

APPROPRIATENESS OF MARGINAL-COST- BASED ELECTRICITY PRICES IN DEREGULATED MARKETS

Nagarajan Swaminathan

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CERTIFICATE OF ORIGINAL AUTHORSHIP

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ABSTRACT

This thesis examines the appropriateness of marginal-cost-based principles for pricing electricity in deregulated markets. This examination is prompted by the rising concerns about the incessant increases in electricity prices; disconnects between costs and prices; social equity and justness of prices; and – more broadly – increasing disparity between expected and actual outcomes of electricity market reform. While it is true that these outcomes are a result of a complex array of factors, this thesis is however premised on the argument that electricity pricing practices, based on marginal-cost principles, is a dominant factor in affecting the above noted market outcomes. In view of multi-dimensional foci of this research, recourse is made to the body of knowledge residing in several academic disciplines (e.g., engineering, economics, and public policy) and research methodologies (e.g., historic review, empirical research, inferential analysis, and econometrics). The case-examples for this thesis are provided by the electricity industries in the developed world (primarily, the US, UK and Australia, but – more broadly – Germany and France). The analysis reveals that pricing philosophies of the earlier times (from the Aristotelian, to the medieval times) – that are precursors to the modern-day pricing practices – quintessentially emphasized considerations of social justice and fairness in pricing; profit, rather profiteering, was generally viewed unfavourably in those times. The coincidental births (in the mid-to-late 1880s) of the electricity industry and neo-classical ideology however appears to have imparted a profit-seeking ethos to the foundations of the electricity industry. Assisted by rapidly rising (and highly, inelastic) electricity demand, technology-innovation-induced economies-of-scale, and mutually-symbiotic ‘understanding’ between diverse industry interest (namely, utilities, customers, equipment manufacturers, fuel suppliers, regulators, investors, governments), the electricity industry – up until the 1960s- continued to earn super-normal profits, while maintaining lowering cost and price trends for electricity. These trends however reversed in the 1970s, turning the electricity industry into a rising-cost, even faster-rising-prices, and a shrinking profit industry. Concomitant with the rise of neo-liberal thinking in the eighties, the electricity industry began to be deregulated – in accord with neo-liberal principles. A key element of this reform was the re-enforcement of faith in market-discovered, marginal-cost-based electricity prices – as the best means to achieve allocative efficiency, lower electricity costs and prices, and investment-attractive returns (profits). In view however of the plateauing of technological advancements in the 1970s and 1980s, availability of alternative technologies (e.g.,

low-capital-high-operation-cost gas turbines, renewables), systems (e.g., decentralized), and structural and governance arrangements (completion, choice, light-handed incentive regulation), marginal cost-based prices failed to deliver on the expectations. The only course of action for the industry to recoup capital costs (in this high-capital cost industry) was to ‘game’ the system, through the abuse of market power, taking advantage of the indispensability of electricity. Cost (euphemism for profit) considerations became the motor of all major decisions. This sent the system into a disarray – costs became disconnected from prices, households bore the brunt of price increases, and the technical integrity of the system was compromised. In addition to empirical validation, this research has substantiated these claims through econometric analyses. This research further makes a case for developing alternative pricing paradigms, underscored by considerations, for example, of continual efficiency improvements, incentivizing technology innovations, benchmarking costs to improved efficiencies, and - above all – ensuring that social justice and fairness are central to the pricing strategies for various segments of society.

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TABLE OF CONTENTS

CERTIFICATE OF ORIGINAL AUTHORSHIP	i
ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
LIST OF FIGURES	viii
LIST OF TABLES	x
ABBREVIATIONS	xi
1 INTRODUCTION	1
1.1 Background	1
1.1.1 Historic Evolution of ESIs	1
1.1.2 Electricity Pricing	12
1.1.3 Pricing based on marginal principles and PURPA	13
1.1.4 Neoliberalism and deregulation of ESIs	23
1.2 Problem Statement	36
1.3 Research Objectives	39
1.4 Research Methodology	39
1.4.1 Origins of Pricing Philosophy	39
1.4.2 Review of electricity pricing practices	40
1.4.3 Assess appropriateness of market based electricity pricing	40
1.4.4 Recommendation for an alternative paradigm	40
1.5 Overall methodological approach	41
1.6 Research Scope	43
1.7 Data and Data development considerations	43
1.8 Research Significance	44
1.9 Organisation of this thesis	45
2 REVIEW OF PRICING PHILOSOPHIES	46
2.1 Introduction	46
2.2 Aristotelian and Scholastic Economic Thinking	47
2.2.1 Aristotelian Economic Thinking	47
2.2.2 Scholastic Economic Thinking	51
2.3 Mercantilist Economic thinking (1500-1750)	54
2.4 Precursors of Classical thought (1650-1750)	55
2.5 Classical Economic thinking (1750-1850)	58
2.5.1 Adam Smith	59
2.5.2 Thomas Robert Malthus and David Ricardo	62
2.5.3 John Stuart Mill (1806-1873)	66
2.5.4 Karl Marx	68

2.6	Neoclassical Economic Thinking	71
2.6.1	Marginal Principles	71
2.6.2	Alfred Marshall	75
2.6.3	Thorstein Veblen (1857-1929)	78
2.6.4	Other economic thinking during neoclassical time	79
2.7	Contributions of Modern Economic Thinking	80
2.7.1	Microeconomic theory	80
2.7.2	Chicago Economists-Neoliberalism	82
2.7.3	Modern Macroeconomics	83
2.7.4	Keynesian economic thinking	84
2.7.5	Emergence of New Classical Economics	85
2.8	Evolution of perspectives	86
2.9	Summary and Insights	92
3	REVIEW OF ELECTRICITY PRICING SYSTEMS	95
3.1	Introduction	95
3.1.1	Methodology	98
3.2	The Formative Phase (1880-1930)	99
3.2.1	United States ESI (technology-led and state-supported)	99
3.2.2	German ESI (State-industry collaboration)	106
3.2.3	UK ESIs (hostage to political conservatism)	107
3.3	The consolidation phase (1930-1965)	109
3.3.1	ESIs' commercial approach challenged (United States)	109
3.3.2	ESIs as benefactors of society (United Kingdom)	110
3.3.3	ESIs as revitaliser of economy (France)	112
3.4	The inflection phase (mid1960s-1980s)	119
3.4.1	PURPA and its impacts (United States)	119
3.4.2	Economic Pricing of electricity (United Kingdom)	126
3.4.3	Economic pricing of Electricity (Australia)	129
3.5	Summary	131
3.6	Conclusions	136
4	COMPREHENSIVE REVIEW OF DEREGULATED ELECTRICITY PRICING SYSTEM	138
4.1	Introduction	138
4.2	Market-based reforms – context	139
4.3	Impacts of market-based pricing of electricity	145
4.3.1	Review of Selected studies	146
4.3.2	Review of Studies supportive of reforms	146
4.3.3	Review of dissenting view points	152
4.3.4	Insights and Hypotheses	157
4.4	Scope, Data and Econometric Models	158

4.5	Econometric Regression Results and Discussion	182
4.6	Summary	186
5	ALTERNATIVE TO MARKET-BASED ELECTRICITY PRICING SYSTEM	191
5.1	Introduction	191
5.2	Capacity Utilisation post deregulation	191
5.3	Insights, challenges and thoughts for alternative approach	201
5.3.1	Reimagining Electricity Supply	209
5.4	Recommendations for Alternative Pricing System	212
5.5	Summary	213
6	CONCLUSIONS AND RECOMMENDATIONS	214
6.1	Main Findings	214
7	APPENDICES	228
7.1	Appendix A	228
7.2	Appendix B	246
7.2.1	Review of studies supportive of reforms	246
7.2.2	Review of studies sceptical of reforms	253
7.3	Appendix C	264
7.4	Appendix D	311
7.4.1	Hypothesis 1	311
7.4.2	Hypothesis 2	315
7.4.3	Hypothesis 3	319
7.4.4	Hypothesis 4	323
7.5	Appendix E	326
8	BIBLIOGRAPHY	348

LIST OF FIGURES

Figure 1-1 Historic Evolution of Electricity Capacity	2
Figure 1-2 Average Price 1926-1963 (Real-1963)	4
Figure 1-3 ESI Scale Economy (US)	5
Figure 1-4 Unit Size-O&M Cost \$/kW	5
Figure 1-5 France Electricity Prices (Real 2010)	15
Figure 1-6 UK Electricity Prices (Real 2010)	16
Figure 1-7 Electricity Generating Capacity Growth (post-nationalisation)	17
Figure 1-8 US Electricity Prices (Real 2010)	33
Figure 1-9 Victoria Electricity Prices (Real 2010)	34
Figure 1-10 New South Wales Electricity Prices (Real 2010)	34
Figure 1-11 Queensland Electricity Prices (Real 2010)	35
Figure 1-12 South Australia Electricity Prices (Real 2010)	35
Figure 1-13 Steam Electricity Generation Plant Cost per kW	36
Figure 1-14 Methodological Approach	42
Figure 2-1 Total Product	73
Figure 2-2 Marginal Product and Average Product	73
Figure 3-1 World Electricity Generation (1962)	96
Figure 3-2 US industries – Asset value (1962)	96
Figure 3-3 US Electricity Capacity Growth	97
Figure 3-4 Rigid Plant	116
Figure 3-5 Development cost	116
Figure 3-6 Electricity Plant Cost (Steam Technology) (US)	121
Figure 3-7 Average retail electricity price (US)	121
Figure 3-8 Changes to electricity consumption (US)	122
Figure 4-1: Profit Trends (US)	160
Figure 4-2 Profit Trends (UK)	161
Figure 4-3 Profit Trends (NSW)	163
Figure 4-4 Profit Trends (Victoria)	163
Figure 4-5 Profit Trends (Queensland)	164
Figure 4-6 Profit Trends (South Australia)	164
Figure 4-7 Price Trends (US)	169
Figure 4-8 Price Trends (UK)	170
Figure 4-9 Price Trends (NSW)	170
Figure 4-10 Price Trends (Victoria)	171
Figure 4-11 Price Trends (Queensland)	171
Figure 4-12 Price Trends (South Australia)	172
Figure 4-13 Inequity Trend (US)	174
Figure 4-14 Inequity Trend (UK)	175
Figure 4-15 Inequity Trend (NSW)	175

Figure 4-16 Inequity Trend (Victoria)	176
Figure 4-17 Inequity Trend (Queensland)	176
Figure 4-18 Inequity Trend (South Australia)	177
Figure 4-19: CO2 Emission Trends (US)	179
Figure 4-20: CO2 Emission Trends (UK)	180
Figure 4-21: CO2 Emission Trends (Australia)	180
Figure 5-1 Total Generation, Total Capacity, Capacity Utilisation, Percentage NG capacity (US)	192
Figure 5-2 Total Generation, Total Capacity, Capacity Utilization, Percentage NG capacity (UK)	192
Figure 5-3 Total Generation, Total Capacity, Capacity Utilization, Percentage NG capacity (Australia)	193
Figure 5-4: Generation capacity by fuel (USA)	194
Figure 5-5: Generation capacity by fuel (UK)	195
Figure 5-6: Generation capacity by fuel (Australia)	195
Figure 5-7: Capacity Utilization Coal-based Power Plants (US)	196
Figure 5-8 Cap. Utilization Coal-based Power Plants (UK)	197
Figure 5-9 Cap. Utilization Coal-based Power Plants (Australia)	197
Figure 5-10 Cap. Utilization NG based Power Plants (US)	198
Figure 5-11 Cap. Utilization NG based Power Plants (UK)	199
Figure 5-12 Cap. Utilization NG based Power Plants (Australia)	199

LIST OF TABLES

Table 4-1 Reviews of Studies Generally Supportive of reforms	147
Table 4-2 Review of studies with dissenting viewpoint.....	153
Table 4-3: Details of econometric model – Hypothesis 1	168
Table 4-4: Details of econometric model - Hypothesis 2.....	173
Table 4-5: Details of econometric model - Hypothesis 3.....	178
Table 4-6: Hypothesis 4.....	181
Table 4-7 Results of Hypotheses (1,2 & 3).....	182
Table 4-8: Results of Hypothesis 4	185

ABBREVIATIONS

AC	Alternating Current
ACT	Australian Capital Territory
ADB	Asian Development Bank
AGR	Advanced Gas-cooled Reactor
ANOVA	Analysis of Variance
ASI	Adam Smith Institute
AUC	Australian Cent
AUD	Australian Dollar
BCA	Business Council of Australia
BPA	Bonneville Power Administration
BST	Bulk Supply Tariff
BTU	British Thermal Unit
CBI	Confederation of Business Industry
CCGT	Combined Cycle Gas Turbine
CEB	Central Electricity Board
CEGB	Central Electricity Generating Board
CPS	Centre for Policy Studies
CSE	Citizens for Sound Economy
DC	Direct Current
DECC	Department of Energy and Climate Change
DSM	Demand Side Management
EFL	External Financing Limit
EIA	Energy Information Administration
ELCON	Electricity Consumers Resource Council
EPA	Energy Policy Act
ESAA	Energy Supply Association of Australia
ESI	Electricity Supply Industry
FERC	Federal Energy Regulatory Commission

FPC	Federal Power Commission
GDP	Gross Domestic Product
GHG	Green House Gases
GNP	Gross National Product
GT	Gas Turbine
GW	Gigawatt
HC	Holding Company
HF	Heritage Foundation
HVDC	High-voltage-direct current
IEA	International Energy Agency
IMF	International Monetary Fund
IPA	Institute of Public Affairs
IPP	Independent Power Producer
IRP	Integrated Resource Planning
LCP	Least Cost Pricing
LRMC	Long Run Marginal Cost
MPT	Marginal Productivity Theory
MW	Megawatt
NELA	National Electric Light Association
NEM	National Electricity Market
NETA	New Electricity Trading Arrangements
NG	Natural Gas
NSW	New South Wales
OECD	Organisation for Economic Co-operation and Development
PPA	Power Purchase Agreement
PSBR	Public Sector Borrowing Requirement
PUHCA	The Public Holding Company Act
PURPA	The Public Utility Regulatory Policies Act
QF	Qualified Facilities

REC	Regional Electricity Company, UK
SA	South Australia
TFP	Total Factor Productivity
TI	Tasman Institute
TVA	Tennessee Valley Authority
UK	United Kingdom
UKP	UK Pound
US	United States
USC	US Cent
WDI	World Development Indicators
WEA	World Energy Agency