## Contents

Pre	eface	xxii
Ac	knowledgments	xxv
Αb	breviations	xxvi
1	Introduction	1
2	SETTING THE STAGE	7
	Why Infrastructure Matters	7
	Trends in Infrastructure Financing	10
	Distribution	17
	Sectoral Distribution	17
	Geographic Distribution	19
	Modal Distribution	21
	Investor Type: Geographic Location	26
	Limitations	28
	Achievements and Moving Forward	35
3	Learning from Existing Literature	43
	Employment and Wages	44
	Prices of Services	45
	Quality of Services	45
	Access to Services and Coverage	46
	Asset Ownership	46
	Impact on Investors	47
	Fiscal Flows	48
	Productivity and Financial Solvency	49
	Distributional Impact and Consumer Welfare	50

xii CONTENTS

4	FILLING GAPS WITH NEW DATA SETS AND	
	Methodologies	57
	Data Sets	58
	Performance Indicators Data Set	58
	Contract and Regulatory Characteristics Data Set	60
	LAC Electricity Benchmarking Database	60
	New Methodology: Separating Transition	
	versus Long-Run Effects	67
	New Methodology: Distinguishing Levels from Trends	68
	Means and Medians Analysis	70
	Econometric Analysis	71
	Adding Contract and Regulatory Characteristics	. 73
	Endogeneity and Selection Bias	74
5	THE IMPACT ON ELECTRICITY DISTRIBUTION	79
	Introduction	79
	The Privatization Process	79
	Data	90
	Impact on Output and Coverage	90
	Electricity Distribution: Output and Coverage Summary	90
	Energy Sold	90
	Number of Connections	93
	Coverage	95
	Impact on Employment	98
	Electricity Distribution: Employment Summary	98
	Impact on Labor Productivity and Efficiency	101
	Electricity Distribution: Labor Productivity	
	and Efficiency Summary	101
	Labor Productivity	101
	Distributional Losses	102
	Impact on Prices	106
	Electricity Distribution: Price Summary	106
	Impact on Quality	109
	Electricity Distribution: Quality Summary	109
	Conclusion	114
6	THE IMPACT ON FIXED-LINE TELECOMMUNICATIONS	117
	Introduction	117
	The Privatization Process	118
	Data	120

COI	NTENTS	xiii
	Impact on Output and Coverage	122
	Telecommunications: Output and Coverage Summary	122
	Number of Connections	122
	Number of Minutes	124
	Coverage	126
	Impact on Employment	129
	Telecommunications: Employment Summary	129
	Impact on Labor Productivity and Efficiency Telecommunications: Labor Productivity and Efficiency	131
	Summary	131
	Labor Productivity	132
	Incomplete Calls	136
	Impact on Prices	138
	Telecommunications: Price Summary	138
	Impact on Quality	141
	Telecommunications: Quality Summary	141
	Liberalization and Competition	144
	Telecommunications: Liberalization and Competition	111
	Summary	144
	Liberalization	148
	Competition from Mobile Service Providers	149
	Conclusion	151
	Conclusion	151
7	THE IMPACT ON WATER AND SEWERAGE	153
	Introduction	153
	The Privatization Process	153
	Data	155
	Impact on Output and Coverage	157
	Water and Sewerage: Output and Coverage	
	Summary	157
	Number of Connections	159
	Water Production	159
	Coverage	161
	Impact on Employment	165
	Water and Sewerage: Employment Summary	165
	Impact on Labor Productivity and Efficiency	166
	Water and Sewerage: Labor Productivity and Efficiency	

166

166

171

173173

Summary

Labor Productivity

Distributional Losses

Impact on Prices
Water and Sewerage: Price Summary

		CONTENTS
x i v		CONTENTS
ALU		

17/	
1/6	
176	
178	
178	
180	
185	
100	
185	
186	
187	
187	
187	
190	
190	
195	
199	
199	
199	
203	
203	
203	
207	
207	
207	
209	
211	
212	
214	
215	
217	
222	
223	
223	
224	
228	
	178 178 178 180 185 185 186 187 187 190 190 190 199 199 203 203 203 203 207 207 207 209 211 212 214 215 218 219 223 223 223 224

CONTENTS xv

	Critical Elements to Be Introduced in Moving Forward to Secure Success and Maximum Benefit of Private	
	Participation Programs	233
	Improved Institutionality	233
	Improved Contract and Concession Design	233
	Regulatory Framework	235
	Regulatory Instruments	235
	Conflict Resolution Mechanism	236
	Addressing Social Issues	236
	Transparency and Communications	236
	Evaluation and Monitoring	236
A	PPENDIXES	
1	Existing Literature	239
2	DETAILS OF ECONOMETRIC APPROACH	253
	Adding Contract and Regulatory Characteristics	255
	Estimation	256
	Endogeneity	257
3	DETAILED RESULTS OF EMPIRICAL ANALYSIS	259
4	SUMMARY OF POWER MARKET REFORMS IN LATIN	
	America and the Caribbean	303
5	Utility Companies	315
Bi	bliography	321
In	dex	329
Во	OXES	
2.		
	Explanations for Social Discontent	
	about Privatization	36
2.	Public Perceptions of Infrastructure Privatization	
	in Peru	38
5.	1 A Failed Electricity Privatization in Peru	89
Fı	GURES	
2.		
	Quality Improved to Costa Rican Levels	8
2.	e ,	9
2.	The Rise and Fall of Private Finance for Infrastructure	11

xvi CONTENTS

2.4	Investment in Infrastructure Projects with Private	
	Participation by Region, 1990–2004	12
2.5a	Evolution of Private Participation in Electricity	
	Distribution	13
2.5b	Evolution of Private Participation in Fixed	
	Telecommunications	14
2.5c	Evolution of Private Participation in Water Distribution	14
2.6a	Public Infrastructure Investment	15
2.6b	Private Infrastructure Investment	15
2.6c	Total Infrastructure Investment	16
2.7	Investment in LAC by Sector, 1990-2001	16
2.8	Sectoral Concentration of Private Participation	17
2.9	PPI in LAC by Country, 1990–2004	20
2.10	Types of Private Participation in Infrastructure	22
2.11	Modal Breakdown by Sector in Latin America,	
	by Number of Projects, 1990–2004	24
2.12	Modal Breakdown of Private Participation	26
2.13	Modal Trends for Private Participation, 1990-2004	27
2.14	Cumulative Private Investment in LAC by Investor	
	Type and Sector, 1998-2004	28
2.15	Private Investment in LAC by Investor Type	29
2.16	Population Expressing Dissatisfaction with	
	Privatization in Latin America	33
2.17	Survey Probing Public Opinion	34
2.2.1	Negative Results of Privatization in Peru	39
3.1	Internal Rate of Return and Weighted Average	
	Cost of Capital	48
3.2	Fiscal Capture of Benefits	49
3.3	Increase in Household Earnings from Access to	
	Infrastructure Public Services	51
3.4	Increase in Household Earnings from Access to	
	Markets through Rehabilitated Rural Roads	51
3.5	Joint Welfare Effect of Price and Access Changes on	
	Consumers Expressed as a Percentage of per Capita	
	Total Household Expenditure	52
3.6	Joint Welfare Effect of Price and Access Changes on	
	Consumers Expressed as a Percentage of per Capita	
	Total Household Expenditure	53
4.1	Transitional Effects on Employment:	
	Electricity Distribution	68
4.2	Transition versus Nontransition Period Comparison	69
4.3	Steady Trend	70
5.1	Electricity Distribution, MWh	92

C C A TOTAL YOUR C	
CONTENTS	xvu
	710 22

	5.2	Refere and After Commercian of Electricity	
	3.2	Before and After Comparison of Electricity  Distribution Levels, GWh	0.2
	5.3	Electricity Distribution: Connections	93 94
	5.4	Before and After Comparison of Electricity	7 <del>4</del>
	J.T	Distribution Levels: Connections	95
	5.5	Electricity Distribution: Coverage	93 96
•	5.6	Before and After Comparison of Electricity	76
	5.0	Distribution: Coverage Levels	97
•	5.7	Electricity Distribution: Employment	97 99
	5.8	Before and After Comparison of Electricity	77
	3.0	Distribution: Employment Levels	100-
	5.9	Electricity Distribution: Labor Productivity	103
	5.10	Before and After Comparison of Electricity	103
	3,10	Distribution: Labor Productivity Levels	104
	5.11	Electricity Distribution: Distributional Losses	105
	5.12	Before and After Comparison of Electricity	103
	J.12	Distribution: Distributional Losses	106
	5.13	Electricity Distribution: Average Prices	108
	5.14	Before and After Comparison of Electricity	100
		Distribution: Prices	109
	5.15	Electricity Distribution: Quality	111
	5.16	Before and After Comparison of Electricity	***
		Distribution: Quality	112
•	6.1	Telecommunications: Number of Connections	123
4	6.2	Before and After Comparison of Telecommunications:	
		Number of Connections	124
	6.3	Telecommunications: Number of Minutes	125
	6.4	Before and After Comparison of Telecommunications:	
		Number of Minutes	126
	6.5	Telecommunications: Coverage	127
	6.6	Before and After Comparison of Telecommunications:	
		Coverage Levels	128
	6.7	Telecommunications: Employment	130
	6.8	Before and After Comparison of Telecommunications:	
•		Employment Levels	131
	6.9	Telecommunications: Connections per Employee	133
	6.10	Telecommunications: Minutes per Employee	134
	6.11	Before and After Comparison of Telecommunications:	
•		Labor Productivity Levels	136
	6.12	Telecommunications: Percentage of	
		Incomplete Calls	137
	6.13	Before and After Comparison of Telecommunications:	
		Efficiency Levels	138
	-		

6.14	Telecommunications: Three-Minute Call Prices	140
6.15	Before and After Comparison of Telecommunications:	
	Three-Minute Call Prices	141
6.16	Telecommunications: Residential Monthly Service	
	Charges	142
6.17	Before and After Comparison of Telecommunications:	
	Residential Monthly Service Charges	144
6.18	Telecommunications: Installation Charges	145
6.19	Before and After Comparison of Telecommunications:	
	Installation Charges	146
6.20	Telecommunications: Quality	147
6.21	Before and After Comparison of Telecommunications:	
	Quality Levels	148
7.1	Water and Sewerage: Number of Connections	160
7.2	Before and After Comparison of Water and	
	Sewerage: Number of Connections	161
7.3	Water and Sewerage: Water Production	162
7.4	Before and After Comparison of Water and Sewerage:	
	Cubic Meters per Year	163
7.5	Water and Sewerage: Coverage	164
7.6	Before and After Comparison of Water and Sewerage:	
	Coverage Levels	167
7.7	Water and Sewerage: Employment	168
7.8	Before and After Comparison of Water and Sewerage:	
	Employment Levels	169
7.9	Water and Sewerage: Connections per Employee	170
7.10	Before and After Comparison of Water and Sewerage:	
	Connections per Employee	171
7.11	Water and Sewerage: Distributional Losses	172
7.12	Before and After Comparison of Water and Sewerage:	
	Distributional Losses	173
7.13	Water and Sewerage: Water Prices	175
7.14	Before and After Comparison of Water and Sewerage:	
	Water Prices	176
7.15	Water and Sewerage: Sewerage Prices	177
7.16	Water and Sewerage: Service Continuity	179
7.17	Before and After Comparison of Water and Sewerage:	
	Service Continuity	180
7.18	Water and Sewerage: Potability	181
7.19	Before and After Comparison of Water and Sewerage:	
	Potability	182
8.1	Electricity Coverage	188
8.2	Energy Sold per Connection per Year	189

CONT	ENTS	xix
8.3	Residential Connections per Employee	191
8.4	Energy Sold per Employee	192
8.5	Distributional Losses	193
8.6	Average Residential Tariffs	194
8.7	Average Industrial Tariffs	196
8.8	Average Frequency of Interruptions per Connection	197
8.9	Average Duration of Interruptions per Connection	198
8.10	Energy Sold per Connection per Year, Public versus	
	Private	200
8.11	Residential Connections per Employee, Public versus	
	Private	201
8.12	Energy Sold per Employee, Public versus Private	202
8.13	Distributional Losses, Public versus Private	204
8.14	Average Frequency of Interruptions per Connection,	
	Public versus Private	205
Tabli	ES	
1.1	Private Sector Participation in Electricity,	
	Telecommunications, and Water	5
2.1	Concentration of Investment with Private Participation	
	by Country, 1990–2004	21
2.2	Jurisdictions and Responsibilities under Different	
•	Types of Private Participation	23
2.3	Canceled or Distressed Investments in Private	
	Infrastructure Projects in Latin America	31
2.4	Renegotiation Incidence and Average Time until	
	Renegotiation, 1988–2001	31
2.5	Common Outcomes of the Renegotiation Process	32
2.6	Illustration of Fiscal Cost of Guarantees	
	from Colombia	33
2.7	Civil Disturbances	35
3.1	Summary of Theoretical and Actual Impacts of Private	
`	Participation	53
4.1	Variable Definitions	61
4.2	Summary Statistics	63
4.3	Contract and Regulatory Variables	65
4.4	Example of Means and Medians Analysis in Levels	
	Output—Electricity Distribution	72
4.5	Example of Econometric Analysis—Electricity	
	Distribution	74
5.1	Power Sector Reform in Latin America	
	and the Caribbean	81

xx CONTENTS

5.7	LAC Wholesale Electricity Markets: Extent of	
5.2	Unbundling and Retail Competition	82
5.2	Electricity Market in LAC	84
5.3	Chronology of the Privatizations of Electricity	
5.4	Distribution in LAC by Country	86
<b>.</b> .	Description of Electricity Distribution Variables	91
5.5	Electricity Distribution: Output and Coverage Results	98
5.6	Electricity Distribution: Output and Coverage Testante Electricity Distribution: Employment Results	101
5.7	Electricity Distribution: Employment Results Electricity Distribution: Labor Productivity and	
5.8		107
5.0	Efficiency Results Electricity Distribution: Price Results	110
5.9	Electricity Distribution: The Results  Electricity Distribution: Quality Results	113
5.10	Electricity Distribution: Quality Results	113
5.11	Electricity Distribution Impact Summary	170
6.1	Privatization Chronology of Fixed	118
	Telecommunications in LAC	
6.2	Privatization Chronology of Fixed	
	Telecommunications in LAC: Liberalization and	119
	Competition  (T.1	121
6.3	Description of Telecommunications Variables	129
6.4	Telecommunications: Output and Coverage Results	132
6.5	Telecommunications: Employment Results	132
6.6	Telecommunications: Labor Productivity and	135
	Efficiency Results	143
6.7	Telecommunications: Price Results	146
6.8	Telecommunications: Quality Results	150
6.9	Fixed Telecommunications Impact Summary	155
7.1	Overview of Water Sector Reform	133
7.2	Privatization Chronology of Water and Sewerage	156
	in LAC	158
7.3	Description of Water and Sewerage Variables	163
7.4	Water and Sewerage: Output Results	166
7.5	Water and Sewerage: Coverage Results	169
7.6	Water and Sewerage: Employment Results	107
<b>7.</b> 7	Water and Sewerage: Labor Productivity and	174
	Efficiency Results	178
7.8	Water and Sewerage: Price Results	182
7.9	Water and Sewerage: Quality Results	183
7.10	Water and Sewerage Impact Summary	209
9.1	Base Case for Regulatory and Contract Variables	210
9.2	Impact of Sale Method	210
9.3	Impact of Autonomy of Regulatory Body	213
9.4	Impact of Duration of Regulatory Body	214
	Appointments	214

CONTENTS		xxi
9.5	Impact of Investor Nationality	216
9.6	Impact of Award Criteria	218
9.7	Impact of Tariff Regulation	220
A1.1	Infrastructure Privatization in Selected Cross-Country	
	and Latin American Country Studies	243
A3.1	Means and Medians Analysis in Levels-Electricity	
	Distribution	260
A3.2	Means and Medians Analysis in Growth-Electricity	
	Distribution	264
A3.3	Econometric Analysis—Electricity Distribution	268
A3.4	Means and Medians Analysis in Levels—Fixed	
	Telecommunications	270
A3.5	Means and Medians Analysis in Growth—Fixed	
	Telecommunications	275
A3.6	Econometric Analysis—Fixed Telecommunications	280
A3.7	Econometric Analysis—Fixed Telecommunications,	
	Liberalization	282
A3.8	Econometric Analysis—Fixed Telecommunications,	
	Mobile Competition	284
A3.9	Econometric Analysis—Fixed Telecommunications,	
	Instrumental Variables	286
A3.10	Means and Medians Analysis in Levels-Water and	
	Sewerage	288
A3.11	Means and Medians Analysis in Growth-Water and	
	Sewerage	293
A3.12	Econometric Analysis—Water Distribution and	
	Sewerage	298
A3.13	Summary of Minimum and Maximum Changes	
	Disaggregated by Regulatory and Contract Variables	300
A4.1	Latin America and the Caribbean Region Summary	
	of Power Market Reforms	304