

Contents

<i>List of figures</i>	page viii
<i>List of tables</i>	ix
<i>Foreword</i>	xi
<i>Preface</i>	xiii
1 Introduction	1
2 A periodization of the development of the computer and electronic devices industry in Japan, 1948–1979	13
3 The VLSI Research Project, 1976–1980	57
4 The Optical Measurement and Control System Project, 1979–1985	98
5 The High-Speed Computing System for Scientific and Technological Uses Project (The Supercomputer Project), 1981–1989	145
6 The Future Electronic Devices Project, 1981–1990	177
7 The Fifth Generation Computer Project, 1982–1991	193
8 Cooperation and competition in the Japanese computing and electronic devices industry: a quantitative analysis	243
9 Conclusions and theoretical implications	256
Appendix 1 NEC's total quality control	292
Appendix 2 Specialization in industrial and consumer electronics by Japanese electronics companies	294
<i>Notes</i>	300
<i>Bibliography</i>	312
<i>Index</i>	323

Figures

3.1	Research areas in the VLSI Project's joint laboratories	<i>page</i> 70
3.2	Joint patents in the VLSI Project	73
3.3	The propensity to share technological knowledge in four technology areas relating to VLSI technology	78
3.4	Japanese market share of memory LSI	83
3.5	NEC's management system for VLSI development	88
3.6	The benefits of alternative forms of government research support	89
3.7	The costs of alternative forms of government research support	95
4.1	The research design for the Optical Measurement Project	108
4.2	The total Optical Measurement System and its subsystems	113
4.3	The funding of the Optoelectronics Joint Laboratory	115
5.1	The supercomputer and its subsystems	155
6.1	A model of joint search	183
7.1	Fifth Generation Project grand design	227
7.2	Some alternatives for government high-technology intervention	230
A.1	NEC's total quality control	292

Tables

2.1	Performance of information technology R & D in Japan, 1970–1981	<i>page</i> 50
3.1	Joint patents in the VLSI joint laboratories	75
3.2	Ranking of firms in terms of number of joint patents held with one other firm in the first three laboratories of the VLSI joint laboratories	76
3.3	Inter-laboratory joint patents in the VLSI joint laboratories	77
3.4	Propensity to share knowledge by firms participating in the VLSI Project	79
3.5	Commercializable products which have emerged from the VLSI Project	84
4.1	Japanese semiconductor sales, 1985	100
4.2	III-V compound devices sold in Japan	100
4.3	The subsystems and components and the firms involved in the Optical Measurement project	114
4.4	Membership of the Optoelectronics Joint Laboratory	119
5.1	Supercomputer Project: allocation of research tasks to the participating companies	155
6.1	FED Project: areas of research specialization by the Kansai companies involved in research on three-dimensional devices	184
6.2	FED Project: areas of research specialization by the companies involved in research on superlattices	185
6.3	Diffusion of patents from the Next Generation (Jisedai) Programme	190
7.1	Research areas in Fujitsu in artificial intelligence	223
7.2	Funding the Fifth Generation Project	228
8.1	Intensity of competition between the firms involved in the national cooperative research projects	244
8.2	Danger of knowledge leakage in the national cooperative research projects	246
8.3	Opportunism in the national cooperative research projects	246
8.4	Role of government as a facilitator of national cooperative research	248

8.5	Benefits received from the national cooperative research projects	250
8.6	Amount of research occurring in the absence of the national cooperative research projects	254
8.7	Evaluation of success of the national cooperative research projects	254
9.1	Oriented-basic research areas in five MITI-initiated projects	274
A.1	Size of Japanese and other international electronic/electrical companies	295
A.2	Sectoral specialization by major Japanese electronics companies	295
A.3	The importance of communications products in the four main NTT-supplying companies	298