

# Contents

Tables	vii
Figures	x
Contributors	xi
Preface	xiii
<b>PART I A REVIEW OF THE ISSUES</b>	
1 Trade transformation and technology transfer <i>Ben Smith and James Jordan</i>	3
2 Technology and changing comparative advantage in the Pacific region <i>Paul Krugman</i>	25
3 Acquiring technology <i>Richard R. Nelson</i>	38
<b>PART II INDUSTRY STUDIES</b>	
4 The electronics industry <i>Edward K. Y. Chen</i>	51
5 The information industry <i>Ken-ichi Imai</i>	74
6 The textile industry <i>Emmanuel T. Velasco</i>	90
7 Robotics technology <i>Kenneth Flamm</i>	107
<b>PART III COUNTRY STUDIES</b>	
8 Technology policy in Japan <i>Shuji Tamura and Shujiro Urata</i>	127
9 Korea: the acquisition of technology <i>Linsu Kim</i>	145
10A China: the bargaining game <i>Susan L. Shirk</i>	158
10B China: policies for technology import <i>Ding Jing Ping</i>	177
11 Indonesia: technology transfer in the manufacturing industry <i>Thee Kian Wie</i>	200
12 Malaysia: the technological factor <i>Fong Chan Onn</i>	233
13 Singapore: the information technology sector <i>Chew Soon Beng</i>	246
14 Canada: technology and competitiveness <i>Steven Globerman</i>	258

15	New Zealand: technology and development <i>Allan Bollard</i>	279
<b>PART IV CONCLUSION</b>		
16	Summary of chapters and discussions <i>Hadi Soesastro, Mari Pangestu and David McKendrick</i>	299
<b>APPENDIXES</b>		
6.A	Computer-based innovations and increased competitiveness	327
7.A	What is a robot?	331
15.A	Supplementary data	333
	Notes	337
	Bibliography	347
	Index	363

# Tables

4.1	The electronics industry in Asia: sectoral distribution, 1980	52
4.2	Revealed comparative advantage (RCA) of selected electronics products in selected Asian economies	53
4.3	Value of OECD semiconductor imports	58
4.4	American FDI in electronics in the Asia-8, 1985	61
4.5	American-owned semiconductor assembly plants in Asia	61
4.6	Japan's manufacturing FDI by industry	63
4.7	Japan's FDI in the electronics and electrical industry in Asia	63
4.8	Comparison of Japanese and American electronics firm in Asia, 1982	63
4.9	Minimum investment requirements for semiconductor production	66
4.10	American FDI in the electronics and electrical industry	69
4.11	Average annual American FDI in the electronics and electrical industry	69
5.1	Semi-macro prediction of Japan's information industry: 4 sectors input-output table of 1984 and 2000	78
5.2	Predicted main indicators for the information sector	80
5.3	Comparison of input-output coefficients, 1984/2000	80
5.4	Predicted employment	81
5.5	Forecast of Japanese FDI by JERC	83
5.6	Japan's new economic plan	83
6.1	Distribution of (cotton type) spinning capacity	93
6.2	Distribution of weaving capacity (cotton system)	94
6.3	Textile and clothing plant capacity, 1970, 1981, 1984	95
6.4	Textile industry: export ratio in selected Southeast and East Asian countries, 1970 and 1980	96
6.5	Employment, value added, and relative factor intensity of textile industries in ASEAN countries	98
6.6	Earnings and productivity in textile industries	101
7.1	Estimated industrial robot populations	110
7.2	Selected measures of intensity of robot use by industry, Japan, 1983	113
7.3	Number of robots per billion US dollars of value added, by industry and country	114
7.4	Robots in use in the auto industry	116
7.5	Intensity of robot use among major auto producers	119
7.6	International differences in use of robots in passenger car production, 1981	119
8.1	Types of R&D activity for major countries	129

8.2	Private sector R&D	131
8.3	Changes in the structure of production	132
8.4	Sources of growth for high-tech products, 1977-85	132
8.5	International trade in high-tech products	134
8.6	Contribution of government funds to R&D in the private sector	137
8.7	Changing pattern of various types of projects	139
8.8	Importance of key technology in various projects	140
9.1	Indicators of human resource development in Korea	147
9.2	Foreign technology transfer to Korea	149
9.3	Major R&D indicators in Korea	151
9.4	Four types of firms categorised by firm size and technological strategy	153
9.5	Evolving pattern of technology transfer	156
10A.1	Preferences in joint ventures involving technology imports	174
10B.1	China's technology imports, 1952-85	178
10B.2	Technology contracts, 1981-86	180
10B.3	Technology contracts by country, 1981-86	181
10B.4	Exports and imports, 1952-86	182
10B.5	China's import of foreign capital, contracted and utilised	190
10B.6	China's import of foreign capital (contracted), by investment method, 1985-86	190
10B.7	China's import of foreign capital, by country, 1986	191
10B.8	China's import of foreign capital (utilised), by Chinese region, 1986	192
10B.9	China's import of foreign capital (utilised), by Chinese sector, 1986	193
10B.10	China's import of foreign capital (contracted), by industry, 1985	194
11.1	Indonesia: number of firms studied by type of industry and mode of arrangement for technology transfer	203
12.1	Malaysia: savings-investment, 1961-87	236
12.2	Malaysian industry: summary of international competitiveness, 1979-81	243
12.3	Enrolment increases in tertiary education, Malaysia, 1970-85	244
13.1	IT hardware manufacturing output	251
13.2	Distribution of computer companies by firm size and ownership, 1984	251
13.3	Indicators of IT penetration in the Asia-Pacific region	252
13.4	IT users by sector	253
13.5	IT application areas, 1987	253
13.6	Types of database services, 1987	254
13.7	Impact of IT on productivity, 1987	255
14.1	Exports and imports to principal trading areas	259
14.2	Exports and imports by commodity groupings	260

14.3	Net export intensity and intra-industry trade for selected Canadian manufacturing industries, selected periods	261
14.4	Patents compared to GNP in 1982	263
14.5	Distribution of Canadian patents granted to Canadians	264
14.6	Industrial distribution of Canada's largest private sector R&D performers, 1980-86	267
14.7	Industrial distribution of the largest private sector R&D performers in the United States, 1986	268
15.1	Breakdown of R&D expenditure by sector, 1984	283
15.2	Industrial know-how in New Zealand	287
15.3	New Zealand indicators of technology transfer in the Pacific Basin	291
15.4	Source of microelectronics used by ownership of company	294
15.5	Use of microelectronics in products and processes	294
15.A1	Major regulatory changes in New Zealand	333
15.A2	Major acts of trade liberalisation in New Zealand	334
15.A3	Gross expenditure on R&D, 1985	334
15.A4	Patent applications, 1983	334
15.A5	New Zealand exports to Pacific Basin countries, 1986	335