One, in the early-to-mid 1970s, the US and other Western countries encountered soaring inflation, following the 1973 oil shock. Further, soaring inflation was also accompanied by rising unemployment. This was contrary to conventional Keynesian thinking based on the Philips curve that suggested an inverse relationship between the rate of inflation and the rate of unemployment in an economy. As a result, the Keynesian models of economic analysis were no longer considered as an adequate guidance for economic policy in these new circumstances. This failure of Keynesianism to provide a sound theoretical platform for policy development contributed to the emergence of neoliberal theories as guides for policy making (King and Wood 1999).

Two, the 1970s saw an increasing economic interdependence between national economies across the world, through a rapid expansion in cross-border movement of goods and capital. The expansion of trade meant that continued economic growth was increasingly dependent on the success of the trade-exposed sectors of the economy. Thus, the primary task of economic management was transformed from that of guaranteeing stable aggregate demand, to promoting the competitiveness of national firms (King and Wood 1999).

2) Neoliberalism of the times was built on ideas of Friedrich Hayek, Milton Friedman, and others. These ideas view government's economic interventions as inherently inefficient due to bureaucratic inefficiencies, lack of market-styled incentives, and highly political bias, especially of strong interest groups. Further, neoliberalism holds the view that a free market economy would achieve optimum economic performance with respect to efficiency, economic growth, and technical progress. It, therefore, attributed the economic recessions of the 1970s to excessive state interventionism, and suggested reduced government intervention through deregulation, free market, and privatisation as the means of reviving economic growth (Harvey 2005).

3) Neoliberalism claimed to be founded on superior ethical values. It is claimed by its proponents that neoliberalism is a reflection of human's fundamental values, namely, human dignity and individual freedom. These values are threatened by all forms of government intervention that substitute collective choice for individual free choice. These values would be advanced by neoliberalism alone, through a free market economy that allowed individuals to make their own decisions (Harvey 2005).

4.2.2 Progress of neoliberal reforms: A significant variation

As discussed in Section 4.2.1, the 1980s and 1990s saw a gradual re-orientation of world developmental ideals away from the state-centric ideals of Embedded Liberalism and Socialism of the earlier years, towards Neoliberalism. This resulted in the implementation, by many countries around the world, of wider economic reforms based on neoliberal principles that emphasised private investment, market competition, and de-regulation. Electricity reforms were considered as part of these wider reforms. But the progress of these reforms, this research argues, varied significantly across countries,

driven primarily by the national political power structures. This variation in turn affected the implementation of electricity reforms (see Table 4.1). Details are discussed in the following paragraphs.

Table 4.1: Progress of neoliberal reforms and its impacts on the implementation of electricity reforms in the 1980s and 90s

	Developed countries	Latin America	Southeast Asia	India	China	Africa
Neoliberal reform progress	- Comprehensive neoliberal reform	- Radical privatisation - Limited competition	- Trade liberalisation - Local business-focused privatisation	- Gradual privatisation and market opening	- Trade liberalisation - Partial privatisation - Continued public dominance	- Stagnant reform - Limited privatisation
Political interests behind the neoliberal reform	- Need to improve international competitiveness of national economy - Inability of Keynesianism as base for policy making - Weakened labour political influence	- Reducing government debt - Supports from business leaders - Belief held by poor that neoliberal reform could improve their living standards - Weakened political influence of urban coalition	- Pressure from the IMF - Need to revive economic progress - Demand of local business sector in anticipation of the economic benefits arising from export-led growth	- Commitment to the IMF - A mixed reception of the reforms - Support from outward-oriented industrialists (e.g., IT) - Opposition from public sector and farm organisations	- Need to revive economic and social progress - Belief that the use of some capitalist measures is necessary to restore such a progress - Belief that public should continue to dominate	- Pressure from the IMF - Need to revive economic and social progress - Political inability that reduced the ability of the government to implement the reforms
Impacts on the electricity industry	- Comprehensive reform - Part of the economy-wide reform programs	- Radical privatisation as a way of reducing government debt - View other reform steps as tools to support this privatisation.	- Contracts for IPPs - Focus on local investors - Limited competition	- Initial emphasis on IPPs - Further privatisation, restructuring and re-regulation in a few states - Limited progress in others	- Investment attraction - Focus on non-central public sources - Promote economic and social progress	- Slow reform progress due mainly to political instability

Source: Developed by the author, based on the discussions presented in Sections 4.2.2.

Comprehensive neoliberal reforms

In the 1980s, countries such as Australia, Britain, and the United States began to implement comprehensive neoliberal reforms. These reforms essentially focused on improving the international competitiveness of domestic business through de-regulation of labour market, financial liberalisation, anti-inflation measures, government deficit reduction, and privatisation and liberalisation of public utilities (Pusey 1991, Steger and Roy 2010). Reform of the electricity industries, this research argues, was implemented in these countries as part of these wider economic reforms.

Neoliberal reforms were prompted in these countries, as also noted earlier, by a fundamental shift in developmental ideal, towards Neoliberalism, driven by several factors including, for example, stagflation and the failure of Keynesianism to provide guidance for economic policy in these new circumstances, globalisation of the world economy and pressure to improve international competitiveness of the national economy, and the emerging belief in neoliberal ideology (see Section 4.2.1).

In addition, neoliberal reforms also received substantial political support in these countries from business sector (especially, multinational corporates), whose economic interests were largely restrained in the post-war years (1950s and 60s), as labour was accorded a large share of the economic benefits resulting from the post-war economic boom. This seemed not to matter while economic growth was rapid in the post-war years, because this growth allowed further accumulation, and the business sector were willing to compromise on this issue. The share of economic benefits to labour was viewed by the business sector as the costs they had to pay to maintain socio-political stability. But when growth stagnated in the 1970s, the declining level of profits threatened the economic interests of the business sector, and prompted them to move decisively to support market reforms (Harvey 2005).

These reforms were also supported by weakened political influence of labour organisations, which strongly advocated government intervention in the economy in the earlier years to support their political priorities (such as, creation of welfare society and full employment). The labour force became increasingly heterogeneous in the late 1960s when the proportion of women, white-collar and professional employees grew and blue-collar manufacturing employment declined (Klausen 1999). Labour unions found it increasingly difficult to represent the diverse group of employees, as class ties and

identities, which bounded employees together while pitting them against employers, weakened sharply in most developed countries during these years (Esping-Andersen 1999). One implication of this was that labour unions or socialist parties were less able to act as cohesive political entities in interclass bargaining processes.

Radical privatisation

During the 1970s and early 1980s, the public sectors of the Latin American countries considered in this research (namely, Argentina, Brazil, and Chile) had performed poorly and had registered large financial losses. For instance, over the period of 1980 to 1987, the three largest Argentinean public-owned electric utilities registered financial losses averaging $800m per annum. Similarly, in Chile, the two largest electric utilities reported negative returns on assets in 1973 (4.3 and 3.2 per cent respectively) (Soto 1999).

With a view to support the public sector, these countries began to borrow intensively from international financial organisations. This resulted in the accumulation of large foreign debt. Most of the debt was denominated in US dollars, and was borrowed from international commercial organisations at floating interest rates. Following the second oil crisis in 1979, the US government decided to appreciate the US dollar, and the Western countries also increased their interest rates significantly. This, together with the declining world demand and prices for Latin American major export commodities, put tremendous pressure on these countries' debt repayment capacities. In response, they sought assistance from international funding agencies, particularly the IMF and the World Bank. In the 1980s, they decided to implement the macroeconomic Structural Adjustment Programs (SAPs) as proposed by the IMF as a precondition for receiving assistance; ESAPs were a set of economic measures, based on neoliberal principles, to transform the state-led economy into a market-oriented economy (Kingstone 2011). In accord with their commitment to the IMF, these countries began to implement neoliberal reform with specific emphasis on privatisation of public owned companies (*e.g.,* electric utilities) as a way to reduce the governments' debt levels (Kingstone 2011).

The neoliberal reform programs also received considerable support from major domestic socio-political actors in these countries. Between 1980s and 1990s, these countries were in the main led by populist governments and charismatic leaders (such

as, Carlos Menem in Argentina, and Fernando Collor in Brazil) who were able to appeal to the heterogeneous mass of rural and urban poor people, many of whom had been previously prevented from participating in the political decision-making (Weyland 1996). These people were supportive of neoliberal reforms for three reasons. One, they expected that the introduction of free market could create a level field for them, and eliminate the privileges that were until then enjoyed only by the urban coalitions that prevailed in the import-substitution era. Two, they seemed to have suffered the most from the macroeconomic crisis of the 1980s, and were therefore more likely to support neoliberal reforms that would purportedly save them from economic catastrophe. Three, neoliberal reforms (especially, privatisation of public enterprises) would provide the government with more resources. These resources were usually promised to be directed at anti-poverty programs which would mainly benefit the poor (Meyland 1996).

The neoliberal reform programs were also supported by large multi-national corporations, and the small, wealthy domestic business sectors, mainly export-oriented enterprises in agriculture, mining, manufacturing, and big banks. The interests of the domestic business sector were well served by neoliberal reforms. For instance, economic liberalisation would provide them with better access to international financial markets. Labour market deregulation could reduce the strength of labour unions and their bargaining power. Privatisation of public enterprises would open new investment opportunities to them (Meyland 2004).

The main victims of neoliberal reforms – inward-oriented industrialists, workers and urban professionals – seemed to at least tolerate reforms for two reasons. First, their political influence had significantly weakened during the 1970s when labour unions and labour parties were harshly repressed by the military forces. The combination of labour market deregulation and privatisation of public enterprises had further contributed to their declining political influence. They were therefore unable to exert adequate influence on the shape of the government's economic reform program (Meyland 2004). Second, the debt crisis and hyperinflation of the 1980s seemed to have forced them to accept some costs associated with the reform programs that were expected to save them from economic catastrophe. As argued in Meyland (2004), 'in crisis situations, people do not dig in their heels and strenuously defend their immediate material well-being;

instead, they are willing to make sacrifices and trust their leaders' plans for straightening out the economy'.

Export-led industrialisation and local business-focused privatisation

In the late 1970s, the economic growth in Southeast Asian countries considered in this research (namely, Thailand, Malaysia, and the Philippines) had begun to slow down due to the rising oil prices and the collapse of global commodity prices. The end of the Vietnam War and drastic reduction in US assistance in the region further compounded their economic woes (Gomez and Jomo 1999, Raquiza 2012). With the view to revive economic growth, the governments of these countries increasingly turned to foreign loans, and in the process accumulated large foreign debts. When the international borrowing conditions became unfavourable (*e.g.*, rising interest rates), these countries were forced to seek support from international financial organisations (such as, the IMF and the World Bank). Reforms based on neoliberal principles were imposed on them as a condition for receiving financial assistance from these organisations (Felker 2004).

In line with their commitment to the IMF and other international financial organisations, in the 1980s, these countries started to implement selected elements of neoliberal reforms including, for example, trade liberalisation, encouragement of foreign investment, and export-oriented industrialisation. This resulted in a partial opening of their economies with a substantial part (such as, infrastructure sector, services sector, and other non-tradeable industries) still remaining under government protection (Jayasuriya 2003).

A continuing government protection of the infrastructure sector (*e.g.*, electricity industry) was largely demanded by politically-connected business leaders whose interests in the sector had expanded considerably in the 1990s when the sector was opened to their investment. Two main factors had contributed to the encouragement of private investment (especially, from domestic sources) in the electricity industry. One, these countries experienced chronic power shortages in the early 1990s. For instance, in Malaysia, annual reserve margins had fallen to 19 per cent in the early 1990s, resulting in power shortages affecting 80 per cent of the population on Peninsular Malaysia. In the Philippines, brownouts averaging up to 10 hours a day were common during the early 1990s (Sharma 2005). It was strongly believed in these countries that their socio-economic progress could falter due to the lack of electricity supply. In response, the

governments of these countries began to open their electricity industries to private investment, especially from domestic sources. Private investors were encouraged to participate in the electricity industry, through their ownership of IPPs. They were provided with attractive supply contracts, typically ensuring guaranteed rates-of-return, take-or-pay clauses, and tax and non-tax incentives (*e.g.*, exemption from machinery import tax) (Greacen and Greacen 2004, Smith 2003).

Two, the export-oriented industrialisation from 1986 onwards changed the export-mix of these countries, from labour-intensive (textiles, shoes) and resource-intensive (processed food) products, to technology-intensive products, for example, computer parts, auto parts, and electrical goods. Multi-national companies had apparent advantage over local firms in these industries, because they largely controlled the technology required, and had easy access to export markets for their products through their extensive networks of trading companies across the world. Local business sector was mainly attracted by profit-making opportunities stimulated by export-led growth (*e.g.*, infrastructure to support export) (Phongpaichit and Baker 2000, Raquiza 2012, Teik 2006).

Gradual liberalisation

Between 1980 and 1990, the Indian government's fiscal deficit increased from 8.1 per cent of the GDP, to 10.1 per cent. This was mainly due to escalating government expenditure on interest repayments on commercial borrowings, subsidies for targeted beneficiaries in agriculture and industry, and rising defence expenditure. The balance of payment crisis broke out in 1991 when the Gulf War pushed up oil prices and costed nearly 1 per cent of India's GDP. A substantial downgrade in India's credit rating further reduced its ability to borrow in foreign markets (Mukherji 2009). In response, India turned to the IMF for financial assistance, and began to implement neoliberal reforms as part of the bailout deal with the IMF (Weinraub 1991).

The neoliberal reforms in India received a mixed reception. Support mainly came from international capital, on the lookout for attractive investments. Indian high-tech industry such as IT and other export-oriented sectors and India's skilled manpower looking for employment in multinational companies also favoured rapid integration with the international market economy (Mitra 2011). Indian industrialists, who favoured protected Indian market, needed resources for financing imports. Acquiescing to

reforms thrust upon them by the IMF seemed to be the only option in the short run. Resistance to reform mainly came from India's public sector and some private sector which feared foreign competition, and the farm lobby which feared the loss of domestic subsidies and competition from abroad (Mukjerji 2009).

The mixed views on neoliberal reforms, together with the highly fragmented political power structure in India and democratic form of government (see section 3.3.2), implied that reforms had to be based on a lengthy consensus building process, and were therefore only implemented in a gradual way (Mitra 2011). Consistent with these wider reforms, electricity reforms in India, this research argues, were implemented in a gradual manner, reflecting consensus building nature of the country's political decision-making process and conflicting interests involved in this process.

Trade liberalisation, partial privatisation and continued public dominance

In 1978, a new socio-economic development orientation was formulated in China. This orientation is referred to as Market Socialism or Socialism with Chinese characteristics (Zweig 2010). Central to this orientation is mixed ownership, partial market competition, trade liberalisation and the relegation of central planning to macroeconomic indicative planning that does not encompass the economic decision-making at the micro level. In addition, five key sectors of the economy (namely, telecommunications, petroleum and refining, metallurgy (steel and other metals), electricity and military industry) were identified as important tools to achieve a range of developmental priorities such as, economic growth and people's living standards' improvement. They accordingly should remain under government control (Zweig 2010). As a result, electricity reform in China, this research argues, mainly focused on encouraging investments (especially from non-central government public sources) for capacity expansion to support further economic and social progress. Other aspects of the reform (*e.g.*, market competition) were largely ignored.

Market Socialism in China was inspired by a combination of political, social, and ideological factors.

1) The CCP no longer viewed social groups other than the proletariat (such as, capitalists, professionals, and local business) as enemies. Instead, the CCP started to gradually broaden its social base through the inclusion of non-proletariat social groups into the party. This change was encapsulated in Jang Zeming's theory of

'Three Representations', articulating that the CCP represents the fundamental interests of the overwhelming majority of the Chinese people (Zweig 2010). This move marked the CCP's change from being a revolutionary party committed to lead the country towards communism through class struggle and mass mobilisation, to a governing party that implied a less ideological claim about its purpose and possibly a greater sense of accountability to all citizens of the country (Weatherley 2006). On the economic front, this political change, this research argues, paved the way for the Chinese government to focus their attention on economic growth and improvement of living standards.

2) The peoples' living standards in China had declined over the post-war period. For instance, over the post-war period, average incomes of urban state workers and industrial employees fell by 5.5 per cent and 8.4 per cent respectively. This resulted in growing social discontent, further prompting the government to put development priority on economic growth and improvement of living standards (Saich 2001).

3) The CCP revised its Marxist ideology based on its development experience over the post-war period, and created its own development ideology – the Primary Stage of Socialism (Weatherley 2006). This ideology created the theoretical basis for Market Socialism. Based on this ideology, capitalism was viewed as the necessary penultimate stage of development towards communism because it created material abundance necessary for the realisation of communism. China's development failures after 1949 were mainly due to the attempts to jump (or bypass) the capitalist stage of development and move straight into communism when the local conditions were not sufficiently developed to accommodate this final phase. China, at that time, was still an under-developed country, and was at the primary stage of developing socialist society. During this intermediary phase before the shift into communism, the priority of the day was rapid economic development. In order to achieve this objective, it was necessary to adopt a more flexible and pragmatic approach to economic policy, including overtly capitalist measures (Weatherley 2006).

Stagnant neoliberal reforms

In the 1980s, Africa was the poorest continent in the world in terms of economic and social development. Economically, between 1980 and 1989, Africa's GDP per capita declined at an annual average rate of 0.7 per cent. It also registered the world's highest

ratio of external (mostly public) debt to GNP (115 per cent). Socially, the continent had the world's highest population growth rate (averaging annual 3.2 per cent over the period 1980-1989), and had a sharp decline in per capita food production index (minus 5 since 1979). The countries in the region required annual food imports of around $18 billion, for overcoming food deficits and for feeding an estimated 30 million people facing starvation. Africa also had the highest infant mortality rate (more than 150/1000) and the lowest average life expectancy (51 years) (Lubeck 1992).

Deteriorating social and economic conditions fuelled political instability. Social unrest was widespread and was further intensified by the political liberalisation of the 1990s. By 1995, almost all sub-Saharan African countries had introduced some measure of political liberalisation, and a majority permitted competitive elections. This political transformation can be traced to three significant factors: the weakening of most African states by prolonged economic and social crises; the increasing influence of international financial organisations on political and economic policies; and the shift in thinking by global powers (especially the United States), after the end of the cold war confrontation, from tolerance of and alliance with authoritarian regimes to political liberalisation (Joseph 1997).

The governments of many African countries found increasingly difficult to maintain political stability and social and economic progress. This difficulty was further intensified in the early 1990s when the world's major powers withdrew their support from the region (*e.g.,* US from Kenya, and Soviet Union from Mozambique). These countries therefore began to seek support from external financial agencies. The World Bank and other international financial organisations that controlled the financial resources made the implementation of Structural Adjustment Programs (SAPs) as a prerequisite for getting loans and developmental aid. Desperate for funds, the African leaders adopted the World Bank/IMF-supported SAPs (Graham 2010). Electricity reforms in these countries were implemented as part of the SAPs. But its implementation has been quite slow, due mainly to political instability that significantly reduced the capability of the governments to implement these reforms (Graham 2010).

4.2.3 Market-oriented model for electricity

As discussed above, the 1980s and 90s witnessed a re-orientation of the developmental ideals away from the state-centric ideals of Embedded Liberalism and Socialism of the

earlier years towards Neoliberalism. This resulted in the implementation by many countries around the world of wider economic reforms based on neoliberal principles that emphasised private investment, market competition, and de-regulation. Electricity reforms were in larger part implemented in these countries as part of these wider reforms. The electricity reforms were expected to replace the state-centric model in the earlier years with a market-oriented model in accord with neoliberal principles. This model was accordingly typified by private ownership, market mechanisms for electricity trading, and sector-specific regulator for overseeing the operation of the power systems.

Electricity reforms were given further immediacy by the performance problems in the industry in the 1980s. These problems varied significantly across countries. While perceived inefficiency in the electricity industry induced by rising electricity prices was considered as the main performance problem in developed countries, the performance problems in many developing countries included lack of investments for system expansion, chronic power shortages, deteriorating quality of supply, and rising system losses. The main cause for these problems, it was argued, was excessive state intervention in the electricity industry. Accordingly, a drastic reduction of state intervention in the industry, through privatisation, restructuring, and re-regulation, was suggested as the means to address these problems.

In addition, the reform of electricity industry based on neoliberal principles was also assisted by technological changes of the 1970s and 80s. First, the appearance of highly-efficient small-scale power plants (such as, the combined cycle gas turbine) had reduced the minimum efficient scale of a generating plant. Lower investment required for this type of technology had removed the barriers for private investors to participate in power generation. Second, the advent of information technology permitted tighter coordination between independent upstream and downstream segments of electricity supply (Belyaev 2011). These technological developments, this research contends, significantly facilitated the introduction of market reform (*e.g.*, private participation and market competition) in the electricity industry.

But the progress of electricity reforms varied significantly across countries. This variation overwhelmingly reflects (in fact, mimics) the progress of economy-wide reform in these countries (see Section 4.2.2). Table 4.2 summarises the progress of

electricity reforms in various countries. A detailed discussion about this progress is provided in the following paragraphs.

Table 4.2: Progress of electricity reforms in the 1980s and 90s

	Progress of electricity reforms
Developed countries	**Comprehensive electricity reforms** - Introduction of market competition at both wholesale and retail levels - Mixed ownership - Creation of sector-specific regulator with high autonomy
Latin America	**Radical privatisation and limited competition** - Radical privatisation of public owned electric utilities - Introduction of limited competition in generation to provide price transparency and to avoid price fluctuations
Southeast Asia	**Local business-focused privatisation** - Dash for IPPs to reduce power shortages - Award of most IPP contracts to local investors (especially, politically-connected) - Limited privatisation and restructuring
India	**Gradual privatisation and market opening** - Initial emphasis on IPPs to reduce power shortages - Deeper reform (privatisation, restructuring and re-regulation) implemented in a few states, while limited progress in others
China	**Market opening to non-central government sources** - Encouragement of investment in generation, especially from non-central government public sources (*e.g.*, provincial governments) to support economic growth and people's living standards' improvement - Continued public dominance
Africa	**Limited privatisation and market opening** - Slow progress of electricity reforms, due mainly to political instability that reduced the ability of the government to progress the reforms

Source: Developed by the author, based on the discussions presented in Sections 4.2.3.

Comprehensive electricity reforms

In developed countries included in this research, the electricity industries had performed reasonably well in the post-war period. For example, the industry had delivered sufficient (often excessive) investments in new capacity to keep up with demand growth. Electricity was available to all groups of consumers under the obligation of universal electricity provision. The electricity systems were well operated with high levels of reliability and low system losses. The consumers in these countries enjoyed low electricity prices that fell almost continuously until the early 1970s. The average prices of electricity in these countries typically covered supply costs including reasonable returns on investments (Joskow 1998).

However, the industry came under growing pressure to increase electricity prices in the 1970s. There were two reasons for this. One, the growth of electricity demand in developed countries was less-than-expected in the 1970s and 80s, due to economic slowdown, improvement in end-user efficiency, and structural changes in these economies (from industry to service, and high technology sectors that were normally identified as less electricity intensive) (Joskow 1998). Two, the economics-of-scale, that has delivered considerable productivity gains in the post-war period, had been largely exhausted. Average production costs were therefore not declining any further, even though the system continued to expand in terms of generation, number of customers, and the size of networks (Thompson *et al*. 1996).

The rising electricity prices gave rise to the impression in these countries that electricity was not being supplied efficiently. In response to these perceived inefficiencies, these countries began to implement comprehensive reforms in their electricity industries based on neoliberal principles. These reforms were largely consistent with their prevalent development priorities, namely, improving economic efficiency, minimal government, and encouraging private participation.

As a result of these reforms, formal market mechanisms were established in these countries for electricity trading. The market was generally organised in the form of a pool market or a power exchange. The electricity markets in Australia, Britain (before 2001), for example, are organised as pool markets. In a pool market, electricity generators submit their bids for electricity supply to the market operator who then

dispatches generators based essentially on a cost-based criterion. This process leads to the development of a single price for market clearing (Aghdam 2006, Newbery 2006).

The electricity markets in Germany, Britain (after 2001), and the United States are organised as voluntary power exchanges with physical bilateral contracts traded on the OTC market. This market model is more decentralised than the power pool model. It allows the generators and buyers to freely reach bilaterally agreements on power supply. The system operator is only responsible for maintaining the balance of supply-demand and the reliability of the system (Brunekreeft and Bauknecht 2006, Newbery 2006, Bowring 2006).

In these electricity markets, market forces rather than engineering standards determine the level of installed capacity and new investments in power projects. This differs significantly from the traditional approach, in which electric utilities meet reliability and capacity adequacy requirements according to engineering standards regarding acceptable hours of load shedding, based on the expected load variance and generation availability (Ranci and Cervigni 2013). Now, the incentives for investment in new generation capacity mainly come from price signals generated in electricity markets (AER 2010, Brunekreeft and Bauknecht 2006, Newbery 2006).

Market competition was also extended to the retail levels in these countries. Most consumers can freely choose their power suppliers. But the retail markets in these countries are still in their infancy. For example, in several jurisdictions of the United States, the incumbent utility still acts as the monopoly supplier for small consumers, procuring electricity from the wholesale market and retailing it at regulated prices. In Europe, despite the introduction of full retail competition for all consumers by the end of 2007 as required by the European Commission Directive, in some countries entry barriers have not yet been completely removed and retail prices are still regulated (Ranci and Cervigni 2013).

The lack of market development at the retail level is understandable if one takes into consideration the fact that small consumers (*e.g.*, households) have to face significant transaction costs involved in the assessment of different offers of electricity supply. As a consequence, retailers enjoy significant market power over their customers. This has led regulators in most countries to retain price controls long after the legal introduction of full retail competition (Ranci and Cervigni 2013).

Comprehensive restructuring of electricity industries has also been undertaken in these countries to facilitate the functioning of the market. As a result, the operational control of network systems has been ceded to system operators, to ensure non-discriminatory access to grids. This has been achieved in most countries in this group (except the United States) through the unbundling of the network segment from the generation and retail segments, and the creation of independent system operator (AER 2010, Brunekreeft and Bauknecht 2006, Newbery 2006). In the United States, vertically-integrated electric utilities are encouraged to voluntarily transfer the rights of system operation to the Regional Transmission Organisations (RTOs). With access to the networks controlled by the RTOs, there is expected to be little economic incentive for electric utilities to discriminate against competing suppliers (O'Neill *et al*. 2006).

Reforms in these countries have also resulted in the privatisation (or at least corporatisation) of former public-owned electric utilities, and the opening-up of electricity businesses to private investors. The privatisation process has been successful in several countries (*e.g*., England and Wales); in others mixed public-private ownership patterns have emerged.

In addition, sector-specific regulators have been established in these countries. These regulators are responsible for monitoring system operation, enforcing regulatory arrangements (*e.g*., reliability standards), promoting competition (*e.g*., regulated open-access to networks, and antitrust regulation), and implementing incentive regulation of the networks (Sharma 2003; Newbery 2006; Joskow 2006).

Radical privatisation and limited competition

In Latin American countries included in this study, the immediate stimulus for electricity market reforms came from macroeconomic crisis of the 1980s. This crisis caused hyperinflation, large fiscal deficits, and rising unemployment. These problems were argued to be a consequence of excessive government spending in public owned companies (*e.g*., electric utilities). The privatisation of these companies was therefore viewed by the governments as the means to solve these problems. Accordingly, radical restructuring and privatisation of public owned electric utilities were implemented in these countries. For example, in Chile, the privatisation process began in 1985, and much of the industry was unbundled and sold to private investors within the first three years (Pollitt 2004). Other countries in the region were also subject to similar changes.

Consequently, the electricity industries in these countries became largely privately owned. The public ownership was limited to the state-owned nuclear and large hydro power plants, and some provincially-owned distribution companies (de Araujo 2006, Pollitt 2008, Raineri 2006).

Limited competition in generation was introduced in these countries. This mainly involved a centralised pool market in which producers and purchasers sell and procure electricity, and a long-term bilateral contract market (Millan 2006). In the centralised pool markets in these countries, suppliers were not allowed to make bids. Instead, they were required to provide information regarding their availability and fuel costs for power production to the system operator several months before actual dispatch. The system operator then determines the electricity prices based on this information (de Araujo 2006, Raineri 2006).

This type of pool market was not meant to promote market competition. Rather, it was mainly designed to avoid price fluctuations that were undesirable for both consumers and producers. Consumers viewed any price hike as permanent, and were afraid that this would cause deterioration in their well-being. Producers preferred a guaranteed revenue stream to reward their investments. In addition, the high share of hydro production in these countries (especially Brazil) provided further justification for the use of this type of pool market. The power systems of these countries had large hydro storage capacities, typically made up of groups of physically interdependent reservoirs and plants located in the same river basin. Coordinated operation of these systems was therefore a must to obtain synergy gains (Millan 2006).

Independent regulators were established in these countries. The regulators were made responsible for protecting users' rights; promoting competition; promoting open access in networks; regulating transmission and distribution tariffs; and promoting efficiency and encouraging investment. While these responsibilities were assumed by a single agency in Argentina and Brazil, they were allocated to different agencies in Chile (de Araujo 2006, Pollitt 2004, 2008). Notwithstanding these changes, the regulators in these countries still lacked autonomy and credibility, and the governments continued to have a significant role in the regulation of the electricity industries, especially in determining electricity prices (Millan 2006).

Local business-focused privatisation

In Southeast Asian countries included in this research, the 1980s saw the formation of a broad consensus that the electricity industries were in dire straits. There were chronic power shortages, deteriorating quality of supply, and rising system losses. At the same time, public electric utilities in these countries were gripped by financial problems, and were unable to mobilise sufficient resources to alleviate the situation (Sharma 2005, Wattana 2010).

Further, accelerated economic growth in the mid-to-late 1980s, and the resultant soaring electricity demand, and the inadequacy of public resources for capacity additions also intensified the shortage of electricity supply. This gave rise to a concern in these countries that their rapid economic growth could falter due to the lack of electricity supply. Therefore, the main motivation for reforms in these countries was essentially associated with the need to attract sufficient investments for capacity additions. However, the proponents of reforms also promised other benefits, such as, better service quality, rational investment decisions, and lower system losses (Sharma 2005).

As influenced by the factors noted above, in the late 1980s, these countries began to promote a greater role for the private sector in the generation business, in the form of Independent Power Producers (IPPs). For example, in the Philippines, the first IPP contract was signed in 1989, and by the end of 1993, more than 25 IPPs were producing electricity in the country. By 2001, IPPs generated about 41 per cent of the electricity that was consumed in the country (Sharma *et al*. 2004). Similar trends were also witnessed in other countries in the region.

The IPPs were usually granted Power Purchase Agreements (PPAs) with generous terms such as attractive guaranteed rates of return, protection from fuel and currency risks, and take-or-pay clauses that the national utilities would have payment obligations regardless of whether they actually needed the electricity (Rector 2005, Tongia 2009). The PPAs enabled the private investors to pass through the market risks to the national utilities. The utilities delivered electricity to the end-users under regulated prices that were determined according to cost-of-service principle. This further transferred the market risks to the consumers. Therefore, under the PPAs, most of the market risks associated with the IPPs were not a direct concern of the private investors. This risk allocation in turn encouraged private investments in the electricity industry (IEA 1999).

Most IPPs were owned by local investors in Malaysia (90 per cent) and Thailand (75 per cent) (Roxas and Santiago 2010). In these countries, the PPAs were normally awarded to politically well-connected local companies. For example, a politically well-connected company was granted with a major hydro project, even though this company was mainly specialised in building resort facilities with no experience in dam building, power cable laying or power plant construction (Smith 2003). In the Philippines, foreign investors controlled most of the IPPs. But these foreign investors normally collaborated with local investors in developing IPPs (Woodhouse 2005).

In addition, public electric utilities were only partially restructured in these countries, with the generation segment separated from the conventional vertically-integrated electric utilities. The remaining functions (namely, transmission, distribution and retail) were still largely undertaken by vertically-integrated entities. Ownership of the public utilities was also partially transferred to the private sector. But this privatisation was quite limited, and the governments continued to have significant ownership of the utilities. For example, in Malaysia, the government corporatised the National Electricity Board in 1990 into Tenaga. In 1992, the Malaysian government further privatised Tenaga by floating the company onto the Kuala Lumpur Stock Exchange. But the government remained the dominant shareholder of the company (Rector 2005).

Gradual privatisation and market opening

Consistent with its wider neoliberal reforms, electricity reforms in India were implemented in a gradual manner, reflecting consensus building nature of the country's political decision-making process and conflicting interests involved in this process.

Initially, the Electricity Act of 1948 was amended in 1991, to allow private participation in generation, in the form of independent power producers (IPPs). This was mainly motivated by the poor performance of the industry in the 1980s, typified by chronic power shortages in many parts of the country, severe financial burden imposed on state governments because revenues did not match costs, and poor quality of supply (Kale 2004).

In 1992, the central government, with the view to expeditiously address the power shortage, assigned eight showcase IPP projects 'fast track clearance', which allowed these projects to leap over licensing hurdles. Encouraged by these inducements, private investors had made 190 proposals for IPPs by 1996. But only 15 of these proposed

projects went to the stage of applying for a techno-economic clearance from the government. The slow progress of IPPs was mainly attributable to the local opposition to these projects (Kale 2004).

By the mid-1990s, it was clear that a focus on private investment in generation was an insufficient reform policy. The reforms left untouched the underlying fundamental weaknesses of the SEBs. End-user tariffs remained well below the actual cost of supply, and the gap was increasing. Transmission and distribution losses and theft were consistently hidden as agricultural consumption. The SEBs' financial problems would become more serious if they purchased more power from the IPPs. The lack of reforms on electricity pricing was further attributable to widespread political interference in electricity tariff settings as electricity tariffs were widely considered by local politicians as important means of subsidising the poor, especially peasants, and winning political support from them (Kale 2004).

In response, several state governments began to reform their SEBs in the mid-1990s. These reforms were aimed to depoliticise the SEBs' tariff settings, and to improve their efficiency, through privatisation and re-regulation. As a result, the SEBs in several states were unbundled into generation, transmission, and distribution, and the distribution companies were then sold to private investors, with the intention of re-orienting these companies towards commercial goals. Independent regulators – the State Electricity Regulatory Commissions (SERCs) – were also established in several states, with the aim of eliminating the possibility of government intervention in the power sector (Kale 2004). But reform progress was quite slow, because the state governments had to frequently deal with strong political opposition from farmers, who had come to rely on enormous quantities of low-cost electricity for pumping water, and labour unions that represented electricity workers who feared losing their jobs if the bloated SEBs were privatised (Tongia 2009).

Market opening to non-central government sources

As part of Market Socialism, the electricity industry was considered by the Chinese government as an important tool to serve wider development objectives of promoting rapid economic growth and improving peoples' living standards. The electricity industry was therefore identified as strategically important, and therefore remained in public control (Zweig 2010).

However, the early 1980s saw rising electricity demand, driven by rapid economic growth. The central government was unable to provide required investments to satisfy this demand. The result was power shortages throughout the country. Between 1984 and 1993, for example, electricity production in China fell short of demand by about 20 per cent (Li and Dorian 1995). Chronic power shortages created a bottleneck for economic and social development.

In response, in 1985, the central government issued the 'Provisional Regulation on Promoting Fund-Raising for Investment in the Power Sector and Implementing Different Power Prices'. This regulation terminated the exclusive rights of the central government to invest in the electricity industry, and allowed other investors (especially, local governments) to invest in the generation sector; this was consistent with the intention of retaining public control of the industry as noted above (Yeoh and Rajaraman 2004).

The 1985 reform of opening the generation segment to non-central government investors was quite successful, and attracted large amounts of investments, especially from local sources (such as, provincial governments). As a result, by 1997, the prospect for serious power shortages had been almost entirely eliminated (Yeoh and Rajaraman 2004).

Limited privatisation and market opening

In most African countries, the electricity industries had performed poorly in the post-war period. The provision of electricity was limited and largely confined to the privileged population (specifically, the white people in South Africa) and politically-connected commercial and industrial interests. The majority of the population, especially rural and urban poor, lacked electricity supply. The public owned electric utilities also suffered from unsatisfactory technical and economic performance, resulting in poor supply reliability, low capacity utilisation and availability factors, lack of maintenance, and high system losses (Karekezi and Kimani 2002).

This poor performance was largely attributed to excessive state intervention. Drastic reduction of government participation in the electricity industry through privatisation, restructuring, and re-regulation was therefore considered as the means to address these problems. This was consistent with the Structural Adjustment Programs (SAPs) suggested by the IMF as pre-conditions of receiving financial assistance.

In response, these countries began to reform their electricity industries. But the reform progress was quite slow. The electricity industries in these countries were only partially unbundled and corporatised, and were still government-owned under unified management. For example, in Mozambique, the state owned electricity company EDM was corporatised and unbundled into several business units comprising generation, transmission, and distribution. However, all these business entities were still government owned and under a unified management (Cumbe 2008). In South Africa, the vertically integrated national utility Eskom was corporatised involving the conversion of the enterprise into a company with defined shareholding (wholly government) and subject to the payment of taxes and dividends (Eberhard 2009).

In addition, private participation was also encouraged in these countries. But its role was limited to the margins of the industry, in the form of IPPs. For example, in Mozambique, power generation was largely dominated by public owned electricity companies. These companies together supplied about 80 per cent of the total national demand (Cumbe 2008). Similarly, in South Africa, the national utility Eskom generated about 96 per cent of the country's electricity (Eberhard 2009).

Sector-specific regulators were established in these countries. But their regulatory roles were limited and did not include some of the most important regulatory functions such as tariff setting and concession awarding (Eberhard 2009, Mbogho 2007). In addition, in some countries (*e.g.*, Mozambique), the regulators were not effective or even operational, and the government continued to assume responsibility for the key issues in the electricity industry (Cumbe 2008).

4.3 Re-reform period (2000s - present)

4.3.1 Global orientation: Balanced Neoliberalism

The 2000s witnessed a re-orientation of global development; it is called Balanced Neoliberalism in this research. This orientation still advocates trade liberalisation, privatisation and market competition, but suggests a relatively more active role for the government to redress market failures, and to take care of distributional concerns. Further, it takes the view that one-size-fits-all solutions do not exist, and countries should be given freedom to experiment on their own development strategy by taking into account the local conditions (Stiglitz 2002, Stiglitz 2004).

The re-orientation towards balanced neo-liberalism can be attributed to the decline in the political dominance of the US, and the growing political influence of many developing countries. After being embroiled in two wars and beset with the worst economic crisis in 2008 since the Great Depression, the political strength of the United States has been considerably weakened. This, together with the rise of several major developing countries, resulted in a gradual transition of the global political system towards a multipolar system. In this system, the United States still remains the world's sole superpower, and leads other countries in any scale of power that matters (such as, economic, military, and cultural) (Nye 2011). But now it has to share the world stage with several regional great powers (especially, developing countries) of varying strengths (Joffe 2009). For example, as shown in Table 4.3, the BRICS countries (including five major developing countries) accounted for about 25 per cent of the world GDP in 2014, and are emerging to be important economic players at the global stage.

Table 4.3: Economic growth: 2000 ~ 2014

Countries	GDP (billion 2005 US dollars)			Percentage of world total (%)		
	2000	2005	2014	2000	2005	2014
United States	10,285	13,094	17,419	31	28	22
Japan	4,731	4,572	4,601	14	10	6
European Union	8,815	14,315	18,461	26	30	24
Brics[1]	2,751	4,979	17,175	10	12	25
China	1,205	2,269	10,360	4	5	13
World	33,276	47,034	77,869	-	-	-

1. BRICS countries include Brazil, Russia, India, China and South Africa

Source: The World Bank database

The growing political influence of developing countries provides them with increased capacity to influence the global development orientation. The emergent balanced neo-liberalism is largely a product of economic, social, and ideological considerations and beliefs that have shaped the developing countries' dissatisfaction with neoliberalism. Some arguments, as a backdrop for this claim, are provided as below:

1) The outcomes of neoliberal reforms in the 1980s and 90s have been disappointing for many developing countries. For example, in Latin American countries, the economic success of neoliberal reforms was short-lived, and was followed by a series of debt crisis in the late 1990s and early 2000s and several years of stagnation and recession (Onis and Senses 2005). Slow economic growth contributed little to poverty alleviation and the living standards continued to stagnate in many developing countries (Fischer 2003). This has resulted in growing social discontent about neoliberalism in these countries, consequently prompting them to question neoliberalism. For example, massive protests were observed in Argentina following the debt crisis of 2001, and in Indonesia, Malaysia, Philippines, Thailand, and other Southeast Asian countries following the 1997 Asian Financial Crisis (Onis and Senses 2005).

2) The ideas of Joseph Stiglitz and others provide intellectual basis for developing countries to re-orient global development. These ideas promote the viewpoint that markets by themselves do not produce efficient economic outcomes because of the prevalence of market failures; these failures in turn are due to a range of factors, such as, technological change, externalities, and imperfect information. Besides, economic efficiency is not the only objective of development. Other objectives (such as, equity and poverty reduction) are important elements of development. The disappointing outcomes of neoliberal reforms, the argument continues, are therefore mainly attributable to its overwhelming focus on the objective of economic efficiency improvement, and its excessive reliance on market forces as the means to achieve this objective. Accordingly, active government intervention to supplement the market, and a focus on broader development objectives, are suggested as the means to rectify the situation (Stiglitz 2002, Stiglitz 2004).

4.3.2 Adjustments to neoliberal reforms

In response to the re-orientation of global development towards Balanced Neoliberalism, the 2000s saw a shift, in development policies, towards context-specificity. For example, in 1998, the World Bank abandoned its previous bank-led development assistance strategy, focused almost exclusively on macroeconomic stability, economic efficiency, and private participation. Instead, the Bank came up with a new approach to development called the Comprehensive Development Framework

(CDF). The CDF emphasised a more balanced development that would address the social, political, environmental, and cultural aspects of society. It also focused on the development of a country strategy led by the country itself (Owusu 2003).

In the context of the electricity industry, more context-specific development policies meant that the reforms should not solely rely on private ownership and market competition. Rather, broader reform approaches, informed by local (social, political, economic and cultural) factors, should be used to redress country-specific reform problems. As a result, countries made quite different adjustments to their neoliberal reforms, driven by the emergent national orientations for socio-economic development. For example:

1) In the 1990s, in ***developed countries*** (including, Australia, Britain, Germany, and the United States), the development orientation gradually changed. These countries still made strong political commitment to further market-oriented neoliberal reforms, as they considered these reforms as not only necessary but inevitable in the context of growing economic globalisation. But they also acknowledged that there exist market failures especially in the areas of social justice, which active government intervention could correct. This orientation has been loosely called the Third Way (Lewis and Surender 2004). It represents a blend of market-oriented thinking and moderate social policies seeking to synthesise market-oriented economic growth within an ethical framework of social justice and human rights (Lewis and Surender 2004).

   In accord with this developmental orientation, the reform of electricity industries in these countries has been deepened, with more efforts being placed on strengthening regulatory arrangements and market mechanisms for the electricity industry. This, it was hoped, would effectively address some performance problems associated with electricity industry reforms, such as, the abuse of market power, regulatory complexity, and lack of new investment, *etc*.

   Most of these countries, for example, initially imposed limits on the supply of electricity through long-term contracts and the degree of vertical integration between generators and retailers. These limits were based on the argument that they could promote market competition. But these limits tended to exert too much risk on investors, and provided limited avenues for risk hedging. As a result, most private

investments in these times were made in less capital-intensive technology (specifically, gas), as other generation technologies (such as, hydro, nuclear, and coal) with relatively high capital intensity were largely considered by investors as too risky to be undertaken. Between 1998 and 2002, for example, private investors added 271 GW of new capacity in the United States. More than 90% of this capacity came from gas-based technologies (Glachant 2006).

These technologies (*i.e.*, hydro, nuclear and coal) however play an important role in maintaining security of electricity supply. Lack of investments in these technologies has therefore led to a growing concern about sub-optimal technology-mix in these countries. In response to this concern, regulators in these markets are increasingly integrating long-term contracts and vertical-integration into the market mechanisms, based on the argument that these measures will contribute to a more efficient sharing of investment risk between investors and retailers (or large consumers), and in turn lead to a more optimal generation technology-mix (Glachant *et al*. 2011).

Further, some forms of out-of-market regulatory measures were also introduced in these countries to ensure supply adequacy. For example, in the United Kingdom, operating reserve is procured by the system operator under regulated long-term contracts of up to five years in order to provide sufficient investment signals to electricity producers and to allow enough time for the repayment of producers' investment (Ranci and Cervigni 2013).

2) In the late 1990s and early 2000s, the ***Latin American countries*** (including, Argentina, Brazil, and Chile) experienced several macro-economic crises, such as the 1999 Brazilian Real crisis, and the 2001 Argentine Peso crisis. These crises were, in large part, associated with high inflation, rising unemployment, and deepened poverty (Kingstone 2011).

   Although these crises may not have direct connections to neoliberal reforms, they created doubts in the minds of the people in these countries about the benefits of neoliberal reform, especially among workers and professionals, who bore the main costs of neo-liberal reform as the governments cut back on employment conditions, altered spending priorities, removed protection from domestic industries, and privatised public-owned enterprises (Kingstone 2011).

In response, the affected people began to vote for left-leaning political leaders, such as, Kirchner in Argentina, Lula in Brazil, and Bachelet in Chile, whose parties had close links with labour organisations. The Worker's party (the party of Lula, the former president of Brazil), for example, was closely linked with Brazil's main labour confederation (Unified Worker's Confederation), as well as a wide range of community-based urban worker organisations (Sanchez *et al*. 2008). The left-leaning governments of the time were also strongly supported by the urban and rural poor, who had suffered from stagnated economic growth of the late 1990s, due to government cut backs on the social spending, and high inflation eroding their limited incomes (Sanchez *et al*. 2008, Schuster 2008).

But top business leaders still held important positions in the governments and retained considerable political influence in these countries. For example, in Brazil, Henrique Meirelles, the former international president of the Bank of Boston and a congressman of the political party that advocated neoliberal reform in the early 1990s, was the President of the Central Bank during the early 2000s (Schuster 2008).

As a result, the left-leaning Latin American parities of this period were more moderate than their radical predecessors of the 1960s and 70s. They did not radically move away from the status quos in a revolutionary way, but gradually changed the existing model through the build-up of national consensus. For example, Lula released 'A Letter to the Brazilian People' in 2002. In this letter, he assured them that he will seek to make the changes demanded by the mass population, while at the same time respect the interest of the business sector. He further committed that any change would be the product of a broad national negotiation (Sanchez *et al*. 2008).

In line with this developmental orientation, the governments of these countries began to gradually modify the market mechanisms for electricity trading and market-based regulatory arrangements with the expectation that such modification would rectify some of the problems associated with electricity reforms of the 1990s.

In Chile, for example, over the period of 1998 to 1999, a combination of prolonged drought conditions and persistent delays in the development of new capacity, led to severe power shortages. The government was forced to announce electricity

rationings (Raineri 2006). Similar situation also occurred in Brazil in 2001 (de Araujo 2006). These crises were mainly due to the fact that the price signals generated by electricity spot markets were too volatile and largely failed to correctly indicate and stimulate the entrance of new generation capacity. This was especially true for countries with a strong hydro share (such as, Brazil and Chile), where favourable hydro conditions can drive the spot prices downwards even if there are structural problems with supply (Moreno *et al*. 2010).

In response, these two countries began to make adjustments to their regulatory arrangements, with the aim of maintaining the positive aspects of neo-liberal principles but correcting the emerging issues of security of supply. A key element of these adjustments was the introduction of regulated long-term contract auction mechanisms. These mechanisms required potential investors to compete for long-term energy contracts for supplying future demand. All contracted capacity was required to be covered by physical capacity. Brazil initiated the long-term energy contract auction in 2004 followed by Chile in 2005 (Moreno *et al*. 2010).

In Argentina, the peso collapsed and lost approximately 70 per cent of its value during the 2001 macro-economic crisis. Fearing that private electricity companies would increase electricity tariffs to recover revenue losses, the government decided to suspend the previous cost-based market mechanisms, and froze electricity tariffs (Haselip and Potter 2010). While the price controls did undermine the neo-liberal reforms, their wider aim, it was argued, was to uphold neo-liberal model in the longer term. Specifically, the government's decision to not pursue a re-nationalisation agenda in the post-crisis era – when the economic conditions and political support had been favourable to do so – suggests a willingness to maintain some key elements of the neoliberal model (such as, market and private ownership). The government maintained that price controls were a short-term emergency action, and they would like to see a move back to market 'normalisation' for the privatised utilities in the medium to long-term (Haselip and Potter 2010).

3) After the 1997 financial crisis, efforts were made to deepen neoliberal reforms in the ***Southeast Asian countries*** (including, Thailand, Malaysia, and the Philippines). But these efforts failed due to a combination of external and internal factors.

Externally, international pressure for further neoliberal reforms declined in the early 2000s, as the economies of these countries gradually returned to growth and rebuilt their foreign exchange reserves. More broadly, against the backdrop of its global war on terrorism, the US government sought greater security cooperation in the region and signalled its willingness to overlook differences in other policy areas, such as neoliberal reforms.

Internally, neoliberal reforms found insufficient political support. The urban and rural poor, who were most severely hit by the 1997 financial crisis, began to actively engage in the country's politics. They were unhappy with the continuing prevalence of chronic corruption and lack of improvement in their living standards. They therefore demanded more active government action to deal with these issues rather than further neoliberal reforms. The domestic business sector, which was the main beneficiary of continued government protection of the infrastructure sector, strongly resisted any further reforms and was inclined to maintain or even strengthen the status quo. For example, in Thailand, efforts were made to deepen neoliberal reforms immediately after the crisis. But domestic business leaders felt threatened as further neoliberal reforms would reduce state protection they had previously enjoyed. They therefore began to actively fight for their benefits. In the Philippines, the government could not mobilise enough political support for reform as powerful domestic family conglomerates largely dominated the country's politics. These conglomerates obstructed or sabotaged any attempt to reform the economy if they felt it will threaten their interests (Case 2005, Hewison 2005).

As a result of these external and internal factors, little progress was made in these countries to deepen electricity reforms. In Thailand, for example, efforts to deepen neoliberal reforms in the electricity industry were made or at least discussed immediately after the 1997 financial crisis. But domestic business leaders actively opposed the reform programs. The previous power pool model proposed by National Energy Policy Office (NEPO) was rejected and the government chose an enhanced single buyer model. This model was built on existing single buyer model. It ensured that EGAT would continue to enjoy its monopolistic status of being the single buyer (or monopsony) in the industry. The only difference was that new IPPs would be allowed to compete directly with EGAT (Wisuttisak 2010).

In Malaysia, some efforts were made to implement a power pooling system that would encourage competition in generation. This however did not progress further, and was abandoned. Instead, the existing single buyer model was further strengthened, through the introduction of competitive bidding for new IPP projects (Rector 2005).

In the Philippines, reforms were further strengthened in 2001, by the enactment of the Republic Act No. 9136, also known as Electric Power Industry Reform Act of 2001 (EPIRA). However, the progress in its implementation was quite slow. The rules and regulations for the Wholesale Electricity Spot Market (WESM), for example, were promulgated in 2002. But it officially commenced to operate only in 2006 and then too it only covered the area of Luzon (the largest, and one of the most populous island in the Philippines).

4) In 2003, the Central government of ***India*** enacted the Electricity Act of 2003. It sought to deepen and formalise electricity reforms that were already underway in some states. Key elements of this Act included: open-access to network, and free entry of new power generators. This reform, however, resulted in a dual-market in the Indian electricity industry. On the one hand, the condition of SEBs remained largely unchanged, and small consumers, especially farmers, continued to receive subsidies. When Indian leaders initiated pricing reforms, they came up against a vocal and organised agricultural sector that did not want market-based electricity pricing. Thus, although distribution reforms had begun and regulatory agencies were set up in every state, the reforms remain largely ineffective: few, if any, meters were installed, prices remained largely unchanged, and theft continued to plagues the sector. On the other hand, large consumers (such as, industrial consumers) were allowed to build their own captive power or to purchase electricity from other private generators. They can also sell their surplus electricity to the grid (Joseph 2010).

5) In ***China***, further attempts were made to deepen market competition in generation. In 1999, five provinces and a municipality were selected to experiment with wholesale competition based on pool market mechanisms (Yeoh and Rajaraman 2004). In 2002, in order to facilitate market competition, the State Power Corporation (SPC) was unbundled and its generation assets were assigned into five

generation companies (including, Huaneng, Huadian, Guodian, Datang, and China Power Investment), and its transmission and distribution assets were allocated into two grid companies (namely, the State Grid company, and South China Grid company) (Xu and Chen 2006).

But these efforts were stifled in 2003 when severe power shortages afflicted the country. In 2004, 25 of China's 31 provinces and major municipalities sustained significant power losses. The power deficit was estimated to be 10 per cent of installed capacity. Industry experienced forced closures and consequential economic losses; and households felt the impact of significant reduction in basic comfort levels. The Chinese government felt that their main priority for the electricity industry – sufficient power supply to support economic growth and living standards – was threatened. They immediately put market reforms on halt and shifted to encouraging investments in new power projects. The California Power Crisis also contributed to this shift as the Chinese government concluded from Californian experience that the only way to ensure supply adequacy is to maintain government control instead of introducing market competition (Wang and Chen 2012, Yeh and Lewis 2004).

6) In ***Africa***, neoliberal reforms of the 1990s largely failed to improve the social and economic conditions. Many African countries (such as, Kenya, Mozambique, and South Africa) were still gripped by huge foreign debts, falling economic growth rates, decline in social development, and persistent poverty. In response, African countries began to re-evaluate their development orientations of the 1990s which were largely based on Structural Adjustment Programs (SAPs) of international donors. This culminated in the development of the New Partnership for Africa's Development (NEPAD). NEPAD is a regional initiative that aims to eradicate poverty and to promote sustainable economic and social development in African countries collectively. It still commits to neoliberal principles and calls for African countries to integrate into the world economy. But, it also acknowledges that the integration into the world economy does not automatically reduce poverty and inequality. It therefore suggests that the government should assume active role in shaping their integration into the world economy, so that the resultant economic

growth could be directed in ways that would contribute to poverty reduction and equitable development (Owusu 2003).

In line with the NEPAD, four regional power pools have been established to facilitate greater cross-border trade. This is expected to attract needed investment in low-cost power supply, as energy resources are distributed quite unevenly in the continent (natural gas in Nigeria, coal in South Africa, and hydro in Mozambique). This is also expected to support the development of large-scale hydropower projects (*e.g.,* in Mozambique) that would not be viable at the national level, due to the relatively small power demand of most African countries (Eberhard *et al*. 2011).

4.4 Summary

This chapter showed that electricity reforms around the world were undertaken as part of the economy-wide reform programs, driven by a gradual shift in global developmental ideals, away from the state-centric ideals of the post-war years, towards market-oriented neoliberalism, that began its ascent in the 1970s. This shift was informed by both external pressures (*e.g.,* call for economic liberalisation) and internal contradictions (*e.g.,* debt crisis and rising social instability). The actual progress of electricity reforms was however strongly influenced by local political interests (*e.g.,* promotion of socio-economic progress), which were well entrenched in the underlying political power structures. These interests however could not be fully satisfied by electricity reform. This in turn created an institutional lock-in in the electricity industry, notably in the form of a continuation of government interference in the industry to satisfy these interests as prevalent in the post-war years (1950s to 1970s). The following is a summary of the main findings of this chapter.

- The 1980s saw a gradual shift in world developmental ideals, away from the state-centric ideals of Embedded Liberalism and Socialism of the earlier years, towards Neoliberalism. This shift was driven by the considerations and beliefs held by major developed countries (namely, the United States and its allies) which dominated the world politics in the 1980s and 90s. These considerations and beliefs included: the end of post-war economic boom and the onset of economic recession; the need to revive economic growth in new economic circumstance (*e.g.,* stagflation and increasing economic globalisation); a view that revival of economic growth in these circumstances can only be achieved by improving international competitiveness of

the national economy; a strong belief that domestic competitiveness is best measured in terms of economic efficiency; and a faith that this efficiency can be best improved through recourse to free market principles.

Besides, these considerations and beliefs were further supported by a lessening of the appeal of Keynesianism as the basis for economic policy in the new economic environment of the 1980s. At that time, rising unemployment was accompanied by soaring inflation. Keynesianism was unable to explain this phenomenon because it assumed that the economy may either experience stagnation (and unemployment) or inflation. This contributed to the emergence of Neoliberalism as a guide for policy-making. According to neoliberal thinking, the economic recession of the 1970s and 80s was essentially attributable to excessive state intervention in the economy, and the elimination of such intervention, through market competition, privatisation and re-regulation, was accordingly considered as the means of reviving economic growth.

In addition, the demise of the Soviet Union and the end of the Cold War in 1989 ended the battle of conflicting ideologies about how society should be organised. It apparently symbolised the triumph of capitalism over communism. This further contributed to the shift in global developmental ideal towards Neoliberalism.

- Major developed countries fully embraced economy-wide neoliberal reforms in the 1980s, indicating a fundamental shift in their developmental ideal towards Neoliberalism. The reform of the electricity industry was essentially undertaken as part of these economy-wide reforms. This reform accordingly included: a structural separation of generation, transmission, distribution and retail segments of the vertically integrated utilities; introduction of competition in generation and retail; development of non-discriminatory access arrangements for transmission and distribution; replacement of centralized state-directed regulatory arrangements with market-based arrangements; and privatization.

  This reform was given further immediacy by growing concerns in these countries about the inefficiencies of their electricity industries. These concerns were created by rising electricity prices, caused by the less-than-expected growth in electricity demand and the exhaustion of the economies-of-scale. These inefficiencies, it was widely believed, were due to guaranteed profits based on rate-of-return pricing

regulation, lack of economic incentives for efficiency improvement, and excessive government intervention in the industry. Cost reduction, efficiency improvement, and elimination of government intervention in the industry therefore became the main motivations for reforming electricity industry in these countries.

In addition, electricity reform (as part of the economy-wide reforms) in these countries was also assisted by declining political influence of labour organisations, which had largely built their political strength on state-directed development of the 1950s and 60s and its associated benefits to labour (*e.g.*, full employment and social welfare provisions).

The economy-wide neoliberal reforms in these developed countries led to rapid economic growth in the 1990s, but also brought about some problems (*e.g.*, growing inequity). These problems, in turn, led to a re-thinking on neoliberal reforms in these countries in the late 1990s. It was also acknowledged in these countries that there existed market failures, and that to rectify these failures, government interventions may be needed. In accord with this thinking, electricity reforms have been deepened in these countries, with strong emphasis on strengthening regulatory arrangements and market mechanisms, with the expectation that these changes would address some of the all-to-familiar failures in the electricity markets, such as, market power and lack of new investments.

- In many developing countries, the state-led development in the post-war years resulted in increased public debts. These debts became increasingly unmanageable in the early 1980s, due mainly to the end of post-war economic boom and its impact on government revenue, and changes in lending policies of World Bank/IMF that made the implementation of Structural Adjustment Programs (SAPs) preconditions for receiving financial assistance. Desperate for funds, these countries adopted the World Bank/IMF-supported SAPs. The SAPs were a set of economic measures, based on neoliberal principles, to transform the state-led economy into a market-oriented economy. In accord with their commitment to the World Bank/IMF, these countries began to implement the SAPs. Electricity reforms were implemented as part of these programs.

  Besides, electricity reforms were given further stimulus by the poor technical (*e.g.*, high network losses) and financial (*e.g.*, high debts) performance of the electricity

industries in these countries. These performance problems were widely believed in these countries to be attributable to excessive government intervention in the electricity industry. Accordingly, the elimination of government intervention through privatisation, introduction of market competition and re-regulation was considered as the means of resolving these problems.

- But the progress of electricity reform varied significantly across these countries, driven by ideological, socio-economic and political considerations and beliefs held by the local socio-political players. For example:

  1) In Latin American countries (*e.g.,* Argentina, Brazil, and Chile), electricity reforms were implemented as part of their economy-wide reform programs. These economy-wide reforms were mainly undertaken by these countries to reduce their debt levels. As a result, the electricity industries of these countries were subject to radical privatisation and restructuring of public owned electric utilities.

     The economic-wide reform programs in these countries were strongly supported by large local companies. They were also supported by the poor who were promised active government efforts to reduce poverty. The main victims of these programs (mainly, inward-oriented industrialists and labour) also accepted these reforms with the belief that they would revive economic and social progress, and that they were only sacrificing short-term gains for long-term benefits.

     The debt crisis in several Latin American countries in the early 2000s however eroded the appeal of neoliberal reforms, especially among the workers and the poor. These groups demanded more active government intervention, especially in the areas of employment creation, poverty reduction, and other social issues. The neoliberal reforms in these countries have however continued to receive support from influential local business leaders who usually hold important positions in the government. As a result, these countries have preserved most of the major elements of neoliberal reforms, but sought to improve the market with more government intervention. In the context of the electricity industry, this meant the introduction of regulated long-term contract auctions with the aim of delivering adequate level of investments for capacity expansion.

2) In the 1990s, limited reforms were implemented in the electricity industries of Southeast Asian countries, with specific emphasis on encouraging private investments in new generation capacity. This was largely in response to the chronic power shortages and concerns about the effect of these shortages on economic growth. In addition, a very significant proportion of these investments were made by politically-connected local investors, who anticipated economic gains resulting from increasing export opportunities.

   Several efforts to progress electricity reforms were made in these countries in the late 1990s. But these efforts failed to achieve concrete results, due to reduced pressure from the United States for further reform, which driven by its geo-strategic priorities in the Asian region, tended to overlook the non-progress of these countries' liberal political and economic changes. In addition, further reforms were strongly opposed by influential local business leaders who obstructed or sabotaged any attempt to deepen electricity reform if they felt it will threaten their economic interests.

3) India implemented neoliberal reforms in a gradual way. This was reflective of the consensus building nature of Indian political decision-making process and conflicting interests involved in this process. As a result, electricity reforms were implemented in the country in a gradual manner. These reforms initially focused at encouraging investments in generation in the form of IPPs, with the aim of alleviating severe power shortages. Deeper reforms were also implemented in a few states, while limited progress was made in others. In the early 2000s, the federal government sought to consolidate electricity reforms undertaken at the state level by enacting the Electricity Act of 2003. This resulted in a dual-market in the Indian electricity industry, reflecting conflicting interests involved in the reform process. On the one hand, the condition of SEBs remained largely unchanged because small consumers (especially farmers) strongly opposed any market reforms that would reduce the subsidies they received. On the other hand, large consumers (such as, industrial consumers) were allowed to build their own captive power or to purchase electricity from other private generators.

4) Electricity reform in China initially focused on encouraging investments for capacity expansion. These investments predominantly came from public sources (non-central government) that were previously prohibited from investing in the electricity industry. This was consistent with the ruling CCP's belief that electricity industry is a critical infrastructure and plays important role in promoting the country's developmental priority of peoples' living standard improvement and rapid economic growth. It should therefore remain in public control.

   Some further attempts were made in the early 2000s to introduce market competition in generation. But these efforts were stifled in 2003 when severe power shortages afflicted the country. The Chinese government felt that their main priority for the electricity industry (*e.g.*, ensure the provision of sufficient power supply to support economic growth and living standards' improvement) was threatened. The market reform was therefore halted and emphasis shifted to encouraging investments for capacity expansion.

5) In African countries, electricity industry reforms were largely implemented as part of their economy-wide reform programs. These programs were undertaken in response to their deteriorating economic conditions, growing social unrest, and political instability. But political instability in these countries significantly reduced the capability of the governments to implement these reform programs. As a result, the progress of electricity reform has been quite slow, and largely failed to improve the social and economic conditions. In response, the African countries began to re-evaluate their development orientation of the 1990s based on Structural Adjustment Programs (SAPs). This culminated in the development of the New Partnership for Africa's Development (NEPAD). NEPAD is a regional initiative that aims to eradicate poverty and to promote sustainable economic and social development in African countries collectively. In line with the NEPAD, four regional power pools have been established to facilitate greater cross-border trade.

The above discussion reveals that electricity has a deep-rooted socio-political connection (also see, Sharma 2002). Key socio-political players at both national and global levels always sought to shape the direction of electricity reform through this

connection, with a view to pursue their interests (*e.g.*, economic expansion and social stability). In this pursuit of interests, some political players have been well-organised and well-financed (*e.g.*, large business), and thus had more capacity to influence other players, through either the application of economic benefits to gain their political supports, or more importantly, the promise of a brighter future towards which society is allegedly moving (probably backed by informal institutions). For example, neoliberal reforms were legitimised in many countries based on the argument that they reflect human's fundamental values of human dignity and individual freedom, which are threatened by all forms of government intervention that substitute collective choice for individual free choice. This argument was well received in many countries by the mass population (especially, the poor), in the backdrop of deteriorating economic and social conditions in the 1980s and rising social discontent with chronic poverty and rising inequality.

The electricity reforms however centred on viewing electricity as an economic commodity. These reforms may therefore loose credibility as they are not informed by the underlying political interests. As a result, the reforms were implemented in most countries (especially, developing) on a fragile and limited political support; this support has arisen partly in response to national (essentially debt crisis) and global pressures (*e.g.*, IMF's Structural Adjustment Programs). Key socio-political players in these countries have therefore either simply accepted some elements of reform that they consider are in line with their interests, or supported reform based on ungrounded expectations that this reform (as part of the economy-wide neoliberal reform) would improve the economic and social conditions.

The reform progress has therefore been rather slow and the outcomes of reform have been sub-optimal. These sub-optimal outcomes, combined with the financial crisis in Asia and Latin America in the late 1990s, and external pressures for further reforms, which were largely in conflict with the interests of major national socio-political players, have contributed to the collapse of the fragile and limited political support for reform in these countries. This has further delayed the implementation of electricity reform, and affected the outcomes.

It is clear that the reasons for the disparity between expected and actual outcomes of electricity reform are fundamental. They arise from the inherent contradiction between

the nature of electricity as a political commodity and electricity reform viewing electricity as if it were an economic commodity (see also, Sharma 2004). This contradiction has resulted in strong political resistance to reform, as powerful political players opposed any reform that they considered as a potential threat to their interests. For example, in some Asian countries (*e.g.*, Thailand and Malaysia), the domestic business sector, which was the main beneficiary of continued government protection of the electricity industry, strongly resisted any further reforms and was inclined to maintain or even strengthen the status quo (see further details in Section 4.3.2).

The political resistance to reform also resulted from a gradual erosion in the appeal of economy-wide neoliberal reform (primarily targeted at the electricity industry) among the wider population, whose initial support for reform was based on expectations of improvement in their personal well-beings. As these expectations failed to realise, a widespread social discontent about neoliberal reform arose, as reflected in massive protests observed in many countries in the late 1990s and early 2000s (see Section 4.3.1).

In addition, the political interests behind this resistance to reform are well entrenched in the underlying political power structures. These political power structures change only slowly, and thus have a lasting grip on the direction and scope of institutional change processes in the electricity industry, because powerful socio-political players would try to maintain the status quo, with a view to protect their own interests.

This research therefore suggests that the significant disparity between expected and actual outcome of reform can only be reduced by an appreciation of the influence of the underlying political power structures on shaping the contours of the reform programs, because this appreciation could enable the identification of the real objectives of reform, and the employment of the most appropriate model to achieve these objectives. This will also ensure a smooth implementation of reform, and the delivery of expected outcomes from reform. The next chapter will demonstrate how the influence of political power structures can be appreciated to improve the efficacy of the reform programs that are currently being implemented (or considering to be implemented) to redress pressing issues facing the electricity industries in countries around the world.

5 SOME SUGGESTIONS FOR IMPROVING THE EFFICACY OF REFORMS

5.1 Introduction

The analysis in the previous chapters showed that the institutional configuration of the electricity industry is essentially determined by the underlying formal and informal macro-level institutions. The contours of these institutions in turn are shaped by dominant political interests of the time. These interests are embedded in the prevalent political power structures. These political power structures usually change slowly; they thus have a lasting grip on the direction and scope of the institutional change processes in the electricity industry. Changes in the configuration of the electricity industry therefore are likely to follow a certain path, as defined by prevalent political power structures and associated interests. This perspective on electricity industry essentially makes electricity a political commodity, serving dominant political interests of the time. By implication, it also suggests that these political interests translate into overall objectives of the electricity industry. Extending this argument, one can say that institutional configuration of the electricity industry is merely a means to achieve the overall objectives of the industry. Contemporary electricity reform (and its attendant electricity industry configuration), which has tended to be viewed almost exclusively from an economic perspective, may therefore be inappropriate means to achieve the overall objectives of the electricity industry, and hence incapable of preventing the ever widening disparity between expectations from reform and its actual outcomes. Moreover, this perspective (*i.e.,* exclusively economic) is also grossly deficient in shedding any light into the reasons for this disparity and for suggesting ways to reduce such a disparity.

Against this backdrop, this research argues that a way to reduce disparity between expectations and actual outcomes of reform is to resolve this dichotomy between 'economic' and 'institutional' perspectives. This will clearly require a considered accommodation, into the electricity reform processes, of dominant political interests of the time. Further, it should be noted that these interests may not even be directly associated with the electricity industry. Rather, they may be associated with wider socio-economic domains, given the important role electricity plays in promoting socio-

economic progress. Electricity reforms, afterall, are only means to achieve these higher ends.

This chapter demonstrates, with the help of selected examples, the merits of developing an institutional perspective to define the contours of the electricity reform and progress reform in ways that will reflect ever changing priorities and 'new' issues faced by the electricity industry, and society, more generally. More specifically, this chapter demonstrates how an institutional perspective (underscored by an appreciation of influence of political power structures and associated interests) could be gainfully applied to develop policy guidance for implementing reform in ways that will contribute to redressing some of the emergent issues (*e.g.*, environmental concerns, lack of investments, and highly politicised electricity subsidies) currently facing the electricity industry, and hence for reducing future disparity between expected and actual outcomes of reform.

It should also be noted that a full-length discourse – aimed at demonstrating how an institutional perspective could be used for reducing the disparity between expected and actual outcomes of reform by enhancing the efficacy of reform – will require considerable additional research, involving delving deep into the policy, governance, planning and strategy dimensions of various countries. This is beyond the scope of this research. This chapter therefore, with the help of selective, yet representative, examples establishes a platform for developing a more comprehensive discourse on this topic.

This chapter is structured as follows. The nature of some of current issues facing the electricity industry is discussed in Section 5.2. Section 5.3 describes current approaches being implemented or considered for redressing the issues identified above. Section 5.4 discusses the limitations of these approaches. This section also presents some thoughts on how an institutional perspective, informed by the importance of underlying political power structures and interests, could provide a better guidance to redress these issues. The practicality of these thoughts is discussed in Section 5.5. Section 5.6 provides a summary of the main findings of this chapter.

5.2 Some current issues

The electricity industries worldwide are facing a variety of pressing issues. While some of these issues (*e.g.*, high Greenhouse Gas (GHG) emissions from power generation) have emerged during the course of electricity reform, others (*e.g.*, highly politicised

electricity subsidies) have existed for a long time, much before the introduction of contemporary electricity reform in the 1980s and 90s; they have largely remained unresolved until now. The true nature of these issues, as argued in Chapters 3 and 4, can be better understood by viewing them from an institutional perspective. In this section, an institutional perspective is used to examine some selected issues currently facing the electricity industries in the world, with the aim of developing an understanding of the nature of these issues.

Market failures, business interests, and biased pluralism

Recent years have seen growing environmental concerns, especially in the developed world, associated with growing GHG emissions from power generation (Sioshansi 2013). For example, in Australia, the energy sector is the largest source of GHG emissions, accounting for more than half of the country's total GHG emissions. Electricity generation is by far the largest source of GHG emissions, contributing to about 50 per cent of all energy emissions (Parliament of Australia 2010). In the United States too, electricity industry is the largest source of GHG emissions. In 2013, it accounted for more than 30 per cent of the country's total GHG emissions (U.S. Department of State 2014). In Europe, electricity industry is the largest GHG emitter, making up for around 40 per cent of total GHG emissions in the region (Olivier *et al*. 2014).

There is ample evidence to suggest that electricity reform did not contribute to lowering GHG emissions from the industry. In fact, reform appears to have encouraged electricity companies to use low-quality high-GHG-emitting coal for power generation, and to rehabilitate some old less-efficient coal power plants, with the view to minimise short-run marginal costs of electricity (see, for example, Sharma 2003). This propensity (*i.e*., to use cheap fuels) is an outcome of the new institutional arrangements of the electricity industry that emphasise cost-minimisation and profit-maximisation (MacGill and Healy 2013).

These institutional arrangements essentially reflect business interests, embedded in the underlying political power structures (as was discussed in section 4.2.2). These political power structures essentially reflect the political philosophy of biased pluralism. Biased pluralism refers, in the context of this research, to political power structures within which business interests (*e.g*., interests of large corporations and business associations)

are disproportionately represented in the political decision-making processes (Holcombe 2015). As discussed in Chapter 3, these political power structures initially took shape in the 19th century, as a response to the Industrial Revolution, urbanisation, and the emergent industrial and financial interests. Accordingly, institutional arrangements for the electricity industry of the time primarily emphasised furtherance of investors' business interests, through recourse to free market principles. In the post-war years (1940s ~ 1970s), the business sector agreed to provide a larger share of its profits to labour, through full employment, better welfare, and rising wages, in the backdrop of rising labour militancy in the 1940s. This was largely viewed by the business sector as the cost it had to pay to maintain social stability, because social stability was considered as important condition for economic certainty and security, which would in turn permit reasonable profits for the business sector over the long run.

The 1980s saw the implementation of economy-wide neoliberal reforms. These reforms were based on national consensus on the need to improve the international competitiveness of the national economies. This consensus was primarily founded on promoting business interests. It also received substantial support from the wider population, whose existence and prosperity were closely linked to further economic growth (see Section 4.2.2). Electricity reforms were therefore implemented in these countries as integral parts of the economy-wide reforms. Accordingly, cost-minimisation and profit-maximisation became key drivers for reform. These drivers were however inherently contradictory with environmental objectives (as noted above). This contradiction became more evident in the early 2000s, when social attitudes began to change due to growing public awareness about the need to reduce GHG emissions (Ranci and Cervigni 2013).

But large electricity companies, whose interests were closely linked to the status quo, strongly opposed any attempts to radically reduce GHG emissions from the electricity industry. This opposition, underpinned by the underlying political power structures (*i.e.*, biased pluralism), this research argues, prevented adequate reforms from being introduced to reduce GHG emissions from the electricity industry. Even though some regulatory incentives were provided to promote the uptake of renewable capacity, these regulatory incentives proved to be insufficient in terms of reducing overall emissions. This is so because new renewable capacity is meant to satisfy only additional (rising)

electricity demand, not existing demand. This, the electricity incumbents believed, would avoid competition with existing generation capacity, and hence prevent any reduction in their profitability. This argument get substantiated if one takes note of the fact that many electricity companies began to fight for their benefits, and urged the government to review the existing regulatory incentives for renewable energy, as electricity demand began to decline in recent years. This declining demand means that new renewable capacity will inevitably compete with existing capacity in a shrinking market, which will obviously affect the interests of existing electricity companies (see, for example, MacGill and Healy 2013).

Besides, the instances of the abuse of market power by dominant generating companies, and manipulation of electricity prices to get excessive profits, have been noticed in many electricity markets including, Alberta, California, England and Wales, New Zealand, PJM, Texas (Adib and Hurlbut 2008, Joskow 2006). In California, for instance, the abuse of market power by major power companies played an important role in creating considerable price spikes in 2000-2001 (Borenstein *et al*. 2002). In New Zealand, the abuse of market power by four largest power companies (namely, Contact, Genesis, Mighty River Power and Meridian) resulted in higher electricity prices over the period 2001-2007, which in turn led to substantial wealth transfers (about $4.3 billion), from consumers to producers. This accounted for 18 per cent of the total wholesale market revenues received by all generators in the market (Wolak 2009).

The electricity industry is quite susceptible to the exercise of market power due to some technical features of electricity, such as, its non-storability, existence of network constraints, and extremely low price elasticity of electricity demand and supply (Cervigni and Perekhodtsev 2013, Joskow 1997). Some flaws in the institutions of the electricity industry (such as, high concentration of generation ownership) also encourage large generating companies to abuse their market power to get excessive profits (Joskow 2006). The interests of these large generating companies are closely linked to the status quo. They therefore strongly oppose any attempts to drastically reduce market power in the electricity markets. Justification for this opposition is usually based on the argument that methods for mitigating market power (such as, price caps) would prevent electricity prices from rising high enough to attract sufficient investments for capacity additions. This may adversely affect long-term security of

electricity supply due to the lack of timely and sufficient investments for capacity additions (see, for example, Joskow and Tirole 2007).

Regulatory credibility, social distrust about market reform, and disunited elitism

The Latin American countries included in this research (namely, Argentina, Brazil and Chile) began to implement electricity market reform in the early 1980s. This reform did deliver some initial success, resulting in significant private investments in power projects, improved efficiency of electricity supply, and lower electricity prices (Millan 2006). Despite this success, electricity regulation in these countries lacked general credibility, and was subject to frequent government interventions. This created an uncertain environment for potential investors, thus discouraging them from investing in power projects. For example, in Argentina, the Secretary of Energy frequently overlooked the industry regulator (ENRE), and made important regulatory decisions, such as, distribution tariff settings, and wholesale electricity price settings (after the 2002 macroeconomic crisis) (Pollitt 2008). In Brazil, the National Energy Policy Council still controlled many important regulatory functions (*e.g.*, network tariff settings), even though a sector-specific regulator (ANEEL) was established (Millan 2007).

In these countries, continued government intervention in the electricity industries, this research argues, was legitimised by widespread social distrust about market reform, resulting from major economic failures, such as the the 1999 Brazilian Real crisis, the 2001 Argentina Peso crisis, and the energy crisis in Brazil and Chile. These failures eroded the appeal of market reform, especially among workers and professionals, who bore the main costs of reform, as governments cut back on employment, removed protection from local industries, and privatised public-owned enterprises. In response, they demanded more active government involvement in the economy (see Section 4.3.2).

This social distrust about market reform was (is) deeply rooted in the underlying political power structures. These structures are called *disunited elitism* in Hellyer (2014) (also see discussion in Sections 3.3.2, 4.2.2 and 4.3.2). Disunited elitism refers to a political power structure in which sharp internal differentiations persist amongst the ruling elites (Domhoff 1967). In the context of Latin American countries included in this research, the two elite groups included labour organisations and outward-oriented

business groups. In the post war years (1950s to 1970s), there were significant conflicts between these two groups, and struggles were often unrestrained and violent (*e.g.*, rising labour militancy). In such situations, external forces (*e.g.*, military) often needed to step in to resolve the political conflicts. For example, in the 1960s and 70s, public deficits and inflation became increasingly unmanageable in these countries. Some radical labour organisations suggested socialist revolution as a way of resolving these problems. This threatened the outward-oriented business groups, who sought support from the military. This resulted in the establishment of military-led authoritarian regimes in Argentina in 1966, in Brazil in 1964, and in Chile in 1973 (Ward 1997).

In recent years, some understanding seemed to have been reached between these two groups. A good illustration of this understanding is provided by labour party president Lula's 'A Letter to the Brazilian People'. In this letter, he assured that he will seek to make the changes demanded by the mass population, while at the same time respect the interest of the business sector. He further committed that any change would be the product of broad national negotiations (see Section 4.3.2). Such commitments imply that the governments could intervene in the economy to redress pressing issues that are of concern to the public. The business groups have tended to accept such intervention, because it would promote social stability, which in turn would create a predictable and secure business environment in the long term. Kolko (1963: 6) has the following to say, 'In the long run, key business leaders realised, they had no vested interest in a chaotic industry and economy in which not only their profits but their very existence might be challenged'.

Continued public dominance, business interests, and politico-economic elite domination

Southeast Asian countries included in this research (namely, Thailand, Malaysia, and the Philippines) are expected to have strong growth in electricity demand (4.2% per annum to 2035), driven by rapid economic growth, rising population and accelerated urbanisation (IEA 2013). Meeting this rising demand will require large amounts of investments, to expand generation and network capacities ($190 billion for Malaysia, $163 billion for the Philippines, and $224 billion for Thailand) (IEA 2013). These investments are unlikely to be fully satisfied from public resources. Private investments

(both domestic and foreign) are therefore considered essential to meet rising electricity demand (OECD 2014).

Besides, the share of renewable capacity is expected to increase significantly in these countries, driven by regulatory incentives provided by the governments (*e.g.*, feed-in tariffs) to promote the uptake of renewable capacity. Higher penetration of renewable generation would require more flexible approaches for system operation and load management (Herberg 2012). This accentuates the significance of private investments (especially, foreign) in the electricity industries in these countries, because these investments would enable better access to necessary technology and know-how associated with this technology for facilitating the shift towards a cleaner generation technology-mix (OECD 2014).

Clearly, the availability of sufficient and timely private (especially, foreign) investments is vital for these countries to satisfy rising electricity demand, and to promote the uptake of renewable generation. The current investment environment is however unfavourable for foreign investors, because this environment is typified by continued public dominance of the industry (Herberg 2012, KPMG 2013, OECD 2014).

This continued public dominance is consistent with the interests of politically well-connected domestic business leaders, who expect the governments to continue to dominate the electricity industry, so as to protect their business interests in the industry. These interests are deeply rooted in the underlying political power structure. This structure is called *politico-economic elite domination* in this research (for further discussion, see Sections 4.2.2 and 4.3.2). In this structure, a small group of politico-economic elites dominate the political decision-making processes. Political elites normally offer profitable business opportunities (*e.g.*, generous IPP contracts) to their favoured business leaders. These opportunities then allow the business leaders to extend their control over the country's economy, and in return, fund their political patrons to reinforce the political dominance (see, for example, Gomez and Jomo 1999). This politico-economic relationship appears to be an integral feature of the electricity landscape of these countries (see Section 4.2.3).

Electricity subsidies, rural interests, and political decentralism

In India, the government initiated market reform of the electricity industry in 1991, in an effort to improve the poor performance of the industry (*e.g.*, chronic supply deficits,

low electrification, and high technical and financial losses) (Kale 2004). This reform, initially launched through a change in legislation – the Electricity Law (Amendment) Act 1991, allowed private investors to participate in generation. In the mid-1990s, some states (such as, Orissa, Haryana and Andhra Pradesh) started to undertake deeper reform by restructuring their State Electricity Boards (SEBs) and setting up independent regulators. In 2003, the Electricity Act 2003 was enacted to consolidate and replace all previous federal laws governing the electricity industry, and to further promote electricity reform in the country (Sen and Jamasb 2013).

This reform significantly improved the performance of the Indian electricity industry. For example, generation capacity in India grew almost threefold from 78 GW in 1992, to 214 GW in 2012, largely driven by private investments. The electrification rate rose considerably, by 15 per cent over the period 2000 to 2010, resulting in about 28 million more people a year to have access to electricity. Distribution losses also fell significantly, from 32 per cent in 2003, to 21 per cent in 2011 (Pargal and Banerjee 2014).

Despite this improved performance, India's electricity supply still remains inadequate and unreliable. More than 300 million people still live without access to electricity. Even those who have access to electricity often receive unreliable electricity supply with frequent outages, especially during summer peak hours when demand for electricity is high. The electric utilities continue to register large financial losses, and they had to be bailed out twice, costing $7.4 billion in 2001, and $18.7 billion in 2012 (Pargal and Banerjee 2014).

This poor performance is attributed by several studies (see, for example, Pargal and Banerjee 2014, Mayer *et al*. 2015, and Min and Golden 2014) to pervasive state government interference in the distribution companies. These distribution companies have been frequently required by the state governments to supply electricity to rural consumers (especially, agricultural) at lower-than-cost prices, with a view to gain their political support. This has, over the years, resulted in huge financial losses for these companies, and thus hindered their ability to finance necessary system maintenance and capacity expansion. In addition, state government interference has also contributed to undermining the ability of these distribution companies to deal with power theft and

under-collection of bills. This has further exacerbated the financial losses of these companies.

The provision of electricity subsidies (in the forms of lower prices, power theft and under-collection of bills) to rural population is essentially reflective of the underlying political power structure in India. This political power structure is called *political decentralism* in this research (for further discussion, see Sections 3.3.2). In this structure, political power is loosely distributed among a variety of social groups. The Indian political system is accordingly structured as a power-sharing system, with a view to accommodate the interests of all these social groups. As a result, the country's political decision-making process is characterised by lengthy consensus building, as there are always conflicting interests involved in this process (see Section 4.2.2). Electricity reform in India was essentially a reflection of this process. In this process, large consumers (especially, industrial) strongly supported deeper electricity reforms to improve the adequacy and reliability of electricity supply. But a vocal and organised agricultural sector opposed any reform, based on the fear that market-based pricing would reduce the amount of subsidies they received on their electricity consumption. As a result, the condition of SEBs has remained largely unchanged, and small consumers, especially farmers, have continued to receive subsidies (see Section 4.3.2).

Inefficient resource allocation, tight government control, and democratic centralism

In China, inefficient resource allocation, due to highly politicalised electricity pricing and planning, is the main issue facing the electricity industry (see, for example, the Chinese government's 2015 announcement of *Some Suggestions of Deepening Electricity Industry Reform*). This issue, this research argues, has been caused by the use of electricity industry as a means to support the country's socio-economic developmental priorities of the time, namely, fast-paced economic growth, and improved living standards. For example, electricity prices have traditionally been tightly regulated in China, with a view to protect small consumers, and any price rise tends to be viewed by the government as a potential threat to people's living standards. Over the period 2007 to 2010, electricity prices for small consumers (including, residential and agricultural) were quite low as compared with large industrial and commercial consumers, even though the costs of supplying electricity to those consumers were high (see Table 5.1). Besides, provincial government owned electricity companies were often

required to add additional generation capacity to support local coal industry, even though sufficient and cheaper capacity was available from neighbouring provinces (Andrews-Speed 2013).

Table 5.1: Average end-user electricity prices, 2007-2010, in yuan per MWh

	2007	2008	2009	2010
Commercial	851	847	842	812
Large industrial	514	535	555	617
General industrial	692	718	747	771
Residential	470	469	467	475
Agricultural	401	399	398	436
Irrigation in poor rural areas	177	160	165	194

Source: Andrew-Speed 2013

The use of electricity industry to support these priorities is well entrenched in the underlying political power structure, which is called *democratic centralism*, or people's democratic dictatorship in Steiner (1950) (also see discussion in Sections 3.3.2 and 4.2.2). The meaning of the people's democratic dictatorship was well presented in Mao Zedong's writings, 'they (the people), are the working class, the peasant class, the petty bourgeoisie and the national capitalists. Under the leadership of the Communist Party, these classes unite together to form their own state and elect their own government to maintain dictatorship over the lackeys of imperialism – the landlord class, the bureaucratic capitalist class and the Kuomintang reactionaries and their henchmen representing these classes – to oppress them, to enable them to behave properly and not permit them to talk and act wildly' (Steiner 1950). In recent years, the ruling Chinese Communist Party (CCP) has broadened the meaning of 'the people' to include members from social groups (such as, middle class, and local capitalists) into the party (Joseph 2010).

In this structure, the political legitimacy of the CCP is primarily based on its ability to response to the demand of 'the people'. In the reform era (1980s to the present), this demand was mainly associated with better living standards arising from widespread social discontent about declining living standards in the pre-reform years (1950s to 1970s). For example, between 1952 and 1978, people's living standards declined, as

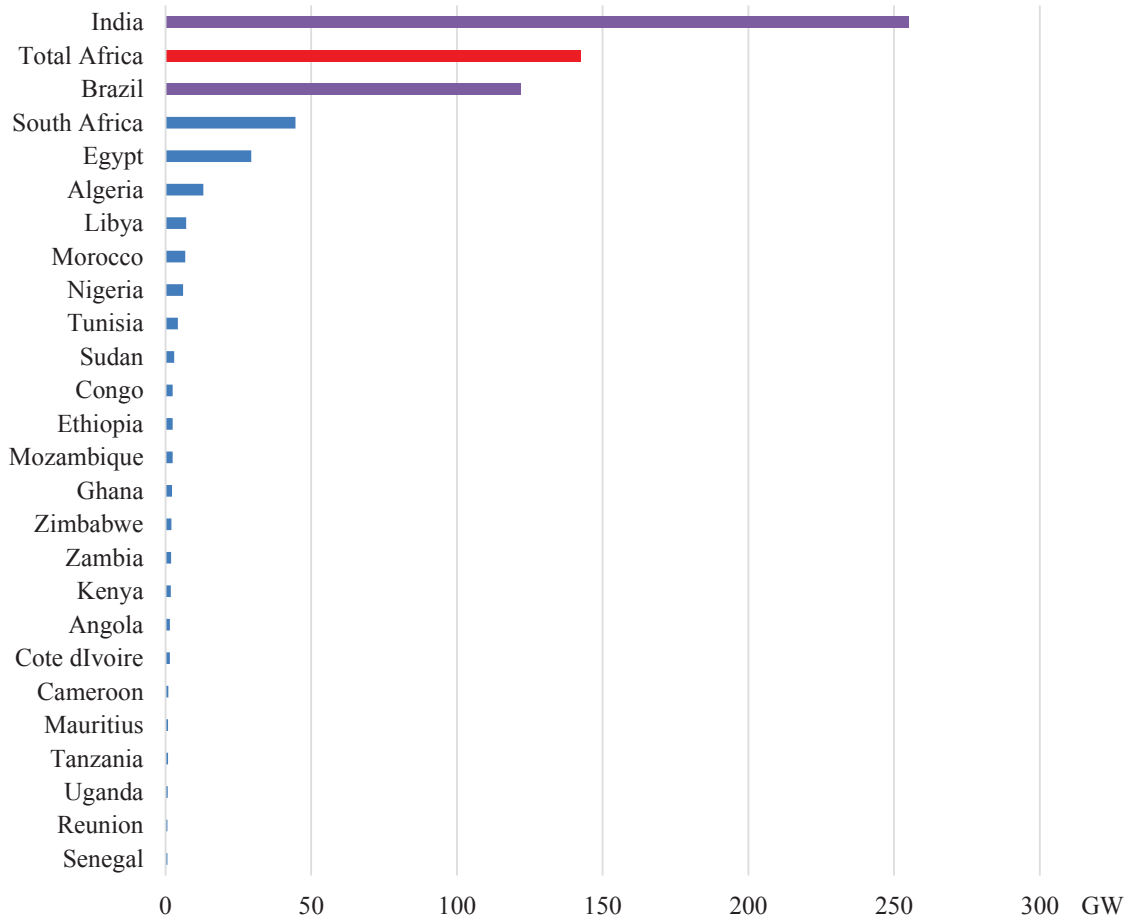
measured in terms of the consumption of food and consumer goods and the availability of housing, even though the economy grew at a moderate rate with annual GNP increasing by about 3 per cent over this period (Nolan and Fureng 1990, Saich 2001). These declining living standards looked potentially worse when compared with neighbouring countries (especially, Japan, Singapore, and South Korea) which had succeeded in achieving phenomenal growth rates over this period (Weatherley 2006). In response, the electricity industry began to be viewed by the CCP as a tool to support improvement in people's living standards. This viewpoint was founded on a range of considerations and beliefs including: CCP's political legitimacy as defined by its ability to improve people's living standards; a strong belief that economic growth is the best means of achieving this improvement; and faith in state ownership and tight government control of strategically important sectors (including, electricity) as necessary institutions to promote economic growth (see Section 4.2.3).

Continued poor performance, political instability, and political fractionalism

In African countries, the governments have traditionally accorded a high priority to the electricity industry. Hence, large amounts of public resources have been allocated for its development (see, for example, Cumbe 2008). Despite this priority, the industry in most African countries has performed poorly, characterised by insufficient generation capacity, inadequate transmission and distribution infrastructure, low electrification rates, and poor reliability of electricity supply. For example, total installed capacity in entire Africa was only 143 GW in 2012, equivalent to the installed capacity of Brazil, and significant less than the capacity of India (see Figure 5.1). Moreover, a significant proportion of this capacity (around 15%) is not operational, due mainly to aging facilities and poor maintenance (Eberhard *et al*. 2011).

Besides, nearly 600 million people in Africa still lack access to electricity, accounting for 48% of the global population without access to electricity. Only seven countries – Cameroon, Cote d'Ivoire, Gabon, Ghana, Namibia, Sengal and South Africa – have electrification rate higher than 50 per cent. In others, the electrification rates average about 20 per cent (Castellano *et al*. 2015). Even when there is access to electricity, the reliability of supply is quite poor. In 2007, for example, many African countries (*e.g*., Kenya and Mozambique) experienced power outages for more than 50 days (Eberhard *et al*. 2011). In response, many people and companies often rely on expensive diesel

backup power generation to meet their electricity needs. This costs some African economies between 1% and 5% of GDP annually (IFC 2015).



Source: U.S. Energy Information Administration, International Energy Statistics

Figure 5.1: Installed capacity in African countries, 2012

This poor performance is attributed by several studies to the lack of depth of electricity reform. For example, lack of electricity price reform is identified by Alleyne (2013) as the main reason for the inefficiency of the public electric utilities in African countries, as highly subsidised electricity prices prevented cost recovery and thus reduced the capacity of public electric utilities to properly maintain facilities and to expand capacity.

Besides, the regulatory arrangements are complex and uncoordinated in most African countries, resulting in arbitrary and inconsistent decision making, regulatory uncertainty and excessive government intervention. This has further led to uncertain investment environment, and discouraged private investments in the electricity industry (KPMG

2014). Lack of private investments has therefore become one of the main contributors to insufficient electricity supply, because the cost of satisfying Africa's electricity needs is estimated at about $41 billion per annum, which is far beyond the ability of the governments in these countries to mobilise (Eberhard *et al*. 2011).

In addition, the state-owned electric utilities are highly inefficient, characterised by high system losses, under-collection of electricity bills, and overstaffing (Eberhard *et al*. 2011). The cost of these inefficiencies has been estimated to be $4.4 billion a year, which is about 1.3% of Sub-Saharan Africa's GDP. Further, these inefficiencies have significantly reduced the capacity of public electric utilities to finance power system maintenance and capacity additions to serve rising electricity demand (Eberhard and Shkaratan 2012).

As discussed in Section 4.2.2, this lack of the depth of reform has been primarily caused by political instability in these countries, which has significantly reduced the capacity of the governments to implement reform. This political instability is deeply rooted in the underlying political power structure, which is called *political fractionalism* in this research (see section 3.3.2). This structure consists of a wide range of social groups defined based on ethnicity, religion, class, and race. These groups represent numerous interests, and continually attempt to influence the political decision-making. The governments therefore become highly inefficient, as they have to accommodate a wide range of conflicting interests in their decision-making processes (Thomson 2010).

5.3 Existing approaches to redress these issues and their limitations

Section 5.2 showed that the electricity industries worldwide are facing a variety of issues, such as, high GHG emissions, lack of regulatory credibility, and highly subsidised electricity prices. Some approaches have already been implemented or considered for implementation for redressing these issues. These approaches are briefly discussed as follows.

1) In ***developed countries*** included in this research (namely, Australia, Germany, United Kingdom and United States), the governments have introduced a variety of regulatory schemes to support the uptake of renewable generation, as the means of reducing the GHG emissions from the industry (Cervigni 2013). These schemes include, for example, feed-in tariffs, feed-in premiums, and renewable obligations. Feed-in tariffs refer to regulated prices paid to electricity producers from renewable

sources irrespective of the market prices for electricity. In some states of the United States (*e.g.*, Maine), for example, households with roof-top solar photovoltaic (PV) installations receive payments for a certain period of time for all PV generated electricity provided to the grid (EIA 2013).

Feed-in premiums refer to prices paid to electricity producers from renewable sources on top of wholesale electricity prices (Cervigni 2013). For example, in Germany, renewable generation is supported by a surcharge on consumers in addition to average wholesale electricity prices. This surcharge is adjusted on a yearly basis to reflect the cost of renewable generation in that year (Pfaffenberger and Chrischilles 2013).

Renewable obligations are obligations to source a certain percentage of electricity supplies from renewable sources. These obligations are normally placed on electricity retailers, who are required to surrender certain amount of green certificates generated by renewable generators to meet their obligations. Market for green certificates is also created, where retailers and renewable generators can trade green certificates (Cervigni 2013). An example of this type of scheme is the Mandatory Renewable Energy Target (MRET) in Australia, under which the country expects to generate 20 per cent of its electricity from renewable sources by 2020 (Moran and Sood 2013).

Besides, several regulatory measures have also been introduced to mitigate market power in the electricity markets. These regulatory measures include, for example, price caps, cost-based bidding, and long-term regulated supply contracts (Blumsack and Lave 2003).

2) Some suggestions have been made to improve the credibility of the regulatory agencies in ***Latin American countries*** included in this research (namely, Argentina, Brazil and Chile). These suggestions include: a) a clear delineation between the functions of the regulatory agency and the government; and reducing government involvement in regulatory decisions (Pollitt 2004, Pollitt 2008, Millan 2007); b) better financial and technical support to the regulatory agencies, with a view to improve their regulatory capacity, as most regulatory agencies in the region lack necessary financial and human resources to fulfil their regulatory responsibilities (Millan 2007); and c) more transparent and accountable regulatory processes, with a

view to reduce the opportunities for governmental interference, because existing regulatory processes are based on complex technical and engineering procedures that rest on mathematical formulas whose results can be easily manipulated (Millan 2006).

3) In ***Southeast Asian countries*** included in this research (namely, Thailand, Malaysia and the Philippines), public utilities have continued to dominate the electricity industries, even after the introduction of electricity reforms in the early 1990s. The regulators in these countries generally lack credibility, and the governments frequently intervene to make regulatory decisions. This has created unfavourable investment environment for foreign investments, which are considered critical for meeting rising electricity demand, and for promoting the uptake of renewable generation (see Section 5.2). Suggestions made to improve the investment environment include: a) restructuring of public-owned electric utilities and introduction of greater competition, with a view to create transparency and level playing field for private investors (Herberg 2012); and b) creation of credible regulatory arrangements to attract private investors, as these arrangements would provide these investors with regulatory predictability and adequate protection from government expropriation (KPMG 2013, OECD 2014).

4) It is discussed in Section 5.2 that electricity companies in ***India*** are frequently required by the state governments to provide large amounts of subsidies to rural consumers. These subsidies significantly affect the financial health of these companies, and reduce their ability to finance necessary capacity expansion and system maintenance. Accordingly, sweeping electricity price reforms have been suggested as the means of resolving these problems (see, for example, Pargal and Banerjee 2014, Mayer *et al*. 2015, Min and Golden 2014). These suggestions include: a) full implementation of the Electricity Act 2003 mandates, especially those on competition and distribution, namely, cost-based tariffs, open access, and compliance with performance standards; b) ensuring regulatory autonomy, effectiveness and accountability; c) gradually proceeding electricity price reform and incrementally removing electricity subsidies; and d) better communication with electricity consumers about the potential benefits (*e*.*g*., more reliable electricity supply) of electricity price reform.

5) In ***China***, the government has expressed its intention to deepen electricity market reform, with the announcement of *Some Suggestions on Deepening Electricity Industry Reform* in 15 March 2015. In this announcement, inefficient allocation of resources has been identified as the major issue currently facing the electricity industry in China. This issue, it was argued in Section 5.2, is mainly caused by tight government regulation of electricity prices, and lack of coordination in industry planning. Suggestions to redress this issue accordingly included electricity price reform, establishment of market mechanisms for electricity trading, and replacement of government-led planning with market-oriented planning.

6) In ***African countries*** included in this research (namely, Kenya, Mozambique and South Africa), the electricity industries have continued to perform poorly, even after the introduction of electricity reform. This, as argued by some, is due to lack of depth of reform (see detailed discussion in Section 5.2). Deeper electricity market reform is accordingly suggested as the way of improving the poor performance of the electricity industries in these countries (Alleyne 2013, Eberhard *et al*. 2011, KPMG 2014). Specific suggestions include:

   a) Electricity price reform, aimed at gradual rationalising the provision of electricity subsidies. The existing electricity subsidies are mainly structured in the form of lower-than-cost electricity tariffs. These subsidies mostly benefit higher-income people in these countries, as they are the largest consumers of electricity. The argument therefore is that rationalisation should re-direct subsidies to lower-income people.

   b) Creation of credible and competent regulatory arrangements, with a view to effectively regulate the incumbent state-owned electric utilities, and at the same time create favourable investment environment that is conducive to private investments.

   c) Reform of state-owned electric utilities, with the aim of improving their efficiency. This reform should focus on a clear separation of the government from day-to-day operation of these utilities, and a separation of regulatory functions (*e.g*., tariff settings) from these utilities.

Some observations and further comment

The reform approaches being implemented or considered for implementation for redressing challenges faced by the electricity industry (as presented in this section) tend to attribute these issues to the institutional arrangements for the electricity industry. Accordingly, these reform approaches suggest modifying the institutional arrangements of the electricity industry as a way of resolving these issues. These suggestions include, for example, introducing regulations to support the functioning of the electricity markets, and a clear delineation between the roles of the government and the regulator, to reduce the scope for unnecessary government intervention.

These reform approaches – this research contends – are deficient, because they do not consider the influence on the institutional arrangements of the electricity industry, of prevalent political power structures and interests that define the role of electricity in the larger socio-economic context of human lives. In fact, these reform approaches are often in conflict with prevalent political interests (see further discussion in Section 5.4). Once such conflicts emerge, political resistance to reform becomes inevitable. This will obviously distort the efficacy of these reform approaches, to redress issues currently facing the electricity industry.

It is therefore reasonable to argue that a prerequisite for redressing these issues requires, first, developing an appreciation of the influence of prevalent political power structures and associated interests on shaping the institutional arrangements for the electricity industry, and then adopting more flexible approaches to reform to accommodate these interests. This is discussed in details in Section 5.4.

5.4 Some suggestions for improving the efficacy of reforms

This section will demonstrate, with the help of selected examples (as noted in Section 5.1), how an appreciation of prevalent political power structures and associated interests could be gainfully applied to develop policy guidance for redressing the challenges faced by the electricity industry, and hence for improving the efficacy of reform and reducing the disparity between expected and actual outcomes of reform. Details are presented as follows.

1) As discussed in Section 5.2, in ***developed countries*** included in this research (namely, Australia, Germany, United Kingdom and United States), a major issue

faced by the electricity industries is high GHG emissions from electricity generation. In response, the governments have introduced various forms of subsidies (*e.g.,* feed-in tariffs) to promote the uptake of renewable technologies (see Section 5.3). These subsidies have however contributed to distorting the price signals in the electricity markets. This distortion has become more evident in recent years as electricity demand has started to decline. Renewable capacity has continued to increase, as motivated by subsidies, even in situations where no new capacity is required. This has obviously affected the interests of politically powerful electricity incumbents. These incumbents have therefore started to actively fight for their interests. This has contributed to significant policy uncertainty for the renewable industry in particular, and the electricity industry in general. For example, in Australia, the Coalition government elected in September 2013 called for a review of the prevailing Renewable Energy Target, as a fulfilment of their campaign platform for re-evaluating climate change policies. This resulted in significant policy uncertainty, and discouraged renewable investments. Renewable investment in Australia fell by 35 per cent in 2014 as compared with previous years. More significant reductions (more than 80 per cent) were witnessed in large-scale renewable investments (Stock 2015).

This political opposition to renewable subsidies comes primarily from business interests associated with existing large-scale fossil fuel power plants. In order to accommodate these interests, this research suggests that electricity incumbents should be rewarded for reducing their output and hence GHG emissions. For example, a target could be set for annual GHG emission reductions. All fossil fuel based power plants could be allowed to bid for reducing their outputs to meet this target. The lowest bids could be selected until the target is met. The successful bidders could be asked to enter into contracts in which the government agrees to purchase GHG emissions from their power plants. A regulator could be established to enforce these contracts.

This approach could result in a gradual phase off of old fossil fuel power plants, as these power plants will gradually reduce their outputs as required by the GHG emission reduction target, and their owners will be well compensated through reward payments for reducing their outputs. The phase off of fossil fuel power

plants could also create investment opportunities for renewables. This will obviously promote the uptake of renewable capacity for power generation and hence lower GHG emissions.

Besides, traditional electricity incumbents could also be encouraged to participate in the development of renewable projects. This, this research contends, will contribute to an alignment between the interests of traditional electricity incumbents and increased use of renewable sources for power generation. This, this research further contends, would contribute to a smooth transition to lower GHG emission electricity industry, and hence a better redress for the environmental concerns about rising GHG emission from power generation.

2) Another major issue faced by these countries is the exercise of market power by dominant generating companies to get excessive profits. In response, the governments have introduced various regulatory measures (such as, price caps) to mitigate market power (see Section 5.3). These measures may however prevent electricity prices from rising high enough to attract sufficient investments for capacity additions, hence adversely affecting long-term security of electricity supply. In fact, in many electricity markets (such as, Chile, England & Wales, Nordic countries, and United States), prices paid to electricity suppliers are substantially below the levels required to stimulate sufficient amounts of new investments for capacity expansion (Amundsen *et al*. 2006, Joskow 2007).

   This research suggests that electricity regulators should be assigned with the role of monitoring the bidding behaviours of generating companies, with the aim of identifying the exercise of market power by these companies. Some degree of market manipulation could be accepted to maintain the profit level of dominant generating companies. In exchange, these companies should be asked to make sufficient and timely investments for capacity expansion. Similar approach is adopted in the United States to mitigate market power (Joskow 2006). The use of this approach appears to have been reasonably successful in mitigating the ability of generators to exercise excessive market power while maintaining supply security.

3) In ***Latin American*** (*i.e*., Argentina, Brazil and Chile) and ***Southeast Asian*** (*i.e*., Malaysia, Philippines, and Thailand) countries included in this research, the main issue facing their electricity industries is continued government presence in the

industry, as reflected in frequent government interventions in regulatory decisions, and continued dominance of public owned electric utilities (as noted in Section 5.2). This continued government presence in the electricity industry has created an uncertain environment for potential investors, thus discouraging them from investing in power projects.

The current approaches suggested to redress this issue (as noted in Section 5.3) essentially focus on reducing the scope for government intervention in the industry by, for example, clearly delineating the roles of the government and the regulator, provision of more financial and human resources to support independent regulators, and introduction of greater competition to provide a level playing field for private investors. These approaches are however in conflict with the political interests embedded in the electricity industries, such as, widespread social distrust about market reform, and local business interests in the industry (for detailed discussion, see Section 5.2). This conflict will inevitably lead to political resistance to the implementation of these approaches, and hence affect the efficacy of these approaches to deliver promised outcomes.

Rather, this research suggests that regional electricity market integration could be an alternative approach to persuade these countries to implement necessary reforms to improve the investment environment in the industry, because it will bring many benefits that would neutralise the political resistance to reforms. At the macro-level, for example, regional electricity market integration is consistent with current government initiatives for promoting regional economic integration, such as, Common Market of South, and ASEAN Economic Community. These initiatives are expected to bring significant economy-wide benefits, in the backdrop of global economic slowdown, declining demand and prices for exports, and renewed desire for regional economic integration as a coping strategy (Balassa 2011).

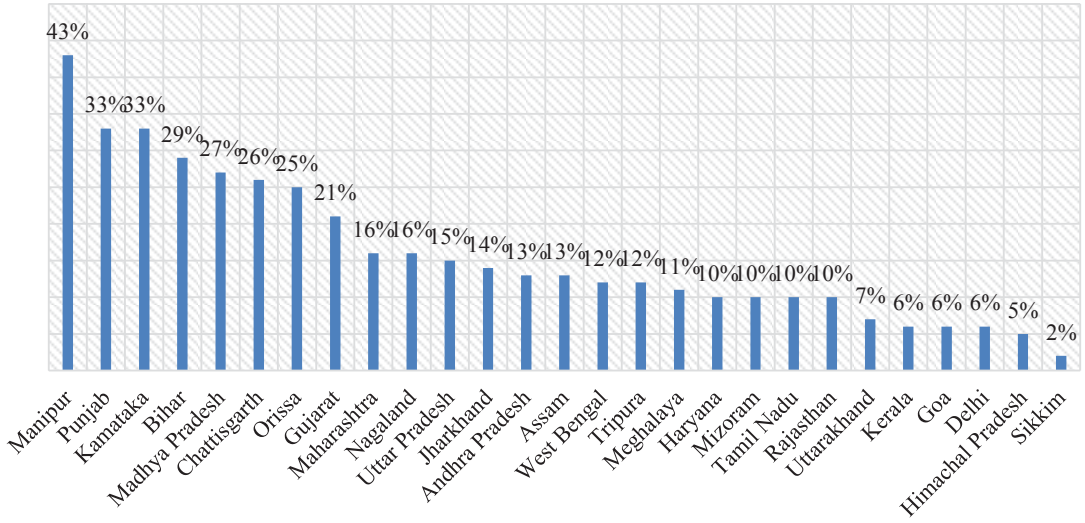
At the micro-level, greater level of regional electricity market integration would lead to lower costs of electricity supply, as cheaper electricity could be obtained from neighbouring countries where energy sources are abundant. This in turn would reduce the cost of meeting rising electricity demand in the region (hence lower electricity prices), and contribute to reduced GHG emissions through reduced needs for excessive generation reserves (Raineri *et al*. 2013).

The combination of these macro- and micro-level benefits, this research argues, would reduce the scope for government intervention in electricity, and hence gradually neutralise political resistance to reform, because a certain investment environment (less government intervention) is widely considered as a prerequisite for the realisation of these benefits (as noted above).

4) As discussed in Section 5.2, in ***India***, the main issues currently facing the electricity industry (*i.e.*, poor financial and technical performance of the distribution companies) are caused by strong rural opposition to the removal of electricity subsidies. It is therefore highly unlikely that the current approach focusing, for example, on sweeping electricity price reform, could ever be fully implemented. Alternatively, this research suggests that electricity price reform should be implemented in a gradual manner. This reform should initially focus on urban areas, and gradually extend to rural areas. There are three reasons for that. One, it is known that non-poor people (especially, in urban areas) are major beneficiaries of electricity subsidies, even though most public opposition for the removal of these subsidies comes from the rural poor. This observation gets substantiated by the fact that, in most Indian states, poor households (below poverty line) only received less than 30% of electricity subsidies in 2010 (see Figure 5.2). It is therefore reasonable to argue that removing electricity subsidies from urban areas would lead to significant cost savings for electricity companies.

   Two, it is more likely that urban residential consumers would accept removal of electricity subsidies, because electricity expenditures only represent a very small proportion of their budgets (about 4 per cent in 2010) (Banerjee *et al*. 2015). More importantly, the removal of electricity subsidies will improve the capacity of electricity companies to finance necessary capacity expansion and system maintenance. This will support country's industrialisation programs, or 'Made in India', as unreliable electricity supply and power shortages have been identified as major barriers for industrial development (see, for example, Pargal and Banerjee 2014). A rapid industrialisation will bring many benefits to urban residents, such as, increased income, more employment opportunities, and cheaper consumer products. These benefits, this research argues, would contribute to a neutralisation of their opposition to the removal of electricity subsidies.

Three, industrial development would accelerate mass migration from rural to urban towns and cities. This would gradually reduce the political bargaining power enjoyed by the agricultural sector, as the benefits of rural residents will be increasingly linked to further industrialisation and urbanisation. This in turn would pave the way for a gradual elimination of electricity subsidies in rural areas.



Source: Mayer *et al*. 2015

Figure 5.2: Percent of electricity subsidies received by poor households (below poverty line), 2010

5) Section 5.2 argued that inefficient allocation of resources is one of the major issues facing the electricity industry in ***China***. This issue is primarily due to the use of electricity industry to support the ruling party's political priorities in the 1990s and early 2000s, namely, rapid economic growth and better quality of life. This is based on the belief held by the party that electricity industry is an important tool to support rapid socio-economic progress. This progress is considered crucial for maintaining the party's political legitimacy. The reform programs proposed by the Chinese government to redress this issue mainly focus on replacing command–based resource allocation in the industry with market-based resource allocation by, for example, electricity price reform and introduction of greater market competition (for detailed discussion, see Section 5.3).

These reform programs, this research contends, are in conflict with the party's current political priorities, namely, of promoting social equity and protecting the

environment. Electricity price reform and introduction of electricity market, for example, would lead to the removal of price subsidies. This will obviously affect the disadvantaged segments of the society (especially, rural and urban poor), because these consumers are currently subsidised by large industrial and commercial consumers (as noted in Section 5.2). Besides, emerging evidence suggests that market competition may encourage electricity companies to use low quality high-GHG-emitting coal for power generation, and to rehabilitate old less-efficient power plants, with the aim of minimising short-run marginal costs of electricity (see, for example, Sharma 2003).

This conflict, this research argues, is likely to pose threat to the political legitimacy of the ruling party (CCP), engender political resistance to reform, and consequently, affects the efficacy of reform to deliver promised outcomes. Alternatively, this research suggests that reform programs, to improve resource allocation in the electricity industry, should firstly focus on improving the efficiency of industry regulation. This could involve, for example, empowering the State Electricity Regulatory Commission (SERC), which currently has only limited regulatory functions (essentially, technical regulation of power plants). Most of the key regulatory functions (*e.g.*, project approval and pricing) are regularly undertaken by the National Development and Reform Commission (NDRC), and to a lesser extent, by several other government agencies, such as, the Ministry of Finance, the State Environmental Protection Agency, and the Ministry of Science and Technology (Andrews-Speed 2013). These regulatory functions should be transferred to the SERC, to reduce regulatory complexity and to arrive at coordinated regulatory decisions.

Besides, the government should also provide more financial and human resources to support the SERC to fulfil its regulatory functions, as it is currently significantly constrained by the lack of resources, and has to frequently rely on local governments to fulfil its regulatory functions (Andrews-Speed 2013). This will, this research argues, reduce the scope for local governments to support their local electricity companies, such as, dispatching local power plants to meet electricity demand despite the availability of cheaper options from neighbouring provinces (as noted in

Section 5.2). This will in turn improve the efficiency of resource allocation in the industry.

The SERC would be required to introduce regulatory reforms, with the aim of supporting the government's current development priorities, namely, social equity and environmental protection. For example, tighter technical and economic regulations could be introduced to reduce GHG emissions from power generation, because small-scale less efficient power plants will be forced to shut down, and be replaced with more efficient ones. The use of more efficient power plants would also result in significant cost savings. These cost savings could be transferred to targeted electricity end-users in the form of lower electricity prices, with a view to support the government's development priorities of social equity (Ma and Zhao 2015).

These regulatory reforms could contribute to augmenting the robustness of existing regulatory arrangements. These arrangements could then provide a solid base for a gradual introduction of market competition. It is well understood that well-designed and well-enforced regulations are important to ensure free access to transmission networks by market participants (Joskow 2006); they will also prevent the abuse of market power by dominant power companies (Adib and Hurlbut 2008), and maintain the reliability of power system (Cervigni and Perekhodtsev 2013). Besides, credible regulatory arrangements are also important to protect investors from government expropriation. This in turn will encourage new entry into the market and hence promote market competition (Beasant-Jones 2006).

Further, these suggested reforms will be politically appealing to the ruling party (CCP), as they are consistent with the party's belief in socialism. As influenced by this belief, the CCP views state ownership and tight government regulation as necessary tools for controlling economic decision-making, even though it accepts that some capitalist measures would be needed to promote economic growth in the process of developing a socialist society (Zweig 2010). As a result, this research argues that a complete state retreat from the electricity industry is highly unlikely and perhaps undesirable. Rather, the state should continue to control decision-making in the industry at the macro-level, while allowing some degree of market competition at the micro-level. This suggestion gets substantiated by China's reform

experience in the past two decades or so; during these years all aspects of reform were, to a very considerable extent, state-designed, state-driven, and state coordinated (McNally 2013).

6) In ***African countries*** included in this research (*i.e.*, Kenya and Mozambique), the electricity industries have continued to perform poorly, even after the implementation of electricity reform. This poor performance is typified by serious power shortages, unreliable electricity supply and low electrification. This performance, it was argued in Section 5.2, is mainly attributable to the lack of depth of reform, such as, lack of electricity price reform, and complex and uncoordinated regulatory arrangements (see further discussion in Section 5.2). Accordingly, deeper electricity reform (such as, electricity price reform, and creation of credible and competent regulator) are suggested as means to improve the industry performance.

   This reform, this research contends, would not deliver its promised outcomes, as it is in conflict with the interests of socio-political players (*i.e.*, the rural poor – recipient of electricity subsidies) who benefit from the status quo. This conflict, this research further contends, will lead to political resistance to the implementation of this reform, and thus affect the efficacy of reform to improve the performance of the industry. Alternatively, this research suggests that a dual-market approach would provide better redress for the poor performance of the electricity industries in these countries. This dual-market approach divides the country into two parts, namely, rural and urban areas. This division is based on the status of socio-economic development of these areas. For example, Maputo, the largest city of Mozambique, is much more developed than the rest of the country. As a result, the poverty level in this city is only 18% as compared with the country's average poverty level (70%) (Cumbe 2008).

   In urban areas, private investors should be encouraged to build power plants. The generation segment should be separated from the incumbent public-owned electric utility. This segment could remain in public control, but should be required to compete with privately-owned generators for electricity supply. The remaining segments (namely, transmission and distribution) of the incumbent public-owned electric utilities should be structured as single-buyers in the market, procuring electricity from both private and public generators.

In rural areas, off-grid generators (*e.g.*, renewable) could be encouraged to meet electricity demand, because it would be too expensive to extend grid-based electricity services to those areas. These generators should be financed by public funds. Electricity subsidies could also be given to ensure the affordability of electricity to the rural consumers.

This dual-market approach would provide a better accommodation of various interests associated with electricity. For example, this approach would improve the performance of the industry by, for example, encouraging private investments for capacity expansion, and provision of better incentives for cost reduction in generation. It would also allow the provision of necessary subsidies to the disadvantaged social groups, in both rural and urban areas. This approach is therefore likely to attract necessary political support for reform, and hence a smooth implementation of reform programs could be ensured.

5.5 Practicality of suggested reforms

Section 5.4 has presented some thoughts on possible reform approaches to redress selected issues currently facing the electricity industries, and by implication for reducing the disparity between expected and actual outcomes of reform. These reform approaches, it is argued, would contribute to a neutralisation of the political resistance to reform, and hence facilitate a smooth implementation of reform programs. It is acknowledged that the implementation of these suggestions may pose some challenges. These challenges are likely to arise due to a lack of understanding of the benefits and costs associated with suggested reforms. In response, this research suggests that all relevant socio-political players to be involved in the design and implementation process of these reforms, because this could provide them with the opportunities to develop a better understanding of the benefits and costs associated with these reforms. This understanding will engender a cross-interest support for reform and contribute to redressing issues currently facing the electricity industries. The practicality of these suggestions are discussed as follows.

1) In developed countries, the approach proposed by this research to reduce GHG emissions from power generation (*i.e.*, subsidies to fossil fuel based power plants to reduce their outputs) may be strongly opposed by the society based on the argument that this approach will made the taxpayers assume the costs for GHG emission

reduction instead of the polluters. But the society, this research argues, will need to be educated that the polluter-paid approach will negatively affect the interests of politically powerful polluters. This will in turn delay the implementation of this approach, and eventually leave the problem of high GHG emissions from power generation unresolved. This will ultimately affect the interests of the society. The taxpayer-paid approach proposed by this research, this research further argue, may incur costs for the society in the short run; but it will lead to significant benefits (*e.g.*, lower GHG emissions from power generation) in the long run.

Accordingly, this research suggests that increased social involvement could be important means to overcome potential political resistance to the implementation of the taxpayer-paid approach proposed by this research, because this could help the society understand the costs and benefits associated with taxpayer-paid approach as compared with polluter-paid approach. Social involvement can be encouraged in various ways. For example, media campaigns (such as, newspaper articles, online websites and television programs) could be established by the responsible government agencies (*e.g.*, Department of the Environment in Australia), to educate the society about the costs and benefits associated with taxpayer-paid approach. These agencies could also regularly update the society about steps being undertaken to implement the taxpayer-paid approach, and the progress to reduce the GHG emissions.

2) Regional electricity market integration in the developing countries would require the development of credible regulatory arrangements for the industry, cross-broader interconnections, and a harmonisation and coordination of national policy making, industry planning and regulations (see, for example, Wu 2012). These requirements, this research argues, may lead to social concerns within participant countries, *i.e.*, the development of cross-broader interconnections may give rise to social concerns about environmental costs associated with these projects, and a harmonisation and coordination of national policy making may give rise to social concerns about national sovereignty. These concerns may prevent necessary steps from being undertaken to promote regional electricity market integration.

   Increased social involvement, this research suggests, could be useful means to redress these social concerns. This social involvement, this research further

suggests, could be encouraged at two levels, namely, national and regional. At the national level, responsible government agencies (such as, Ministry of Energy in Thailand) could establish media campaigns (such as, newspaper articles, online websites and television programs), to educate the society about the potential benefits of regional electricity market integration, such as, lower electricity prices, more investments and economy-wide benefits. Besides, channels should also be developed for the society to express their concerns about potential costs from regional electricity market integration, such as, environmental costs associated with interconnection projects, and loss of national sovereignty. This could help the governments to determine the speed and scope of regional electricity market integration.

At the regional level, some form of regional development associations could be established. These associations could provide platforms where participant countries could express their concerns about regional electricity market integration. This will contribute to the promotion of regional electricity market integration in a way that will accommodate country-specific concerns in a balanced manner. Some initiatives have already been undertaken to develop these regional development associations, for example, Andean Community, ASEAN Economic Community, and Latin American Integration Association.

3) In India, urban-focused electricity price reform will reduce the level of electricity subsidies received by urban residents. This may lead to political resistance to price reform. In order to reduce this resistance, this research suggests that urban interests should be well represented in the design of price reform policy and its implementation, with a view to identify an acceptable level and speed of price increase. This would also enable urban residents to have a better understanding about the benefits they are likely to receive from price reform, such as, less power shortages, more reliable of electricity supply, and other economy-wide benefits.

   This research suggests that a consumer panel could be established to represent electricity consumers in the design of price reform policy and its implementation. This panel could consist of elected electricity experts. Besides, this research further suggests that this consumer panel could express its interests about the electricity price reform through Consumer Grievances Redressal Forum. This forum was

established in India as required by the Electricity Act of 2003. It was made responsible for dealing with consumer complains about electricity services, such as, load shedding, billing problems, and failure of power supply.

4) The dual-market approach suggested to improve the performance of the electricity industries (*e.g.,* lack of investments and poor reliability) in selected African countries (*e.g.,* Mozambique and Kenya), as argued in Section 5.4, need to accommodate various interests associated with electricity, such as, price subsidies, employment, and sufficient supply. This could enable the formation of cross-interest support to the implementation of this dual-market approach for reform. The formation of this cross-interest support, this research suggests, could be promoted by increased social involvement in the design and implementation of the reform programs, because this will ensure the identification of acceptable level of costs to various social groups. Social involvement could be encouraged in various ways. For example, members of the society could be invited to participate in enquiries about issues related to the design and implementation of the dual-market approach for reform. Questionnaire could be used to consult with the society about key issues related to the dual-market approach for reform that are of important public concern.

5.6 Summary

This chapter has demonstrated how an institutional perspective (underscored by an appreciation of influence of political power structures and associated interests) could be gainfully applied to develop policy guidance for designing reform that will contribute to redressing some of the emergent issues currently facing the electricity industry, and hence for reducing future disparity between expected and actual outcomes of reform. Main points of this chapter are summarised as follows:

Some current issues: An institutional perspective

- An institutional perspective, informed by insights gained from previous chapters, is developed in this chapter to examine some of the issues currently facing the electricity industries around the world. This perspective attributes these issues to the institutional arrangements of the industry, underpinned by dominant political power structures and interests of the time. For example:

- Recent years have seen growing environmental concerns, especially in the developed world, associated with rising GHG emissions from power generation. This issue can be attributed to the institutional configuration of the electricity industries that emphasises private ownership and market competition. This configuration encourages electricity companies use low-quality high-GHG-emitting coal for power generation, and to rehabilitate old less-efficient coal power plants, with the view to minimise short-run marginal costs of electricity. This configuration essentially reflects the business interests (of large corporations and business associations) that are disproportionately represented in the political decision-making processes.
- The instances of the abuse of market power by dominant generating companies, and manipulation of electricity prices to get excessive profits, have been noticed in many electricity markets including, Alberta, California, England and Wales, New Zealand, PJM, Texas. The abuse of market power can be attributable to flaws in the institutions of the electricity industry, such as, high concentration of generation ownership. The interests of large generating companies are closely linked to the status quo. They therefore strongly oppose any attempts to drastically reduce market power in the electricity markets. Justification for this opposition is usually based on the argument that methods for mitigating market power (such as, price caps) would prevent electricity prices from rising high enough to attract sufficient investments for capacity additions, hence adversely affecting long-term security of electricity supply.
- In Latin America, electricity regulation lacks general credibility, and is subject to frequent government interventions. This has been legitimised by widespread social distrust about market reform, resulting from major economic failures.
- In Southeast Asian countries, the investment environment is unfavourable for private investors (especially, foreign), because of the continuing governmental dominance of the industry. This dominance reflects the interests of politically well-connected domestic business leaders, who expect the governments to continue to dominate the industry, so as to protect their business interests in the industry. These business interests are deeply rooted in the underlying political power structures. In these structures, political elites normally offer profitable

business opportunities to their favoured business leaders, who are then able to extend their control over the country's economy, and in turn, fund their political patrons to reinforce the political dominance.

- In India, there is pervasive state government interference in electricity distribution companies, and these companies have been frequently required by the state governments to provide electricity subsidies to rural consumers (especially, agricultural), with a view to gain their political support. These rural interests are well entrenched in the underlying political power structures. In these structures, political power is loosely distributed among several social groups. The political decision-making processes are therefore typified by lengthy consensus-building.
- Inefficient resource allocation is the main issue facing the electricity industry in China. This issue is primarily due to the use of electricity industry to support the government's developmental priorities, namely, economic growth and improvement in people's living standards. These priorities essentially reflect the viewpoint of the ruling Chinese Communist Party: the Party's political legitimacy as defined by its ability to improve people's living standards; a strong belief that economic growth is the best means of achieving this improvement; and faith in state ownership and tight government control of strategically important sectors (including, electricity) as necessary institutions to promote economic growth.
- In African countries, the electricity industries have continued to perform poorly (*e.g.,* lack of investment, low electrification, and poor reliability), even after the introduction of electricity reform. This is attributable to the lack of the depth of reform, caused by political instability, which has significantly reduced the capacity of the governments to implement reform. This political instability essentially reflects the underlying political power structures. In these structures, there is a wide range of social groups that attempt to influence political decision-making. The government have therefore become highly inefficient, as they have to accommodate a wide range of conflicting interests in their decision-making processes.

Existing approaches to redress these issues and their limitations

- Existing approaches to redress these issues have attributed them to the institutional arrangements for the electricity industry. Accordingly, these approaches suggest modifying the institutional arrangements of the electricity industry as a way of resolving these issues. These suggestions include, for example, a clear delineation between the roles of the government and the regulator, to reduce the scope for unnecessary government intervention.
- These approaches – this research contends – are deficient, because they do not consider the influence on institutional arrangements of the electricity industry, of prevalent political power structures and associated interests that define the role of electricity in the larger socio-economic context of human lives. In fact, these reform approaches, as argued in Section 5.4, are often in conflict with prevalent political interests. Once such conflicts emerge, political resistance to reform becomes inevitable. This will obviously distort the efficacy of these reform approaches, and leaving the task of redressing the issues facing the industry largely unresolved.
- It is therefore reasonable to argue that prerequisites for redressing these issues are: one, develop an appreciation of the influence of prevalent political power structures and associated interests on shaping the institutional arrangements for the electricity industry; and two, adopt more flexible approaches to reform to accommodate these interests.

Some thoughts on alternative approaches

- In developed countries, political opposition to renewable subsidies comes primarily from business interests associated with large-scale fossil fuel power plants. This research suggests that these fossil fuel power plants should be rewarded for reducing their output and hence GHG emissions. This could lead to a gradual phase off of old fossil fuel power plants, and create investment opportunities for renewables. Growing uptake of renewable will in turn lead to lower GHG emissions from power generation.
- Besides, this research suggests that electricity regulators in developed countries should be assigned with the role of monitoring the bidding behaviours of generating companies, with the aim of identifying the exercise of market power by these

companies. The regulator should be required to allow some acceptable levels of market manipulation. This could maintain the profit level of dominant generating companies, and persuade them to make sufficient and timely investments for capacity expansion.

- This research suggests that regional electricity market integration could be an alternative approach to persuade Latin American and Southeast Asian countries to implement necessary reforms to improve the investment environment in the industry. This is because regional electricity market integration will bring macro-level (*e.g.*, promotion of regional economic integration) and micro-level (*e.g.*, lower costs of electricity supply) benefits. The combination of these macro- and micro-level benefits, this research argues, would contribute to a gradual neutralisation of political resistance to reform, because a certain investment environment (less government intervention) is widely considered as a prerequisite for the realisation of these benefits.

- In India, this research suggests that electricity price reform should initially focus on urban areas, and gradually extend to rural areas. This is because electricity expenditures represent only a very small proportion of the budgets of urban residents (about 4 per cent in 2010). They are therefore more likely to accept the removal of electricity subsidies. Besides, the removal of electricity subsidies will improve the capacity of electricity companies to finance necessary capacity expansion and system maintenance. This will support country's industrialisation programs, which in turn will bring many benefits to the urban residents (such as, increased income). In addition, industrial development would also create attractive employment opportunities for the rural residents. This would gradually reduce the political bargaining power enjoyed by the agricultural sector, and pave the way for a gradual elimination of electricity subsidies in rural areas.

- Reform to improve resource allocation in the Chinese electricity industry should focus on improving the efficiency of industry regulation. It will support government's current development priorities (namely, social equity and environmental protection) by, for example, introducing and effectively enforcing tighter technical and economic regulation of electricity companies. It could also pave the way for introducing market competition and electricity price reforms, as

robust regulatory arrangements could provide a solid base for an efficient functioning of electricity markets. Besides, this reform is consistent with the Chinese Communist Party's belief in socialism.

- The reforms suggested by this research to redress the issues facing the electricity industries may also pose some challenges. These challenges are likely to arise due to a lack of understanding (by various interests) of the benefits and costs associated with these reforms. In response, this research suggests that all relevant socio-political players be involved in the design and implementation process of these reforms; this could provide them with the opportunities to develop a better understanding of the benefits and costs associated with reforms. This understanding will engender a cross-interest support for reform and contribute to redressing issues currently facing the electricity industries.

The above discussion (and the discussion in the previous chapters) shows that the institutional configurations of the electricity industry are essentially reflective of prevalent political power structures and associated interests. These political power structures typically change slowly. This creates an institutional lock-in in the electricity industry, as powerful socio-political players try to block any amendments in the institutional configurations of the industry that they consider would threaten their interests. This perspective on electricity industry essentially makes electricity a political commodity, serving prevalent political interests. These political interests are driven by a wide range of cultural, ideological, socio-economic and political considerations and beliefs, held by dominant socio-political players. Contemporary electricity reform (as its attendant electricity industry configuration), which has tended to view electricity industry almost exclusively from an economic perspective, is therefore incapable of preventing the ever widening disparity between expectations from reform and its actual outcomes. This perspective (*i.e.*, exclusively economic), it is argued by this research, is also grossly deficient in shedding any light into the reasons for this disparity and hence means to reduce such disparity. It is in the resolution of this dichotomy between 'economic' and 'institutional' perspectives, this research has demonstrated, reside a way to reduce disparity between expectations and actual outcomes of reform.

6 CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

6.1 Conclusions

The main objective of this research is to develop an institutional perspective on electricity reform, with specific emphasis on understanding the reasons for the disparity between expectations and the outcomes of reform, and for identifying ways to reduce this disparity. The backdrop for this research is as follows. There is a significant, and global, disparity between expected and actual outcomes of reform. The discussion about the reasons for such a disparity and how to reduce it has been primarily confined to the economics of structural and implementational aspects of the reform. This perspective – this research contends – is deficient, because it is unappreciative of the influence on the shape and direction of reform of other factors (cultural, socio-economic and political) that define the role of electricity in the wider socio-economic domain of human lives.

This research is accordingly founded on the premise that a real understanding of the reasons for the disparity between expected and actual outcomes of reform, and ways to reduce it, could only be developed from an institutional perspective on electricity reform, that recognise the influence of wider socio-political-cultural factors (as noted above) on shaping reform. Institutions, in the context of this research, are defined as constraints that shape the decisions made by human beings, through a variety of human interactions (North 1990). Institutions can be formal (*e.g.*, market rules, ownership, regulations and wider socio-economic structure) or informal (*e.g.*, norms, ideology, and beliefs) (Davis and North 1970). Formal institutions essentially reflect the underlying priorities for socio-economic development, and derive their legitimacy from the underlying informal institutions (*i.e.*, how the socio-economic development ought to be structured). Given the central role electricity plays in promoting socio-economic development, electricity industry is generally viewed as a means to support the developmental priorities. The institutional arrangements of the industry (*i.e.*, ownership, structure and regulation) are therefore largely shaped by the underlying wider formal and informal institutions.

Further, the institutional arrangements of the electricity industry are subject to continuous changes, as influenced by the interaction between wider formal and informal institutions. These changes are referred to as *institutional change processes* in this research. It is in the understanding of these institutional change processes, this research argues, resides a fuller understanding of the reasons for the disparity between expected and actual outcomes of reform, and ways to reduce this disparity.

The approach adopted in this research to analyse institutional change processes in the electricity industry essentially draws upon the basic tenets of the *combined institutional approach* and the approaches for *analysing political power structure*. This approach views the arrangements of the industry in terms of the institutions of ownership, structure and regulation. These arrangements are informed by the macro-level formal and informal institutions. These macro-level formal and informal institutions are determined by the political bargaining processes. In these processes, various socio-political players pursue their interests through the exercise of political power to influence other players. The political power of a political player is primarily derived from the power assets (*i.e.*, utilitarian, coercive and persuasive) that this player has ownership or control of. The outcome of this (pursuit of interest) is what gives rise to the development orientation of the time. As the underpinning factors (*i.e.*, political power structures and associated interests) change, new macro-level formal and informal institutions emerge. This then (by the logic presented above) leads to changes in the institutions for the electricity industry.

The main conclusions of this research, in summary, are presented below.

Institutional change processes in the electricity industry

- In the years following the emergence of the electricity industry, the institutions of the industry emphasised furtherance of business interests, through recourse to *laissez faire* principles, namely, private ownership as the best way to promote economic and social progress. Government involvement in the industry was therefore limited, mainly confined to granting concessions for power projects and price regulation based on cost-of-service principles.
- Further, belief in the philosophy of *laissez faire* initially developed in major industrialised countries, as a response to Industrial Revolution, urbanisation, and the

emergent industrial and financial interests in the mid-to-late 19th century. It received substantial support from the growing urban workers and professionals, whose existence and prosperity were closely linked to accelerated urbanisation and industrialisation.

- Later, this belief spread to several less-developed countries through the colonisation process. In this process, major industrialised countries divided the world into economic territories, either under their direct colonial rule, or subjected to their indirect political influence. *Laissez fair* policies in these territories were largely intended to facilitate free movements of capital and products between the core of industrialised countries and the periphery of less-developed countries.
- The colonisation process was driven by the needs and imperatives of major industrialised countries (which dominated the world politics over the period of late 19th century to the 1930s) namely, need to find markets for their surplus production capacity and capital, belief that market expansion (especially into the less-developed countries) was vital to their economic and social prosperity, and a feeling of cultural superiority.
- The global economic and political turbulence of the early-to-mid 20th century, caused by two World Wars, the Great Depression, the onset of cold war confrontation, and growing communist and leftist influence, provided the catalyst for the emergence of two schools of thought, namely, Keynesianism and Socialism. These schools of thought held the belief that *laissez faire* and private ownership were incapable of reviving the economic and social progress of the war-damaged economies. Rather, the government would have to be substantially involved to achieve such progress. Consistent with this belief, the governments around the world began to take lead in developing electricity industries. The configuration of the electricity industry in those times was accordingly typified by public ownership, vertically-integrated electric utilities, and tight government regulation.
- Further, this belief was strongly supported by a range of technological, economic, and geo-political interests. One, the electricity industry was widely considered as capital-intensive because to build large-scale power plants and long-distance high-voltage transmission lines required large investments. It was widely believed that investments of such magnitude could only be effectively financed by the

governments, because the government was the most creditworthy entity and was therefore able to borrow money at lowest rates.

Two, the electricity industry was widely considered as a 'natural monopoly'. This meant that a single company that integrated all components of electricity industry will be able to supply electricity at the lowest costs, as it will avoid wasteful duplication, especially of transmission and distribution networks. But the behaviour of this vertically-integrated electric utility will need to be tightly regulated by the government in order to prevent it from abusing its monopoly power.

Three, public investments in power projects were strongly encouraged by major power, especially, the United States, through different types of financial aid and international lending practices. This was further driven by the US's concern about its national security, which it even argued would be threatened if the Soviet Union captured or co-opted technology, industrial strength, and skilled labour of advanced industrialised countries (including, Western European countries and Japan), and natural resources of less developed countries. It was strongly believed by the US that the appeal of communism would be significantly reduced in these countries if their economic progress could be revived. Government interventionism, it was believed, was an effective way of achieving such progress.

- State interventionism in the electricity industry implied that the industry development was informed by the prevalent political objectives rather than considerations of economic efficiency and cost minimisation. These political objectives varied significantly across the countries, and were largely informed by the underlying interests of major socio-political players.
    - In the case of developed countries included in this research, these objectives essentially focused on creating a welfare society and ensuring full employment. Further, this focus was an outcome of a consensus in these countries between the labour and the business. The consensus was that the capitalist system should be maintained, but it must be modified with more active redistribution of income from capital to labour. In order to achieve these objectives, the electricity industries were expected to provide sufficient electricity to meet all reasonable public demand for electricity, and to procure domestic fuels to protect certain industries (coal) from international competition.

- In the case of Latin American countries (*e.g.*, Argentina, Brazil, and Chile), the post-war development prioritised import-substitution industrialisation, wealth re-distribution, welfare society, and employment creation. These priorities were reflective of the interests of the urban coalition (comprising industrialists, urban professionals, and workers), which assumed political leadership in the post-war period. Import-substitution industrialisation was expected to promote domestic industry, and create employment opportunities for urban professionals and factory workers. More equitable wealth distribution and better social welfare provisions was considered to be in the interest of factory workers, and was viewed by the industrialists as costs they needed to pay to obtain the loyalty of the workers.

  Consistent with these priorities, public electric utilities deliberately encouraged overinvestment in the electricity industry. They also hired more workers than needed, and paid them high salaries and generous welfare benefits than their productivity warranted. In addition, electricity price freezes were frequently used in the periods of high inflation that was largely considered in these countries as a threat to welfare society.

- In Southeast Asian countries (including, Thailand, Malaysia, and the Philippines), public electric utilities were largely used to support their industrialisation programs in the 1960s and 70s. This was mainly based on the World Bank's advice, and the interests of politically-connected domestic local business sectors. Beginning in the early 1970s, as a response to the growing communist movement in the region, and the increasing social mobilisation of the rural population, the governments in these countries began to accelerate rural electrification, as a means to win support from previously disadvantaged population, and to maintain political stability.

- In India, the socio-economic development orientation of the 1950s and 60s emphasised consensus building and industrialisation. This orientation was largely informed by Gandhism that was strongly critical of capitalism for its neglect of social aspects of development (*e.g.*, cooperation, social harmony, and poverty eradication). The practical guidance for this orientation essentially came

from Soviet Socialism that provided a scientific way for organising social and economic development, in line with Gandhism.

In accord with the Indian government's broader social and economic development orientation, the electricity industry was used as a tool to support country's industrialisation programs in the 1950s and 60s. In the 1970s, the Indian government began to put development priority on the agricultural sector, as a result of political change in the late 1960s, when mounting democratic activism by previously quiet social groups (particularly, the peasants) was observed. As a response, the government began to set lower electricity tariffs for agricultural consumers, even though the cost of serving remote rural areas was much higher.

- China's post-war socio-economic development orientation emphasised rapid industrialisation (especially focusing on heavy industry). This orientation was largely informed by the ruling Chinese Communist Party (CCP) and the Party's belief in Marxism. Electricity was viewed as a vital input to support country's massive industrialisation program. The Chinese government provided strong financial and material support to develop the electricity industry to achieve this objective.
- In some African countries (*e.g.,* Kenya and Mozambique), the governments promoted universal access to electricity, as part of their commitment to egalitarian development. This development was supported by a small group of nationalist leaders who intended to consolidate their political control, through winning the support of major social, ethnic and regional groups.
- In South Africa, the electricity industry was used as a vehicle for implementing the wider national development strategy, namely, of maintaining and reinforcing the economic and social privileges of white South Africa. As a result, the public electric utility was made responsible for supporting the country's industrialisation programs - largely controlled by the white population, and for providing electricity to the entire white population.

The above discussion shows that the governments around the world gradually realised the political appeal of the electricity in the 1940s, and started to actively intervene in the electricity industry, to support their development priorities including, for example, rapid

industrialisation, job creation, wealth re-distribution, and poverty reduction. These priorities essentially reflected the interests of key national socio-political players of the time. The use of electricity industry to promote these priorities in the post-war era (1940s to 1970s), this research argues, ingrained the interests behind these priorities into the foundations of the electricity industry. These interests have remained largely unchanged in the post-reform years (1980s to present). For example, sufficient and affordable electricity supply is still considered in the post-reform era as an important prerequisite for socio-economic progress. This, it is argued, will promote the interests of the poor (*i.e.*, poverty reduction). Contemporary electricity reform, however, has not fully satisfy these interests, because private investors have primarily been interested in commercially-viable investments. As a result, electricity reforms have showed strong path dependence, notably in the form of a continuation of frequent government interference in the industry, to satisfy these interests (*e.g.*, poverty reduction) as prevalent in the pre-reform era of 1950s to 70s. Some further discussion of this matter is as follows:

- The 1980s saw a gradual shift in world developmental ideals, away from the state-centric ideals of Embedded Liberalism and Socialism of the earlier years, towards Neoliberalism. This shift was assisted by several developments that affected the interests of major developed countries (especially, the United States and its allies), which dominated the world politics in the 1980s and 90s. These developments included: the end of post-war economic boom and the onset of economic recession; the need to revive economic growth in new economic circumstances typified, for example, by stagflation and increasing economic globalisation; a view that revival of economic growth in these circumstances can only be achieved by improving international competitiveness of the national economies; an argument that improving international competitiveness requires improvement in domestic competitiveness first; a strong belief that domestic competitiveness is best measured in terms of economic efficiency; and a faith that this efficiency can be best improved through recourse to free market principles.
- Besides, this shift (towards neoliberalism) was further supported by a lessening of the appeal of Keynesianism as the basis for economic policy in the new economic environment of the 1980s. At that time, rising unemployment was accompanied by

soaring inflation. Keynesianism was unable to explain this phenomenon because it assumed that the economy may either experience stagnation (and unemployment) or inflation. This contributed to the emergence of Neoliberalism as a guide for policy-making. According to neoliberal thinking, the economic recession of the 1970s and 80s was essentially attributable to excessive state intervention in the economy, and the elimination of such intervention, through market competition, privatisation and re-regulation, was accordingly considered as the means of reviving economic growth.

- In addition, the demise of the Soviet Union and the end of the Cold War in 1989 ended the battle of conflicting ideologies about how society should be organised. It apparently symbolised the triumph of capitalism over communism. This further contributed to the shift in global developmental ideal towards Neoliberalism.

- Major developed countries fully embraced economy-wide neoliberal reforms in the 1980s, indicating a fundamental shift in their developmental ideal towards Neoliberalism. The reform of the electricity industry was essentially undertaken as part of these economy-wide reforms. This reform accordingly included: a structural separation of generation, transmission, distribution and retail segments of the vertically integrated utilities; introduction of competition in generation and retail; development of non-discriminatory access arrangements for transmission and distribution; replacement of centralized state-directed regulatory arrangements with market-based arrangements; and privatization.

  This reform was given further immediacy by growing concerns in these countries about the inefficiencies of their electricity industries. These concerns were created by rising electricity prices, caused by the less-than-expected growth in electricity demand and the exhaustion of the economies-of-scale. These inefficiencies, it was widely believed, were due to guaranteed profits based on rate-of-return pricing regulation, lack of economic incentives for efficiency improvement, and excessive government intervention in the industry. Cost reduction, efficiency improvement, and elimination of government intervention in the industry therefore became the main motivations for reforming electricity industry in these countries.

  In addition, electricity reform (as part of the economy-wide reforms) in these countries was also assisted by declining political influence of labour organisations,

which had largely built their political strength on state-directed development of the 1950s and 60s and its associated benefits to labour (*e.g.*, full employment and social welfare provisions).

The economy-wide neoliberal reforms in these developed countries led to rapid economic growth in the 1990s, but also brought about some problems (*e.g.*, growing inequity). These problems, in turn, led to a re-thinking on neoliberal reforms in the late 1990s. It was also acknowledged that there existed market failures, and that to rectify these failures, government intervention may be needed. In accord with this thinking, electricity reforms were deepened, with strong emphasis on strengthening regulatory arrangements and market mechanisms, with the expectation that these changes would address some of the all-to-familiar failures in the electricity markets, such as, market power and lack of new investments.

- In many developing countries, the state-led development in the post-war years resulted in increased public debts. These debts became increasingly unmanageable in the early 1980s, due mainly to the end of post-war economic boom and its impact on government revenue, and changes in lending policies of World Bank/IMF that made the implementation of Structural Adjustment Programs (SAPs) preconditions for receiving financial assistance. Desperate for funds, these countries adopted the World Bank/IMF-supported SAPs. The SAPs were a set of economic measures, based on neoliberal principles, to transform the state-led economy into a market-oriented economy. In accord with their commitment to the World Bank/IMF, these countries began to implement the SAPs. Electricity reforms were implemented as part of these programs.

  Besides, electricity reforms were given further stimulus by the poor technical (*e.g.*, high network losses) and financial (*e.g.*, high debts) performance of the electricity industries in these countries. These performance problems were widely believed to have been caused by excessive government intervention in the electricity industry. Accordingly, the elimination of government intervention through privatisation, introduction of market competition and re-regulation was considered as the means of resolving these problems.

- But the progress of electricity reform varied significantly across these countries, driven by ideological, socio-economic and political considerations and beliefs held by the local socio-political players. For example:
  - In Latin American countries (Argentina, Brazil, and Chile), electricity reforms were implemented as part of their economy-wide reform programs. These economy-wide reforms were mainly undertaken by these countries to reduce their debt levels. As a result, the electricity industries of these countries were subject to radical privatisation and restructuring of public owned electric utilities.

    The economic-wide reform programs in these countries were strongly supported by large local companies. They were also supported by the poor who were promised active government efforts to reduce poverty. The main victims of these programs (mainly, inward-oriented industrialists and labour) also accepted these reforms with the belief that they would revive economic and social progress, and that they were only sacrificing short-term gains for long-term benefits.

    The debt crisis in several Latin American countries in the early 2000s however eroded the appeal of neoliberal reforms, especially among the workers and the poor. These groups demanded more active government intervention, especially in areas of employment creation, poverty reduction, and other social issues. The neoliberal reforms in these countries have however continued to receive support from influential local business leaders who usually hold important positions in the government. As a result, these countries have preserved most of the major elements of neoliberal reforms, but sought to improve the market with more government intervention. In the context of the electricity industry, this meant the introduction of regulated long-term contract auctions with the aim of delivering adequate investments for capacity expansion.
  - In the 1990s, limited reforms were implemented in the electricity industries of Southeast Asian countries, with specific emphasis on encouraging private investments in new generation capacity. This was largely in response to the chronic power shortages and concerns about the effect of these shortages on economic growth. In addition, a very significant proportion of these investments

were made by politically-connected local investors, who anticipated economic gains from increased export opportunities.

Several efforts to progress electricity reforms were made in these countries in the late 1990s. But these efforts failed to achieve concrete results, due to reduced pressure from the United States for further reform, which in turn was due to a change in US geo-strategic priorities in the Asian region; these priorities tended to overlook the lack of progress in promoting liberal political and economic changes. In addition, further reforms were strongly opposed by influential local business leaders who obstructed or sabotaged any attempt to deepen electricity reform if they felt it will threaten their economic interests.

- India implemented neoliberal reforms in a gradual way. This was reflective of the consensus building nature of Indian political decision-making process and conflicting interests involved in this process. As a result, electricity reforms were implemented in the country in a gradual manner. These reforms initially focused on encouraging investments in generation in the form of IPPs, with the aim of alleviating severe power shortages. Deeper reforms were also implemented in a few states, while limited progress was made in others. In the early 2000s, the federal government sought to consolidate electricity reforms undertaken at the state level by enacting the Electricity Act of 2003. This resulted in the establishment of a dual-market in the Indian electricity industry, reflecting conflicting interests involved in the reform process. On the one hand, the condition of SEBs remained largely unchanged because small consumers (especially farmers) strongly opposed any market reforms that would reduce the subsidies they received. On the other hand, large consumers (such as, industrial consumers) were allowed to build their own captive power or to purchase electricity from other private generators.
- Electricity reform in China initially focused on encouraging investments for capacity expansion. These investments predominantly came from public sources (non-central government) that were previously prohibited from investing in the electricity industry. This was consistent with the ruling CCP's belief that electricity is a critical infrastructure and plays important role in promoting the

country's developmental priority of improving living standard of the people and promoting rapid economic growth. It should therefore remain in public control.

Some further attempts were made in the early 2000s to introduce market competition in generation. But these efforts were stifled in 2003 when severe power shortages afflicted the country. The Chinese government felt that their main priority for the electricity industry (*e.g.*, ensure the provision of sufficient power supply to support economic growth and improvement in living standards) was threatened. The market reform was therefore halted and emphasis shifted to encouraging investments for capacity expansion.

- In African countries, electricity industry reforms were also implemented as part of their economy-wide reform programs. These programs were undertaken in response to deteriorating economic conditions, growing social unrest, and political instability. But political instability in these countries significantly reduced the capability of the governments to implement these reform programs. As a result, the progress of electricity reform has been quite slow. In response, the African countries began to re-evaluate their development orientation of the 1990s, as prompted by the Structural Adjustment Programs (SAPs). This culminated in the development of the New Partnership for Africa's Development (NEPAD). NEPAD is a regional initiative that aims to eradicate poverty and to promote sustainable economic and social development in African countries. In line with the NEPAD, four regional power pools have been established to facilitate greater cross-border trade.

Reasons for the disparity between expected and actual outcomes of reform

The institutional analysis (as noted above) revealed that electricity has a deep-rooted socio-political connection (also see, Sharma 2002). Key socio-political players, at both national and global levels, have therefore continually sought to shape the direction of electricity reform, with a view to pursue their interests (*e.g.*, economic expansion and social stability). In this pursuit, some political players have been well-organised and well-financed (*e.g.*, large business), and thus had more capacity to influence other players, by promising (through their control of the media) the prospect of a brighter economy. For example, neoliberal reforms were legitimised in many countries based on the argument that they reflect human's fundamental values of human dignity and

individual freedom, which are threatened by all forms of government intervention that substitutes collective choice for individual free choice. This argument was well received in many countries by the mass population (especially, the poor), in the backdrop of deteriorating economic and social conditions in the 1980s and rising social discontent with chronic poverty and rising inequality.

The electricity reforms however centred on viewing electricity as an economic commodity. These reforms therefore lost credibility as they are not informed by the underlying political interests and realities. As a result, reforms were implemented in most countries (especially, developing) on a fragile and limited political support; this support was primarily driven by a range of national (essentially debt crisis) and global pressures (*e.g.*, IMF's Structural Adjustment Programs). Key socio-political players in these countries therefore either simply accepted some elements of reform that they considered were in line with their interests, or supported reform based on ungrounded expectations that this reform (as part of the economy-wide neoliberal reform) would improve their economic and social conditions.

The reform has therefore progressed rather slowly, and the outcomes of reform have generally been sub-optimal. These outcomes, combined with the financial crisis in Asia and Latin America in the late 1990s, and external pressures for further reform, which were largely in conflict with the interests of major national socio-political players, contributed to the collapse of the fragile and limited political support for reform in these countries. This further delayed the implementation of electricity reform, and affected the outcomes.

It is clear that the reasons for the disparity between expected and actual outcomes of electricity reform are fundamental. They arise from the inherent contradiction between the nature of electricity as a political commodity and electricity reform viewing electricity as if it were an economic commodity (see also, Sharma 2004). Clearly, this contradiction has contributed to engender political resistance to reform, and consequently has contributed to diminish the efficacy of reform. Further, this political resistance has arisen from political interests that are well entrenched in the underlying political power structures. These political power structures change only slowly, and thus have a lasting grip on the direction and scope of institutional change processes in the electricity industry. This is so because powerful socio-political players endeavour to

maintain the status quo, with a view to protect their own benefits. It is in resolving this dichotomy between 'economic' and 'institutional' domain, this research argues, reside the path that could contribute to reducing the disparity between expected and actual outcomes of reform.

Suggestions to reduce the disparity between expected and actual outcomes of reform

This research demonstrated how an institutional perspective (underscored by an appreciation of influence of political power structures and associated interests) could be gainfully applied to develop policy guidance for designing reform that will contribute to redressing some of the emergent issues facing the electricity industry, and hence for reducing future disparity between expected and actual outcomes of reform.

Some current issues: An institutional perspective

The electricity industries worldwide are facing a variety of pressing issues. While some of these issues (*e.g.*, high GHG emissions from power generation) have emerged during the course of electricity reform, others (*e.g.*, highly politicised electricity subsidies) have existed for a long time, much before the introduction of contemporary electricity reform in the 1980s and 90s; they have largely remained unresolved until now. The true nature of these issues, this research argues, can be better understood by viewing them from an institutional perspective. This perspective attributes these issues to the institutional configurations of the electricity industry (structure, ownership and regulation). These configurations essentially reflect the prevalent political power structures and interests. For example:

- Recent years have seen growing environmental concerns, especially in the developed world, associated with rising GHG emissions from power generation. This issue can be attributed to the institutional configuration of the electricity industries that emphasises private ownership and market competition. This configuration encourages electricity companies use low-quality high-GHG-emitting coal for power generation, and to rehabilitate old less-efficient coal power plants, with the view to minimise short-run marginal costs of electricity. This configuration essentially reflects the business interests (of large corporations and business

associations) that are disproportionately represented in the political decision-making processes.

- In Latin America, electricity regulation lacks general credibility, and is subject to frequent government interventions. This has been legitimised by widespread social distrust about market reform, resulting from major economic failures.
- In Southeast Asian countries, the investment environment is unfavourable for private investors (especially, foreign), due to continuing governmental dominance of the industry. This dominance reflects the interests of politically well-connected domestic business leaders, who expect the governments to continue to dominate the industry, so as to protect their business interests. These business interests are deeply rooted in the underlying political power structures. In these structures, political elites offer profitable business opportunities to their favoured business leaders, who are then able to extend their control over the country's economy, and in turn, fund their political patrons to reinforce the political dominance.
- In India, electricity distribution companies have been frequently required by the state governments to provide electricity subsidies to rural consumers (especially, agricultural), with a view to gain their political support. These rural interests are well entrenched in the underlying political power structures. In these structures, political power is loosely distributed among several social groups. The political decision-making processes are therefore typified by lengthy consensus-building.
- Inefficient resource allocation is the main issue facing the electricity industry in China. This issue is primarily caused by the use of electricity industry to support the government's developmental priorities, namely, economic growth and improvement in people's living standards. These priorities essentially reflect the viewpoint of the ruling Chinese Communist Party: the Party's political legitimacy as defined by its ability to improve people's living standards; a strong belief that economic growth is the best means of achieving this improvement; and faith in state ownership and tight government control of strategically important sectors (including, electricity) as necessary institutions to promote economic growth.
- In African countries, the electricity industries have continued to perform poorly (*e.g.,* lack of investment, low electrification, and poor reliability), even after the

introduction of electricity reform. This is largely due to the lack of the depth of reform, caused by political instability, which has significantly reduced the capacity of the governments to implement reform. This political instability essentially reflects the underlying political power structures. In these structures, there is a wide range of social groups that attempt to influence political decision-making. The government have therefore become highly inefficient, as they have to accommodate a wide range of conflicting interests in their decision-making processes.

Existing approaches to redress these issues and their limitations

- Existing approaches to redress these issues have attributed them to the institutional arrangements for the electricity industry. Accordingly, these approaches suggest modifying the institutional arrangements of the electricity industry as a way of resolving these issues. These approaches – this research contends – are deficient, because they do not consider the influence on institutional arrangements of the electricity industry, of prevalent political power structures and associated interests that define the role of electricity in the larger socio-economic context of human lives. In fact, these reform approaches, as argued in Section 5.4, are often in conflict with prevalent political interests. Once such conflicts emerge, political resistance to reform becomes inevitable. This will obviously distort the efficacy of these reform approaches, and leaving the task of redressing the issues facing the industry largely unresolved. Hence, disparity between expected and actual outcomes of reform will emerge. It is therefore reasonable to argue that prerequisites for redressing these issues are: one, develop an appreciation of the influence of prevalent political power structures and associated interests on shaping the institutional arrangements for the electricity industry; and two, adopt more flexible approaches to reform to accommodate these interests.

Some thoughts on alternative approaches

- In developed countries, political opposition to renewable subsidies comes primarily from business interests associated with large-scale fossil fuel power plants. This research suggests that these fossil fuel power plants should be rewarded for reducing their output and hence GHG emissions. This could lead to a gradual phase off of old fossil fuel power plants, and create investment opportunities for renewables.

Growing uptake of renewable will in turn lead to lower GHG emissions from power generation.

- This research suggests that regional electricity market integration could be an alternative approach to persuade Latin American and Southeast Asian countries to implement necessary reforms to improve the investment environment in the industry. This is because regional electricity market integration will bring macro-level (*e.g.*, promotion of regional economic integration) and micro-level (*e.g.*, lower costs of electricity supply) benefits. The combination of these macro- and micro-level benefits, this research argues, would contribute to a gradual neutralisation of political resistance to reform, because a certain investment environment (less government intervention) is widely considered as a prerequisite for the realisation of these benefits.
- In India, this research suggests that electricity price reform should initially focus on urban areas, and gradually extend to rural areas. This is because electricity expenditures represent only a very small proportion of the budgets of urban residents (about 4 per cent in 2010). They are therefore more likely to accept the removal of electricity subsidies. Besides, the removal of electricity subsidies will improve the capacity of electricity companies to finance necessary capacity expansion and system maintenance. This will support country's industrialisation programs, which in turn will bring many benefits to the urban residents (such as, increased income). In addition, industrial development would also create attractive employment opportunities for the rural residents. This would gradually reduce the political bargaining power enjoyed by the agricultural sector, and pave the way for a gradual elimination of electricity subsidies in rural areas.
- Reform to improve resource allocation in the Chinese electricity industry should focus on improving the efficiency of industry regulation. It will support government's current development priorities (namely, social equity and environmental protection) by, for example, introducing and effectively enforcing tighter technical and economic regulation of electricity companies. It could also pave the way for introducing market competition and electricity price reforms, as robust regulatory arrangements could provide a solid base for an efficient

functioning of electricity markets. Besides, this reform is consistent with the Chinese Communist Party's belief in socialism.

- The reforms suggested by this research to redress the issues facing the electricity industries may also pose some challenges. These challenges are likely to arise due to a lack of understanding (by various interests) of the benefits and costs associated with these reforms. In response, this research suggests that all relevant socio-political players be involved in the design and implementation process of these reforms; this could provide them with the opportunities to develop a better understanding of the benefits and costs associated with reforms. This understanding will engender a cross-interest support for reform and contribute to redressing issues currently facing the electricity industries.

This research shows that the institutional configurations of the electricity industry are essentially reflective of prevalent political power structures and associated interests. These political power structures typically change slowly. This creates an institutional lock-in in the electricity industry, as powerful socio-political players try to block any amendments in the institutional configurations of the industry that they consider would threaten their interests. This perspective on electricity industry essentially makes electricity a political commodity, serving prevalent political interests. These political interests are driven by a wide range of cultural, ideological, socio-economic and political considerations and beliefs, held by dominant socio-political players. Contemporary electricity reform (as its attendant electricity industry configuration), which has tended to view electricity industry almost exclusively from an economic perspective, is therefore incapable of preventing the ever widening disparity between expectations from reform and its actual outcomes. This perspective (*i.e.*, exclusively economic), it is argued by this research, is also grossly deficient in shedding any light into the reasons for this disparity and hence means to reduce such disparity. It is in the resolution of this dichotomy between 'economic' and 'institutional' perspectives, this research has demonstrated, reside a way to reduce disparity between expectations and actual outcomes of reform.

6.2 Some recommendations for further research

This research has analysed electricity reform from an institutional perspective. This analysis has provided an in-depth understanding about the reasons for the disparity

between expected and actual outcomes of reform, and ways of reducing this disparity. However, there is still scope for further improvements in this analysis. Some suggestions include:

Approach

The approach proposed by this research to analyse institutional change processes in the electricity industry is essentially qualitative. It is based on a historical review of changes in institutional domain and their influence on shaping the institutional configurations of the electricity industries in 15 selected countries. This approach, this research contends, can be further complement by the application of quantitative approaches (*e.g.*, econometric), which would statistically analyse the correlation between influence, industry configurations, and actual outcomes. This analysis, this research further contends, could contribute to the development of more generalised platform for assessing the impact of institutional dimension of electricity reform.

Besides, the approach proposed in this research to analyse institutional change processes in the electricity industry largely focuses on political power structures at the national and global levels. It, this research argues, could be improved by incorporating the analysis of regional and local political power structures. The potency of this argument becomes evident if one takes note the fact that changes in the institutional configuration of the electricity industry are frequently shaped by political interests at the regional and local levels.

Scope

Though the proposed approach has been developed for analysing electricity reform, it could easily be adapted for analysing reforms in other infrastructure sectors, such as, water, gas, and railway.

Besides, suggestions made in Chapter 5 for improving the efficacy of electricity reforms are mainly a supplement to the main topic of this thesis, namely, development of an institutional perspective on electricity reform with the view to understand the reasons for the significant disparity between expected and actual outcomes of reform (Chapters 2 to 4). This chapter demonstrates, with the help of selected examples, the merits of developing an institutional perspective to define the contour of electricity reform and progress reform in ways that will reflect ever changing priorities and 'new' issues

facing the electricity industry, and society, more generally. The discussion on this chapter, this research suggests, sets a foundation for future research on the topic of improving the efficacy of reform.

Appendix A: Econometric model

Model specification

The econometric model used in this research draws from Erdogdu (2011), Erdogdu (2014) and Nagayama (2007). It is based on Ordinary Least Regression (OLR) model with the consideration of either fixed or random country-specific effects. The simplified regression models adopted in this research are presented in models (1) and (2).

$$Y_{it} = a_0 + a_1 X_{it} + a_2 C_{it} + Z_{it} + \varepsilon_{it} \quad (1)$$

Model (1) aims to assess the individual effects of reform steps on performance of the electricity industry. It specifies the performance indicator Y_{it}, as a function of reform variables X_{it}, control variables C_{it}, for country i and year t. Z_{it} denotes unobserved country-specific factors that are independent of electricity industry reforms but have important influences on shaping the performance of the electricity industry. a_0 and ε_{it} are constant term and normal errors, respectively.

$$Y_{it} = a_0 + a_1 (X_{it} \times X^*_{it}) + a_2 C_{it} + Z_{it} + \varepsilon_{it} \quad (2)$$

Model (2) aims to assess the simultaneous effects of several reform steps. It specifies the performance indicator Y_{it}, as a function of interaction between reform variables X_{it} and X^*_{it}, control variables C_{it}, for country i and year t. Same to model (1), Z_{it} denotes unobserved country-specific factors that are independent of electricity industry reforms but have important influences on shaping the performance of the electricity industry. a_0 and ε_{it} are constant term and normal errors, respectively.

The unobserved country-specific effects (Z_{it}) may be caused by country-specific factors including, for example, cultural background, energy endowment, climate and geographical location. These effects are included in this model because we are not sure whether control variables in our models capture all relevant characteristics of the countries, so that we cannot directly use an OLR model. If we were to do so, it would generate an omitted variable bias, and over- or under-estimate the effects of reform and control variables on performance of the electricity industry (Erdogdu 2011). Therefore, we try to include these effects in this model by using either fixed effects (FE) or random effects (RE) models. In FE model, these effects are assumed to be identical for each country, and to be time independent. In RE model, these effects are estimated as stochastic, arising from random causes. The validity of these two models in this

research will be tested by using Hausman test (Erdogdu 2011, Erdogdu 2014, Nagayama 2007).

Model variables

This section discusses the variables used in the econometric models employed in this research. The **performance variables** used in this research include, difference between actual and optimal reserve margins, capacity utilisation rates, and installed capacity per capita.

Reserve margin is calculated as the difference between installed capacity and peak demand, divided by peak demand. Electricity reforms were expected to deliver new investments in power generation to satisfy future demand in a more efficient way. As a result, the reserve margin would be maintained at a more optimal level to satisfy demand (Steiner 2001). Further, according to Steiner (2001), 15 per cent may be taken as the optimal reserve margin benchmark. Following this suggestion, this research also uses 15 per cent as the optimal reserve margin benchmark, to calculate the difference between actual and optimal reserve margins. The data on peak demand and installed capacity are obtained from the database of the International Energy Agency.

Capacity utilisation rates are measure of the intensity with which electricity industry uses its production capacity. Higher capacity utilisation rates imply higher efficiency of electricity production as many countries have rated capacity levels that are considerably higher than available capacity and higher utilisation rate should closely reflect improvements in availability. It is calculated as: Total electricity production in TWh / Total installed capacity in TW / 365×24 (Erdogdu 2011). The data on total electricity production and total installed capacity are obtained from the database of US Energy Information Administration.

Installed capacity per capita is calculated as installed capacity divided by total population. Data on installed capacity is obtained from the database of the US Energy Information Administration. Data on total population is compiled from database of the World Bank.

In this analysis, five **reform variables** are used to represent different aspects of electricity reforms. These variables include introduction of IPPs, privatisation, introduction of wholesale competition, introduction of retail competition, and creation

of independent regulator. The values of these variables are determined based on Table 9 in Appendix B. Dummy variables are used to analyse the impacts of these reform variables on the performance of electricity industry.

This research also incorporates a number of **control variables** in the econometric models. These variables are independent of the reform variables; but have important influences on the performance of the electricity industry. For example, capacity utilisation rates are assumed to be strongly influenced by GDP per capita, because high GDP per capita implies high demand for electricity, and thus high capacity utilisation rates. In addition, industrial value added is also assumed to have important influences on capacity utilisation rates. This is because large industrial output implies high demand for electricity. This would consequently increase the utilisation rate of generation capacity.

Similarly, the variable of installed capacity per capita is assumed to be influenced by GDP per capita. Because high GDP per capita usually indicates rapid economic growth and thus higher electricity demand. As a result, more capacity is needed to satisfy such a demand. In addition, industry value added is also assumed to have important influences on the installed capacity per capita, because industrial sector is the major electricity consumer in the economy. A rapid development in the sector would accordingly lead to high installed capacity per capita.

Data for variables used in the econometric analysis conducted in this research are presented in Appendix B.

Appendix B: Data sets for the econometric analysis conducted in this research

This appendix provides the data used in this research to assess the impact of electricity reforms. It contains the following tables:

Table 1: Installed capacity (GW)

Table 2: Electricity production (TWh)

Table 3: Capacity utilisation rates

Table 4: Peak electricity demand (GW)

Table 5: Difference between actual to optimal reserve margins

Table 6: Installed capacity per capita (MW per 000)

Table 7: GDP per capita (2005 thousand USD per person)

Table 8: Industry value added as a percentage of GDP (%)

Table 9: Introduction periods of various reform steps

Table 1: Installed capacity (GW)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Developed countries	Australia	24	26	28	29	31	33	33	34	35	35	35	35	36	37	38	39	39	40	41	43	43	44	47	47	47	47	47	49	51	53	56
	Canada	79	82	84	87	93	94	97	99	96	97	105	106	109	109	113	114	115	112	109	110	111	112	114	119	120	122	123	126	127	135	137
	Denmark	7	8	8	8	8	8	9	8	8	9	9	9	10	10	10	11	10	11	11	11	12	12	12	12	12	12	12	12	12	13	13
	Finland	10	9	10	10	10	10	10	10	10	11	11	11	12	12	12	12	12	13	14	14	14	14	14	14	14	14	14	14	14	14	14
	France	64	71	74	78	85	87	92	98	101	100	103	104	105	108	107	108	110	114	113	115	115	116	117	117	117	116	116	117	118	119	124
	Germany	68	70	71	73	75	79	81	82	83	85	84	101	99	99	98	100	100	100	99	99	108	110	116	115	114	114	122	124	129	136	146
	Japan	144	150	155	159	163	169	174	179	182	186	195	200	206	213	221	228	234	243	251	255	260	264	268	271	275	277	279	279	281	284	287
	Netherlands	17	18	17	17	17	17	17	17	17	17	18	18	17	18	18	19	20	20	20	21	21	20	21	21	22	22	23	24	25	26	27
	New Zealand	6	6	6	6	7	7	7	7	7	7	7	7	8	8	8	8	7	8	8	9	8	8	8	8	9	9	9	9	9	9	9
	Norway	17	19	20	21	21	21	22	23	23	25	25	24	24	24	24	26	26	26	25	26	26	26	27	27	28	28	28	29	29	30	30
	Sweden	27	29	30	31	28	31	31	31	31	32	32	33	33	33	33	32	33	33	32	33	33	33	31	32	33	32	33	33	33	34	35
	United Kingdom	68	65	65	62	63	64	63	64	66	70	69	66	63	64	65	66	69	68	68	70	72	73	70	72	73	74	75	77	78	79	86
	United States	626	641	650	655	672	656	665	674	678	685	690	693	695	700	703	706	710	712	687	647	621	819	876	919	933	949	956	966	981	996	1,009
Latin America countries	Argentina	13	13	14	15	16	16	17	17	17	17	17	17	17	18	19	20	21	22	23	23	26	27	28	28	28	28	28	29	31	32	33
	Bolivia	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2
	Brazil	33	38	40	41	42	44	45	48	50	52	53	54	55	56	58	59	62	63	65	68	74	76	82	87	91	93	97	100	104	106	114
	Chile	3	3	3	3	4	4	4	4	4	4	4	5	5	5	6	6	8	8	9	9	10	10	11	11	12	13	13	13	14	16	16
	Colombia	5	5	6	6	7	7	7	9	9	9	9	10	11	12	13	13	14	15	13	13	13	13	14	13	13	13	13	13	13	14	14
	Paraguay	0	0	0	1	1	2	3	4	5	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8	8	8	9	9
	Peru	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5	6	6	6	6	6	6	6	6	7	7	7	8	9
	Uruguay	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
	Venezuela	9	10	11	12	16	18	19	17	19	19	19	19	19	19	19	19	21	22	22	21	21	21	21	21	22	22	22	23	23	25	24

Sources: US Energy Information Administration database

Table 1: Installed capacity (GW) (cont.)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Asian countries	China	66	69	72	76	80	87	94	103	115	127	138	151	167	184	201	219	239	257	281	303	325	345	364	398	449	525	631	726	807	891	988
	India	34	37	40	44	49	53	56	61	67	72	75	78	82	87	92	95	97	100	104	109	112	123	127	132	139	148	156	169	177	189	208
	Bangladesh	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3	3	4	4	4	5	5	5	5	5	5	5	6	6
	Pakistan	4	4	5	5	7	7	7	8	8	8	8	8	9	11	11	12	13	15	16	17	18	18	18	19	19	19	19	19	20	21	22
	Sri Lanka	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
	Cambodia	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.09	0.09	0.11	0.12	0.13	0.15	0.17	0.19	0.19	0.23	0.34	0.39	0.38	0.37	0.36
	Indonesia	5	6	6	7	8	9	10	11	12	13	13	13	14	16	16	16	17	20	23	22	22	23	23	26	26	28	31	32	31	33	35
	Malaysia	3	3	3	4	4	4	5	5	5	5	5	6	7	7	9	11	13	14	14	13	14	15	16	20	24	23	23	23	23	25	25
	Philippines	5	5	6	6	6	6	7	7	7	7	7	7	7	8	9	10	11	12	12	12	13	13	15	15	16	16	16	16	16	16	16
	Thailand	5	5	6	7	8	8	8	8	9	9	10	11	13	14	16	18	19	21	22	24	28	29	30	31	38	34	30	37	41	47	48
	Vietnam	1	1	1	1	1	2	2	2	2	2	2	2	3	3	4	4	5	5	6	6	6	8	9	9	12	12	13	14	15	15	15
African countries	Cameroon	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.9	1.1	1.1	1.1	1.0	0.9	0.9	0.9	1.0	1.0
	Kenya	0.5	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.4	1.4	1.3	1.7	1.7	1.8
	Mali	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Mozambique	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.5	2.4	2.4	2.4
	South Africa	21	24	24	25	25	24	27	30	31	32	34	36	37	38	36	38	37	39	39	41	46	42	42	42	42	42	43	43	44	44	44
	Uganda	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5
	Zambia	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8

Sources: US Energy Information Administration database

Table 2: Electricity production (TWh)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Developed countries	Australia	85	90	91	92	98	105	109	116	121	128	138	141	143	148	151	156	160	165	175	181	187	199	197	189	196	195	199	205	207	213	216
	Canada	368	380	378	397	427	448	458	484	491	485	469	494	506	518	540	544	558	558	546	563	588	572	584	572	582	608	596	620	623	597	591
	Denmark	25	18	22	21	20	26	29	28	26	21	24	34	29	32	38	35	51	42	39	37	34	36	37	44	39	35	43	38	35	35	37
	Finland	27	29	30	31	32	34	34	37	37	36	35	38	37	39	41	39	44	43	41	42	41	44	43	51	52	40	49	49	46	43	47
	France	250	262	265	280	306	324	342	356	371	384	396	429	438	447	453	468	483	477	482	495	510	520	526	534	541	543	541	536	541	505	537
	Germany	348	353	357	366	390	407	408	416	430	441	431	426	428	420	424	429	454	451	457	461	493	504	512	492	469	479	481	498	500	464	492
	Japan	547	546	554	587	618	638	644	694	725	764	813	840	849	856	911	936	955	985	991	997	990	972	990	982	1,010	1,030	1,036	1,061	1,017	989	1,052
	Netherlands	63	62	58	57	60	60	64	65	66	70	68	70	73	72	75	76	80	80	85	81	84	88	90	91	97	95	93	99	102	107	112
	New Zealand	22	23	24	26	27	27	28	28	29	30	31	32	31	32	33	34	34	34	34	34	35	35	37	36	38	38	39	39	39	40	41
	Norway	72	81	81	93	93	90	85	91	96	106	108	95	100	106	98	108	92	97	104	108	127	108	124	101	105	131	115	130	135	122	113
	Sweden	78	88	88	98	112	121	123	131	132	130	133	132	131	130	126	131	123	133	145	141	133	148	132	120	136	143	127	131	132	118	126
	United Kingdom	249	243	239	244	249	262	264	265	269	274	281	283	282	283	287	294	310	308	316	320	323	336	334	342	336	337	335	337	332	320	326
	United States	2,286	2,295	2,241	2,310	2,416	2,470	2,487	2,572	2,704	2,780	2,802	2,829	2,790	2,880	2,911	2,999	3,083	3,087	3,184	3,240	3,468	3,411	3,538	3,561	3,659	3,754	3,775	3,861	3,839	3,678	3,840
Latin America countries	Argentina	42	40	41	42	44	44	47	50	49	48	46	49	54	59	61	65	67	70	71	77	85	87	81	88	96	101	111	111	116	117	120
	Bolivia	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	4	4	4	4	4	4	4	5	5	6	6	6	7
	Brazil	138	140	150	160	178	191	199	200	212	218	220	231	239	249	257	272	288	304	318	330	343	323	340	359	381	396	413	438	455	459	507
	Chile	12	12	12	13	13	14	15	16	17	18	20	20	22	23	24	29	31	33	35	37	40	41	42	45	49	51	54	56	58	59	58
	Colombia	20	20	26	27	29	30	33	31	33	34	36	36	33	38	41	43	44	45	45	43	42	42	44	46	49	49	53	54	55	56	55
	Paraguay	1	1	1	1	1	4	12	19	20	24	27	29	27	31	36	42	45	50	50	51	53	45	48	51	51	51	53	53	55	54	54
	Peru	10	11	11	11	12	12	13	14	13	13	13	14	13	15	14	16	17	18	18	19	20	20	22	22	24	25	27	29	32	32	33
	Uruguay	3	4	3	7	7	7	7	7	7	6	7	7	9	8	8	6	7	7	10	7	7	9	10	9	6	8	5	9	9	9	11
	Venezuela	32	36	38	42	43	46	48	52	56	56	58	62	66	68	69	72	74	76	79	79	83	88	87	89	96	101	108	112	116	117	115

Sources: US Energy Information Administration database

Table 2: Electricity production (TWh) (cont.)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Asian countries	China	285	294	312	335	359	391	427	472	518	556	590	643	716	796	880	956	1,005	1,070	1,104	1,172	1,281	1,427	1,585	1,810	2,104	2,370	2,718	3,091	3,281	3,508	3,904
	India	119	131	139	145	162	175	192	208	229	255	275	300	316	339	366	396	413	441	471	505	530	549	564	600	630	661	712	772	797	855	904
	Bangladesh	3	3	3	4	4	5	5	6	6	7	8	8	9	9	10	10	11	11	12	14	15	16	18	19	23	25	28	30	33	36	40
	Pakistan	15	16	20	22	25	26	29	32	37	39	36	40	46	45	52	52	52	58	60	62	63	69	72	77	81	90	94	91	88	91	90
	Sri Lanka	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4	5	4	5	6	6	6	7	7	7	8	9	8	10	9	9	10
	Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Indonesia	13	15	18	18	20	26	30	32	37	37	43	46	49	52	58	57	64	73	75	81	89	96	103	108	114	121	126	135	142	149	161
	Malaysia	10	11	11	13	14	15	15	16	18	21	24	27	28	33	37	43	49	55	57	62	66	67	70	75	78	78	85	92	92	110	118
	Philippines	17	17	18	20	20	22	21	21	23	25	25	24	23	24	29	32	35	38	40	40	44	45	47	51	54	54	55	57	58	59	65
	Thailand	14	15	16	19	21	23	25	28	32	37	44	47	54	60	67	76	83	83	82	85	90	96	102	109	117	123	129	132	136	137	145
	Vietnam	4	4	4	5	5	5	5	6	6	8	8	9	9	10	12	14	17	19	21	23	26	30	35	39	44	51	58	64	70	80	91
African countries	Cameroon	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	4	4	4	5	5	6	6	6
	Kenya	2	2	2	2	2	3	2	3	3	3	3	3	3	4	4	4	4	4	5	4	4	5	5	5	5	6	6	7	7	7	7
	Mali	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Mozambique	14	3	3	5	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	8	10	12	13	11	12	13	15	16	15	17	16
	South Africa	93	107	112	114	127	133	138	142	148	153	156	159	157	163	171	176	186	195	191	188	196	196	203	217	228	228	235	245	238	232	242
	Uganda	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
	Zambia	9	10	10	10	10	10	10	8	8	7	8	8	8	8	8	8	7	8	8	8	8	8	8	8	8	9	10	10	10	10	11

Sources: US Energy Information Administration database

Table 3: Capacity utilisation rates[1]

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Developed countries	Australia	0.40	0.40	0.37	0.37	0.36	0.37	0.38	0.38	0.40	0.42	0.45	0.46	0.46	0.46	0.45	0.46	0.46	0.47	0.49	0.49	0.50	0.51	0.48	0.46	0.48	0.48	0.49	0.47	0.47	0.46	0.44
	Canada	0.53	0.53	0.51	0.52	0.52	0.54	0.54	0.56	0.58	0.57	0.51	0.53	0.53	0.54	0.55	0.55	0.55	0.57	0.57	0.58	0.61	0.58	0.58	0.55	0.56	0.57	0.55	0.56	0.56	0.50	0.49
	Denmark	0.41	0.28	0.33	0.31	0.28	0.35	0.39	0.37	0.35	0.28	0.31	0.42	0.34	0.36	0.43	0.37	0.55	0.43	0.39	0.37	0.33	0.34	0.35	0.41	0.36	0.32	0.40	0.35	0.32	0.31	0.33
	Finland	0.32	0.35	0.36	0.36	0.38	0.40	0.38	0.41	0.41	0.37	0.35	0.38	0.37	0.37	0.39	0.36	0.40	0.36	0.34	0.34	0.34	0.36	0.35	0.41	0.42	0.32	0.40	0.39	0.37	0.35	0.38
	France	0.45	0.42	0.41	0.41	0.41	0.43	0.42	0.42	0.42	0.44	0.44	0.47	0.47	0.47	0.48	0.50	0.50	0.48	0.49	0.49	0.51	0.51	0.51	0.52	0.53	0.54	0.53	0.52	0.52	0.48	0.49
	Germany	0.59	0.58	0.57	0.58	0.59	0.59	0.57	0.58	0.59	0.60	0.58	0.48	0.49	0.49	0.49	0.49	0.52	0.52	0.53	0.53	0.52	0.52	0.50	0.49	0.47	0.48	0.45	0.46	0.44	0.39	0.39
	Japan	0.43	0.42	0.41	0.42	0.43	0.43	0.42	0.44	0.46	0.47	0.48	0.48	0.47	0.46	0.47	0.47	0.47	0.46	0.45	0.45	0.43	0.42	0.42	0.41	0.42	0.42	0.42	0.43	0.41	0.40	0.42
	Netherlands	0.42	0.40	0.38	0.38	0.41	0.40	0.42	0.43	0.43	0.46	0.44	0.46	0.47	0.47	0.47	0.46	0.45	0.46	0.48	0.45	0.46	0.49	0.50	0.50	0.51	0.50	0.46	0.48	0.47	0.47	0.48
	New Zealand	0.43	0.45	0.48	0.46	0.44	0.41	0.43	0.44	0.45	0.48	0.49	0.51	0.47	0.49	0.50	0.51	0.52	0.51	0.51	0.45	0.50	0.49	0.50	0.50	0.51	0.51	0.52	0.49	0.49	0.49	0.50
	Norway	0.47	0.48	0.46	0.52	0.51	0.48	0.43	0.45	0.47	0.49	0.50	0.45	0.47	0.50	0.47	0.48	0.40	0.43	0.47	0.48	0.56	0.48	0.52	0.42	0.43	0.53	0.47	0.51	0.52	0.47	0.44
	Sweden	0.32	0.34	0.34	0.36	0.45	0.45	0.46	0.49	0.48	0.46	0.47	0.46	0.46	0.45	0.44	0.47	0.43	0.46	0.51	0.49	0.46	0.51	0.48	0.42	0.47	0.50	0.44	0.45	0.46	0.40	0.41
	United Kingdom	0.42	0.43	0.42	0.45	0.45	0.47	0.48	0.47	0.47	0.45	0.46	0.49	0.51	0.50	0.51	0.51	0.51	0.51	0.53	0.52	0.51	0.52	0.54	0.54	0.52	0.52	0.51	0.50	0.48	0.46	0.43
	United States	0.42	0.41	0.39	0.40	0.41	0.43	0.43	0.44	0.46	0.46	0.46	0.47	0.46	0.47	0.47	0.48	0.50	0.50	0.53	0.57	0.64	0.48	0.46	0.44	0.45	0.45	0.45	0.46	0.45	0.42	0.43
Latin America countries	Argentina	0.37	0.34	0.33	0.31	0.31	0.31	0.33	0.35	0.33	0.32	0.31	0.32	0.35	0.37	0.36	0.37	0.37	0.37	0.35	0.38	0.38	0.36	0.33	0.35	0.39	0.41	0.45	0.44	0.43	0.42	0.42
	Bolivia	0.35	0.36	0.33	0.40	0.36	0.36	0.36	0.28	0.35	0.35	0.34	0.37	0.37	0.35	0.38	0.40	0.43	0.38	0.38	0.32	0.32	0.36	0.33	0.36	0.35	0.39	0.41	0.42	0.44	0.44	0.45
	Brazil	0.47	0.42	0.43	0.45	0.49	0.49	0.51	0.48	0.49	0.48	0.47	0.49	0.49	0.51	0.51	0.53	0.53	0.55	0.56	0.55	0.53	0.48	0.47	0.47	0.48	0.49	0.49	0.50	0.50	0.49	0.51
	Chile	0.42	0.41	0.41	0.43	0.39	0.40	0.42	0.44	0.47	0.49	0.52	0.45	0.48	0.49	0.47	0.52	0.46	0.48	0.45	0.46	0.46	0.45	0.46	0.47	0.47	0.46	0.48	0.49	0.47	0.43	0.41
	Colombia	0.48	0.47	0.53	0.49	0.49	0.48	0.55	0.41	0.40	0.45	0.46	0.43	0.34	0.35	0.37	0.39	0.37	0.35	0.40	0.37	0.38	0.36	0.36	0.39	0.41	0.42	0.45	0.46	0.47	0.47	0.47
	Paraguay	0.36	0.31	0.28	0.15	0.08	0.29	0.40	0.48	0.42	0.47	0.48	0.51	0.47	0.54	0.63	0.69	0.72	0.77	0.77	0.79	0.81	0.69	0.73	0.79	0.79	0.78	0.75	0.75	0.77	0.70	0.69
	Peru	0.35	0.36	0.38	0.35	0.38	0.37	0.38	0.40	0.38	0.37	0.36	0.38	0.35	0.38	0.37	0.41	0.42	0.40	0.37	0.38	0.37	0.39	0.41	0.43	0.45	0.46	0.46	0.47	0.51	0.46	0.44
	Uruguay	0.39	0.29	0.30	0.64	0.63	0.51	0.58	0.59	0.46	0.38	0.50	0.45	0.50	0.44	0.39	0.33	0.34	0.37	0.52	0.37	0.39	0.48	0.50	0.45	0.30	0.42	0.28	0.44	0.39	0.39	0.46
	Venezuela	0.40	0.41	0.40	0.38	0.31	0.29	0.29	0.34	0.35	0.34	0.35	0.37	0.40	0.41	0.42	0.43	0.41	0.40	0.42	0.42	0.45	0.47	0.48	0.50	0.50	0.52	0.55	0.57	0.58	0.54	0.55

Note 1: Capacity utilisation rates = Electricity production (MW) ÷ (Installed Capacity (MW) × 24 × 365)

Source: Calculated by the author using the formula noted above.

Table 3: Capacity utilisation rates (cont.)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Asian countries	China	0.49	0.49	0.49	0.50	0.51	0.51	0.52	0.52	0.51	0.50	0.49	0.49	0.49	0.49	0.50	0.50	0.48	0.48	0.45	0.44	0.45	0.47	0.50	0.52	0.53	0.52	0.49	0.49	0.46	0.45	0.45
	India	0.40	0.41	0.40	0.37	0.38	0.38	0.39	0.39	0.39	0.41	0.42	0.44	0.44	0.44	0.45	0.47	0.48	0.51	0.52	0.53	0.54	0.51	0.51	0.52	0.52	0.51	0.52	0.52	0.51	0.52	0.50
	Bangladesh	0.31	0.34	0.38	0.38	0.36	0.40	0.40	0.34	0.32	0.32	0.35	0.36	0.38	0.36	0.38	0.36	0.37	0.39	0.40	0.43	0.47	0.52	0.43	0.45	0.56	0.61	0.61	0.64	0.69	0.71	0.78
	Pakistan	0.44	0.43	0.47	0.52	0.43	0.44	0.44	0.47	0.53	0.54	0.54	0.54	0.56	0.49	0.53	0.49	0.46	0.45	0.43	0.41	0.41	0.44	0.46	0.46	0.48	0.53	0.56	0.53	0.51	0.50	0.46
	Sri Lanka	0.36	0.37	0.40	0.29	0.27	0.26	0.28	0.25	0.25	0.25	0.28	0.27	0.23	0.29	0.32	0.35	0.32	0.33	0.36	0.39	0.35	0.34	0.35	0.38	0.39	0.42	0.39	0.45	0.38	0.40	0.43
	Cambodia	0.27	0.29	0.35	0.33	0.31	0.35	0.38	0.41	0.44	0.47	0.39	0.30	0.29	0.28	0.26	0.38	0.39	0.41	0.37	0.38	0.41	0.39	0.47	0.44	0.46	0.45	0.37	0.42	0.41	0.36	0.30
	Indonesia	0.28	0.30	0.31	0.29	0.29	0.35	0.35	0.34	0.35	0.33	0.38	0.40	0.40	0.37	0.41	0.40	0.43	0.41	0.38	0.42	0.45	0.48	0.51	0.47	0.49	0.49	0.46	0.49	0.52	0.51	0.52
	Malaysia	0.38	0.40	0.40	0.39	0.39	0.41	0.38	0.39	0.43	0.48	0.54	0.51	0.47	0.55	0.47	0.46	0.44	0.46	0.48	0.55	0.55	0.51	0.51	0.42	0.36	0.38	0.43	0.46	0.45	0.49	0.53
	Philippines	0.43	0.40	0.37	0.38	0.37	0.39	0.37	0.36	0.38	0.41	0.41	0.37	0.35	0.34	0.36	0.38	0.36	0.37	0.38	0.37	0.38	0.38	0.36	0.38	0.39	0.40	0.39	0.41	0.42	0.43	0.45
	Thailand	0.34	0.34	0.32	0.31	0.31	0.34	0.35	0.40	0.43	0.50	0.49	0.49	0.47	0.48	0.49	0.48	0.50	0.46	0.43	0.40	0.36	0.38	0.39	0.41	0.35	0.41	0.50	0.41	0.38	0.33	0.34
	Vietnam	0.38	0.41	0.43	0.44	0.39	0.38	0.37	0.37	0.39	0.44	0.45	0.45	0.37	0.35	0.34	0.37	0.41	0.43	0.42	0.46	0.47	0.41	0.46	0.50	0.43	0.48	0.52	0.52	0.55	0.60	0.68
African countries	Cameroon	0.39	0.39	0.41	0.40	0.40	0.43	0.43	0.43	0.47	0.49	0.49	0.49	0.49	0.49	0.50	0.39	0.41	0.43	0.44	0.47	0.49	0.46	0.35	0.39	0.43	0.44	0.62	0.63	0.68	0.63	0.65
	Kenya	0.33	0.38	0.40	0.49	0.48	0.53	0.48	0.51	0.47	0.48	0.45	0.48	0.48	0.51	0.51	0.57	0.60	0.58	0.60	0.48	0.44	0.46	0.47	0.48	0.48	0.47	0.50	0.59	0.46	0.45	0.47
	Mali	0.14	0.14	0.18	0.20	0.23	0.22	0.26	0.28	0.31	0.32	0.32	0.33	0.36	0.33	0.28	0.31	0.33	0.38	0.39	0.39	0.24	0.18	0.16	0.18	0.18	0.19	0.19	0.20	0.20	0.19	0.20
	Mozambique	0.86	0.22	0.20	0.33	0.04	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.07	0.37	0.46	0.56	0.61	0.53	0.57	0.63	0.70	0.73	0.70	0.79	0.78
	South Africa	0.52	0.51	0.53	0.53	0.57	0.62	0.59	0.55	0.54	0.54	0.53	0.50	0.49	0.50	0.54	0.53	0.58	0.57	0.55	0.52	0.48	0.53	0.55	0.59	0.62	0.62	0.63	0.65	0.61	0.60	0.62
	Uganda	0.44	0.36	0.40	0.36	0.43	0.45	0.45	0.43	0.41	0.48	0.54	0.55	0.69	0.68	0.71	0.62	0.67	0.54	0.55	0.52	0.63	0.58	0.63	0.66	0.71	0.72	0.45	0.56	0.49	0.51	0.51
	Zambia	0.65	0.70	0.71	0.71	0.71	0.71	0.70	0.61	0.61	0.46	0.52	0.52	0.52	0.52	0.52	0.53	0.48	0.53	0.51	0.52	0.52	0.53	0.55	0.56	0.56	0.59	0.66	0.65	0.64	0.65	0.70

Note 1: Capacity utilisation rates = Electricity production (MW) ÷ (Installed Capacity (MW) × 24 × 365)

Source: Calculated by the author using the formula noted above.

Table 4: Peak demand (GW)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Developed countries	Australia	15	16	16	19	19	21	21	22	22	24	25	28	29	29	30	30	31	31	31	32	34	35	35	35	36	38	39	40	41	43	42
	Denmark	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6	7	6	6	6	6	6	6	6	6	6	6	6	6
	Finland	8	8	8	8	9	9	10	9	10	10	10	10	10	11	11	11	11	12	13	12	12	13	14	14	14	13	15	15	14	13	15
	France	46	47	47	48	47	60	58	62	57	60	63	68	64	70	67	67	70	69	69	72	72	77	77	83	81	86	86	89	89	92	97
	Germany	52	53	53	51	52	56	55	58	58	59	62	74	73	73	71	71	71	74	72	74	75	75	75	76	76	77	78	78	77	76	76
	Japan	87	92	97	102	107	110	111	114	121	127	144	149	154	145	167	171	168	168	168	169	173	182	180	167	174	178	175	179	179	159	178
	Netherlands	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	11	13	14	15	15	15	15	15	15	15	15	15	15	14	17	17
	New Zealand	3	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	6	6	6	6	6	6	6	6	6	6	6	6
	Norway	14	15	16	15	17	17	17	18	18	18	17	19	18	19	20	20	22	20	20	20	20	21	21	20	21	21	22	22	22	22	24
	Sweden	21	21	21	21	21	24	22	24	24	24	22	23	24	24	24	24	26	25	25	26	26	27	26	26	27	26	26	26	24	25	26
	United Kingdom	48	48	49	49	49	53	52	55	54	53	54	54	52	55	52	56	57	57	56	58	58	59	62	61	61	62	59	62	60	60	61
	United States	396	397	413	429	445	461	477	496	529	523	546	551	549	549	586	620	620	660	660	682	678	576	715	709	704	759	789	782	752	726	768

Source: International Energy Agency database

Table 5: Difference between actual and optimal reserve margins[1,2]

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Developed countries	Australia	0.43	0.50	0.55	0.35	0.48	0.40	0.40	0.43	0.41	0.33	0.27	0.10	0.09	0.11	0.14	0.15	0.13	0.15	0.16	0.18	0.12	0.13	0.18	0.18	0.14	0.07	0.04	0.09	0.10	0.08	0.18
	Denmark	0.33	0.43	0.45	0.41	0.46	0.41	0.39	0.24	0.29	0.34	0.40	0.44	0.54	0.50	0.53	0.54	0.50	0.56	0.60	0.61	0.73	0.73	0.78	0.77	0.83	0.81	0.79	0.78	0.81	0.90	0.89
	Finland	0.10	0.08	0.10	0.11	-0.04	-0.04	-0.14	-0.08	-0.11	-0.09	-0.03	-0.05	-0.04	-0.07	-0.02	-0.04	-0.05	-0.05	-0.09	-0.03	-0.04	-0.10	-0.11	-0.15	-0.11	-0.11	-0.20	-0.19	-0.12	-0.11	-0.17
	France	0.25	0.37	0.41	0.46	0.64	0.29	0.44	0.42	0.63	0.53	0.48	0.39	0.49	0.39	0.45	0.46	0.43	0.51	0.48	0.44	0.44	0.36	0.38	0.25	0.29	0.20	0.19	0.16	0.17	0.14	0.14
	Germany	0.16	0.16	0.19	0.27	0.29	0.24	0.34	0.26	0.28	0.29	0.20	0.21	0.21	0.21	0.23	0.26	0.26	0.20	0.23	0.19	0.30	0.32	0.40	0.36	0.34	0.33	0.42	0.43	0.53	0.64	0.76
	Japan	0.50	0.48	0.44	0.41	0.38	0.39	0.42	0.41	0.35	0.31	0.20	0.19	0.19	0.32	0.17	0.18	0.25	0.30	0.34	0.36	0.36	0.30	0.34	0.47	0.43	0.41	0.44	0.41	0.42	0.64	0.46
	Netherlands	0.88	0.87	0.78	0.72	0.60	0.62	0.57	0.53	0.59	0.52	0.48	0.47	0.50	0.46	0.55	0.55	0.37	0.31	0.19	0.22	0.25	0.20	0.23	0.23	0.28	0.28	0.39	0.45	0.63	0.38	0.37
	New Zealand	0.53	0.38	0.24	0.26	0.28	0.43	0.40	0.40	0.29	0.25	0.25	0.23	0.32	0.30	0.31	0.32	0.22	0.21	0.26	0.40	0.31	0.28	0.28	0.31	0.27	0.26	0.20	0.27	0.31	0.28	0.34
	Norway	0.08	0.09	0.09	0.20	0.07	0.07	0.19	0.11	0.18	0.19	0.28	0.14	0.20	0.10	0.07	0.11	0.04	0.17	0.10	0.12	0.13	0.10	0.17	0.22	0.18	0.21	0.16	0.19	0.21	0.20	0.08
	Sweden	0.17	0.26	0.27	0.32	0.22	0.12	0.25	0.12	0.17	0.17	0.33	0.28	0.22	0.20	0.20	0.17	0.10	0.17	0.15	0.13	0.11	0.07	0.07	0.08	0.05	0.11	0.11	0.11	0.23	0.22	0.20
	United Kingdom	0.26	0.19	0.19	0.13	0.14	0.05	0.05	0.00	0.08	0.17	0.13	0.06	0.08	0.02	0.09	0.03	0.07	0.05	0.06	0.06	0.08	0.10	-0.01	0.03	0.05	0.05	0.12	0.10	0.15	0.17	0.26
	United States	0.43	0.46	0.42	0.38	0.36	0.27	0.24	0.21	0.13	0.16	0.11	0.11	0.12	0.12	0.05	-0.01	-0.01	-0.07	-0.11	-0.20	-0.23	0.27	0.08	0.14	0.17	0.10	0.06	0.08	0.15	0.22	0.16

Notes:

1. Optimal reserve margin in this research is assumed to be equal to 0.15 based on Steiner (2001).
2. Difference between actual and optimal reserve margins = (Installed capacity – Peak demand) ÷ Installed capacity – 0.15

Source: Calculated by the author using the formula noted above.

Table 6: Installed capacity per capita (MW per 000)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Developed countries	Australia	1.64	1.74	1.85	1.86	2.01	2.07	2.07	2.12	2.11	2.08	2.08	2.02	2.03	2.08	2.15	2.17	2.15	2.17	2.20	2.25	2.24	2.29	2.38	2.36	2.33	2.29	2.26	2.35	2.37	2.43	2.53
	Canada	3.22	3.28	3.34	3.41	3.63	3.63	3.69	3.73	3.57	3.55	3.76	3.75	3.82	3.77	3.88	3.88	3.89	3.73	3.61	3.62	3.60	3.60	3.65	3.76	3.74	3.78	3.78	3.82	3.81	4.01	4.01
	Denmark	1.35	1.47	1.51	1.50	1.57	1.66	1.66	1.65	1.62	1.69	1.75	1.83	1.91	1.96	1.94	2.01	1.99	2.09	2.15	2.13	2.21	2.23	2.25	2.28	2.29	2.29	2.27	2.26	2.25	2.31	2.31
	Finland	2.00	1.96	1.99	2.00	2.02	2.01	2.06	2.06	2.09	2.22	2.29	2.29	2.28	2.40	2.40	2.44	2.44	2.62	2.68	2.69	2.67	2.71	2.71	2.70	2.70	2.67	2.68	2.70	2.69	2.61	2.66
	France	1.15	1.28	1.32	1.39	1.50	1.52	1.62	1.70	1.74	1.72	1.77	1.78	1.79	1.82	1.81	1.81	1.84	1.90	1.87	1.90	1.89	1.90	1.89	1.87	1.86	1.83	1.82	1.82	1.83	1.84	1.91
	Germany	0.86	0.89	0.91	0.93	0.97	1.01	1.05	1.06	1.06	1.07	1.06	1.26	1.23	1.22	1.21	1.22	1.22	1.22	1.21	1.21	1.32	1.33	1.41	1.39	1.38	1.39	1.48	1.51	1.57	1.66	1.78
	Japan	1.23	1.28	1.31	1.34	1.36	1.40	1.43	1.47	1.48	1.51	1.58	1.61	1.65	1.71	1.77	1.81	1.86	1.93	1.99	2.01	2.05	2.07	2.10	2.12	2.15	2.17	2.18	2.18	2.20	2.23	2.25
	Netherlands	1.22	1.24	1.22	1.20	1.15	1.18	1.19	1.19	1.18	1.17	1.17	1.16	1.15	1.15	1.19	1.23	1.31	1.29	1.28	1.30	1.32	1.27	1.29	1.29	1.34	1.33	1.40	1.45	1.51	1.57	1.60
	New Zealand	1.87	1.86	1.84	1.99	2.17	2.29	2.28	2.26	2.25	2.18	2.16	2.03	2.13	2.11	2.09	2.09	1.99	1.99	1.98	2.24	2.11	2.12	2.10	2.06	2.10	2.08	2.06	2.16	2.13	2.12	2.15
	Norway	4.28	4.64	4.84	4.98	5.03	5.11	5.38	5.55	5.52	5.83	5.83	5.67	5.64	5.60	5.55	5.88	5.90	5.83	5.72	5.79	5.81	5.70	6.02	6.01	5.99	6.09	6.07	6.15	6.18	6.13	6.06
	Sweden	3.30	3.52	3.57	3.68	3.40	3.67	3.66	3.65	3.71	3.77	3.79	3.79	3.76	3.79	3.74	3.64	3.71	3.73	3.62	3.73	3.69	3.69	3.52	3.61	3.64	3.59	3.64	3.62	3.54	3.66	3.77
	United Kingdom	1.21	1.15	1.16	1.11	1.11	1.13	1.11	1.12	1.16	1.23	1.21	1.15	1.10	1.11	1.12	1.13	1.19	1.17	1.17	1.19	1.22	1.24	1.19	1.20	1.23	1.23	1.24	1.26	1.28	1.29	1.38
	United States	2.75	2.79	2.81	2.80	2.85	2.76	2.77	2.78	2.77	2.77	2.77	2.74	2.71	2.69	2.67	2.65	2.64	2.61	2.49	2.32	2.20	2.87	3.04	3.17	3.19	3.21	3.20	3.21	3.23	3.25	3.26
Latin America countries	Argentina	0.46	0.47	0.49	0.52	0.53	0.53	0.54	0.53	0.54	0.53	0.52	0.53	0.51	0.53	0.56	0.58	0.58	0.61	0.64	0.64	0.70	0.74	0.74	0.75	0.74	0.73	0.72	0.74	0.78	0.80	0.81
	Bolivia	0.10	0.10	0.10	0.08	0.08	0.08	0.08	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.10	0.13	0.13	0.16	0.16	0.14	0.16	0.15	0.16	0.15	0.15	0.16	0.15	0.15	0.16
	Brazil	0.27	0.30	0.31	0.31	0.31	0.32	0.32	0.34	0.34	0.35	0.35	0.36	0.36	0.36	0.36	0.36	0.37	0.38	0.38	0.40	0.42	0.43	0.46	0.48	0.49	0.50	0.51	0.53	0.54	0.55	0.58
	Chile	0.29	0.30	0.29	0.29	0.33	0.33	0.33	0.32	0.32	0.31	0.33	0.38	0.38	0.37	0.41	0.44	0.52	0.53	0.58	0.59	0.64	0.67	0.67	0.69	0.73	0.77	0.78	0.79	0.83	0.92	0.94
	Colombia	0.17	0.18	0.20	0.22	0.23	0.24	0.22	0.27	0.29	0.27	0.27	0.28	0.32	0.35	0.35	0.35	0.36	0.39	0.33	0.34	0.32	0.33	0.34	0.32	0.32	0.31	0.31	0.30	0.30	0.30	0.29
	Paraguay	0.08	0.09	0.09	0.18	0.37	0.44	0.89	1.13	1.36	1.41	1.54	1.50	1.46	1.43	1.39	1.44	1.46	1.48	1.45	1.42	1.39	1.36	1.33	1.31	1.28	1.26	1.35	1.33	1.30	1.39	1.36
	Peru	0.19	0.19	0.19	0.19	0.18	0.19	0.19	0.20	0.19	0.19	0.19	0.19	0.18	0.19	0.19	0.19	0.19	0.20	0.22	0.22	0.23	0.22	0.22	0.22	0.22	0.23	0.24	0.25	0.25	0.28	0.29
	Uruguay	0.32	0.46	0.45	0.44	0.43	0.48	0.48	0.48	0.55	0.54	0.54	0.56	0.64	0.64	0.69	0.66	0.67	0.67	0.66	0.66	0.66	0.65	0.65	0.65	0.65	0.62	0.67	0.72	0.75	0.75	0.79
	Venezuela	0.61	0.65	0.68	0.76	0.92	1.05	1.09	0.95	0.99	0.96	0.96	0.95	0.91	0.90	0.88	0.86	0.92	0.94	0.92	0.89	0.87	0.86	0.81	0.80	0.84	0.83	0.82	0.82	0.82	0.87	0.82

Source: US Energy Information Administration database

Table 6: Installed capacity per capita (MW per 000) (cont.)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Asian countries	China	0.07	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.14	0.16	0.17	0.18	0.20	0.21	0.23	0.24	0.26	0.27	0.28	0.31	0.35	0.40	0.48	0.55	0.61	0.67	0.74
	India	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17
	Bangladesh	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04
	Pakistan	0.05	0.05	0.06	0.05	0.07	0.07	0.08	0.08	0.08	0.08	0.07	0.07	0.08	0.09	0.09	0.10	0.10	0.11	0.12	0.12	0.12	0.12	0.12	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.13
	Sri Lanka	0.04	0.04	0.04	0.05	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.08	0.09	0.09	0.09	0.09	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13
	Cambodia	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.03
	Indonesia	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.14	0.14	0.13	0.14	0.15
	Malaysia	0.22	0.22	0.23	0.25	0.26	0.26	0.28	0.29	0.29	0.28	0.28	0.32	0.35	0.35	0.45	0.51	0.59	0.62	0.61	0.55	0.59	0.62	0.64	0.81	0.96	0.90	0.86	0.86	0.86	0.91	0.90
	Philippines	0.10	0.10	0.11	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.12	0.11	0.12	0.14	0.14	0.16	0.16	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.18	0.18	0.18	0.17	0.17	0.17
	Thailand	0.10	0.10	0.11	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.19	0.23	0.25	0.27	0.30	0.32	0.34	0.36	0.39	0.45	0.45	0.47	0.48	0.59	0.52	0.45	0.56	0.63	0.71	0.73
	Vietnam	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.06	0.07	0.08	0.07	0.08	0.11	0.11	0.11	0.14	0.15	0.15	0.16	0.17	0.18	0.17
African countries	Cameroon	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	Kenya	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.04
	Mali	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	Mozambique	0.15	0.14	0.14	0.14	0.14	0.14	0.13	0.14	0.18	0.18	0.17	0.17	0.16	0.16	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.10	0.10
	South Africa	0.75	0.84	0.83	0.83	0.83	0.78	0.83	0.90	0.93	0.94	0.96	1.01	1.00	1.00	0.94	0.97	0.91	0.96	0.94	0.96	1.05	0.93	0.92	0.91	0.90	0.89	0.89	0.89	0.91	0.90	0.89
	Uganda	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02
	Zambia	0.27	0.27	0.26	0.25	0.24	0.23	0.23	0.22	0.21	0.22	0.22	0.21	0.21	0.20	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14

Source: US Energy Information Administration database

Table 7: GDP per capita (2005 thousand USD)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Developed countries	Australia	20.7	21.0	21.3	20.6	21.3	22.1	22.7	23.0	23.9	24.4	24.9	24.5	24.3	25.1	25.8	26.5	27.2	28.0	28.9	30.0	30.8	31.0	31.8	32.4	33.3	33.9	34.5	35.2	35.9	35.9	36.1
	Canada	23.1	23.6	22.7	23.1	24.2	25.1	25.4	26.2	27.1	27.3	27.0	26.1	26.0	26.3	27.3	27.8	28.0	28.8	29.8	31.2	32.5	32.7	33.4	33.7	34.4	35.1	35.8	36.2	36.0	34.6	35.3
	Denmark	29.8	29.5	30.6	31.5	32.8	34.1	35.8	35.8	35.7	35.9	36.4	36.8	37.4	37.3	39.2	40.2	41.1	42.2	43.0	43.9	45.3	45.5	45.6	45.6	46.5	47.5	49.0	49.6	48.9	45.9	46.4
	Finland	21.7	21.9	22.4	23.0	23.6	24.2	24.8	25.6	26.8	28.1	28.1	26.3	25.2	24.9	25.7	26.6	27.5	29.1	30.5	31.6	33.2	33.9	34.4	35.0	36.4	37.3	38.8	40.7	40.6	37.0	38.1
	France	23.2	23.4	23.8	23.9	24.1	24.4	24.8	25.2	26.3	27.2	27.8	28.0	28.3	28.0	28.5	29.0	29.2	29.7	30.6	31.5	32.4	32.7	32.8	32.9	33.5	33.8	34.4	35.0	34.8	33.5	33.9
	Germany	22.5	22.6	22.5	22.9	23.6	24.3	24.8	25.1	25.9	26.7	27.9	29.1	29.4	29.0	29.6	30.0	30.1	30.6	31.2	31.7	32.7	33.1	33.0	32.9	33.3	33.5	34.8	36.0	36.5	34.7	36.2
	Japan	21.0	21.7	22.3	22.8	23.7	25.0	25.5	26.5	28.2	29.6	31.2	32.1	32.3	32.3	32.4	32.9	33.7	34.2	33.4	33.3	34.0	34.0	34.0	34.5	35.3	35.8	36.4	37.2	36.8	34.8	36.5
	Netherlands	24.8	24.5	24.0	24.4	25.1	25.6	26.2	26.5	27.3	28.3	29.3	29.8	30.0	30.2	30.9	31.7	32.7	33.9	35.0	36.4	37.5	38.0	37.8	37.7	38.4	39.1	40.4	41.9	42.5	40.7	41.2
	New Zealand	18.7	19.5	19.4	19.7	20.5	20.6	21.0	20.8	21.1	21.1	21.0	19.7	19.8	20.8	21.5	22.1	22.5	22.8	22.9	23.9	24.3	25.0	25.8	26.3	26.8	27.4	27.5	28.2	27.4	27.3	27.1
	Norway	36.2	36.6	36.5	37.8	39.9	41.9	43.5	44.1	43.7	44.0	44.7	45.9	47.2	48.2	50.4	52.2	54.6	57.2	58.4	59.2	60.7	61.6	62.2	62.5	64.5	65.8	66.7	67.8	67.0	65.1	64.6
	Sweden	25.6	25.5	25.8	26.2	27.3	27.9	28.6	29.5	30.1	30.8	30.8	30.3	29.7	29.0	29.9	30.9	31.4	32.2	33.5	35.1	36.6	36.9	37.7	38.5	39.9	41.0	42.6	43.6	43.0	40.5	42.8
	United Kingdom	21.0	20.7	21.2	21.9	22.5	23.2	24.1	25.1	26.3	26.9	26.4	25.8	26.0	26.7	27.9	28.7	29.5	30.6	31.5	32.4	33.7	34.5	35.2	36.4	37.3	38.1	38.9	40.0	39.4	37.6	37.9
	United States	25.5	25.9	25.1	26.0	27.7	28.6	29.3	29.9	30.9	31.7	31.9	31.4	32.0	32.5	33.4	33.9	34.7	35.9	37.0	38.4	39.5	39.6	39.9	40.6	41.6	42.5	43.2	43.6	43.1	41.4	42.0
Latin America countries	Argentina	4.4	4.1	3.8	3.9	3.9	3.6	3.8	3.9	3.7	3.4	3.3	3.6	4.0	4.2	4.4	4.2	4.4	4.7	4.8	4.6	4.5	4.3	3.8	4.1	4.4	4.7	5.1	5.5	5.8	5.8	6.3
	Bolivia	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.2
	Brazil	4.2	3.9	3.9	3.7	3.8	4.0	4.2	4.3	4.2	4.3	4.0	4.0	3.9	4.0	4.2	4.3	4.3	4.4	4.3	4.3	4.4	4.4	4.5	4.5	4.6	4.7	4.9	5.1	5.3	5.3	5.6
	Chile	3.4	3.5	3.1	2.9	3.1	3.2	3.4	3.5	3.7	4.0	4.1	4.4	4.8	5.1	5.3	5.7	6.1	6.4	6.5	6.3	6.6	6.7	6.8	6.9	7.3	7.6	7.9	8.2	8.4	8.2	8.6
	Colombia	2.5	2.5	2.4	2.4	2.4	2.5	2.6	2.6	2.7	2.7	2.8	2.8	2.9	2.9	3.1	3.2	3.2	3.2	3.2	3.0	3.1	3.1	3.1	3.2	3.3	3.4	3.6	3.8	3.8	3.8	3.9
	Paraguay	1.3	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.4	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.7
	Peru	2.7	2.9	2.8	2.4	2.5	2.5	2.7	2.8	2.5	2.2	2.0	2.0	2.0	2.0	2.2	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.7	2.9	3.1	3.3	3.6	3.6	3.8
	Uruguay	4.2	4.3	3.8	3.4	3.4	3.4	3.7	3.9	4.0	4.0	4.0	4.1	4.4	4.4	4.7	4.6	4.9	5.2	5.4	5.3	5.2	5.0	4.6	4.6	4.9	5.2	5.4	5.8	6.2	6.3	6.8
	Venezuela	6.4	6.2	5.9	5.5	5.4	5.3	5.5	5.5	5.7	5.1	5.3	5.7	5.9	5.8	5.5	5.6	5.5	5.7	5.6	5.2	5.3	5.3	4.8	4.3	5.0	5.4	5.9	6.3	6.5	6.2	6.0

Source: World Bank database

Table 7: GDP per capita (2005 thousand USD) (cont.)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Asian countries	China	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.6	1.7	1.9	2.2	2.4	2.6	2.9
	India	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.9	0.9	0.9	1.0
	Bangladesh	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5
	Pakistan	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.7	0.8	0.8
	Sri Lanka	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.4	1.5	1.5	1.6
	Cambodia	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6
	Indonesia	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.5	1.5	1.6
	Malaysia	2.3	2.4	2.5	2.6	2.7	2.6	2.6	2.6	2.8	3.0	3.1	3.4	3.6	3.8	4.1	4.3	4.7	4.9	4.4	4.6	4.9	4.8	4.9	5.1	5.4	5.6	5.8	6.0	6.2	6.0	6.3
	Philippines	1.1	1.1	1.1	1.1	1.0	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4
	Thailand	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.1	2.3	2.4	2.3	2.1	2.1	2.2	2.2	2.3	2.5	2.6	2.7	2.8	2.9	3.0	2.9	3.2
	Vietnam	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9
African countries	Cameroon	1.0	1.1	1.2	1.2	1.2	1.3	1.4	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	Kenya	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6
	Mali	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
	Mozambique	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4
	South Africa	5.3	5.5	5.3	5.1	5.2	5.0	4.9	4.9	5.0	5.0	4.9	4.7	4.5	4.5	4.5	4.6	4.7	4.7	4.6	4.6	4.7	4.7	4.8	4.9	5.0	5.2	5.5	5.7	5.8	5.7	5.8
	Uganda	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4
	Zambia	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7

Source: World Bank database

Table 8: Industry value added as a percentage of GDP (%)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Developed countries	Australia	85.8	85.7	85.6	85.6	85.5	85.5	85.4	85.4	85.4	85.4	85.4	85.5	85.7	85.8	86.0	86.1	86.3	86.5	86.7	87.0	87.2	87.4	87.6	87.8	88.0	88.2	88.4	88.5	88.7	88.9	89.0
	Canada	36.9	35.8	34.0	34.5	35.4	35.1	32.7	33.2	33.4	32.7	31.3	29.2	28.6	28.9	30.0	30.7	30.9	30.9	30.0	31.2	33.2	31.9	31.0	31.2	31.6	32.4	31.9	31.5	32.0	32.5	33.0
	Denmark	83.7	83.8	84.0	84.1	84.2	84.4	84.4	84.5	84.6	84.7	84.8	84.9	84.9	84.9	85.0	85.0	85.0	85.0	85.1	85.1	85.1	85.3	85.4	85.6	85.7	85.9	86.0	86.2	86.4	86.6	86.8
	Finland	71.7	72.5	73.4	74.2	75.0	75.8	76.5	77.2	77.9	78.7	79.4	79.7	80.0	80.3	80.6	81.0	81.2	81.5	81.7	81.9	82.2	82.3	82.5	82.6	82.8	82.9	83.0	83.2	83.3	83.4	83.6
	France	31.8	30.9	30.1	29.7	29.1	29.0	28.7	28.3	28.1	27.2	27.1	26.9	26.3	25.0	24.3	24.5	23.8	23.6	23.4	23.1	22.9	22.5	21.9	21.3	21.0	20.8	20.5	20.6	20.5	19.1	19.2
	Germany	72.8	72.8	72.8	72.8	72.7	72.7	72.8	72.9	73.0	73.0	73.1	73.2	73.2	73.2	73.3	73.3	73.2	73.2	73.2	73.1	73.1	73.1	73.2	73.2	73.3	73.4	73.4	73.5	73.6	73.7	73.8
	Japan	39.0	38.9	38.4	37.6	38.0	37.8	37.2	37.2	37.4	37.3	37.5	37.3	36.3	34.9	33.6	33.0	32.9	32.6	31.9	31.5	31.1	29.7	29.0	28.9	28.9	28.1	28.1	28.1	27.4	25.9	27.5
	Netherlands	33.1	33.5	32.4	31.8	33.2	33.3	30.9	29.4	29.6	29.4	29.4	28.9	27.9	27.5	27.2	27.4	26.9	25.8	25.3	24.5	24.9	24.7	24.1	23.9	23.8	24.2	24.6	24.7	25.6	23.8	23.9
	New Zealand	83.4	83.5	83.5	83.6	83.6	83.7	83.9	84.1	84.3	84.5	84.7	84.9	85.0	85.1	85.2	85.3	85.4	85.5	85.5	85.6	85.7	85.8	85.8	85.9	86.0	86.1	86.1	86.1	86.1	86.2	86.2
	Norway	70.5	70.7	70.9	71.0	71.2	71.3	71.4	71.6	71.7	71.8	72.0	72.3	72.7	73.0	73.4	73.8	74.2	74.7	75.2	75.6	76.1	76.4	76.6	76.9	77.2	77.5	77.8	78.1	78.5	78.8	79.1
	Sweden	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.2	83.4	83.5	83.7	83.8	83.9	83.9	83.9	84.0	84.0	84.1	84.1	84.2	84.3	84.3	84.5	84.6	84.8	84.9	85.1
	United Kingdom	78.5	78.5	78.4	78.4	78.4	78.4	78.3	78.3	78.2	78.2	78.1	78.2	78.2	78.3	78.3	78.4	78.4	78.5	78.5	78.6	78.7	78.7	78.8	78.9	78.9	79.0	79.1	79.2	79.3	79.4	79.5
	United States	73.7	73.9	74.0	74.2	74.3	74.5	74.7	74.8	75.0	75.1	75.3	75.7	76.1	76.5	76.9	77.3	77.6	78.0	78.4	78.7	79.1	79.4	79.7	80.1	80.4	80.7	81.0	81.3	81.6	81.9	82.1
Latin America countries	Argentina	82.9	83.3	83.7	84.2	84.6	85.0	85.4	85.8	86.2	86.6	87.0	87.3	87.7	88.0	88.3	88.7	88.9	89.2	89.5	89.8	90.1	90.4	90.6	90.9	91.1	91.4	91.6	91.8	92.0	92.2	92.3
	Bolivia	32.4	32.7	34.7	35.7	33.3	34.8	35.1	33.0	34.0	34.4	34.8	33.7	33.6	32.2	31.6	33.1	32.3	30.6	30.4	28.6	29.8	29.2	29.3	29.4	31.0	32.0	35.1	36.4	38.4	36.2	37.3
	Brazil	65.5	66.3	67.2	68.1	69.0	69.9	70.7	71.5	72.3	73.1	73.9	74.7	75.4	76.1	76.9	77.6	78.3	79.0	79.8	80.5	81.2	81.5	81.8	82.2	82.5	82.8	83.1	83.4	83.7	84.0	84.3
	Chile	81.2	81.5	81.8	82.1	82.3	82.6	82.8	82.9	83.0	83.1	83.3	83.5	83.7	83.9	84.2	84.4	84.7	85.0	85.3	85.6	85.9	86.3	86.6	87.0	87.3	87.6	87.9	88.2	88.4	88.7	88.9
	Colombia	32.5	31.5	31.8	32.3	34.0	35.5	37.3	36.0	37.6	38.2	37.9	37.1	35.0	36.0	31.4	31.7	30.8	29.4	28.4	28.6	29.4	29.4	29.8	31.4	32.4	32.8	33.8	33.7	35.5	34.5	35.0
	Paraguay	36.3	36.5	36.8	37.0	37.3	37.5	37.8	38.0	38.3	38.5	38.8	39.0	37.6	35.3	34.9	34.6	34.0	33.8	34.9	35.9	35.7	38.0	40.5	37.3	34.6	34.8	33.3	31.7	29.7	32.0	30.1
	Peru	21.6	22.6	23.6	24.5	25.5	26.5	27.4	33.4	33.4	36.2	27.4	27.1	27.9	29.4	31.2	31.0	30.2	30.7	29.7	29.6	29.9	29.6	30.4	30.8	33.0	34.3	37.0	37.0	36.6	34.2	36.1
	Uruguay	31.3	31.9	32.5	33.1	34.4	35.9	36.2	35.8	34.2	33.7	34.6	35.5	32.8	29.7	28.0	28.9	28.5	26.4	26.2	26.0	24.5	24.5	24.3	26.1	25.6	27.1	26.4	27.2	25.8	25.6	26.1
	Venezuela	46.4	44.4	41.6	38.7	52.5	50.8	49.3	50.3	51.3	57.1	60.6	56.4	54.4	51.6	44.1	41.3	49.1	50.8	44.4	45.6	49.7	46.1	49.8	51.6	55.5	57.8	56.5	53.3	54.1	44.2	52.2

Source: World Bank database

Table 8: Industry value added as a percentage of GDP (%) (cont.)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Asian countries	China	19.4	20.1	20.8	21.5	22.2	22.9	23.6	24.3	25.0	25.7	26.4	27.3	28.2	29.2	30.1	31.0	31.9	32.9	33.9	34.9	35.9	37.2	38.5	39.9	41.2	42.5	43.9	45.2	46.5	47.9	49.2
	India	23.1	23.3	23.6	23.8	24.1	24.3	24.6	24.8	25.1	25.3	25.5	25.8	26.0	26.2	26.4	26.6	26.8	27.0	27.2	27.5	27.7	28.0	28.3	28.6	28.9	29.2	29.6	29.9	30.3	30.6	30.9
	Bangladesh	20.6	20.9	21.1	21.9	21.2	21.4	21.5	20.8	21.2	21.1	21.5	21.7	22.5	23.8	24.3	24.6	24.9	25.1	25.8	25.2	25.3	25.9	26.4	26.3	26.6	27.2	27.9	28.4	28.5	28.7	28.5
	Pakistan	24.9	22.6	22.3	22.1	22.7	22.5	23.4	24.0	24.4	23.9	25.2	25.4	25.0	24.7	24.3	23.8	24.2	23.5	23.8	23.7	23.3	24.0	23.9	23.9	27.0	27.1	26.9	26.9	26.8	24.7	25.4
	Sri Lanka	29.6	28.0	26.3	26.3	26.3	26.2	26.6	27.4	26.7	26.8	26.0	25.6	25.6	25.6	26.2	26.5	26.4	26.9	27.5	27.3	27.3	26.8	28.0	28.4	28.6	30.2	30.6	29.9	29.4	29.7	29.4
	Cambodia	2.0	2.6	3.1	3.8	4.7	5.6	6.5	7.5	8.4	9.3	10.2	11.1	12.1	13.0	14.4	14.8	15.7	17.1	17.4	19.1	23.0	23.5	25.6	26.3	27.2	26.4	27.6	26.8	23.8	23.1	23.3
	Indonesia	41.7	41.2	37.9	39.8	39.1	35.8	33.7	36.3	37.3	38.3	39.1	40.4	39.6	39.7	40.6	41.8	43.5	44.3	45.2	43.4	45.9	46.5	44.5	43.7	44.6	46.5	46.9	46.8	48.1	47.7	46.9
	Malaysia	42.0	42.8	43.6	44.4	45.1	45.9	46.7	47.5	48.2	49.0	49.8	51.0	52.2	53.3	54.5	55.7	56.9	58.2	59.5	60.7	62.0	63.1	64.2	65.3	66.5	67.6	68.5	69.3	70.2	71.1	72.0
	Philippines	37.5	38.6	39.7	40.8	41.9	43.0	44.2	45.3	46.4	47.5	48.6	48.5	48.5	48.4	48.4	48.3	48.2	48.2	48.1	48.1	48.0	48.0	48.0	48.0	48.0	48.0	48.2	48.3	48.4	48.5	48.6
	Thailand	26.8	27.1	27.3	27.6	27.8	28.1	28.4	28.6	28.9	29.2	29.4	29.6	29.8	29.9	30.1	30.3	30.4	30.6	30.8	31.0	31.1	31.4	31.6	31.8	32.0	32.2	32.5	32.8	33.1	33.4	33.7
	Vietnam	20.7	21.2	22.8	24.3	25.8	27.4	28.9	28.4	24.0	22.9	22.7	23.8	27.3	28.9	28.9	28.8	29.7	32.1	32.5	34.5	34.2	35.5	35.7	36.7	37.4	38.1	38.6	38.5	37.1	37.4	38.2
African countries	Cameroon	25.6	29.9	32.1	34.7	37.5	36.0	33.6	30.1	29.2	29.7	29.5	29.5	25.8	32.4	32.2	31.3	30.9	30.6	29.2	32.1	36.0	32.6	32.0	30.7	30.7	30.4	31.4	31.0	30.7	30.3	30.0
	Kenya	20.8	20.3	19.9	19.4	18.9	19.1	18.6	18.5	19.6	19.0	19.0	19.7	18.4	16.9	17.2	16.0	18.3	17.8	17.5	16.8	16.9	17.2	17.4	17.6	18.2	19.1	18.5	18.5	19.8	18.7	18.6
	Mali	13.2	14.0	13.7	14.8	14.5	15.5	16.0	15.9	15.9	14.2	15.9	16.9	15.8	16.3	18.9	18.7	17.9	15.6	17.3	16.7	20.6	26.4	27.5	23.6	23.9	24.2	24.0	24.2	20.1	21.0	21.8
	Mozambique	34.4	33.8	32.6	27.5	20.0	13.2	15.0	21.4	25.4	24.3	18.4	14.6	16.7	13.1	15.2	14.5	16.3	17.8	22.0	22.7	24.5	25.8	23.1	25.4	26.7	24.8	25.7	25.2	23.9	23.0	22.4
	South Africa	48.4	45.7	44.2	44.7	43.2	43.6	43.9	41.7	41.5	40.7	40.1	38.4	36.4	35.5	35.0	34.8	33.4	32.7	32.2	31.2	31.8	32.3	32.6	31.7	31.3	31.2	31.2	31.3	32.3	31.0	29.8
	Uganda	4.5	6.7	11.4	9.4	10.9	9.9	10.2	10.1	10.2	10.7	11.1	12.4	13.2	13.1	13.9	14.3	16.2	17.6	18.1	19.7	22.9	22.6	24.4	24.2	22.1	25.0	24.2	26.6	27.4	25.8	25.5
	Zambia	42.1	41.1	39.0	47.2	44.1	46.8	49.4	45.5	46.8	52.5	51.3	51.0	49.0	41.9	39.8	35.8	34.8	34.2	29.2	24.8	25.1	25.4	26.0	26.8	28.0	29.2	31.9	33.1	33.8	34.2	36.0

Source: World Bank databas

Table 9: Introduction periods of various reform steps

		Introduction of IPPs[1]	Privatisation[2]	Wholesale competition[3]	Retail competition[4]	Regulator[5]
Developed Countries	Australia	1992	1992	1997	2002	1995
	Canada	1996	1996	1996	2001	1995
	Denmark	1999	1999	1999	1999	1998
	Finland	1998	1998	1998	1998	1995
	France	1996	1996	2001	2000	2000
	Germany	1998	1998	1998	1998	1998
	Japan	1995	1995	2005	2001	-
	Netherlands	1994	1994	1999	1999	1998
	New Zealand	1996	1996	1996	1996	1996
	Norway	1991	1991	1991	1991	1991
	Sweden	1996	1996	1996	1996	1996
	United Kingdom	1990	1990	1990	1990	1989
	United States	1980	1980	1998	1998	1992
Developing Latin America	Argentina	1992	1991	1992	-	1992
	Bolivia	1994	1994	1994	-	1994
	Brazil	1995	1995	1999	-	1996
	Chile	1993	1982	1982	-	1982
	Colombia	1992	1995	1995	-	1994
	Paraguay	-	-	-	-	-
	Peru	1993	1994	-	-	-
	Uruguay	1997	-	1997	-	2001
	Venezuela	-	2007	-	-	1999
Developing Asia	Bangladesh	1996	1990	-	-	2004
	Cambodia	1997	1993	-	-	2001
	China	1984	1997	-	-	2003
	India	1995	1994	2007	-	1998
	Indonesia	1991	1993	-	-	2002
	Malaysia	1994	1990	-	-	1991
	Pakistan	1995	2005	-	-	1997
	Philippines	1991	2001	2006	-	2001
	Sri Lanka	1996	-	-	-	2003
	Thailand	1994	1991	-	-	1992
	Vietnam	1997	2007	-	-	2005
Developing Africa	Cameroon	1998	2001	-	-	1998
	Kenya	1997	1992	-	-	1997
	Mali	2000	1995	-	-	2000
	Mozambique	1997	1995	-	-	1997
	South Africa	2001	2001	-	-	2004
	Uganda	1999	2003	-	-	2001
	Zambia	1995	2004	-	-	1997

1: Year when the sector was opened to private investment
2: Year of substantive corporatisation/privatisation of public utilities
3: Year of introduction of market competition for wholesale electricity trading
4: Year of introduction of market competition for retail electricity trading
5: Year of establishment of sector-specific regulator
Sources: various

Appendix C: Modelling results

This appendix provides modelling results from the econometric analysis conducted by this research to quantify the disparity between expected and actual outcomes of reform. It contains the following tables:

Table 1: Impact of electricity reform on efficiency of electricity supply in developed countries

Table 2: Impact of electricity reform on installed capacity per capita in developing countries

Table 1: Impact of electricity reform on the efficiency of electricity supply in developed countries

	Difference between actual to optimal reserve margins		Capacity utilisation rates	
	M_1	M_2	M_1	M_2
IPPs	-0.023 (-0.973)	-	-0.040** (-2.228)	-
Privatisation	-0.022 (-0.781)	-	-0.050** (-2.432)	-
Wholesale	0.013 (0.300)	-	0.047* (1.616)	-
Retail	0.022 (0.523)	-	-0.063** (-2.354)	-
Regulator	-0.049* (-1.598)	-	0.037** (1.609)	-
IPPs + regulator	-	-0.037* (-1.562)	-	0.023 (1.316)
Privatisation + regulator	-	-0.103** (-2.505)	-	0.027 (0.891)
Wholesale + regulator	-	0.026 (0.452)	-	0.027 (0.720)
Retail + regulator	-	0.059 (1.161)	-	-0.037 (-1.234)
GDP per capita	-0.941*** (-8.115)	-0.934*** (-8.329)	0.250** (2.363)	0.139* (1.540)
Industry value added	-	-	-0.238*** (-3.462)	-0.127** (-2.619)
Num of obs	372	372	403	403
Adjusted R^2	0.66	0.67	0.69	0.18

Note: *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 2: Impact of electricity reform on installed capacity per capita in developing countries

	Installed capacity per capita					
	Latin American countries		Asian countries		African countries	
	M_1	M_2	M_1	M_2	M_1	M_2
IPPs	-0.125** (-2.424)	-	-0.017 (-0.789)	-	-0.024* (-1.543)	-
Privatisation	-0.074* (-1.633)	-	0.044*** (2.685)	-	-0.005 (-0.530)	-
Wholesale	0.059 (1.090)	-	-0.096*** (-2.965)	-	-	-
Retail	-	-	-	-	-	-
Regulator	-0.101** (-2.177)	-	-0.018 (-0.940)	-	-0.018 (-1.256)	-
IPPs + regulator	-	-0.032 (-0.515)	-	-0.001 (-0.064)	-	-0.042*** (-3.081)
Privatisation + regulator	-	-0.071 (-1.389)	-	0.041** (2.051)	-	0.017 (1.360)
Wholesale + regulator	-	-0.026 (-0.415)	-	-0.093*** (-2.780)	-	-
Retail + regulator	-	-	-	-	-	-
GDP per capita	0.446*** (4.839)	0.416*** (4.768)	0.187*** (10.699)	0.176*** (7.222)	0.002 (0.097)	-0.001 (-0.061)
Industry value added	-0.099 (-0.788)	-0.213** (-1.990)	-0.029* (-1.445)	-0.024 (-1.099)	0.009 (0.784)	0.008 (0.699)
Num of obs	279	279	341	341	217	217
Adjusted R^2	0.83	0.35	0.54	0.80	0.99	0.99

Note: *** significant at 1%; ** significant at 5%; * significant at 10%.

BIBLIOGRAPHY

Abbott, M. 2006, 'The Productivity and Efficiency of the Australian Electricity Supply Industry', *Energy Economics*, vol. 28, pp. 444-54.

Abueva, J.V. 1988, 'Philippine Ideologies and National Development', in R.P. de Guzman & M.A. Reforma (eds), *Government and Politics of the Philippines*, Oxford University Press, New York.

Adib, P. & Hurlbut, D. 2008, 'Market Power and Market Monitoring', in S. F.P. (ed.), *Competitive Electricity Markets: Design, Implementation, Performance*, Elsevier.

Adib, P., Schubert, E. & Oren, S. 2008, 'Resource Adequacy: Alternate Perspective and Divergent Paths', in F.P. Sioshansi (ed.), *Competitive Electricity Markets: Design, Implementation, Performance*, Elsevier.

AER 2010, *State of the Energy Market reports 2010*, Australian Energy Regulator.

Aghdam, R.F. 2006, 'Electricity Industry Reform in Australia: Rationale, Impacts and Challenges', University of Technology, Sydney.

Aghdam, R.F. 2011, 'Dynamics of Productivity Change in the Australian Electricity Industry: Assessing the Impacts of Electricity Reform', *Energy Policy*, vol. 39, pp. 3281-95.

Aghdam, R.F., Sharma, D., Al-Hajji, M. & Ulussever, T. 2013, 'Macroeconomic Impacts of Contemporary Electricity Reform: 19 OECD and Seven Australian States', *Journal of Energy and Power Engineering*, vol. 7, pp. 949-62.

Alchian, A.A. & Demsetz, H. 1973, 'The Property Right Paradigm', *The Journal of Economic History*, vol. 33, pp. 16-27.

Allen, C. 1995, 'Understanding African politics', *Review of African Political Economy*, vol. 22, pp. 301-20.

Alleyne, T. 2013, *Energy Subsidy Reform in Sub-Saharan Africa: Experiences and Lessons*, International Monetary Fund.

Alston, L. & Mueller, B. 2004, 'Property Rights and the State', in C. Menard & M.M. Shirley (eds), *Handbook of New Institutional Economics*, Springer.

Amundsen, E.S., Bergman, L. & Von der Fehr, N.M. 2006, 'The Nordic Electricity Market: Robust by Design?', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

Andres, L., Biller, D. & Dappe, M.H. 2013, *Reducing Poverty by Closing South Asia's Infrastructure Gap*, World Bank.

Andrews-Speed, P. 2013, 'Reform Postponed: The Evolution of China's Electricity Markets', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Atkinson, S.E. & Halabi, C.E. 2005, 'Economic Efficiency and Productivity Growth in the Post-Privatisation Chilean Hydroelectric Industry', *Journal of Productivity Analysis*, vol. 23, pp. 245-73.

Ausubel, L.M. & Cramton, P. 2010, 'Using Forward Markets to Improve Electricity Market Design', *Utilities Policy*, vol. 18, pp. 195-200.

Ayres, C.E. 1952, *The Industrial Economy*, Houhgton Mifflin, Boston.

Bacon, R.W. & Besant-Jones, J. 2001, 'Global Electric Power Reform, Privatisation, and Liberalisation of the Electric Power Industry in Developing Countries', *Annual Review of Energy and the Environment*, vol. 26, pp. 331-59.

Baer, W. & McDonald, C. 1998, 'A Return to the Past? Brazil's Privatization of Public Utilities: The Case of the Electric Power Sector', *Quarterly Review of Economics and Finance*, vol. 38, pp. 503-23.

Bakewell, P. 2004, *A History of Latin America: C. 1450 to the Present*, Wiley.

Balassa, B. 2011, *The Theory of Economic Integration*, Routledge.

Balza, L., Jimenez, R. & Mercado, J. 2013, *Privatization, Institutional reform, and Performance in the Latin American Electricity Sector*, Inter-American Development Bank.

Banerjee, S.G., Barnes, D., Singh, B., K., M. & Samad, H. 2015, *Power for All: Electricity Access Challenge in India*, World Bank.

Bank, W. 1981, *China: Socialist Economic Development*.

Bank, W. 1985, *Thailand: Energy Sector Issues and Options*.

Bank, W. 2009, 'Reducing Technical and Non-Technical Losses in the Power Sector', paper presented to the *Background Paper for the World Bank Group Energy Sector Strategy*.

Barmack, M., Kahn, E. & Tierney, S. 2007, 'A Cost-Benefit Assessment of Wholesale Electricity Restructuring and Competition in New England', *Journal of Regulatory Economics*, vol. 31, pp. 151-84.

Bell, S. 1997, *Ungoverning the Economy: the Political Economy of Australian Economic Policy*, Oxford University Press.

Belyaev, L.S. 2011, *Electricity Market Reforms: Economics and Policy Challenges*, Springer, New York.

Bertram, G. 2006, 'Restructuring the New Zealand Electricity Sector 1984-2005', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

Bertram, G. 2013, 'Weak Regulation, Rising Margins, and Asset Revaluations: New Zealand's Failing Experiment in Electricity Reform', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Bhattacharyya, S.C. 2007, 'Power Sector Reform in South Asia: Why Slow and Limited So Far?', *Energy Policy*, vol. 35, pp. 317-32.

Bierstedt, R. 1950, 'An Analysis of Social Power', *American Sociological Review*, vol. 15, no. 7130-7138.

Bill, D. 2009, *Global Political Economy: A Marxist Critique*, Pluto Press, London.

Birdsall, N. & Nellis, J. 2003, 'Winners and Losers: Assessing the Distributional Impact of Privatisation', *World Development*, vol. 31, no. 1617-1633.

Boltz, W. 2013, 'The Challenges of Electricity Market Regulation in the European Union', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Borenstein, S. 2000, 'The Trouble with Electricity Markets: Understanding California's Restructuring Disaster', *Journal of Industrial Economics*, vol. 47, no. 285-323.

Borenstein, S., Bushnell, J. & Wolak, F. 2002, *Measuring Market Inefficiencies in California's Restructuring Wholesale Electricity Market*, Centre for the Study of Energy Markets, University of California Energy Institute.

Bourguinon, F., Branson, W.H. & de Melo, J. 1989, *Adjustment and income distribution: a counterfactual analysis*, World Bank.

Bowring, J. 2006, 'The PJM Market', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

Boyer, R. & Hollingsworth, J.R. 1997, 'From National Embeddedness to spatial and institutional nestedness', in R. Boyer & J.R. Hollingsworth (eds), *Contemporary Capitalism: the Embeddedness of Institutions*, Cambridge University Press.

Branston, J.R. 2000, 'A Counterfactual Price Analysis of British Electricity Privatisation', *Utilities Policy*, vol. 9, pp. 31-46.

Bresser-Pereira, L.C. 2009, 'From Old to New Developmentalism in Latin America', in J.A. Ocampo (ed.), *Handbook of Latin America Economics*, Oxford University Press.

Briggs, R.J. & Kleit, A. 2013, 'Resource adequacy reliability and the impacts of capacity subsidies in competitive electricity markets', *Energy Economics*, vol. 40, pp. 297-305.

Britannica, E. 2014, *Laissez-faire*, <http://www.britannica.com/topic/laissez-faire >.

Brunekreeft, G. & Bauknecht, D. 2006, 'Energy Policy and Investment in the German Power Market', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

Bukharin, N. 1917, *Imperialism and World Economy*, International Publishers.

Bulmer-Thomas, V. 1995, *The State, the Market, and Elections in Latin America: How Much has Really Changed?*, Institute of Latin American Studies, London.

Callinicos, A. 2009, *Imperialism and Global Political Economy*, Polity Press.

Case, W. 2005, 'New Reforms, Old Continuities, Tense Ambiguities', *The Journal of Development Studies*, vol. 41, pp. 284-309.

Castellano, A., Kendall, A., Nikomarov, M. & Swemmer, T. 2015, *Brighter Africa: the Growth Potential of the Sub-Saharan Electricity Sector*, McKinsey & Company.

Cervigni, G. 2013, 'Climate Change and the Future of the Liberalised Electricity Markets', in P. Ranci & G. Cervigni (eds), *The Economics of Electricity Markets: Theory and Policy*, Edward Elgar Publishing.

Cervigni, G., Commisso, A. & Perekhodtsev, D. 2013, 'Generation Capacity Adequacy', in P. Ranci & G. Cervigni (eds), *The Economics of Electricity Markets: Theory and Policy*, Edward Elgar Publishing.

Cervigni, G. & Perekhodtsev, D. 2013, 'Wholesale Electricity Markets', in P. Ranci & G. Cervigni (eds), *The Economics of Electricity Markets: Theory and Policy*, Edward Elgar Publishing.

Chazan, N., Lewis, P., Mortimer, R.A., Rothchild, D. & Stedman, S.J. 1988, *Politics and Society in Contemporary Africa*, Macmillan Education, Basingstoke.

Chong, A. & López-de-Silanes, F. 2005, *Privatization in Latin America: Myths and Reality*, World Bank.

Cigre 1996, *A Dictionary on Electricity*, The International Conference on Large High Voltage Electrical Systems.

Clark, A., Davis, M., A., E. & Wamakonya, N. 2005, *Power sector reform in Africa: Assessing the impact on poor people*, World Bank.

Coase, R.H. 1937, 'The Nature of the Firm', *Economica*, vol. 4, pp. 386-405.

Coase, R.H. 1960, 'The Problem of Social Costs', *Journal of Law and Economics*, vol. 3, pp. 1-44.

Connell, R. & Irving, T.H. 1980, *Class Structure in Australian History: Documents, Narrative, and Argument*, Longman Cheshire.

Creti, A. & Poletti, C. 2013, 'Retail Competition', in P. Ranci & G. Cervigni (eds), *The Economics of Electricity Markets: Theory and Policy*, Edward Elgar Publishing.

Cubbin, J. & Stern, J. 2004, *Regulatory Effectiveness: The Impact of Good Regulatory Governance on Electricity Industry Capacity and Efficiency in Developing Countries*, World Bank.

Cubbin, J. & Stern, J. 2006, 'The Impact of Regulatory Governance and Privatization on Electricity Industry Generation Capacity in Developing Economies', *World Bank Economic Review*, vol. 20, pp. 115-41.

Cumbe, F.M.A. 2008, 'Electricity Industry Reform in Mozambique: Rationale, Impacts and Challenges', University of Technology, Sydney.

Dahl, R.A. 1957, *The Concept of Power*, Yale University.

Dahl, R.A. 1976, *Politics, Economics, and Welfare*, Charles Edward.

David, P. 1994, 'Why are Institutions the 'Carriers of History'? Path Dependence and the Evolution of Conventions, Organisations and Institutions', *Structural Change and Economic Dynamics*, vol. 5, pp. 205-20.

Davidson, P. 2003, 'Is "Mathematical Science" an Oxymoron when Used to Describe Economics?', *Journal of Post Keynesian Economics* vol. 25, pp. 527-45.

Davis, L. & North, D.C. 1970, 'Institutional Change and American Economic Growth: A First Step Towards a Theory of Institutional Innovation', *Economic History*, vol. 30, pp. 131-49.

De Angelis, M. 2000, *Keynesianism, Social Conflict and Political Economy*, Macmillan.

De Araujo, J.L.R. 2006, 'The Case of Brazil: Reform by Trial and Error? ', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

de Soysa, I. & Jutting, J. 2007, 'Informal Institutions and Development: How They Matter and What Makes Them Change', in J. Jutting, D. Drechsler, S. Bartsch & I. de Soysa (eds), *Informal Institutions: How Social Norms Help or Hinder Development*, Organisation for Economic Co-operation and Development.

Demsetz, H. 1967, 'Toward a Theory of Property Rights', *The American Economic Review*, vol. 57, pp. 347-59.

Diop, N. 2014, 'Why is Reducing Energy Subsidies a Prudent, Fair, and Transformative Policy for Indonesia?', *Economic Premise*, vol. 136.

Domah, P. & Pollitt, M.G. 2001, 'The Restructuring and Privatisation of the Electricity Distribution and Supply Businesses in England and Wales: A Social Cost-Benefit Analysis', *Fiscal Studies*, vol. 22, pp. 107-46.

Domhoff, G.W. 1967, *Who Rules America?* , Prentice-hall.

Dragomir, E. 2012, 'The Formation of the Soviet Bloc's Council for Mutual Economic Assistance: Romania's Involvement', *Journal of Cold War Studies*, vol. 14, pp. 34-47.

Dua, P. & Tuteja, D. 2015, *Global Recession and Eurozone Debt Crisis: Impact on Exports of China and India*, Delhi School of Economics.

Dubash, N.K. & Rajan, S.C. 2001, 'Power Politics: Process of Power Sector Reform in India', *Economic and Political Weekly*, vol. 36, pp. 3367-87.

Dubash, N.K. & Williams, J.H. 2009, 'The Political Economy of Electricity Liberalisation', in J. Byrne, N. Toly & L. Glover (eds), *Transforming Power: Energy As A Social Project*, Transaction Publishers.

Dyner, I., Arango, S. & Larsen, E.R. 2006, 'Understanding the Argentinean and Colombian Electricity Markets', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

Eberhard, A. 2009, 'The Political Economy of Power Sector Reform in South Africa', in D.G. Victor & T.C. Heller (eds), *The Political Economy of Power Sector Reform: The Experience of Five Major Developing Countries*, Cambridge University Press.

Eberhard, A., Rosenes, O., Shkaratan, M. & Vennemo, H. 2011, *Africa's Power Infrastructure: Investment, Integration, Efficiency*, World Bank.

Eberhard, A. & Shkaratan, M. 2012, 'Powering Africa: Meeting the Financing and Reform Challenge', *Energy Policy*, vol. 42, pp. 9-18.

Efficiency, D.o.A.E.D.a. 2010, *Electric Power in Thailand: 1980–2010, Annual Reports*, DEDE Bangkok.

EIA 1996, *The Changing Structure of the Electric Power Industry: An Update*, Energy Information Administration.

EIA 2013, *Feed-In Tariff and Similar Programs*, U.S. Energy Information Administration

Erdogdu, E. 2011, 'What Happened to Efficiency in Electricity Industries after Reforms? ', *Energy Policy*, vol. 39, pp. 6551-60.

Erdogdu, E. 2014, 'Investment, Security of Supply and Sustainability in the Aftermath of Three Decades of Power Sector Reform', *Renewable and Sustainable Energy Reviews*, vol. 31, pp. 1-8.

Essama-Nssah, B. & Bassole, L. 2010, *A counterfactual analysis of the poverty impact of economic growth in Cameroon*, World Bank.

Etzioni, A. The Active Society: A Theory of Societal and Political Processes, Free Press, New York.

Fearon, J.D. 2003, 'Ethnic and Cultural Diversity by Country', *Journal of Economic Growth*, vol. 8, pp. 195-222.

Felker, G. 2004, 'Southeast Asian Development in Regional and Historical Perspective', in M. Beeson (ed.), *Contemporary Southeast Asia: Regional Dynamics, National Differences*, Palgrave Macmillan.

Fenner, B. 1963, *African Socialism*, The Bodley Head, London.

Field, G.L. & Higley, J. 1980, *Elitism*, Routledge Kegan Paul, London.

Filippini, M. & Wetzel, H. 2014, 'The Impact of Ownership Unbundling on Cost Efficiency: Empirical Evidence from the New Zealand Electricity Distribution Sector', *Energy Economics*, vol. 45, pp. 412-8.

Finon, D. 2006, 'Incentives to invest in liberalised electricity industries in the North and South. Differences in the need for suitable institutional arrangements', *Energy Policy*, vol. 34, pp. 601-18.

Fischer, R., Gutierrez, R. & Serra, P. 2003, *The Effects of Privatization on Firms and on Social Welfare: The Chilean Case*, Inter-American Development Bank.

Fischer, S. 2003, 'Globalisation and its Challenges', *The American Economic Review*, vol. 93, p. Papers and Proceedings of the One Hundred Fifteenth Annual Meeting of the American Economic Association.

Fishlow, A. 1985, 'Lessons from the Past: Capital Markets During the 19th century and the Interwar Period', *International Organisation*, vol. 39, pp. 383-439.

Foster, V., Butterfield, W. & Chen, C. 2008, *Building Bridges: China's Growing Role as Infrastructure Financier for Africa*, World Bank.

Frankel, F. 2005, *India's Political Economy, 1947-2004: The Gradual Revolution*, Oxford University Press, New Delhi.

Frieden, J. 1994, 'International Investment and Colonial Control: A New Interpretation', *International Organisation* vol. 48, pp. 559-93.

Geweke, J.F., Horowitz, J.L. & Persaran, M.H. 2006, *Econometrics: A Bird's Eye View*, the Institute for the Study of Labour (IZA).

Gilbert, C.L. & Kahn, E. 1996, 'Competition and Institutional Change in the US electric Power Regulation ', in R.J. Gilbert & E. Kahn (eds), *International Comparisons for Electricity Regulation*, Cambridge University Press.

Gilbert, C.L., Kahn, E. & Newbery, D.M. 1996, 'Introduction: International Comparisons of Electricity Regulation', in R.J. Gilbert & E. Kahn (eds), *International Comparisons for Electricity Regulation*, Cambridge University Press.

Glachant, J.M. 2006, 'Generation Technology Mix in Competitive Electricity Markets', in F. Leveque (ed.), *Competitive Electricity Markets and Sustainability*, Edward Elgar Publishing.

Glachant, J.M., Finon, D. & de Hauteclocque, A. 2011, *Competition, Contracts and Electricity Markets: A New Perspective*, Edward Elgar Publishing.

Gomez, E.T. & Jomo, K.S. 1999, *Malaysia's Political Economy: Politics, Patronage and Profits*, Cambridge University Press.

Goucher, C., LeGuin, C. & Walton, L. 1998, *In the Balance: Themes in Global History*, McGraw-Hill.

Graham, H. 2010, *Neoliberal Africa: the Impact of Global Social Engineering*, Zed.

Greacen, C.S. & Greacen, C. 2004, 'Thailand's Electricity Reforms: Privatisation of Benefits and Socialisation of Costs and Risks', *Pacific Affairs*, vol. 77, pp. 517-41.

Green, R. & Newbery, D.M. 1992, 'Competition in the British Electricity Spot Market', *Journal of Political Economy*, vol. 100, pp. 929-53.

Groenewegen, J., Kerstholt, F. & Nagelkerke, A. 1995, 'On Integrating New and Old Institutionalism: Douglass North Building Bridges', *Journal of Economic Issues*, vol. 29, pp. 467-75.

Guo, D., Jiang, K., Kim, B.Y. & Xu, C.G. 2014, 'The Political Economy of Private Firms in China', *Journal of Comparative Economics*, vol. 42, pp. 286-303.

Haacke, O. 2015, 'Understanding China's 13th Five-Year Plan', *China Business Review*, pp. February 12, 2015.

Hamilton, W.H. 1919, 'The Institutional Approach to Economic Theory', *American Economic Review*, vol. 9, pp. 309-18.

Harvey, D. 2005, *Brief History of Neoliberalism*, Oxford University Press.

Haselip, J. & Potter, C. 2010, 'Post-neoliberal Electricity Market Re-reforms in Argentina: Diverging from Market Prescriptions?', *Energy Policy*, vol. 38, pp. 1168-76.

Hayek, F.A. 1973, *Law, Legislation and Liberty*, The University of Chicago Press.

Hellyer, G.P. 2014, *Disunited Elites, legitimacy Politics, and Constitutional Change: An Agency-Centred Account of Democratic Deconsolidation in Hungary*, Central European University.

Henisz, W.J. 2000, 'The Institutional Environment for Economic Growth', *Economics and Politics*, vol. 12, pp. 1954-85.

Henisz, W.J. & Zelner, B.A. 2002, *The Political Economy of Private Electricity Provision in Southeast Asia*, Wharton School, University of Pennsylvania.

Henisz, W.J., Zelner, B.A. & Guillen, M.F. 2005, 'The Worldwide Diffusion of Market-Oriented Infrastructure Reform, 1977-1999', *American Sociological Review*, vol. 70, pp. 871-91.

Herberg, M.E. 2012, *Powering Asia's Growth: Meeting Rising Electricity Needs*, Pacific Energy Summit.

Hesla, E. 2011, 'Electricity in Brazil, Industry Applications Magazine', *IEEE*, vol. 17, pp. 8-12.

Hewison, K. 1985, 'The State and Capitalist Development in Thailand', in R. Higgott & R. Robison (eds), *Southeast Asia: Essays in the Political Economy of Structural Change*, Routledge & Kegan Paul.

Hewison, K. 2005, 'Neo-liberalism and Domestic Capital: the Political Outcomes of the Economic Crisis in Thailand', *Journal of Development Studies*, vol. 41, pp. 310-30.

Hewison, K. 2006, 'Thailand: Boom, Bust, and Recovery', in G. Rodan, K. Hewison & R. Robison (eds), *The Political Economy of Southeast Asia: Markets, Power and Contestation*, Oxford University Press.

Heywood, A. 2000, *Key Concepts in Politics*, Palgrave Macmillan.

Hick, A. & Lechner, F. 2005, 'Neo-pluralism and Neo-functionalism in Political Sociology', in T. Janoski, R. Alford, A. Hicks & M. Schwartz (eds), *Handbook of Political Sociology, Cambridge*, MIT Press.

Hiferding, R. 1910, *Finance Capital: A study in the Latest Phase of Capitalist Development*, Routledge.

Higley, J. 2010, 'Elite Theory and Elites', in K.T. Leicht & J.C. Jenkins (eds), *Handbook of Politics: State and Society in Global Perspective*, Springer.

Higley, J. & Burton, M. 2006, *Elite foundations of liberal democracy*, Rowman & Littlefield.

Hobson, J.A. 1902, *Imperialism: A Study*, James Pott Company.

Hodgson, G.M. 1993, 'Institutional Economics: Surveying the 'Old' and the 'New'', *Metroeconomica*, vol. 44, pp. 1-28.

Hodgson, G.M. 2002, 'Darwinism in Economics: From Analogy to Ontology', *Journal of Evolutionary Economics*, vol. 12, pp. 259-81.

Holcombe, R.G. 2015, 'Political Capitalism', *Cato Journal*, vol. 35, pp. 41-6.

House, F. 2015, *Freedom in the World 2015*.

Hudelson, R. 1999, *Modern Political Philosophy*, M.E. Sharpe, Inc.

Hunt, S. 2002, *Making Competition Work in Electricity*, Wiley.

Ibrahim, S.B. 2014, 'ASEAN Power Grids Interconnection Projects for Energy Efficiency and Security of Supply', paper presented to the *Regional Energy Trade Workshop*, Asian Development Bank, Manila.

IEA 1995, *World Energy Outlook*, International Energy Agency.

IEA 1999, *Electricity Market Reform: An IEA Handbook*, International Energy Agency.

IEA 2013, *Southeast Asia Energy Outlook*, International Energy Agency.

IEA 2014, *World Energy Investment Outlook*, International Energy Agency.

IFC 2014, *Tower Power Africa: Energy Challenges and Opportunities for the Mobile Industry in Africa*, International Finance Corporation, World Bank Group.

IMF 2013, *Energy Subsidy Reform: Lessons and Implications*, International Monetary Fund.

International, T. 2014, *Corruption Perceptions Index 2014*.

J.E., B.-J. 2006, *Reforming Power Markets in Developing Countries: What Have We Learned?*, vol. 19, World Bank.

Jamasb, T. 2006, 'Between the State and Market: Electricity Sector Reform In Developing Countries', *Utilities Policy*, vol. 14, pp. 14-30.

Jamasb, T., Nepal, R., Timilsina, G. & Toman, M. 2014, *Energy Sector Reform, Economic Efficiency and Poverty Reduction*, World Bank.

Jamasb, T., Newbery, D. & Pollitt, M. 2005, *Core Indicators for Determinants and Performance of the Electricity Sector in Developing Countries*, World Bank.

Jamasb, T. & Pollitt, M. 2005, 'Electricity Market Reform in the European Union: Review of Progress toward Liberalisation & Integration', *The Energy Journal*, vol. 26, pp. 11-41.

Jannuzzi, G.D.M. 2005, 'Power Sector Reforms in Brazil and its Impacts on Energy Efficiency and Research and Development Activities', *Energy Policy*, vol. 33, pp. 1753-62.

Jayasuriya, K. 2003, 'Embedded Mercantilism and Open Regionalism: the Crisis of a Regional Political Project', *Third World Quarterly*, vol. 24, pp. 339-55.

Joffe, J. 2009, 'The Default Power', *Foreign Affairs*, vol. 88, pp. 21-35.

Johnson, M. & Rix, S. 1991, *Powering the Future: the Electricity Industry and Australia's Energy Future*, Sydney Pluto Press.

Joseph, K.L. 2010, 'The Politics of Power: Electricity Reform in India', *Energy Policy*, vol. 38, pp. 503-11.

Joseph, R. 1997, 'Democratisation in Africa after 1989: Comparative and Theoretical Perspectives', *Comparative Politics*, vol. 29, pp. 363-82.

Joskow, P.L. 1998, 'Electricity Sectors in Transition', *The Energy Journal*, vol. 19, pp. 25-62.

Joskow, P.L. 2006, 'Lessons Learned from Electricity Market Liberalisation', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

Joskow, P.L. 2007, 'Competitive Electricity Markets and Investment in New Generating Capacity', in D. Helm (ed.), *The New Energy Paradigm*, Oxford University Press.

Joskow, P.L. 2008, 'Capacity payments in imperfect electricity markets: Need and design', *Utilities Policy*, vol. 16, pp. 159-70.

Joskow, P.L. & Tirole, J. 2000, 'Transmission Rights and Market Power on Electric Power Networks', *Rand Journal of Economics*, vol. 31, pp. 450-87.

Kale, S.S. 2004, 'Current Reforms: The Politics of Policy Change in India's Electricity Sector', *Pacific Affairs*, vol. 77, pp. 467-91.

Kang, J.J., Yuan, J.H., Hu, Z.G. & Xu, Y. 2012, 'Review on Wind Power Development and Relevant Policies in China During the 11th Five-Year Plan Period', *Renewable and Sustainable Energy Reviews*, vol. 16, pp. 1907-15.

Kapika, J. & Eberhard, A. 2013, *Power Sector Reform and Regulation in Africa: Lessons from Kenya, Tanzania, Uganda, Zambia, Namibia and Ghana*, HSRC Press.

Karekezi, S. & Kithyoma, W. 2002, 'Renewable Energy Strategies for Rural Africa: Is a PV-Led Renewable Energy Strategy the Right Approach for Providing Modern Energy to the Rural Poor of sub-Saharan Africa?', *Energy Policy*, vol. 30, pp. 1071-86.

Kaufman, R. & Stallings, B. 1991, 'The Political Economy of Latin American Populism', in R. Dornbusch & S. Edwards (eds), *The Macroeconomics of Populism in Latin America*, University of Chicago Press.

Kaufman, S., Little, R. & Wohlforth, W. 2007, *The Balance of Power in World History*, Palgrave-Macmillan.

Kennedy, P. 1989, *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000*, Random House.

Kessides, I. 2012, 'The Impacts of Electricity Sector Reforms in Developing Countries', *The Electricity Journal*, vol. 25, pp. 79-88.

Kim, Y. 2013, 'Unfinished Business: The Evolution of US Competitive Retail Electricity Markets', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

King, D. & Wood, S. 1999, 'The Political Economy of Neoliberalism: Britain and the United States in the 1980s', in K.e. al. (ed.), *Continuity and Change in Contemporary Capitalism*, the Press Syndicate of the University of Cambridge.

Kingston, C. & Caballero, G. 2009, 'Comparing Theories of Institutional Change', *Journal of Institutional Economics*, vol. 5, pp. 151-80.

Kingstone, P.R. 2011, *The Political Economy of Latin Amercia: Reflections on Neoliberalism and Development*, Routledge.

Kinloch, R.F. 1966, 'The Growth of Electric Power Production in Malaya', *Annals of the Association of American Geographers*, vol. 56, pp. 220-35.

Klausen, J. 1999, 'The Declining Significance of Male Workers: Trade Union Responses to Changing Labour Markets', in H. Kitschelt (ed.), *Continuity and Change in Contemporary Capitalism*, the Press Syndicate of the University of Cambridge.

Knight, F.H. 1921, *Risk, Uncertainty, and Profit*, MA: Hart.

Knudsen, T. 2007, 'Organisational Routines in Evolutionary Theory', in M. Becker (ed.), *Handbook of Organisational Routines*, Edward Elgar.

Kojima, M., Bacon, R. & Trimble, C. 2014, *Political Economy of Power Sector Subsidies: A Review with Reference to Sub-Saharan Africa*, World Bank.

Kolko, G. 1963, *The Triumph of Conservatism: A Reinterpretation of American History, 1900-1916*, The Free Press.

Kornai, J. 1992, *The Socialist System: the Political Economy of Communism*, Oxford University press.

KPMG 2013, *The Energy Report: Philippines – Growth and Opportunities in the Philippine Electric Power Sector*.

KPMG 2014, *Power in Afric: Sector Report*.

Krauthammer, C. 1990, 'The Unipolar Moment', *Foreign Affairs*, vol. 70, pp. 23-33.

Lam, P. & Shiu, A. 2004, 'Efficiency and Productivity of China's Thermal Power Generation', *Review of Industrial Organisation*, vol. 24, pp. 73-93.

Larsen, E.R., Dyner, I., L., B.V. & Franco, C.J. 2004, 'Lessons from Deregulation in Colombia, Successes, Failures and the Way Ahead', *Energy Policy*, vol. 32, pp. 1767-80.

Lawler, J., Ticktin, H. & Ollman, B. 1998, *Market Socialism: The Debate Among Socialist*, Routledge.

Leffler, M.P. 1992, *A Preponderance of Power: National Security, the Truman Administration, and the Cold War*, Stanford University Press.

Lenin, V. 1916, *Imperialism, the Highest Stage of Capitalism*, Progress Publishers.

Lewis, J. & Surender, R. 2004, *Welfare State Change: Towards a Third Way?* , Oxford University Press.

Li, B. & Dorian, J. 1995, 'Change in China's Power Sector', *Energy Policy*, vol. 23, pp. 619-26.

Libecap, G.D. 1989, *Contracting for Property Rights*, Cambridge University Press.

Lindblom, C.E. 1977, *Politics and Markets*, Basic Books.

Littlechild, S. 2006, 'Foreword: The Market versus Regulation', in F.P. Sioshansi (ed.), *Electricity Market Reform: An International Perspective*, Elsevier.

Lubeck, P.M. 1992, 'The Crisis of African Development: Conflicting Interpretations and Resolutions', *Annual Review of Sociology*, vol. 18, pp. 519-40.

Parliament of Australia. 2010, *How Much Australia Emits*, 31 August 2015, <http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/Browse_by_Topic/ClimateChange/whyClimate/human/howMuch>.

Ma, C.B. & Zhao, X.L. 2015, 'China's Electricity Market Restructuring and Technology Mandates: Plant-Level Evidence for Changing Operational Efficiency', *Energy Economics*, vol. 47, pp. 227-37.

MacGill, I. & Healy, S. 2013, 'Is Electricity Industry Reform the Right Answer to the Wrong Question? Lessons from Australian Restructuring and Climate Policy', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Maddison, A. 2003, *The World Economy: Historical Statistics*, OECD Development Centre.

Maddison, A. 2007, *Contours of the World Economy, 1-2030 AD: Essays in Macro-economic History*, Oxford University Press.

Mastropietro, P., Batlle, C., Barroso, L.A. & Rodilla, P. 2013, 'Electricity Auctions in South America: Towards Convergence of System Adequacy and RES-E Support', *Renewable and Sustainable Energy Reviews*, vol. 40, pp. 375-85.

Mayer, K., Namerjee, S.G. & Trimble, C. 2015, *Elite Capture: Residential Tariff Subsidies in India*, World Bank.

Mbogho, S.M. 2007, 'Kenyan Electricity Industry Reforms: Issues, Impacts and Approaches', University of Technology, Sydney.

McFarland, A.S. 2007, 'Neopluralism', *Annual Review of Political Science*, vol. 10, pp. 45-66.

McKenzie, D. & Mookherjee, D. 2003, *The distributive impact of Privatization in Latin America: Evidence from four countries*, Institute for Economic Development.

McNally, C.A. 2013, 'Refurbishing State Capitalism: A Policy Analysis of Efforts to Rebalance China's Political Economy', *Journal of Current Chinese Affairs*, vol. 42, pp. 45–71.

Michels, R. 1915, *Political Parties. A Sociological Study of the Oligarchical Tendencies of Modern Democracies*, Collier Books.

Millan, J. 2006, *Power Sector Reform in Latin America: Accomplishments, Failures and Challenges*, Inter-American Development Bank.

Millan, J. 2007, *Market or State? Three Decades of Reform in the Latin American Electric Power Industry*, Inter-American Development Bank.

Mills, W. 1956, *The Power Elite*, Oxford University Press.

Min, B. & Golden, M. 2014, 'Electoral Cycles in Electricity Losses in India', *Energy Policy*, vol. 65, pp. 619-25.

Mitra, S.K. 2011, *Politics in India: Structure, Process and Policy*, Routledge.

Moran, A. 2006, 'The Electricity Industry in Australia: Problems along the Way to a National Electricity Market', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

Moran, A. & Sood, R. 2013, 'Evolution of Australia's National Electricity Market', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Moreno, R., Barroso, L.A., Rudnick, H., Mocarquer, S. & Bezerra, B. 2010, 'Auction Approaches of Long-Term Contracts to Ensure Generation Investment in Electricity Markets: Lessons from the Brazilian and Chilean Experiences', *Energy Policy*, vol. 38, pp. 5758-69.

Morgenthau, H.J. 1966, 'The Purpose of Political Science', in J.C. Charlesworth (ed.), *A Design for Political Science: Scope, Objectives, and Method*, Books for Libraries Press.

Mosca, G. 1939, *The Ruling Class*, McGraw-Hill Book Company.

Mota, R.L. 2003, *The Restructuring and Privatisation of Electricity Distribution and Supply Business in Brazil: A Social Cost-Benefit Analysis*, University of Cambridge.

Mou, D.G. 2014, 'Understanding China's electricity market reform from the perspective of the coal-fired power disparity', *Energy Policy*, vol. 74, pp. 224-34.

Mukherji, R. 2009, *The Political Economy of Development in India*, Australian National University.

Muller, J. & Stahl, K. 1996, 'Regulation of the Market for Electricity in the Federal Republic of Germany', in R.J. Gilbert & E.P. Kahn (eds), *International Comparison of Electricity Regulation*, Cambridge University Press.

Nadeau, K. 2008, *The History of the Philippines*, Greenwood Publishing Group.

Nagayama, H. 2007, 'Effects of Regulatory Reforms in the Electricity Supply Industry on Electricity Prices in Developing Countries', *Energy Policy*, vol. 35, pp. 3440-62.

Nagayama, H. 2010, 'Impacts on Investments, and Transmission/Distribution Loss Through Power Sector Reforms', *Energy Policy*, vol. 38, pp. 3453-67.

Nagel, J.H. 1975, *The Descriptive Analysis of Power*, Yale University Press.

Naidu, G. 1998, 'Power Sector Reform in Malaysia: Privatisation and Regulation', in R.I. Wu & Y.P. Chu (eds), *Business, Markets and Government in the Asia Pacific*, Routledge

Naidu, G. & Lee, C. 1997, 'The Transition to Privatisation: Malaysia', in A. Mody (ed.), *Infrastructure Strategies in East Asia: the Untold Story*, World Bank.

Neher, C.D. 1984, 'Thailand', in D.K. Mauzy (ed.), *Politics in the ASEAN States*, Marican.

Newbery, D. 2006, 'Electricity Liberalisation in Britain and the Evolution of Market Design', in F.P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

Newbery, D. & Pollitt, M. 1997, 'The Restructuring and Privatisation of Britain's CEGB - Was it Worth It? ', *The Journal of Industrial Economics*, vol. 45, pp. 269-303.

Newbery, D.M. & Green, R. 1996a, 'Regulation, public ownership and privatisation of the English electricity industry', in R. Gilbert & E. Kahn (eds), *International Comparisons of Electricity Regulation*, Cambridge University Press.

Newbery, D.M. & Green, R. 1996b, 'Regulation, Public Ownership and Privatisation of the English Electricity Industry', in R.J. Gilbert & E.P. Kahn (eds), *International Comparison of Electricity Regulation*, Cambridge University Press.

Nissanke, M. & van Huellen, S. 2014, 'Commodities Super-cycle: Implications for South Asia', in A. Razzaquem M & Y. Basnett (eds), *Regional Integration in South Asia: Trends, Challenges and Prospects*, The Commonwealth.

Nolan, P. & Dong, F. 1990, *The Chinese Economy and Its Future*, Polity Press.

North, D.C. 1990, *Institutions, Institutional Change and Economic Performance*, Cambridge University Press.

North, D.C. 2005, *Understanding the Process of Economic Change*, Princeton University Press.

North, D.C. & Thomas, R.P. 1973, *The Rise of the Western World: An New Economic History*, Cambridge University Press.

Nye, J.S. 2011, *The Future of Power*, Public Affairs.

Nye, J.S. Soft Power: The Means to Success in World Politics, Public Affairs.

O'Brien, R. & Williams, M. 2010, *Global Political Economy: Evolution and Dynamics*, Palgrave Macmillan.

O'Neill, R., Helman, U., Hobbs, B.F. & Baldick, R. 2006, 'Independent System Operators in the USA: History, Lessons Learned', in P. Sioshansi & W. Pfaffenberger (eds), *Electricity Market Reform: An International Perspective*, Elsevier.

OECD 2014, *Southeast Asia Investment Policy Perspectives*, Organisation for Economic Co-operation and Development.

Olivier, J.G.J., Janssens-Maenhout, G., Muntean, M. & Peters, J. 2014, *Trends in Global CO2 emissions: 2014 Report*, PBL Netherlands Environmental Assessment Agency.

Ollman, B. 1998, *Market Socialism: The Debate among Socialists*, Routledge.

Onis, Z. & Senses, F. 2005, 'Rethinking the Emerging Post-Washington Consensus', *Development and Change*, vol. 36, pp. 263-90.

Ostrom, E. 2004, 'Doing Institutional Analysis: Digging Deeper than Markets and Hierarchies', in C. Menard & M.M. Shirley (eds), *Handbook of New Institutional Economics*, Springer.

Ostrom, E. & Basurto, X. 2011, 'Crafting Analytical Tools to Study Institutional Change', *Journal of Institutional Economics*, vol. 7, pp. 317-43.

Owusu, F. 2003, 'Pragmatism and the gradual Shift from Dependency to Neoliberalism: the World Bank, African Leaders and Development Policy in Africa', *Energy Policy*, vol. 31, pp. 1655-72.

Paredes, R.M. 2001, *Redistributive Impact of Privatization and the Regulation of Utilities in Chile*, World Institute for Development Economic Research

Pareto, V. 1916, *The Mind and Society*. *A Treatise on General Sociology*, Dover.

Pargal, S. & Banerjee, G.S. 2014, *More Power To India: The Challenge of Electricity Distribution*, World Bank.

Parsons, T. 1937, *The Structure of Social Action*, McGraw Hill.

Pfaffenberger, W. & Chrischilles, E. 2013, 'Turnaround in Rough Sea - Electricity Market in Germany', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Phongpaichit, P. & Baker, C. 2000, *Thailand's Crisis*, Institute of Southeast Asian Studies.

Pinheiro, A.C. & Schneider, B.R. 1994, *The Fiscal Impact of Privatisation in Latin America*, TEXTO PARA, IPEA.

Poch, K. & Tuy, S. 2012, 'Cambodia's Electricity Sector in the Context of Regional Electricity Market Integration', in Y. Wu, X. Shi & S. Kimura (eds), *Energy Market Integration in East Asia: Theories, Electricity Sector and Subsidies*, ERIA Research Project Report 2011-17, Jakarta, ERIA, pp 141-172.

Pollitt, M.G. 1995, *Ownership and Performance in Electric Utilities: The International Evidence on Privatisation and Efficiency*, Oxford University Press for the Oxford Institute of Energy Studies.

Pollitt, M.G. 2004, *Electricity Reform in Chile: Lessons for Developing Countries*, Department of Applied Economics, University of Cambridge.

Pollitt, M.G. 2008, 'Electricity Reform in Argentina: Lessons for Developing Countries ', *Energy Economics*, vol. 30, pp. 1536-67.

Pollitt, M.G. 2009, *Electricity Liberalisation in the European Union: A Progress Report*, University of Cambridge.

Posen, B.K. 2003, 'Command of the Commons: The Military Foundation of U.S. Hegemony', *International Security*, vol. 28, pp. 5-46.

Prebisch, R. 1950, *The Economic Development of Latin America and Its Principal Problems*, United Nations.

Pusey, M. 1991, *Economic Rationalism in Canberra: A Nation Building State Changes Its Mind*, Cambridge University Press.

Quiggin, J. 2001, 'Market-oriented reform in the Australian electricity industry', *Economic and Labour Relations Review*, vol. 12, pp. 126-50.

R.A., P. & M.F., B. 1991, 'Electricity System in Brazil', paper presented to the *CERES Workshop on Electricity Regulation in the Southern Cone*, Montevido, Uruguay.

Raineri, R. 2006, 'Chile: Where it all started', in F.P.P. SioshansI, W. (ed.), *Electricity Market Reform: An International Perspective*, Elsevier.

Raineri, R., Dyner, I., Goni, J., Castro, N., Olaya, Y. & Franco, C. 2013, 'Latin American Energy Integration: An Outstanding Dilemma', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Ranci, P. & Cervigni, G. 2013, 'Introduction', in P.C. Ranci, G. (ed.), *The Economics of Electricity Markets: Theory and Policy*, Edward Elgar Publishing.

Raquiza, A. 2012, *State Structure, Policy Formation, and Economic Development in Southeast Asia: The Political Economy of Thailand and Philippines*, Routledge.

Rector, J. 2005, *The IPP Investment Experience in Malaysia*, Centre for Environmental Science and Policy, Stanford University.

Roland, G. 2004, 'Understanding Institutional Change: Fast-Moving and Slow-Moving Institutions', *Studies in Comparative International Development*, vol. 38, pp. 109-31.

Roxas, F. & Santiago, A. 2010, 'Broken Dreams: Unmet Expectations of Investors in the Philippine Electricity Restructuring and Privatisation', *Energy Policy*, vol. 38, pp. 7269-77.

Ruggie, J.G. 1982, 'International Regimes, Transactions, and Change: Embedded Liberalism in the Postwar Economic Order', *International Organisation*, vol. 36, pp. 379-415.

Russell, B. 1975, *Power: A New Social Analysis*, Allen and Unwin.

Sadoulet, E. & A., d.J. 1995, *Quantitative Development Policy Analysis*, Johns Hopkins University Press.

Saich, T. 2001, *Governance and Politics of China*, Palgrave.

Sally, R. 1998, *Classical Liberalism and International Economic Order: Studies in Theory and Intellectual History*, Routledge.

Sanchez, F., Neto, J. & Marques, R. 2008, 'Lula's Government: A Critical Appraisal', in P. Barrett, D. Chavez & C. Rodriguez-Garavito (eds), *New Latin American Left: Utopia Reborn*, Pluto Press.

Schlesinger, A. 1956, *Liberalism in America: A Note for Europeans*, Riverside Press.

Schmid, A. 1972, 'Analytical Institutional Economics', *American Journal of Agricultural Economics*, vol. 54, pp. 893-901.

Schotter, A. 1981, *The Economic Theory of Social Institutions*, Cambridge University Press.

Schuster, F. 2008, 'The Left, Parties and Movements: Strategies and Prospects', in P. Barrett, D. Chavez & C. Rodriguez-Garavito (eds), *New Latin American Left: Utopia Reborn*, Pluto Press.

Schwartz, H.M. 2010, *States versus Markets: the Emergence of a Global Economy*, Palgrave Macmillan.

Sen, A. & Jamasb, T. 2013, 'Not Seeing the Wood for the Trees? Electricity Market Reform in India', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Sharma, D. 2003, 'The multidimensionality of electricity reform - an Australian perspective', *Energy Policy*, vol. 31, pp. 1093-102.

Sharma, D. 2004, 'Australian Electricity Reform: The Ownership Debate', paper presented to the *International Conference on Electricity Supply Industry in Transition: Issues and Prospects for Asia*, Asian Institute of Technology (AIT), Bangkok, Thailand.

Sharma, D. 2005, 'Electricity Reforms in the ASEAN: A Panoramic Discourse', *Economic and Political Weekly*, vol. 11, pp. 5318-26.

Sharma, D., Madamba, S.E. & Chan, M.R.L. 2004, 'Electricity Industry Reforms in the Philippines', *Energy Policy*, vol. 32, pp. 1487-97.

Sharma, D.P., Chandramohanan Nair, P.S. & Balasubramanian, R. 2005, 'Performance of Indian Power Sector During A Decade Under Restructuring: A Critique', *Energy Policy*, vol. 33, pp. 563-76.

Shepsle, K.A. 1979, 'Institutional Arrangements and Equilibrium in Multidimensional Voting Models', *American Journal of Political Science*, vol. 23, pp. 27-59.

Short, C., Swan, A., Graham, B. & Mackay-Smith, W. 2001, 'Electricity Reform: The benefits and costs to Australia', paper presented to the *Outlook 2001 Conference*, Australian Bureau of Agriculture and Resource Economics (ABARE), Canberra, Australia.

Sidney, F. 1964, *Laissez faire and the General-Welfare State*, The University of Michigan Press.

Simon, H. 1957, *A Behavioural Model of Rational Choice, in Models of Man, Social and Rational: Mathematical Essays on Rational Human Behaviour in a Social Setting*, Wiley.

Simon, H.A. 1953, 'Notes on the Observation and Measurement of Political Power', *Journal of Politics*, vol. 15, pp. 500-16.

Sioshansi, F.P. 2013, 'Introduction', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Sirasoontorn, P. & Quiggin, J. 2007, 'The political economy of privatisation in the Thai electricity industry', *Journal of the Asia Pacific Economy*, vol. 12, pp. 403-19.

Smith, M.J. 1990, 'Pluralism, Reformed Pluralism and Neo-pluralism: The Role of Pressure Groups in Policy-Making', *Political Studies*, no. 38, pp. 302-22.

Smith, T.B. 2003, 'Privatising Electric Power in Malaysia and Thailand: Policies and Infrastructure Development Policy', *Public Administration and Development*, vol. 23, pp. 273-83.

Soto, R. 1999, *Institutional Reforms in the Electricity Sector*, Graduate Program in Economics, ILADES-Georgetown University.

Speed, P.A. 2013, 'Reform Postponed: The Evolution of China's Electricity Markets', in P. Sioshansi (ed.), *Evolution of Global Electricity Markets*, Elsevier.

Spiller, P.T. & Martorell, L.V. 1996, 'How Should It be Done? Electricity Regulation in Argentina, Brazil, Uruguay and Chile', in R.J. Gilbert & E.P. Kahn (eds), *International Comparison of Electricity Regulation*, University of Cambridge.

Srivastava, L., Misra, N. & Hasan, S. 2013, *Promoting Regional Energy Cooperation in the Region*, Commonwealth Secretariat.

Stanfield, J.R. 1999, 'The Shape, Method and Significance of Original Institutional Economics', *Journal of Economic Issues*, vol. 32, pp. 231-55.

Steger, M.B. & Roy, R.K. 2010, *Neoliberalism: A Very Short Introduction*, Oxford University Press.

Steiner, F. 2001, 'Regulation, Industry Structure and Performance in the Electricity Supply Industry', *OECD Economic Studies*, vol. 32, p. 2001/1.

Steiner, H.A. 1950, 'The People's Democratic Dictatorship in China', *The Western Political Quarterly*, vol. 3, pp. 38-51.

Stiglitz, J.E. 2002, *Globalisation and Its Discontents*, W.W. Norton & Company.

Stiglitz, J.E. 2004, 'Is There a Post-Washington Consensus Consensus? ', in N. Serra & J.E. Stiglitz (eds), *The Washington Consensus Reconsidered: Towards a New Global Governance*, Oxford University Press.

Stock, P. 2015, *Giga-What? Explaining Australia's Renewable Energy Target*, The Climate Council.

Sweeting, A. 2007, 'Market Power in the England and Wales Wholesale Electricity Market, 1995-2000', *The Economic Journal*, vol. 117, pp. 654-85.

Teik, K.B. 2006, 'Malaysia: Balancing Development and Power', in G. Rodan, K. Hewison & R. Robison (eds), *The Political Economy of Southeast Asia: Markets, Power and Contestation*, Oxford University Press.

Teiwes, F.C. 2010, 'Mao Zedong in Power (1949-1976)', in W.A. Joseph (ed.), *Politics in China: An Introduction*, Oxford University Press.

Thompson, H.G., Hovde, D.A. & Irwin, L. 1996, *Economics of Scale and Vertical Integration in the Investor-Owned Electric Utility Industry*, the National Regulatory Research Institute, the Ohio State University.

Thompson, L.M. 2001, *A History of South Africa*, Yale University Press.

Thomson, A. 2010, *An Introduction to African Politics*, Routledge.

Toba, N. 2003, *Welfare Impacts of Electricity Generation Sector Reform*, Asian Development Bank.

Tongia, R. 2009, 'The Political Economy of Indian Power Sector Reforms', in D.G. Victor & T.C. Heller (eds), *The Political Economy of Power Sector Reform: the Experiences of Five Major Developing Countries*, Cambridge University Press.

Torero, M. & Pasco-Font, A. 2003, 'The Social Impact of Privatisation and the Regulation of Utilities in Peru', in C. Ugaz & C. Waddams-Price (eds), *Utility Privatisation and Regulation*, Edward Elgar.

Trachtenberg, A. 2010, *The Collected Works of V.I. Lenin*, Kessinger Publisher.

Turok, B. & Maxey, K. 1976, 'Southern Africa: White Power In Crisis', in P.C.W. Gutkind & I.M. Wallerstein (eds), *The Political Economy of Contemporary Africa*, Sage Publications.

Ullah, K. 2015, 'Reforming the Power: An Institutional Analysis of Power Sector Reforms in Pakistan', University of Twente.

Unay, S. 2013, 'From Engagement to Contention: China in the Global Political Economy', *Perceptions*, vol. 18, pp. 129-53.

U.S. Department of State. 2014, *United States Climate Action Report 2014*, <http://www.state.gov/documents/organization/219038.pdf>.

Veblen, T. 1899, *Theory of the Leisure Class: A Economic Study of Institutions*, Viking Press.

Veblen, T. 1909, 'The Limitations of Marginal Utility', *Journal of Political Economy*, vol. 17, pp. 620-36.

Wamukonya, N. 2003, 'Power sector reform in developing countries: Mismatched agendas', *Energy Policy* vol. 31, pp. 1273-89.

Wang, Q. & Chen, X. 2012, 'China's electricity market-oriented reform: from an absolute to relative monopoly', *Energy Policy*, vol. 51, pp. 143-8.

Ward, J. 1997, *Latin America: Development and Conflict since 1945*, Psychology Press.

Wattana, S. 2010, 'Electricity Industry Reforms in Thailand: A Comprehensive Review', University of Technology, Sydney.

Wattana, S., Sharma, D. & Vaiyavuth, R. 2007, 'Electricity Industry Reforms in Thailand: A Historical Review', *GMSARN International Journal*, vol. 2, pp. 41-52.

Weatherley, R. 2006, *Politics in China Since 1949*, Routeldge.

Weinraub, B. 1991, 'Economic Crisis Forcing Once Self-Reliant India to Seek Aid', *New York Times*, June 29.

Weyland, K. 1996, 'Neo-populism and Neoliberalism in Latin America', *Studies in Comparative International Development* vol. 31, pp. 3-31.

Whiteman, J. 1999, 'The Potential Benefits of Hilmer and Related Reforms: Electricity Supply', *American Economic Review*, vol. 32, pp. 17-30.

Wiarda, H.J. 1997, *Corporatism and Comparative Politics: the Other Great "ism"*, M.E. Sharpe.

Williams, J.H. & Dubash, K. 2004, 'Asian Electricity Reform in Historical Perspective', *Pacific Affairs* vol. 77, pp. 411-36.

Williams, J.H. & Ghanadan, R. 2006, 'Electricity Reform in Developing and Transition Countries: A Reappraisal', *Energy* vol. 31, pp. 815-44.

Williamson, O.E. 1975, *Markets and Hierarchies: Analysis and Antitrust Implications*, Free Press, New York.

Williamson, O.E. 1985, *The Economic Institutions of Capitalism*, Free Press, New York.

Williamson, O.E. 1993, 'Calculativeness, Trust, and Economic Organization', *Journal of Law and Economics*, vol. 36, pp. 453-86.

Williamson, O.E. 2000, 'The New Institutional Economics: Taking Stock, Looking Ahead', *Journal of Economic Literature*, vol. 38, no. 595-613.

Wisuttisak, P. 2010, 'Regulatory Framework of Thai Electricity Sector', paper presented to the *3rd Annual Conference on Competition and Regulation in Network Industries*, Brussels, Belgium.

Wolak, F. 2009, *An Assessment of the Performance of the New Zealand Wholesale Electricity Market*, Commerce Commission.

Wolf, C. & Pollitt, M.G. 2009, *The Welfare Implications of Oil Privatisation: A Cost-Benefit Analysis of Norway's Statoil*, Electricity Policy Research Group, University of Cambridge.

Wolfram, C.D. 1999, 'Measuring Duopoly Power in the British Electricity Spot Market', *American Economic Review*, vol. 89, pp. 805-26.

Woo, P.Y. 2005, *Independent Power Producers in Thailand*, Centre for Environmental Science and Policy, Stanford University.

Woodhouse, E.J. 2005, *The IPP Experience in the Philippines*, Centre for Environment Science and Policy, Stanford University

Xu, S.F. & W.Y., C. 2006, 'The Reform of Electricity Power Sector in the PR of China', *Energy Policy*, vol. 34, pp. 2455-65.

Yang, M.Y. & Sharma, D. 2014, 'Impacts of Electricity Market Reforms on Investments in the Power Sector', *4th International Association for Energy Economics (IAEE) Asian conference*, Beijing, China.

Yarrow, G. 1992, *British Electricity Prices Since Privatisation*, Oxford Regulatory Policy Institute.

Yeh, E.T. & Lewis, J.I. 2004, 'State Power and the Logic of Reform in China's Electricity Sector', *Pacific Affairs*, vol. 77, pp. 437-65.

Yeoh, B.S. & R., R. 2004, 'Electricity in China: The Latest Reforms', *The Electricity Journal*, vol. 17, pp. 60-9.

Zhang, C. & Heller, T.C. 2009, 'Reform of the Chinese Electric Power Market: Economics and Institutions', in D.G. Victor & T.C. Heller (eds), *The Political Economy of Power Sector Reform: The Experience of Five Major Developing Countries*, Cambridge University Press.

Zhang, Y.F., Parker, D. & Kirkpatrick, C. 2008, 'Electricity Sector Reform in Developing Countries: An Econometric Assessment of the Effects of Privatisation, Competition and Regulation', *Journal of Regulatory Economics*, vol. 33, pp. 159-78.

Zhu, X.D. 2012, 'Understanding China's Growth: Past, Present, and Future', *Journal of Economic Perspectives*, vol. 26, pp. 103-24.

Zweig, D. 2010, 'China's Political Economy', in W.A. Joseph (ed.), *Politics in China: An Introduction*, Oxford University Press.