

# Electricity Networks Privatization in Australia: An Overview of the Debate

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## Abstract

The debate on electricity networks privatization in the Australian National Electricity Market is an important public policy concern but remains unsettled. This article reviews and compares the economic performance between the privately and state-owned electricity networks in Australia across three dimensions encompassing prices, quality and investment. The comparative analysis suggests that privately owned networks are not worse off than the state-owned networks in terms of performance. However, international empirical evidences indicate that the efficiency gains to consumers from electricity networks privatization will depend on the underlying regulatory regime and regulatory institutional framework. The long-term concerns on future investments, security of supply, climate change and economic regulation of networks will continue to prevail once the short-term efficiency gains from privatization are exhausted. These concerns imply that the role of the state will still be significant, although transformed, even after electricity networks privatization raising questions on the motives of privatization.

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## **1. Introduction**

The privatization of the electricity sector remains an important public policy matter in Australia. The political and economic appeal of electricity network privatization has received renewed attention in Australia as the state governments of Queensland (QLD) and New South Wales (NSW) announced further electricity privatizations if re-elected in 2014 (Chester, 2015). The major rationale for privatizing electricity networks involves 'recycling' publicly owned assets to fund other infrastructure sectors such as transport, delivering lower consumer electricity prices and providing greater quality of service by improving network companies efficiency (Productivity Commission, 2014)<sup>1</sup>. Significant gaps in the performance of state-owned corporations and privately owned network companies in the Australian National Electricity Market (NEM) have also motivated the privatization debate (Productivity Commission, 2013). A backlash against the privatisation agenda reflected by the results of recent elections in QLD and the soaring electricity and gas disconnections in Victoria (VIC) confirms that electricity privatisation is far and away the most important policy issue in Australia. However, the political and economic concern on electricity networks privatization continues to be debated among academics and policymakers without any clear consensus emerging on the benefits of privatization.

Studies advocating electricity privatization have often pointed to the privatization of the Victorian electricity assets over the 1990s as a successful example of the productivity enhancing benefits of micro-economic reform (Moran, 2008). The privatization of the Victorian electricity industry is also considered to have been a successful fiscal initiative, which rescued the state government from unsustainable debts while increasing expenditure and employment levels in education, health care, and law and order (Abbott, 2007). Victoria corporatized and privatized its electricity networks between 1995 and 1999 after the Kennett government functionally unbundled the state electricity commission in 1994. Likewise, electricity privatization in South Australia

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<sup>1</sup> Under capital recycling, the proceeds from privatization are channeled towards the procurement of new infrastructure. Retail electricity prices have gone up about 50 percent over the last four years in Australia (Nepal et al. 2014).

occurred during 1999-2000 implying that the Australian state governments embarked on privatization programs to different extent since the 1990s.

In contrast, studies opposing electricity privatization have criticized the same 'free market' models of electricity supply in Victoria attributing to a record of failures in improving electricity affordability and reliability over 20 years of reforms (Quiggin, 2014). The transmission and distribution networks remain state-owned in Tasmania (TAS), NSW, QLD and part of the Australian Capital Territory (ACT). A rapidly growing number of households are suffering from energy impoverishment caused by escalating electricity prices in Victoria contradicting the proclaimed benefits of lower electricity prices from the restructuring and privatisation of the electricity sector (Chester, 2014).

Moreover, the privatization of the network segments needs to be understood differently from other segments of the electricity supply industry (ESI) given its distinct economic characteristics. Electricity networks exhibit natural monopoly characteristics such as economies of scale, economies of scope and economies of densities due to high sunk costs and low marginal network operating costs (Kahn, 1971). In practice, entry to network businesses is restricted and economic regulation is required to minimize the inefficiencies and rent seeking associated with monopoly pricing. In the Australian context, economic regulation of electricity networks involves different incentive regulation (or price control) regimes across the network segments. For example, the Australian Energy Regulator (AER) determines the maximum revenue (*revenue caps*) that the transmission companies can recover from the network users and sets the maximum prices that electricity distribution companies can charge to consumers (*price caps*) (AER, 2013)<sup>2</sup>. However, the empirical evidence and discussions on privatizing a regulated natural monopoly such as electricity network infrastructure remain relatively unexplored and debated in the economics literature, especially in the Australian context.

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<sup>2</sup> In QLD, ACT and TAS, distribution networks are regulated using revenue caps while weighted average price caps are used in NSW, VIC and SA.

The purpose of this article to provide an overview of the academic and policy debate surrounding the privatization of electricity networks in the NEM as previous electricity privatization studies in Australia have focused mostly on the electricity generation segments. We derive relevant policy lessons for Australia based on the international empirical evidences considering electricity networks privatization as an important public policy. This is important as misguided and overlapping policy failures are perceived to be the primary causes of inefficiency in the NEM (Simshauser, 2014). Hence, the article aims to guide policymaking and also contribute to the limited literature on the privatization of a regulated natural monopoly, in the context of the NEM.

The remainder of the paper is structured as follows. Section 2 provides a brief overview of the important academic literature on the economics of privatization in general and utilities privatization in particular. Section 3 is a literature review of the existing international empirical evidence on the success and failure of electricity networks privatization. The economic components of costs, quality, pricing and investment performance of the regulated public and private network companies in the NEM are analyzed in section 4. The findings and relevant policy considerations are outlined and discussed in section 5. Section 6 concludes the paper.

## **2. Review of the Academic Literature**

The academic literature on the theory of privatization is copious and forms a subset of a large literature on the economics of ownership and the role for government ownership of productive resources (Megginson and Netter, 2001; Muhlenkamp, 2013). Several economic theoretical models have explained why economic performances differ between a public and a private firm. For example, Alachian (1965), based on property rights approach, showed that variations in the allocation and attenuation of property rights could explain the performance differences across firms. His argument is that inferior incentives lead to inferior efficiency among state-owned firms as property rights are often distributed badly than private firms. Sappington and Stiglitz (1987) developed a model showing that the main difference between public and private ownership lies in

the transactions costs faced by the government when attempting to intervene in production activities. Other economists like Shapiro and Willig (1990), Laffont and Tirole (1991) and Hart, Shleifer and Vishny (1997) employed principal-agent theory and incomplete contracts models in finding that the choice between private versus public ownership vary depending upon conditions. Likewise, Frey (1997) applied the concept of intrinsic motivation while Houston (2000) studied the public service motivation in better explaining the relative efficiency of private and public firms.

A 'conventional wisdom' on privatization is that private ownership strengthens incentives for profit maximization and therefore should lead to gains in productive and allocative efficiency. This is because private ownership can be viewed as one means of reducing the impact of political factors on economic incentives, behavior and performance (Vickers and Yarrow, 1988; 1991). Public activity tends to improve when divested as divestiture reduces political influence and increases influence of capital market factors. The fiscal considerations to undertake privatization are also important as it provides government with incentives to undertake the privatization in raising cash and eliminating public subsidies to state-owned firms. Moreover, the fiscal benefits of privatization are related to the efficiency and welfare advantages of private ownership, as the government is better off keeping the firms in public ownership and receiving the stream of profits if the public ownership is optimal (Guriev and Megginson, 2007). The importance of innovation in an economy is another argument in favor of private ownership. Economists have argued that innovation can prosper only under private ownership as development and commercialization of innovation is certainly more likely under private hands (Shleifer, 1998).

However, privatization is prone to market failures as it can result in firm's overemphasizing profit maximization at the expense of other socially valuable objectives (Holmstrom and Milgrom, 1991). The occurrence of market failures provides a strong criticism to the 'welfare theorems' of neoclassical economics. Thus, an alternative to privatization is to persist with state ownership and planning but under conditions of 'market socialism' (Barone, 1908; Lange, 1936).

Market socialism entails that state-owned firms facilitate economic exchange in competitive settings (markets) even though the state has the ownership while the managers of the firms are incentivized by performance contracts<sup>3</sup>. However, a commonplace observation is that public enterprises are inefficient as they address the objectives of politicians rather than maximizing economic efficiency (Boycko, Shleifer and Vishny, 1996). An alternative institutional arrangement is to create regulated private firms instead of regulated public firms to correct for market failures and alongside maximize efficiency.

Nonetheless, the impact of regulation on economic efficiency and in addressing market failures depends on the underlying efficiency incentives embodied in the regulatory regime (incentive contracts) and the extent of independence of the regulator from the government. In the absence of independence, regulation can become prone to political capture becoming a tool of self-interest within the government (Stiglitz, 1998). Regulatory captures can lead to privatization creating powerful interest groups engendering adverse effect on public policy choices. However, developed countries tend to have or able to create more robust institutional framework and arrangements due to their high institutional endowment (Laffont, 2005). Adequate institutional endowments and having mature institutions also allows competition policy to develop and flourish (Faccio, 2006).

The above theoretical discussions on privatization suggest that theory alone is insufficient and inclusive in assessing relative performance of a regulated private monopoly over a state-owned monopoly. Privatization theorists like Laffont and Tirole (1993) have also mentioned the limitations of theoretical models on privatization analyzing trade-offs between government and private ownership in promoting efficiency. The next section illustrates the empirical evidences on the gains and losses of privatizing a regulated private monopoly entity in the context

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<sup>3</sup> However, the inability of the government to ensure the exit of failing firms coupled with the difficulties for the government in deciding whether/when to intervene in the markets are some of the challenges associated with market socialism. Private ownership is preferred to public ownership to the extent that government intervention has greater costs than benefits (Sappington and Stiglitz, 1987).

of developed and industrialized countries. This allows us to theoretically assume that political connections and corruption issues have less influence on the outcomes of the privatization process in developed countries unlike developing countries with weak institutional framework and arrangements. However, the assumption can be incorrect in practice.

### **3. Review of the Empirical Literature**

Electricity networks privatization was actively pursued among the Latin American Countries (LACs) and the United Kingdom (UK) since the early 1980s. Chile, for example, is regarded as the pioneer enforcer of the 'textbook reform model' (see Joskow, 1998) in 1982 and started privatizing the electricity networks assets from 1986. In fact, privatization in the LACs proceeded at such a speed that they contributed to about 40 percent of the total value of electricity privatization in the world during the 1990s (Gabriele, 2004). There is, currently, full private sector participation in electricity transmission and distribution in Chile. The 'textbook reform model' was later adopted by the UK in 1990, Norway in 1991 and other LACs such as Argentina, Brazil and Peru with some variations<sup>4</sup>.

In the UK, the privatization process was dramatic, as the Labour government had nationalized more than 570 public and private entities involved in the generation and distribution of electricity prior to electricity privatization in 1990 (Newbery and Pollitt, 1997). The Electricity Act of 1983 emphasized on the privatization of state owned electricity assets and reinforced the ideology of the Thatcher government that hinged on greater faith on the forces of market and competition. There are 14 privately owned regional electricity distribution companies in Britain while these companies also own the electricity transmission network.

Hence, the empirical evidence on the privatization of electricity networks focusing on the UK and the LACs has been a subject of few studies using varying

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<sup>4</sup> However, privatization is not an essential ingredient of the 'textbook reform model' as Norway successfully adopted and implemented the 'textbook' model in 1991 without privatizing its electricity network assets. Nevertheless, the push for competitive markets implies relinquishing state ownership and control.

assessment techniques. The different techniques to assess the economic impacts of privatization include: a social-cost benefit analysis (SCBA), efficiency and productivity analysis and macro studies. A *SCBA* considers electricity networks privatization as an investment and compares the costs of investment with the benefit which is the change in actual and projected performance relative to a defined counterfactual of what would have happened in the absence of privatization (Jones et al., 1990). *Efficiency and productivity analyses* on privatization are desirable for assessing the effectiveness with which inputs are transformed into outputs, relative to best practice. These studies rely on parametric method such as Stochastic Frontier Analysis (SFA) and non-parametric method such as Data Envelopment Analysis (DEA) in measuring productivity and efficiency. *Macro studies* of privatization estimate their impacts using general equilibrium models such as the Computable General Equilibrium (CGE) to estimate how an economy might react to changes in policy, technology or other external factors pertaining to electricity privatization using actual economic data.

In the UK context, Newbery and Pollitt (1997) estimated that the privatization and separation of the Central Electricity Generating Board (CEGB) into generation and transmission in 1990 led to a permanent gain in welfare equivalent to 6 percent of 1995 turnover even though consumers and government lost initially. However, the electricity producers gained more the cost reduction. In Northern Ireland, the restructuring and privatization of the ESI in 1992 led to a permanent cost reduction of 6 percent per annum while consumers paid 4 percent higher prices (Pollitt, 1997). Pollitt (1999) applied a SCBA to estimate the efficiency gains from restructuring and privatization of the Scottish electricity supply industry in 1991. Under the more probable counterfactual scenario, the gains were relatively small at about 10 percent of turnover as compared to 50 percent in England and Wales. Similarly, Domah and Pollitt (2001) found out that the privatization of then 12 regional electricity distribution companies in the UK led to a permanent gain equivalent to 9 percent of 1995 turnover. However, electricity consumers began to gain only from 2000 while the government gained 5 billion UK pounds in sale proceeds and net taxes.



These findings suggest that consumers lose initially (in the short-term) in the privatization process.

In the LACs context, Galal et al. (1994) estimated that the privatisation of the Chilean distribution and generation companies led to a permanent gain in social welfare equivalent to 2.1 percent of 1986 sales although two-thirds of the aggregate gains went to foreign shareholders. Mota (2003) found out that the privatisation of distribution companies in Brazil created a one-off gain equal to 2.5 percent of national Gross Domestic Product (GDP) while producers gained around two-thirds of the benefits. Consumers could have benefited more from privatization had the regulation been tougher since the beginning in Brazil. Anaya (2010) calculated the welfare impacts of privatisation of two retailing and distribution companies in Peru to be overall worthwhile leading to a permanent gain of 27 percent of costs. Government and producers benefited the most and consumers the least due to electricity price increases.

Similarly, Chisara et al. (1999) estimated the macroeconomic and distributional effects of utilities privatisation and regulation in Argentina using a CGE model. The results showed that both privatisation and effective regulation led to significant macroeconomic benefits. However, gains from privatisation accrued mainly to high-income classes, while gains from the effective regulation of newly privatized utilities accrued mainly to low-income classes. The CGE estimates of overall employment effects suggested that privatisation was not a major contributor to the dramatic rise in unemployment in Argentina between 1993 and 1995. In the Australian context, Whiteman (1999) evaluated the macroeconomic impact of microeconomic reform of the Australian electricity industry using a CGE model. The study estimated a 0.22 percent increase in the GDP in the long run as a result of the electricity reform. The benefits of the reform were reflected in terms of a rise in real wages rather than an increase in employment.

Other studies such as Berg et al. (2005) showed that a privately owned firm responded to policies and incentives associated with reducing commercial and

non-commercial network losses than publicly owned firms by analyzing 24 electric utilities in Ukraine in the context of a new regulatory authority and distribution utilities privatization. Cullman and von Hirschhausen (2008a) illustrated that technical efficiency of the privately owned companies increased during the transition process while allocative efficiency deteriorated in the economic transition toward a market economy of 32 Polish distribution companies using the DEA and SFA techniques. The results illustrated that technical efficiency of the companies increased during the transition process while allocative efficiency deteriorated. Similarly, Cullman and von Hirschhausen (2008b) showed that that privatisation had a positive effect on technical efficiency of electricity distribution companies in Poland, the Czech Republic, Slovakia and Hungary using non-parametric efficiency measurement involving DEA.

In the Australian context, Abbott (2006) using a DEA Malmquist approach showed that there has been a substantial improvement in the productivity performance of the industry since the mid-1980s although the productivity performance of the electricity industry did speed up after 1991 after the restructuring and liberalisation of the electricity sector. Likewise, Simshauser (2005) and Abbott and Cohen (2014) have argued that increased competition drove efficiency gains in the case of electricity generation where both privately and government-owned generation companies increased their levels of efficiency in the Australian East-Coast Power Generation Industry. In contrast, Aghdam (2011) showed that the productivity gains in the industry have been largely driven by technological improvements and, to a lesser extent, by reform-induced comparative efficiency gains based on the Malmquist Total Factor Productivity Index approach. Market restructuring and privatization only contributed marginally in driving the efficiency gains. However, none of these studies closely analyze the performance of the electricity network companies in the NEM, which our study aims to cover.

Few studies have also studied the distributional concerns associated with electricity privatizations in Australia. For example, Chester (2007) identified

investors, owners and creditors as being the major beneficiaries (or winners) of privatization and employees as being the major losers. Abbott (2011) also diagnosed the providers and receivers of public services as being the winners in the form of increased employment levels of police, school teachers and nurses after the privatization of Victoria's electricity and gas assets and subsequent reduction in state debt levels.

Table 1 summarizes the empirical studies on the economic impacts of electricity networks privatization in industrialised and advanced economies. The evidences overwhelmingly suggest that the extent of gains to consumers from networks privatization depends on the toughness of the regulator and the effectiveness of the underlying network regulation regime in a given regulatory institutional framework. However, creating powerful and effective regulatory authorities and regime is a difficult and complicated task in any governance framework.

<b><i>Study</i></b>	<b><i>Region</i></b>	<b><i>Method</i></b>	<b><i>Policy Implications</i></b>
Newbery and Pollitt (1997)	Britain	SCBA	Privatization led to a permanent cost reduction of 5% per year, equivalent to an extra 40% return on assets. Consumers and government lose, and producers gain more than the cost reduction.
Pollitt (1997)	Northern Ireland	SCBA	The net gains are equivalent to a permanent cost reduction of 6% per annum, consumers pay 4% higher prices, while the government can expect to gain around £1.4bn in asset sales and higher tax revenue
Pollitt (1999)	Scotland	SCBA	The gains were relatively small at about 10 percent of turnover as compared to 50 percent in England and Wales.
Domah and Pollitt (2001)	England And Wales	SCBA	Privatisation did yield significant net benefits but that these were unevenly distributed across time and groups in society. Consumers experience slightly lower prices and the government gains £5 billion in sale proceeds and net taxes. However, consumers began to

			gain only from 2000.
Galal et al. (1994)	Global	SCBA	Privatisation when combined with proper regulatory framework can be welfare enhancing, private ownership improves efficiency, promote profit maximization and increases the value of regulation
Mota (2003)	Brazil	SCBA	Economic welfare (net benefits) was significant but most of it went to the producers; consumers could have benefited more from privatisation in the presence of tougher regulation
Anaya (2010)	Peru	SCBA	Privatisation was worthwhile in terms of social welfare. Government and producers benefited the most while consumers the least due to price increases.
Chisari, Estache and Romero (1999)	Argentina	CGE	Privatisation resulted in different kinds of efficiency gains with significant macroeconomic benefits, privatisation not the cause for rising unemployment.
Berg, Lin and Tsaplin (2005)	Ukraine	SAF/DEA	Private operators responded well to incentives than public operators. Perverse regulation worsens incentives
Cullman and von Hirschhausen (2008a)	Poland	DEA/SFA	Technical efficiency improved with privatization but allocative efficiency deteriorated among the distribution companies.
Cullman and von Hirschhausen (2008b)	Poland, Czech Republic, Slovakia and Hungary	DEA	Privatization had a positive effect on efficiency in all four countries.
Celen (2013)	Turkey	DEA	Private ownership positively affected

			efficiencies.
Bonifaz and Santin (2000)	Peru	DEA	Privatization of electricity distribution companies did not lead to an improvement in efficiency.
Bonifaz and Jaramilo (2010)	Peru	SFA	Private distribution network companies are less efficient than public companies due to better management practices.
Motta (2004)	Brazil	DEA/SFA	Privatization had no effect on operating cost efficiency.
Abbott (2006)	Australia	DEA	The improvement in the productivity performance of the industry did speed up after 1991.
Aghdam (2011)	Australia	DEA	The productivity gains in the industry have been largely driven by technological improvements and, to a lesser extent, by reform-induced comparative efficiency gains.

Table 1: Empirical studies on electricity networks privatization

#### 4. Methodology: A Comparative Analysis

The privatization, corporatization and the creation of competitive electricity markets are expected to give consumers lower prices and more choices, promote efficiency and reliability, and drive better investment decisions (Quiggin, 2014). Hence, in this section, we compare the indicators of performance between state-owned and privatized electricity network companies in Australia with regards to allocative efficiency based on retail electricity prices and network costs; operational cost efficiency, quality of service and investments in electricity networks. These performance indicators relate directly to the social welfare impacts of privatization.

Table 2 enumerates the transmission and distribution networks in Australia in terms of ownership. There are two privately owned and three state-owned

regional transmission networks in the NEM. The number of distribution networks under full state-ownership is six while six distribution networks remain under complete private ownership.

<i>Privately Owned</i>	<i>State Owned</i>
<i>Transmission Networks</i>	
VIC: SP AusNet; SA: ElectraNet	QLD: Powelink; NSW: TransGrid, Transend; TAS
<i>Distribution Networks</i>	
VIC: Powercor, SP AusNet, United Energy, CitiPower, Jemena; SA: SA Power Networks	QLD: Energex, Ergon Energy; NSW: AusGrid, Endeavour Energy, Essential Energy, ActewAGL <sup>5</sup> ; TAS: Aurora Energy

Table 2: Electricity Networks in terms of Ownership in 2013  
Source: Compiled from AER (2013)

Figure 1 shows that around 72 percent (40644 kms) of the regional transmission networks are owned by the state while 38 percent (3493479 kms) of the distribution networks were privately owned in the NEM during 2013. Figure 2 shows that state-owned distribution network companies in the NEM served 62 percent, which includes a total of 507428 customers during 2013. These numbers confirm a significant state involvement in the network segments of the Australian ESI in terms of ownership.

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<sup>5</sup> The ACT Government owns 50% of the ActewAGL networks and hence is a public-private partnership (PPP) model.

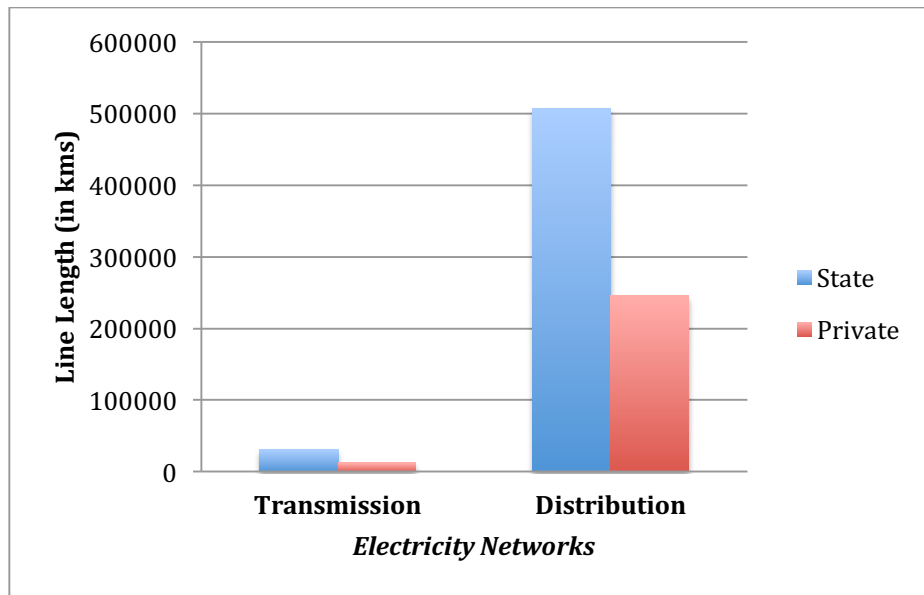


Figure 1: Networks Ownership in the NEM (line length) in 2013<sup>6</sup>  
Source: Compiled from AER (2013)

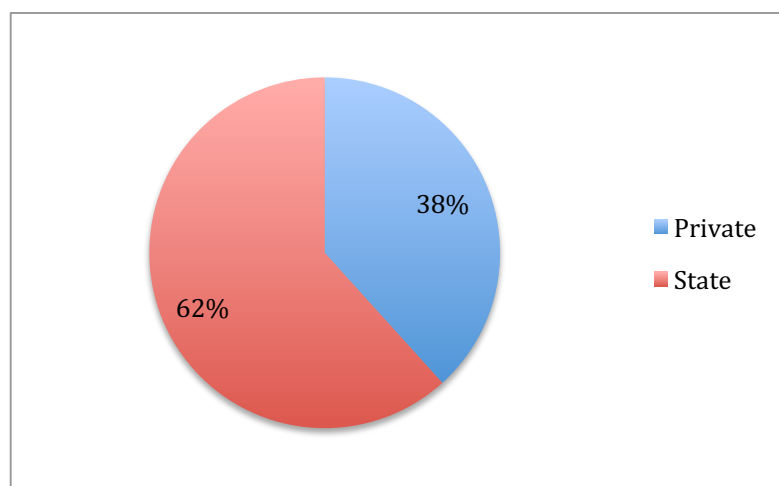


Figure 2: Distribution Networks Ownership in the NEM (number of customers) in 2013  
Source: Compiled from AER (2013)

#### **4.1. Retail Electricity Prices and Network Costs**

Market-oriented electricity reforms aimed at liberalization and privatization is expected to establish the principles of efficient pricing mechanism in the electricity industry by fostering competition (Newbery, 2002). This would lead to improved efficiency and lower end user electricity prices. In Australia, electricity prices have decreased for the first 10 years of the reform but have increased over the last few years (Chester and Morris, 2011). Retail electricity prices have risen significantly across all Australian states over the long term.

<sup>6</sup> The distribution networks do not include ActewAGL for figures (1 and 2).

However, the price rise is pronounced in NSW and QLD where retail electricity prices have more than doubled since 1996-1997 leading to significant political and economic concerns in these states. Table 3 shows that average retail electricity prices rose by 83 percent in NSW and by 57 percent in QLD from 1996/1997 to 2012/2013 while the average price rise was only around 28 percent in Victoria. In South Australia, prices rose by 28 percent on average between 1998/1999 and 2010/2011.

	<b>State-Owned</b>		<b>Privately-Owned</b>	
	<i>NSW (1996/97 – 2012/13)</i>	<i>QLD (1996/97- 2012/13)</i>	<i>VIC (1996 – 2013)</i>	<i>SA (1998/99 – 2010/11)</i>
<i>Retail electricity prices</i>	+83%	+57%	+28%	+23%
<i>Network costs</i>	+122%	+140%	-18%	-17%
<i>Other costs<sup>7</sup></i>	+51%	+11%	+72%	+86%
<i>Increase in electricity bill</i>	\$1180	\$932	\$743	\$660
<i>Increase in network bill</i>	\$726	\$619	\$227	\$135
<i>Change in operating costs per MWh</i>	+71% (1999-2010)	+96% (2002 – 2010)	-23% (1996 – 2010)	-3% (2000-2010)

Table 3: Long Term Changes in Prices and Costs in terms of Ownership  
Source: Compiled from Ernst and Young (2014)

The regulated network charges have been the major driver of the increase in retail electricity prices in NSW and QLD (but not in VIC and SA). Both NSW and QLD experienced a more than 100 percent increase in network costs over the long-term. Hence, electricity customers in NSW and QLD are paying more in network charges and electricity bills. The network costs as a proportion of the total bill have increased in QLD and NSW while decreased in VIC and SA. Both VIC and SA were also able to achieve significant reductions in per real unit operating costs which occurred particularly after privatization (Ernst and Young,

<sup>7</sup> Other costs include non-network costs. In Victoria, it also includes the Advanced Metering Infrastructure (AMI) or smart meters charges.



2014)<sup>8</sup>. However, per unit real operating costs have increased alarmingly in NSW and QLD (more than 70 percent) on average.

#### ***4.2. Quality of Service***

One of the major aims of liberalized electricity reforms in the early 1990s was to enhance the quality of electricity supply in the reforming countries. Hence, the NEM was created in 1998 in the Eastern jurisdictions of Australia with the objective of developing and operating electricity supply infrastructure to facilitate low-cost, safe, reliable and efficient electricity supply (AEMO, 2014). As such, the transmission networks in the NEM deliver high rates of reliability and account for only 5 percent of the outages. For example, transmission outages in 2011-12 caused less than three minutes of unsupplied energy in NSW, VIC and SA while TAS had around nine minutes of unsupplied energy (AER, 2013).

Power outages due to transmission networks congestion are rare in the NEM. However, transmission network losses and network congestions are empirically shown to be less significant between SA and VIC as compared to across the regional interconnector joining NSW and QLD (Nepal and Foster, 2013). Most of the electricity outages occur at the distribution networks accounting for over 95 percent of electricity outages in the NEM. Figures 3 and 4 shows the distribution reliability indicators for the Australian states based on the system average interruption duration index (SAIDI) and the system average duration frequency index (SAIFI)<sup>9</sup>.

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<sup>8</sup> Although there has been some increase in real operating costs in Victoria and South Australia in recent years, this trend is not inconsistent as in NSW and QLD primarily reflecting the changes in the scope of service provided or changes in service levels.

<sup>9</sup> However, differences in geographic conditions and historical investment imply that comparing reliability data across different jurisdictions is difficult.

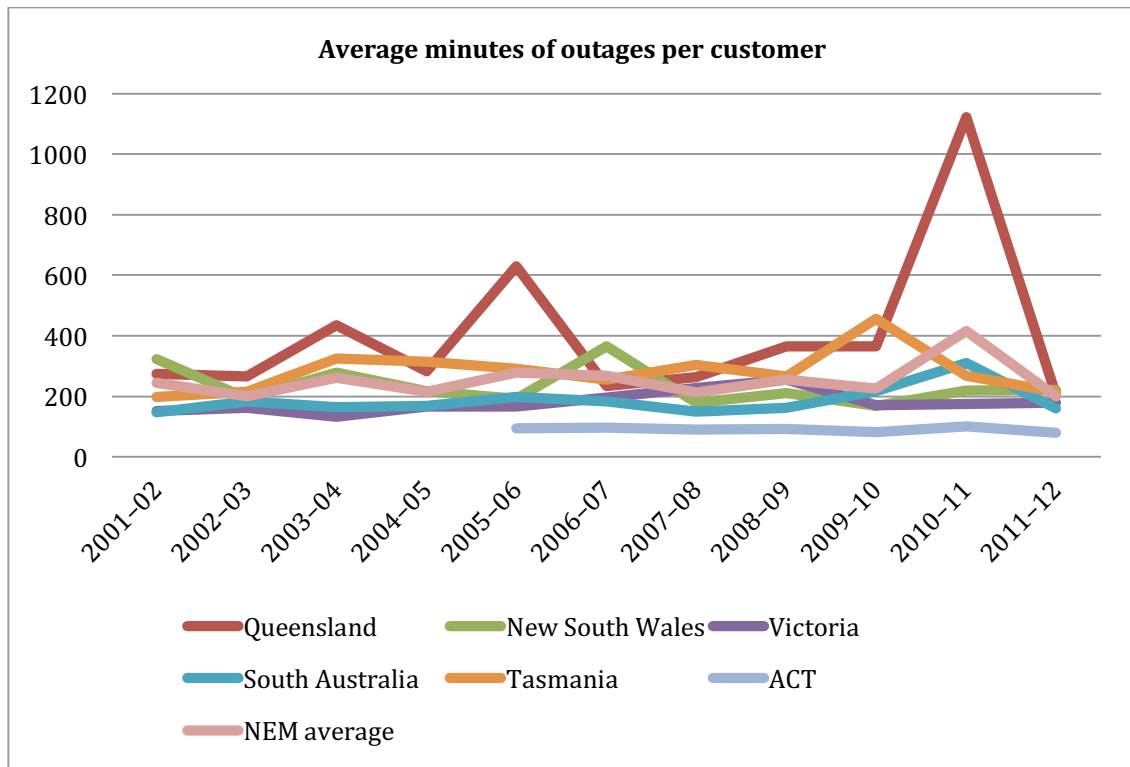


Figure 3: SAIDI Indicator  
Source: AER (2013)

The average minutes of outages per customer remains below the NEM average (200-250 minutes of outages per year) among states with privatized electricity distribution networks (VIC, SA and ACT). In NSW, the averages minutes of outages have been stable since 2008/2009. However, states like TAS and QLD, in general, experienced outages greater than the NEM average although the minutes of outages reduced in QLD in 2011/12 due to less extreme weather events. QLD has been experiencing a large variation in quality of supply performance given its large and widely dispersed rural networks that remain vulnerable to power outages. Likewise, the SAIFI data shows that VIC and SA experienced, on average, outage around twice a year (which is the NEM average). The average number of outages per customer in NSW has also been below the NEM average. The number of outages reduced significantly in QLD during 2011/12. The commercial service quality measured as percentage of calls answered by the operator within 30 seconds stood the highest for SA (89%) followed by QLD (86.6%), VIC (70.34%) and NSW (64.87%) during 2011/2012 (AER, 2013).

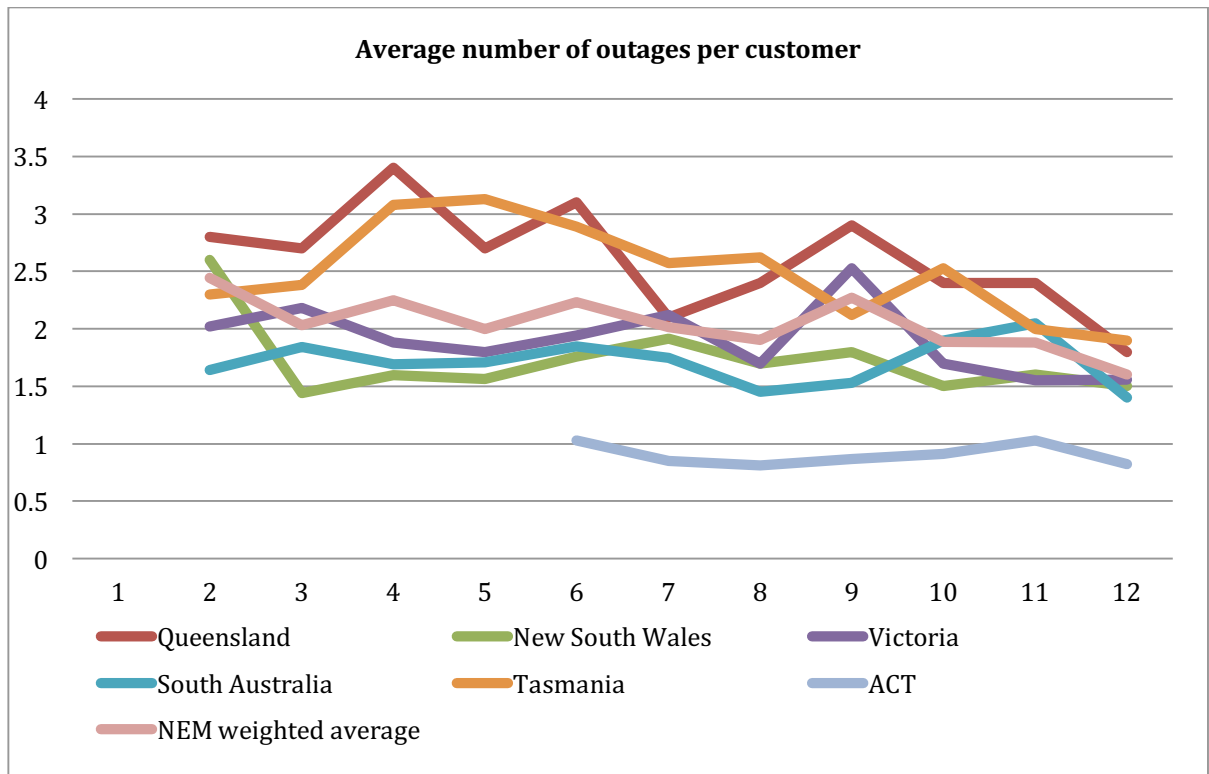


Figure 4: SAIFI Indicator  
Source: AER (2013)

#### 4.3. Electricity Network Investments and Revenue

One of the principal arguments for private ownership of electric network utilities has been to improve innovation and investments in the electricity sector (Kessides, 2004). However, electricity networks are regulated to prevent the risks of monopoly pricing and encourage efficient investment in network infrastructure given their inherent natural monopoly characteristics. Investment drivers also vary across networks depending upon network's age and technology, load characteristics, the demand for new connections, and licensing, reliability and safety requirements (AER, 2013). For example, electricity network investment over the current five-year cycle (2011-2015) is forecasted at over \$7 billion for transmission networks and \$36 billion for distribution networks representing an increase on investment in the previous regulatory periods (2006-2011) of around 16 per cent in transmission and 60 percent in distribution.

	<i>Change in average investments forecasts</i>	<i>Change in average revenue forecasts</i>
<i>QLD</i>	+35.5%	+42.5%
<i>NSW</i>	+80%	+69%
<i>TAS</i>	-22%	+13%
<i>VIC</i>	+56%	+18.4%
<i>SA</i>	+96	+35%

Table 4: Forecasted change in distribution network investments and revenue<sup>10</sup>  
Source: AER (2013)

The forecasted transmission network investments in state owned regions for 2011-2015 increased by 73 percent in NSW; 68 percent in TAS while decreased by 16 percent in QLD from the 2006-2011 levels. Likewise, among states with private ownership, transmission networks investments forecasts decreased by 22 percent in SA and increased by 50 percent in VIC (AER, 2013). These estimates suggest that state-owned networks in NSW and QLD have increased their network capacity well above those of privately owned networks in VIC for a given level of peak demand. Table 4 shows the average forecasts for distribution network investments and revenue. The investments increased by 35.5 percent in QLD and 80 percent in NSW as opposed to 56 percent in VIC and 96 percent in SA. The corresponding change in revenue is a 42.5 percent increase in QLD, 69 percent increase in NSW, 13 percent increase in TAS, 18.4 percent increase in VIC and 35 percent increase in SA.

<sup>10</sup> The estimates exclude ActewAGL network in SA, which is based on a PPP initiative.

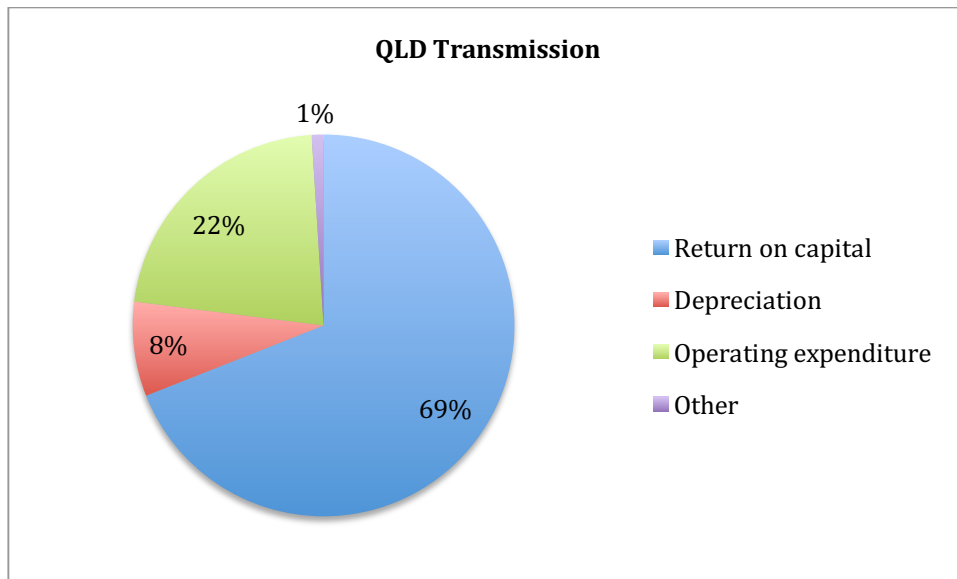


Figure 5: Revenue components for QLD transmission network  
Source: AER (2013)

Figures (5 and 6) show the revenue components of the QLD transmission network (2012-2017) and VIC distribution networks (2011-2015) respectively. The return on capital accounts for two-thirds of the revenue while an allowance for operating costs accounts for around 30 percent of the revenue requirements in QLD. The return on capital constituted around 49 percent (on average) of the revenue among the distribution networks in VIC. These figures indicate that publicly owned network companies could have had large increases in the regulatory asset base (RAB) for a given increase in network capacity though not conclusive.

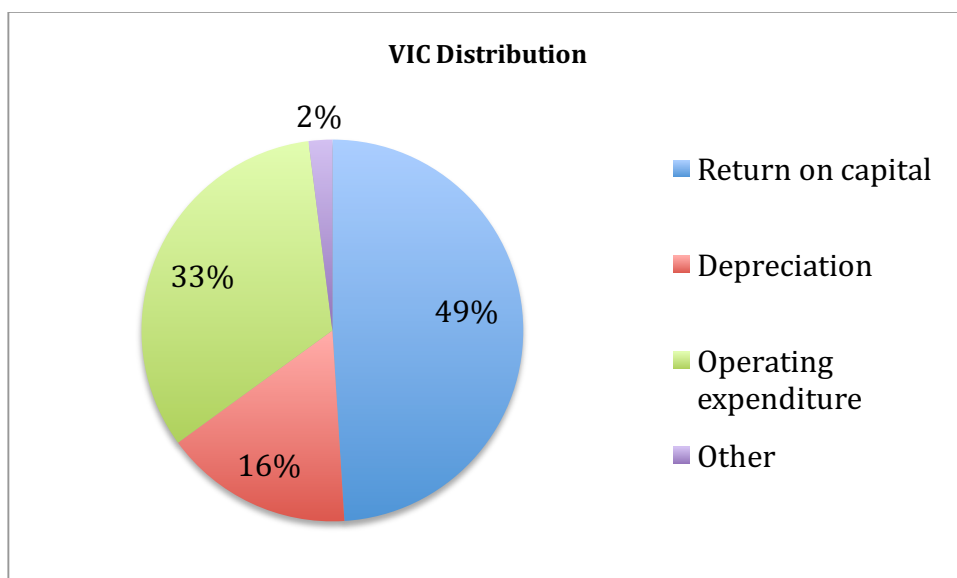


Figure 6: Revenue components for VIC distribution network  
Source: AER (2013)

### ***5. Discussions and Policy Considerations***

It is clear from the above analysis that retail electricity customers in states with privately owned network companies (VIC and SA) have experienced the least of the average price rise over the long-term due to falling network costs. The long term average network costs, which constitutes a significant proportion of the final electricity bill, has decreased in privately-owned networks in the NEM as opposed to a significant long-term increase (more than 100 percent) in states with publicly owned networks (NSW and QLD). The long-term operating cost efficiency of the privately owned distribution networks in the NEM has increased unlike in publicly owned network where the operating costs increased significantly.

With regards to quality of electricity supply, the average duration and frequency of interruptions is lower than the NEM average in privately owned electricity networks. However, NSW, where electricity networks are publicly owned, has also experienced lower interruptions than the NEM average unlike QLD and TAS. The change in average investment forecast in the current regulatory period (2011-2015) for SA and VIC exceeds 50 percent from the previous regulatory period (2006-2011) while QLD experienced around 35 percent increase. However, the change in average revenue forecasts in QLD exceeds the change in VIC and SA coinciding with the highest increase in the long-term retail electricity prices among all states. Furthermore, the significant share of return on capital as a revenue component indicates that electricity networks in QLD are overcapitalised than in VIC. These increases in network revenues in states like QLD and NSW reflects the coincidence of increases in the weighted average cost of capital and increasing capital expenditure (Productivity Commission, 2013).

Our results overall indicate, though not conclusive, that electricity consumers served by the privately owned electricity distribution companies in the NEM have not been worse off in terms of: a) facing lower extent of long-term

electricity price rise and a long term decline in network costs, b) electricity supply quality due to reduced duration and frequency of interruptions and c) increase in network investments but not at the expense of rising electricity prices as compared to the electricity consumers served by state-owned network companies. However, the results can be adverse as future network investments increase among the privately owned distribution companies in the NEM. These results give rise to several policy considerations.

### **5.1. Future Investment Concerns**

Electricity networks in the NEM will need to undergo profound technical changes in the future in achieving a sustainable energy sector and adequate levels of security of supply (Garnaut, 2011). Such transformation can only be achieved through substantial capital investments over-time. Rising peak demand and the need to replace ageing assets developed between the 1950s and 1970s are some of the other key drivers driving investments in the electricity networks. However, ensuring sufficient and efficient investments in the networks can present itself as a major policy and regulatory challenge considering the anticipated scale of the required investments. For example, the lack of adequate investments has been a major policy concern across the European electricity markets that underwent a broader paradigm shift from state-ownership and vertical integration towards more decentralised and unbundled structures, competition, independent regulation and private ownership during the last two decades (EURELECTRIC, 2014). However, current investment trends in electricity networks are positive in the NEM even though network investments among publicly owned networks in NSW and QLD have increased significantly as compared to the privately owned networks in SA and VIC. Whether these investments are '*useful*' and '*efficient*' remains debatable although the AER uses a regulatory investment test for transmission (RIT-T) since 2010 while the regulatory test for distribution networks augmentation is based on cost-benefit analysis or a least cost solution to maintain certain reliability standards.

## ***5.2. Security of Supply Concerns***

More questions have been raised if liberalised and competitive electricity markets are consistent with achieving acceptable levels of electricity supply reliability (Joskow, 2007). For example, the California electricity crisis (2000 and 2001) coupled with the large blackouts in the USA and Western Europe during 2003 reinforced this view. There are greater risks of blackouts associated with the context of electricity liberalisation and privatisation (Yu and Pollitt, 2009). However, the Australian evidence shows that privatization does not always adversely affect reliability based on a decade of SAIDI and SAIFI statistics. Nonetheless, the most costly reliability standards apply in those states with state-owned network companies (Productivity Commission, 2013). The SAIFI and SAIDI statistics for NSW also show high reliability standards implying that costs and reliability standards are highly correlated. Moreover, the electricity networks in the NEM continue to face the risk of significant damages and threats from extreme events such as adverse weather conditions and bushfires<sup>11</sup>. Preventing the grids against extreme events and maintaining a reliable supply of electricity will necessitate that reliability is treated outside of economic regulation and at the policy level where governments, as central planners, assume responsibility. Economic regulation of the networks, alone, will be incapable of addressing the delivery of a secure supply of electricity in the wake of extreme events facing the electricity grids through the design of an optimal regulatory framework. On the other hand, designing an optimal and workable incentive laden regulatory mechanism that induces regulated network companies to deliver the welfare-maximising levels of supply security is a difficult and complicated task facing the electricity regulators (Sappington, 2005).

## ***5.3. Effective Network Regulation Concerns***

Network costs should fall as network regulation becomes effective and operating efficiency improves (Pollitt, 2012). Only the privately owned networks in SA and VIC have experienced a fall in the long-term network costs where weighted average price caps are used to regulate the distribution networks. Mountain and

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<sup>11</sup> For example, QLD is vulnerable to floods and storms while Bushfires are common in VIC.



Littlechild (2010) attribute the falling network costs in VIC to private ownership of electricity networks favourably impacting the nature and effectiveness of regulation. Incentive-based regulation in VIC and SA provides strong incentives for cost efficiency and discourages incentives for gold plating of costs. However, consumers can only benefit from efficiency improvements brought about by incentive regulation if the regulators are able to pass the efficiency gains to end consumers which has proven to be difficult even in developed economies like UK with robust regulations<sup>12</sup>. This implies that the success of privatization is strongly linked to the regulatory regime and underlying regulatory institutions. However, privatization and incentive regulation of network companies should allow adequate and timely investment, promote innovation and maintain reliability of electricity supply (Newbery, 2004). These are conflicting objectives with potential trade-offs among each other. Hence, the UK Energy Regulator (OFGEM) proposed and implemented a new performance based price control regime based on the 'RIIO' model for both the privately owned electricity transmission networks (2013-2021) and distribution networks (2015-2023) (OFGEM, 2013). RIIO stands for '*Revenue = Incentives + Innovation + Outputs*' and is expected to encourage network companies to invest efficiently, innovate to reduce network costs, facilitate low carbon objectives and encourage demand side participation. The revenue that a network company is allowed to earn is linked to performance such that those that deliver outputs, innovation and associated lower costs are rewarded. Alongside, the AER should be more autonomous with better coordination between different federal and state regulatory institutions (Nepal, et al. 2014).

#### **5.4. Post-Efficiency Concerns**

The major rationale for incentive regulation and privatization of electricity networks was to promote economic efficiency in the regulated segments of the ESI by promoting the prospects for competition. Incentive regulation of electricity networks was believed to mimic the outcomes of a competitive

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<sup>12</sup> The inability to do so has led to mass protests and public oppositions) against utilities privatization in many countries in the past (Roland, 2008).

market in a monopoly environment and hence overcome the perverse incentives of overcapitalisation (Averch-Johnson effect) under cost-based regulation (Joskow, 2008). The global experience with incentive regulation and networks privatization has indeed led to positive and globally widespread but modest efficiency gains but a lack of clearly visible direct benefits to households in many industrialised economies (Pollitt, 2012). Moreover, the appeal of incentive regulation and networks privatisation has been questioned or diminished among some countries after the efficiency gains have exhausted. For example, the UK, one of the pioneers of electricity privatization and incentive regulation, proposed a new electricity market reform signalling the desire for significant government intervention in order to meet its climate change objectives (DECC, 2011). The UK experience has also coincided with the renationalization of the electricity industries in LACs like Bolivia and Venezuela highlighting the changing but significant role of the state within market-based electricity reforms (Balza, Jimenez and Mercado, 2013). Likewise, Argentina, once at the forefront of reform, is also systematically undermining the role of markets in the electricity sector (Littlechild, 2013). The ongoing energy transition in Germany (Energiewende) is another example of significant state intervention in the electricity (energy) sector towards achieving a sustainable economy sourced by renewable energy. Hence, the QLD and NSW electricity sector should also be poised to cautiously consider the post efficiency concerns after privatization. An imminent involvement of the state post privatization may preclude the need for privatization at the first place as international experiences suggest.

## ***6. Conclusions***

The debates on electricity networks privatization in Australian states like NSW and QLD are important but remain unsettled among academics and policymakers. This paper contributes towards this debate with a view to guide policymaking based on international empirical evidences on the winners/looser and costs/benefits of networks privatization among industrialised countries. We also compare the performance of the state-owned versus privately owned network companies in the NEM against prices, costs, quality and investments variables based on which the policy considerations are drawn.

Our performance assessment suggest that privately owned networks have not been worse off than the state-owned networks in terms of the extent long-term electricity price rise, falling networks and operating costs, reductions in the duration and frequency of interruptions and minimizing overcapitalisation in networks. Although retail electricity prices were expected to fall in SA and VIC on average; the long term prices rose to a lesser extent than in NSW and QLD reflecting the changes in the market conditions. The fall in the long-term average network costs in SA and VIC indicate the effectiveness of incentive regulation in these states. The frequency and duration of power outages is also lower in SA and VIC as in NSW. These results provide indicative evidences that electricity consumers in SA and VIC may have benefited from electricity networks privatization as compared to consumers in other states. However, these benefits can be short-term and hence not guaranteed as the electricity networks responds to changing operating environment of the ESI. Future studies based on a social cost benefit analysis of electricity privatization in NSW and QLD is essential to determine the winners and losers of electricity privatization in the Australian context.

However, lessons from international empirical evidences suggest that privatization has only achieved efficiency improvements when accompanied by effective regulation. While consumers tend to initially loose in the privatization process as electricity price rises; the extent of the loss can be minimized by undertaking price restructuring prior to privatization. The long-term gains depend on the ability of the sector regulators to pass the efficiency gains, which, undoubtedly has been a challenge even in advanced economies like the UK. Moreover, international experiences show that market failures associated with privatization tend to get exposed once the efficiency gains are exhausted. Climate change and security of supply concerns can justify state intervention in the long-run even when networks are privately owned. Hence, it can be concluded that the privatization of electricity networks in NSW and QLD will rather transform the significant role and involvement of the state in the sector than ceasing it. This

suggests that majority of electricity customers being served by state owned network companies in the NEM is justifiable.

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