

# Contents

<b>1 Overview</b>	1
1.1 Introduction	1
1.2 Why This Study	4
1.3 Objectives	6
1.4 Research Significance	7
1.5 Research Design	9
1.6 Research Questions and Empirical Motivations	10
1.7 Assumptions and Limitations	10
1.7.1 Energy Price	11
1.7.2 Methodological and Theoretical Assumptions	11
1.8 Operational Definitions	11
1.9 Expected Results	16
1.10 The Structure of This Book	16
1.11 Summary	17
Bibliography	18
<b>2 ICT Investment and Energy Use in South Korea and Japan</b>	23
2.1 Introduction	24
2.2 ICT Investment	25
2.2.1 South Korea	26
2.2.2 Japan	28
2.3 Energy Use	30
2.3.1 South Korea	30
2.3.2 Japan	31
2.4 Energy Efficiency	33
2.4.1 South Korea	33
2.4.2 Japan	34
2.5 Summary	35
Bibliography	36

<b>3</b>	<b>ICT Investment and Energy Use in the Literature</b> . . . . .	39
3.1	Efficiency in the Use of Energy . . . . .	40
3.2	ICT Investment and Economics Growth . . . . .	42
3.3	ICT Investment and Energy Use . . . . .	44
3.4	Summary . . . . .	46
	Bibliography . . . . .	47
<b>4</b>	<b>The Factor Demand Model and the Theory of Productivity</b> . . . . .	51
4.1	Historical Development of the Factor Demand Models . . . . .	52
4.1.1	The Firm's Temporary Equilibrium . . . . .	52
4.1.2	The Adjustment Cost . . . . .	53
4.1.3	The Dynamic Factor Demand . . . . .	54
4.2	The Industrial Demand Models for Input Factors . . . . .	56
4.3	Inter-Factor Substitutability and Complementarity . . . . .	57
4.4	The Total Factor Productivity . . . . .	62
4.5	Summary . . . . .	64
	Bibliography . . . . .	65
<b>5</b>	<b>The EUKLEMS Data</b> . . . . .	71
5.1	Data Source . . . . .	71
5.2	Population and Sampling Strategy . . . . .	73
5.3	Classification of the Industrial Sectors . . . . .	77
5.4	Summary Statistics . . . . .	79
5.5	Multicollinearity and Validation of Results . . . . .	79
5.6	Industrial Sectors' Energy Use Intensity . . . . .	83
	Bibliography . . . . .	84
<b>6</b>	<b>The Impact of ICT Investment on Energy Use:</b>	
	<b>A Comparative Study Between South Korea and Japan</b> . . . . .	85
6.1	Introduction . . . . .	85
6.2	Theoretical Model and Empirical Specification . . . . .	88
6.3	Parameters Estimates . . . . .	94
6.4	The Adjustment Speed . . . . .	99
6.5	Deviation from the Optimal Values . . . . .	103
6.6	The Own and Cross Price Elasticities . . . . .	105
6.7	Conclusion . . . . .	110
	Bibliography . . . . .	111
<b>7</b>	<b>Productivity Analysis of South Korean Industrial Sector</b> . . . . .	115
7.1	Introduction . . . . .	115
7.2	Stages in the Industrial and Technological Policies . . . . .	117
7.3	Divisia Index . . . . .	118
7.4	Theoretical Model and Empirical Specification . . . . .	121
7.5	Determinants of the TFP Growth . . . . .	124
7.6	Capacity Utilization Index . . . . .	130

7.7	Price and Output Elasticities . . . . .	132
7.8	Returns to Scale . . . . .	135
7.9	The Rate of Technical Change . . . . .	137
7.10	The TFP Growth . . . . .	139
7.11	The Output Growth . . . . .	142
7.12	Conclusion . . . . .	143
	Bibliography . . . . .	143
<b>8</b>	<b>Overall Summary, Hypotheses Test, and Policy Implications . . . . .</b>	<b>147</b>
8.1	Introduction . . . . .	147
8.2	The Research Questions and the Hypotheses . . . . .	149
	8.2.1 The Research Questions . . . . .	149
	8.2.2 Hypotheses Test . . . . .	150
8.3	Summary of Results and Policy Implications . . . . .	151
8.4	Implications for Industry and Policy Makers . . . . .	156
8.5	Conclusions and Practical and Policy Recommendations . . . . .	157
8.6	Contribution to the Literature . . . . .	159
8.7	Limitations of the Study and Recommendations for Further Research . . . . .	161
	Bibliography . . . . .	162

ICT Investment for Energy Use in the Industrial Sectors

Khayyat, N.T.

2017, XIII, 164 p. 11 illus., Hardcover

ISBN: 978-981-10-4755-8