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Trends in Technology Exports from Japan
— 1993 Fiscal Year —

December 1995

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National Institute of Science and Technology Policy
Science & Technology Agency

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Japanese version

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-1993 fiscal Year-**

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I. Introduction

Understanding the true state of technological trade is of great significance in assessing the technological ties between Japan and foreign countries and the international impact of Japan's technology. Both the Bank of Japan and the Management and Coordination Agency release statistics on Japan's technological trade *¹. However, the Bank of Japan statistics show only the money amounts involved in technological trade agreements, while those of the Management and Coordination Agency cover only amounts and numbers. This institute, on the other hand, has been conducting a trend analysis of the technological import aspect of technological trade, annually releasing the "Trend Analysis of Foreign Technology Introduction" based on reports on the conclusion (amendment) of technology introduction agreements filed in accordance with the Foreign Exchange and Foreign Trade Control Law. With technological export, however, no such analysis has been undertaken. To gain an understanding of the actual state of affairs in technological trade, details including the nature of technology, the forms of technology (in terms of patents, know-how, etc.), agreement formats and financial interest held in technological trade agreement partners need to be analyzed. To this end, this institute undertook a questionnaire survey targeting private companies in the last fiscal year and conducted a qualitative analysis of technological export, producing "Trends in Technology Exports from Japan (FY 1992)".

Dramatic changes can occur to technological export depending on importing countries' economic conditions and exporting companies' corporate strategies, and this makes it difficult to analyze the structure of Japan's technological trade and importing countries' situations based on a single fiscal year's survey. To improve the reliability of the report and better understand the trends in Japan's technological export, therefore, it was necessary to continue with the survey, thereby expanding on the data.

Based on this view, a questionnaire survey was again conducted in a similar format to the one for FY 1992 but covering technological exports having taken place during FY 1993, with the results compiled in this report. In this survey, companies which had never been involved in technological export were also covered, with questions such as whether they intended to participate in technological export in the future asked.

Amid talks of the hollowing out of Japan's industrial base and structural changes in the industry, we hope that this report will be useful as a source of information for forecasting trends in Japan's technological trade.

¹ Types and Characteristics of Major Technological Trade Statistics in Japan

Type of Statistics	Characteristics	Categories
Bank of Japan statistics	Amounts of import/export agreements	Money amounts only
Management and Coordination Agency statistics	Amounts and numbers of import/export agreements	Industrial categories, regional categories, new/continuing agreements separately

See "Technological Trade Statistics of Japan" (NISTEP Study Material No. 26) by this institute for further information on the types and characteristics of technological trade statistics that are available in Japan.

II. Survey Methods

1. Contents of Questionnaire Survey

This questionnaire survey is aimed primarily at understanding the status of technological export and illustrating the special characteristics of Japan's technological trade. This institute has been publishing the "Trend Analysis of Foreign Technology Introduction" annually, covering the introduction of technologies from overseas. The questions in this survey were prepared along the lines of the items surveyed in the "Trend Analysis of Foreign Technology Introduction" for the sake of comparing and contrasting the results. The agreements covered by this survey are **new technological export agreements concluded within the one-year period between 1 April 1993 and 31 March 1994.**

"Technological export" is defined in this survey as the transfer of industrial property rights (patents, utility models, designs, trademarks) or rights connected with technological know-how, the establishment of usufructuary rights, and/or the provision of technological guidance/instruction. (A list of the survey questions is given in Reference Material 1).

2. Survey Methods

An outline of the questionnaire survey is given below.

- (1) Survey target companies: companies capitalized at 1 billion yen or more and involved in R&D activities or connected in some way with technological trade (1,568 companies)
- (2) Survey method: questionnaire survey by mail; questionnaires mailed directly to intellectual property managers or R&D managers in the aforementioned companies.
- (3) Survey period: conducted between 11 January 1995 (surveys sent) and 9 February 1995 (reply deadline)
- (4) Response results: responses from 920 companies (response rate: 58.7%)

3. Attribute Distribution of Response Samples

A breakdown by capitalization and industry type of the companies targeted by this survey and of those which responded is given in the following section (see Figure 2-1, Table 2-1).

[Remarks]

- The industrial categories of the companies covered in this report were taken from the "Directory of Companies and Corporations" compiled by the Statistics Bureau of the Management and Coordination Agency, as in the case of this institute's "Analysis of Trends in Technology Imports"; similarly, companies not listed therein were assigned industrial categories in accordance with the "Japan Standard Industrial Categories" (1984, Notification No. 2 of the Administrative Management Agency).
- The letter N shown in the graphs in this report represents the number of samples. Where any section of the questionnaire was left unanswered, that response was simply excluded from the count for the section concerned.

Figure 2-1 Capitalization of Companies Covered in Survey and Companies Responding to Survey

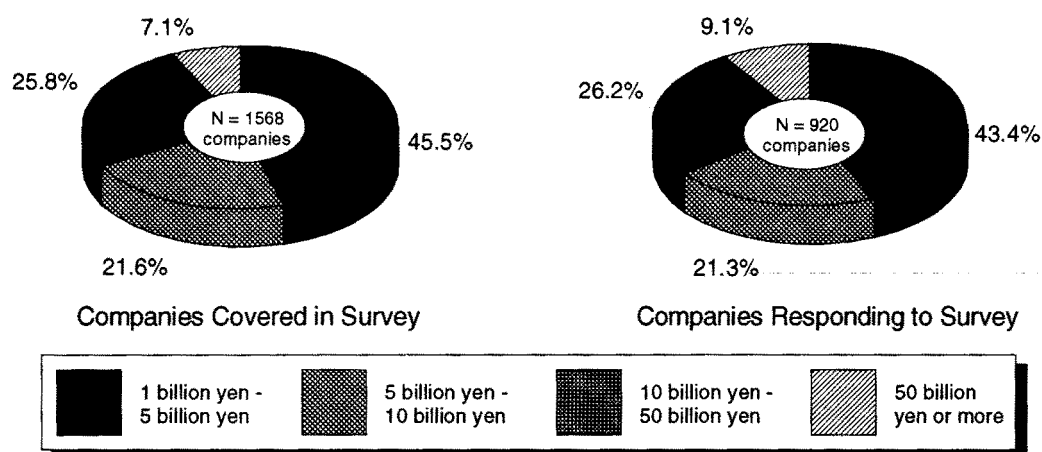


Table 2-1 Industrial Categories of Companies Covered in Survey

Industry	Survey Companies	Respondent Companies	Response Rate (%)
(1) Agriculture, forestry, and fisheries	5 (0.3)	3 (0.3)	60.0
(2) Mining	11 (0.7)	5 (0.5)	45.5
(3) Construction	122 (7.8)	89 (9.7)	73.0
(4) Food manufacturing	90 (5.7)	50 (5.4)	55.5
(5) Textiles manufacturing	42 (2.7)	24 (2.6)	57.1
(6) Pulp and paper manufacturing	30 (1.9)	18 (2.0)	60.0
(7) Printing and publishing	9 (0.6)	5 (0.5)	55.6
(8) Industrial chemicals manufacturing	103 (6.6)	64 (7.0)	62.1
(9) Oils and paints	25 (1.6)	16 (1.7)	64.0
(10) Drugs and medicines	58 (3.7)	40 (4.3)	69.0
(11) Other chemical products manufacturing	33 (2.1)	17 (1.8)	51.5
(12) Petroleum and coal products manufacturing	23 (1.5)	13 (1.4)	56.5
(13) Plastic products manufacturing	31 (2.0)	21 (2.3)	67.7
(14) Rubber products manufacturing	13 (0.8)	7 (0.8)	53.8
(15) Ceramics	47 (3.0)	30 (3.3)	63.8
(16) Iron and steel manufacturing	43 (2.7)	29 (3.2)	67.4
(17) Non-ferrous metals and products manufacturing	41 (2.6)	27 (2.9)	65.9
(18) Fabricated metal products manufacturing	49 (3.1)	28 (3.0)	57.1
(19) General machinery manufacturing	149 (9.5)	86 (9.3)	57.7
(20) Electrical machinery, equipment and supplies	80 (5.1)	47 (5.1)	58.8
(21) Communication and electronics equipment	141 (9.0)	72 (7.8)	51.1
(22) Motor vehicles	70 (4.4)	38 (4.1)	54.3
(23) Other transportation equipment manufacturing	31 (2.0)	22 (2.4)	71.0
(24) Precision instrument manufacturing	33 (2.1)	17 (1.8)	51.0
(25) Other manufacturing	47 (3.0)	26 (2.8)	55.3
(26) Transport, communication and public utilities	42 (2.7)	31 (3.4)	73.8
(27) Wholesaling, retailing	103 (6.6)	43 (4.7)	41.7
(28) Information services, surveys, and advertising	36 (2.3)	20 (2.2)	55.6
(29) Other service industries	61 (3.9)	32 (3.5)	52.5
Total	1568 (100.0)	920 (100.0)	58.7

- (Note)
- Industrial chemicals manufacturing refers to the manufacture of chemical fertilizers, inorganic chemicals, organic chemicals, and chemical fibers.
 - Figures in parentheses indicate component ratio (%) by industry

III. Overall Trends in Survey Results

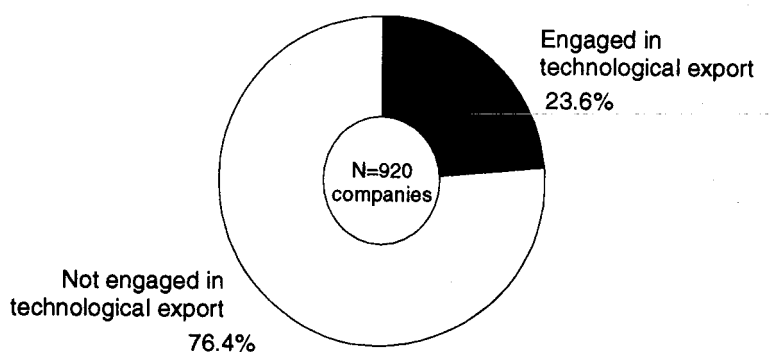
In compiling the survey results for FY 1993, overall trends in technological export are first analyzed in this chapter.

1. Overview of Conclusion of Technological Export Agreements

a. Companies Having Concluded Technological Export Agreements

To determine the number of companies that concluded new technological export agreements in FY 1993, we asked companies whether or not they had concluded such agreements during this period. Of the 920 companies which responded, 217 companies (23.6%) affirmed that they had concluded one or more new technological export agreement during this period, meaning that, as in the case of FY 1992 (§26.6%)*², about one company in four was engaged in new technological export in FY 1993 (see Figure 3-1).

Figure 3-1 Conclusion of Technological Export Agreements



Classifying respondent companies by industry gave us a view of which industries had concluded new technological export agreements at this time. The non-ferrous metals and products manufacturing (44.4%), drugs and medicines (42.5%) and motor vehicles (36.8%) industries had high proportions of companies engaged in new technological export, while the shares of companies in the transport, communication, and public utilities (6.5%), fabricated metal products manufacturing (7.1%) and wholesale/retail trade (9.3%) industries were low. Major differences among industries were apparent. Although a direct numerical comparison with the fiscal 1992 results is not possible, since there is a difference in the number of respondents, a general comparison was undertaken to identify overall trends. The results showed that large changes occurred in the following industries: motor vehicles (§58.8% Æ 36.8%), and electrical machinery, equipment and supplies (§40.4% Æ 28.6%) — a decrease; and drugs and medicines (§26.5% Æ 42.5%) — an increase (see Figure 3-2).

² For comparison with FY 1993 results, FY 1992 data is shown by preceding it with “§”.

Figure 3-2 Companies with Technological Export Agreements (*by industrial category)

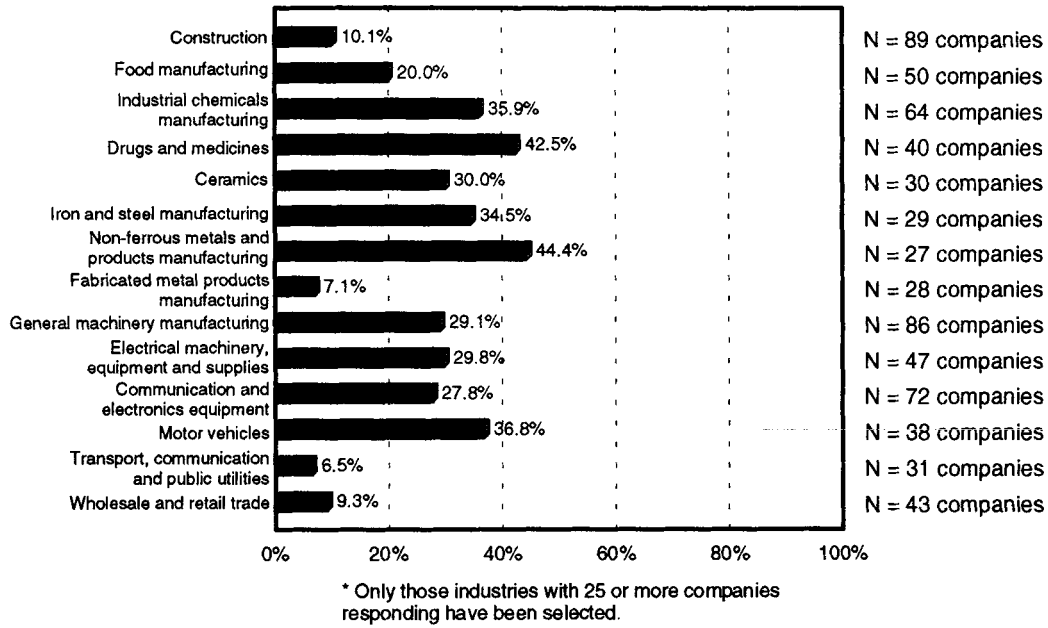
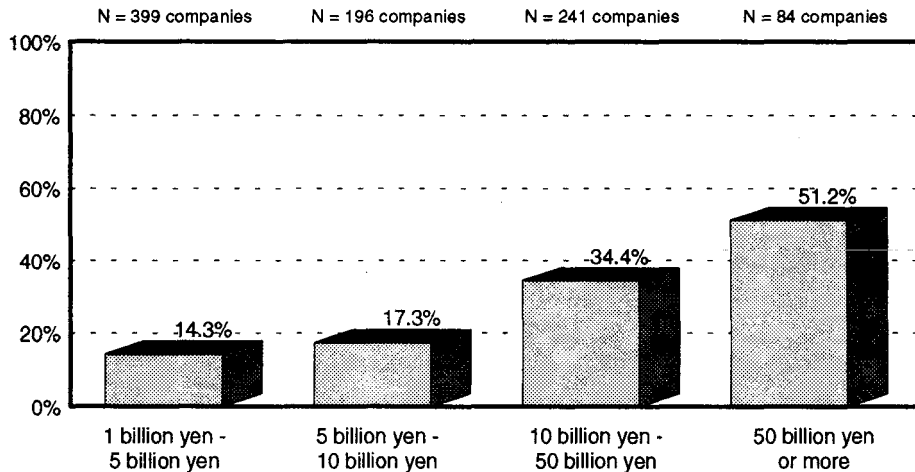


Figure 3-3 Companies with Technological Export Agreements (by capitalization)



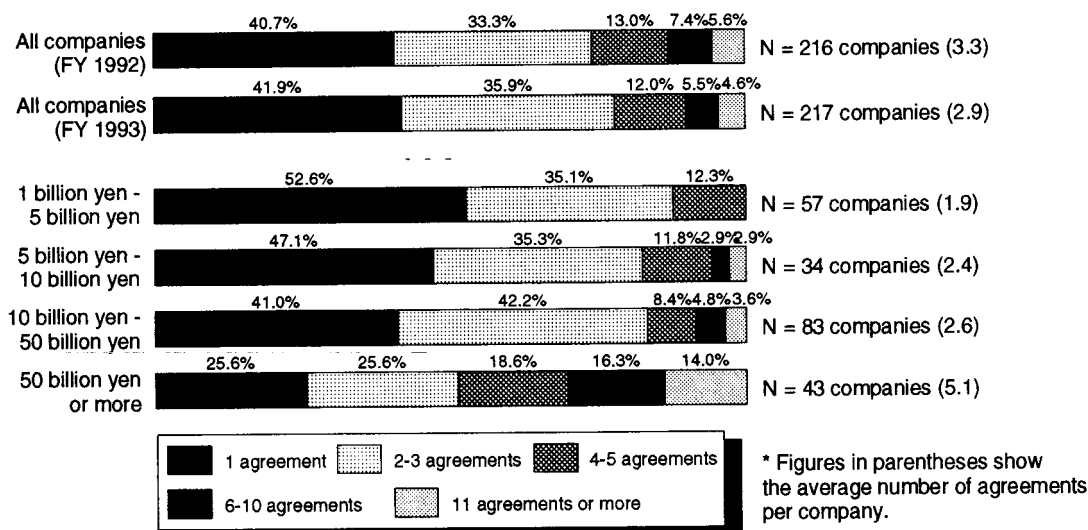
Looking at the capitalization of exporting companies, we discovered that the higher the level of capitalization, the higher the proportion of companies engaged in technological export; this indicates that there is a close correlation between the level of capitalization and participation in new technological export. Of special note is the fact that over half of the companies capitalized at 50 billion yen or more replied that they had engaged in new technological export during the survey period (see Figure 3-3).

b. Number of Technological Export Agreements

A total of 626 (\$712) agreements were concluded by the 217 companies which engaged in new technological export in FY 1993. Although the number of companies that carried out technological exports is more or less the same as the previous fiscal year (\$216), the number of agreements per company decreased by about 10%, from \$3.3% to 2.9%.

A glance at the distribution of the number of technological export agreements of the 217 companies that engaged in technological export shows that 41.9% of these companies concluded one agreement and 35.9% of these companies 2 or 3 agreements, meaning that as many as three quarters of the total number of companies that engaged in technological export had only up to 3 agreements, while a mere 4.6% of the companies said “11 agreements or more”. Is there a correlation between the capitalization of the exporting company and the number of export agreements? 87.7% of companies with capital of 1 billion yen to less than 5 billion yen had up to 3 export agreements, which translates to 1.9 agreements per company. In contrast, only 51.2% of companies with capital of 50 billion yen or more had up to 3 export agreements, with 14% of these companies concluding 11 or more export agreements for an overall 5.1 agreements per company. This shows that, as in the previous fiscal year, the greater the capitalization level, the greater the number of export agreements per company (see Figure 3-4).

Figure 3-4 Export Agreements per Company (by capitalization)



2. Regions and Countries/Areas of Agreement Partners

We also looked at the home regions of the agreement partners in new technological export in FY 1993. Of the total 626 agreements, 56.2% (\$54.1%) involved a partner in Asia, 19.0% (\$21.8%) one in North America, 19.6% (\$19.1%) one in Europe, and 5.1% (\$ 5.6%) one in other regions. Thus Asia accounted for more than half the total, as in the case of FY 1992.

Breaking this regional data down by country/area, R.O.K took over the U.S. as the No. 1 destination in FY 1993, followed by the U.S., China, Taiwan and Thailand, in that order; Of the top five countries, four are in Asia, and, as in the case of FY 1992, Japan’s technological export appears strongly oriented towards Asia. Compared to FY 1992, the decrease in the U.S. and Southeast Asian countries’ shares and the increase in China’s share are remarkable (see Figure 3-5, Table 3-1).

(For more details by country/area, see Table 2 of the aggregate tables in the appendix.)

Figure 3-5 Home Regions of Technological Export Agreement Partners

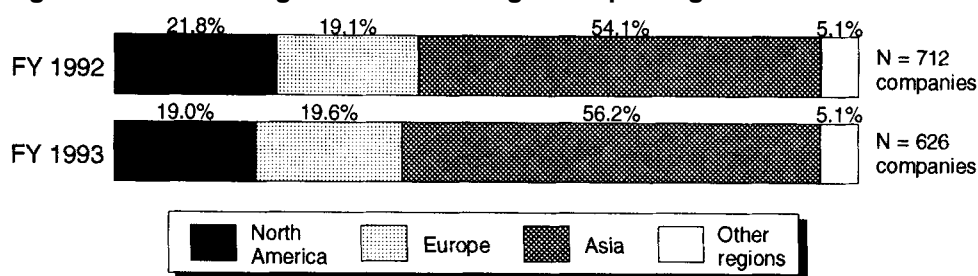


Table 3-1 Top 10 Destination Countries/Areas for Technological Export

FY 1992			FY 1993		
Country/Area	Share	Number of Agreements	Country/Area	Share	Number of Agreements
U.S.	19.9%	142	R.O.K.	16.6%	104
R.O.K.	13.8%	98	U.S.	16.0%	100
China	7.9%	56	China	12.8%	80
Taiwan	7.4%	53	Taiwan	8.3%	52
Thailand	7.2%	51	Thailand	5.1%	32
U.K.	4.9%	35	U.K.	4.6%	29
Malaysia	4.8%	34	Germany	4.2%	26
Germany	3.4%	24	Indonesia	3.0%	19
Indonesia	3.2%	23	India	2.9%	18
India	2.8%	20	France	2.4%	15
Others	24.7%	176	Others	24.1%	151
Total	100.0%	712	Total	100.0%	626

3. Financial Interest in Agreement Partner Companies

We have studied the degree of financial interest held ^{*3} by Japanese exporting companies in their partner companies in new technological export agreements in FY 1993. Overall, 68.8% (§64.9%) of new technological exports went to partners in which no financial interest was held. 20.4% (§22.3%) of export agreements were with companies in which a 50% or greater interest was held, and 10.7% (12.8%) to companies in which a less than 50% interest was held. This shows that, as in FY 1992, Japan's technological export takes place largely through transactions with companies in which the Japanese exporter holds no financial interest.

The ratio of exports to companies in which financial interest is held was highest for Asia (39.8%), followed by North America (25.2%) and Europe (16.2%), exhibiting a marked disparity among regions. Compared to FY 1992, in Asia the ratio (§38.3%) increased by 1.5 %, while in North America (§33.8%) and in Europe (§27.2%) decreased by 8.6% and 11.0%, respectively, indicating a widening gap between Asia and Europe/North America (see Figure 3-6).

³ Holding a financial interest in a partner company means owning stock or equity in that company.

Figure 3-6 Financial Interest in Technological Export Agreement Partner Companies (by region)

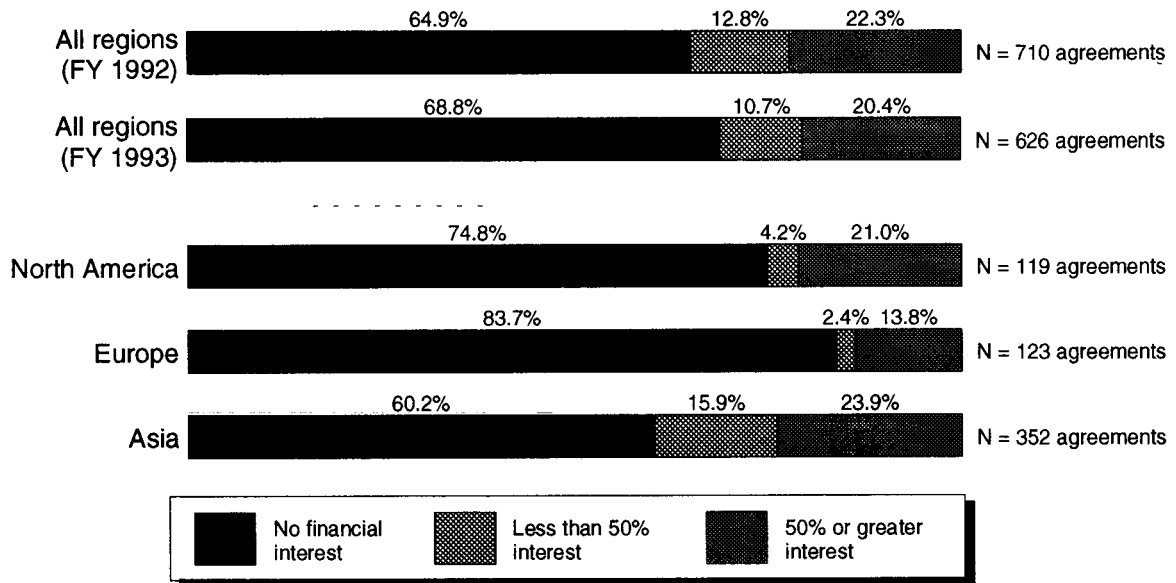
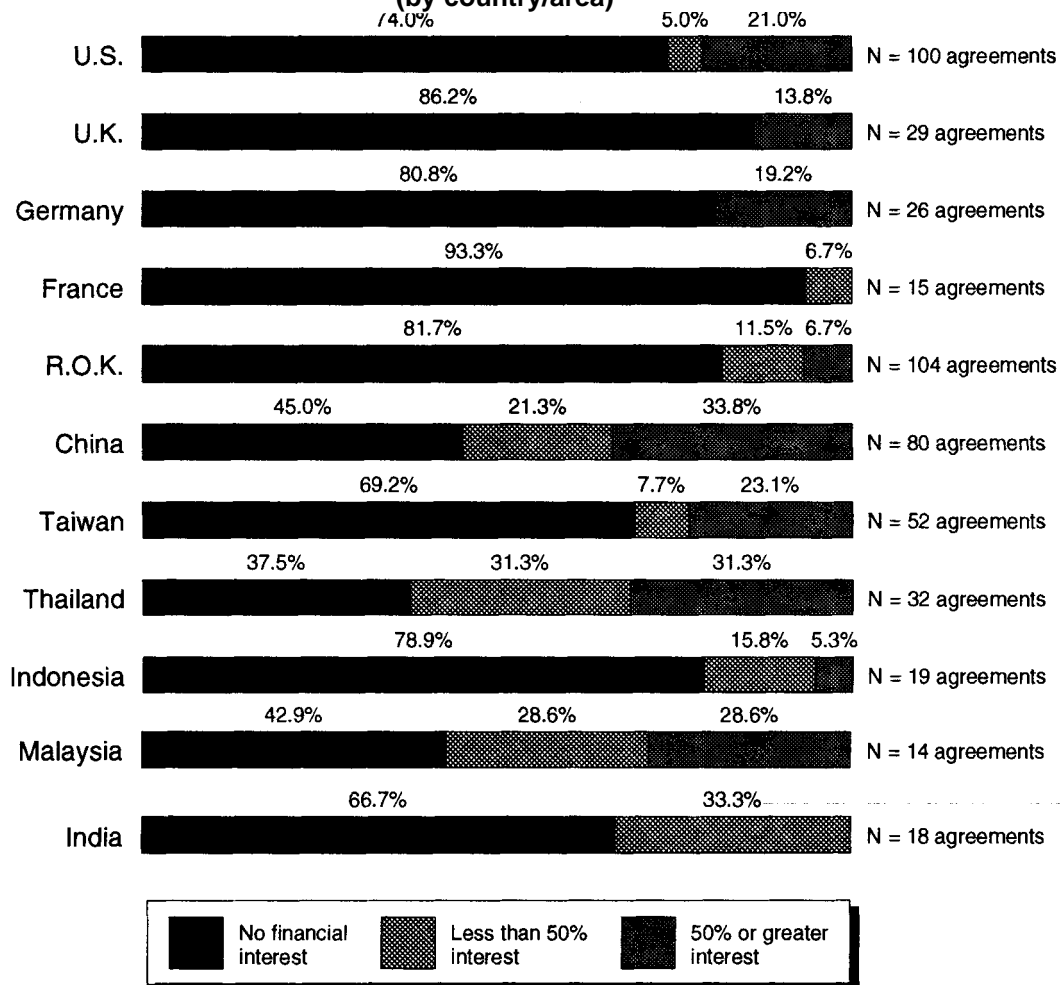


Figure 3-7 Financial Interest in Technological Export Agreement Partner Companies (by country/area)



By country/area, a notable characteristic emerges in the Asian region. The countries/areas of the region fall into basically two categories: those in which a high rate of Japan's technological export is directed to local companies in which the Japanese exporter has no financial interest (R.O.K., Indonesia, Taiwan and India), and those in which this rate is low (Thailand, Malaysia and China). Even within Asia, the state of direct investment from Japan and local economic conditions vary from country to country, and this seems to have resulted in a clear difference in the make up of partner companies in terms of Japanese financial interest among countries/areas. (see Figure 3-7).

4. Agreement Term

Let us now look at the agreement terms for new technological export agreements in FY 1993. Ranking all agreements by length of agreement term, we see that 32.1% (§32.4%) of the total number of agreements were for 5 years to less than 10 years and 26.7% (§24.6%) for 1 year to less than 5 years; together, i.e. 1 year to less than 10 years, these agreements account for a majority (58.8%) of the total. 15.0% (§11.7%) of agreements had terms of 10 years to less than 15 years, and 8.9% (§10.4%) were valid until the expiration of industrial property rights, while 7.2% (§12.0%) were accounted for by "other" terms *4. Though accounting for only a small share, there were agreements at the extreme ends of the scale: 15 years or more (5.4%) and less than 1 year (4.6%).

A comparison by region reveals the following: Compared to other regions, North America has a low proportion (18.5%) of export agreements for 1 year to less than 5 years, but high ratios of agreements valid until the expiration of industrial property rights (21.0%). Export to Europe shows a similar trend to North America, although the proportion of agreements for 5 years to less than 10 years is low (22.0%). Export to Asia is marked by a higher ratio of short-term agreements than the other two regions, with the frequency of agreements for less than 1 year particularly high (7.1%), while the proportion of agreements valid until the expiration of industrial property rights is low (2.0%) (see Figure 3-8).

For three major regions, average agreement terms *5 were calculated for comparison purposes, though not based exactly on actual agreement terms. These were 9.5 years for North America, 9.3 years for Europe and 7.0 years for Asia, against an overall average of 8.0% (§8.2%), and this shows that agreement terms of technological export to Asia are in general shorter by more than 2 years compared to North America or Europe.

While North American and European countries have average agreement terms of more than 8 years across the board, Asian countries/areas show large individual variations. With China and India, average agreement terms are more than 8 years, but, in the case of Indonesia and Malaysia, they are less than 6 years. This seems to reflect to some degree differences in government policies towards the introduction of foreign technology (Table 3-2).

4 Agreements with "other" terms refer to agreements where no agreement term is set out, permanent agreements, and agreements valid until nullified by another agreement.

5 To calculate average agreement terms, the validity ranges of "less than 1 year", "1 year to less than 5 years", "5 years to less than 10 years", "10 years to less than 15 years", "15 years or more", and "valid until the expiration of industrial property rights" were converted to 0.5 years, 3 years, 7.5 years, 12.5 years, 17.5 years and 15 years, respectively.

Figure 3-8 Agreement Terms of Technological Export Agreements

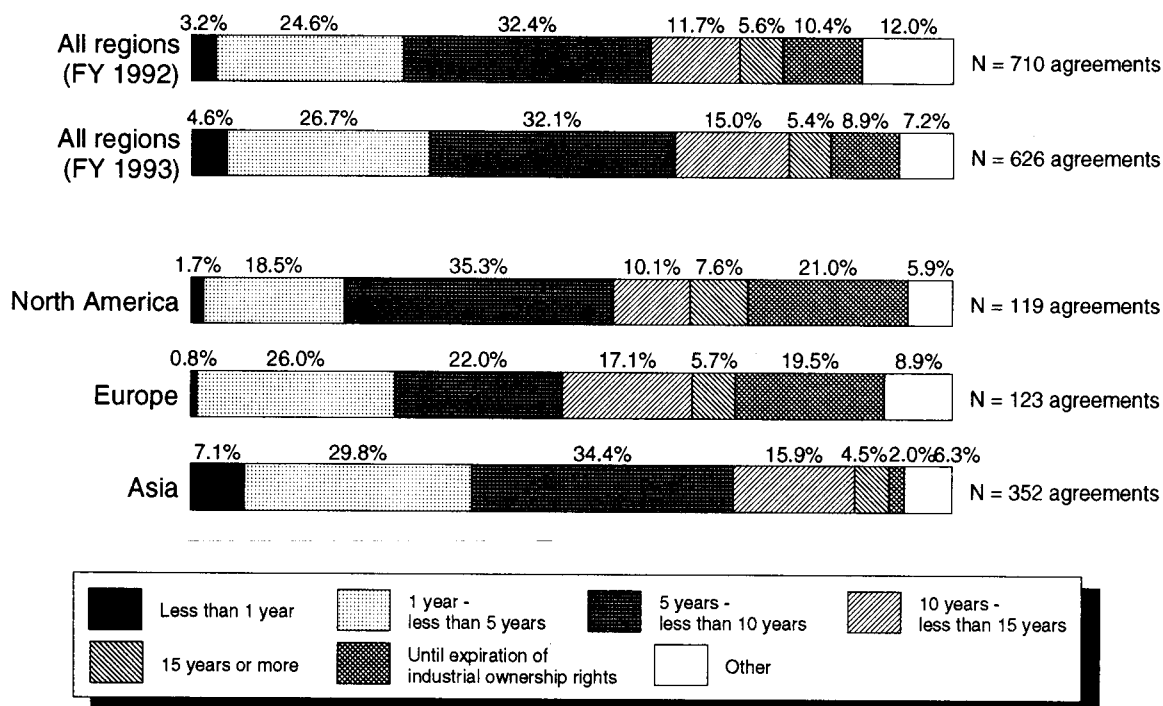


Table 3-2 Agreement Terms by Region and Country/Area

(Unit: years)

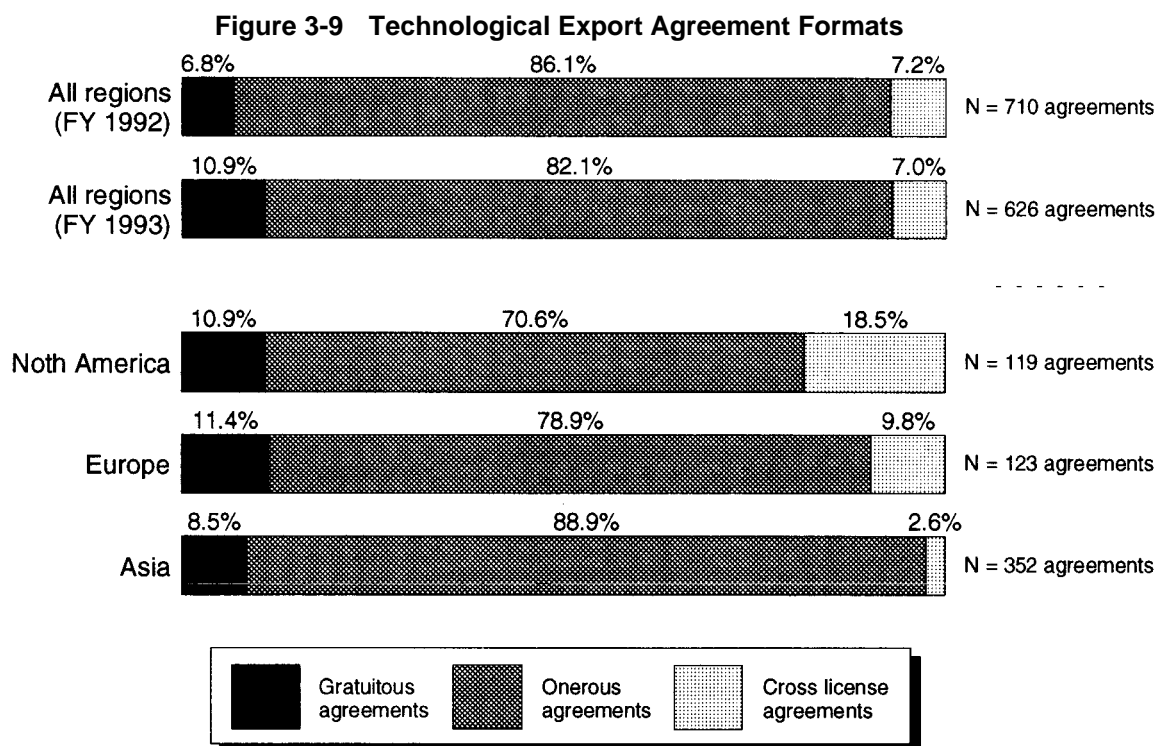
Agreement Partner Location	Average Agreement Term	Agreement Partner Location	Average Agreement Term
Overall	8.0		
		Asia	7.0
North America	9.5	R.O.K.	6.6
U.S.	9.7	China	8.1
		Taiwan	6.2
Europe	9.3	Thailand	7.5
U.K.	8.0	Indonesia	5.6
Germany	9.7	Malaysia	5.9
France	10.3	India	8.4

5. Agreement Format

What format did new technological export agreements take? 82.1% (§86.1%) of the overall number of technological export agreements were onerous agreements and 7.0% (§7.2%) cross license agreements *⁶. Gratuitous agreements accounted for 10.9% (§6.8%) of the total.

⁶ Included among cross license agreements are equivalent exchange agreements and agreements that stipulate payment of value. 2.6% are value received agreements, 3.5% equivalent exchange agreements and 1.0% value payment agreements.

Looking at differences in agreement format by export destination region, one sees a high rate of cross license agreements (18.5%) in North America, while the rate is very low in Asia (2.6%) (see Figure 3-9).



6. Initial Payments and Running Royalties

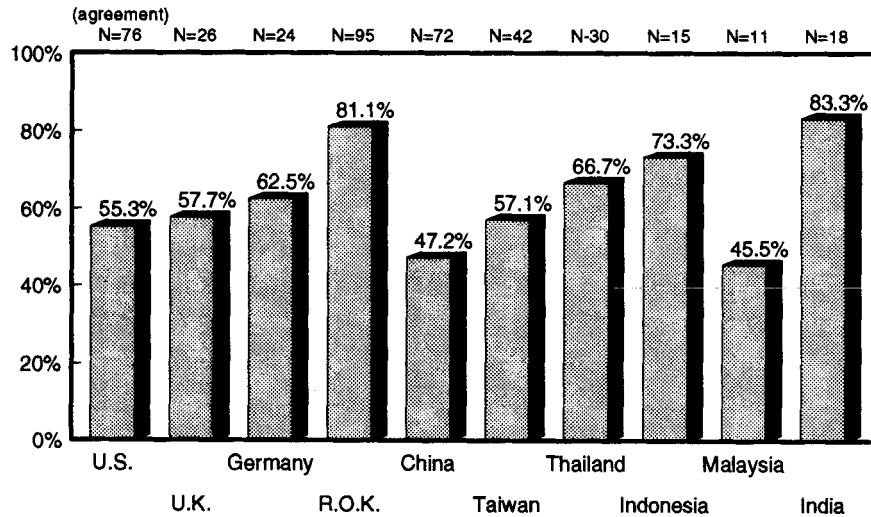
Initial payments and running royalties ^{*7} are typical means of receiving payments for technological trade; in what percentage of new technological export agreements for FY 1993 were these methods applied? We examined the value receipt methods used in the 530 technological export agreements listed as onerous agreements or value received cross license agreements (514 onerous agreements and 16 'value received' cross license agreements).

Agreements requiring initial payments accounted for 62.6% (§56.8%) of the total, and this represents a slight increase over the previous fiscal year. By region, the share of such agreements was 66.0% for Europe, 63.3% for Asia, and 55.1% for North America, with Europe greatly increasing its share over the previous year (§53.3%).

76.8% (§75.2%) of agreements required running royalties, over three-quarters of the total. By region, the ranking is Europe (83.2%), North America (78.9%), and Asia (74.0%), and the growth in Europe over the previous year (§73.6%) stands out here as well (see Figure 3-10).

⁷ Initial payments refer to the amount(s) paid independently upon the effectuation of an agreement or within a set time frame, regardless of whether or not any execution payment obligations are incurred based on production, sale, or use of the item(s) listed in the agreement. Running royalties are fees paid based on the quantity of the item(s) in the agreement and are also known as "piecemeal execution fees".

Figure 3-10 Agreements with Initial Payments/Running Royalties (by region)



Next we examined the payment of initial payments/running royalties by country/area in detail. In Asia, a large variation was observed among countries/areas, while there was little difference in Europe. With R.O.K. and India, the proportion of agreements requiring initial payments exceeded 80%, whereas this was not even 50% with China and Malaysia. This variation seems to be greatly affected by whether there is financial interest in the partner company in technological export, to be discussed below (see Figures 3-11 and 13).

The ratio of agreements requiring running royalties is more or less the same in most countries, but is high in Malaysia (90.9%) and low in Indonesia (47.1%) (see Figure 3-12).

Figure 3-11 Agreements with Initial Payments (by country/area)

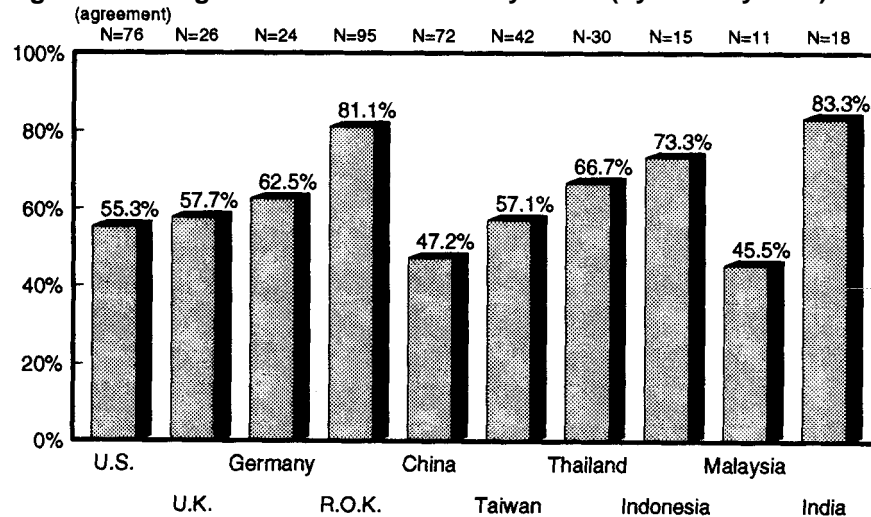
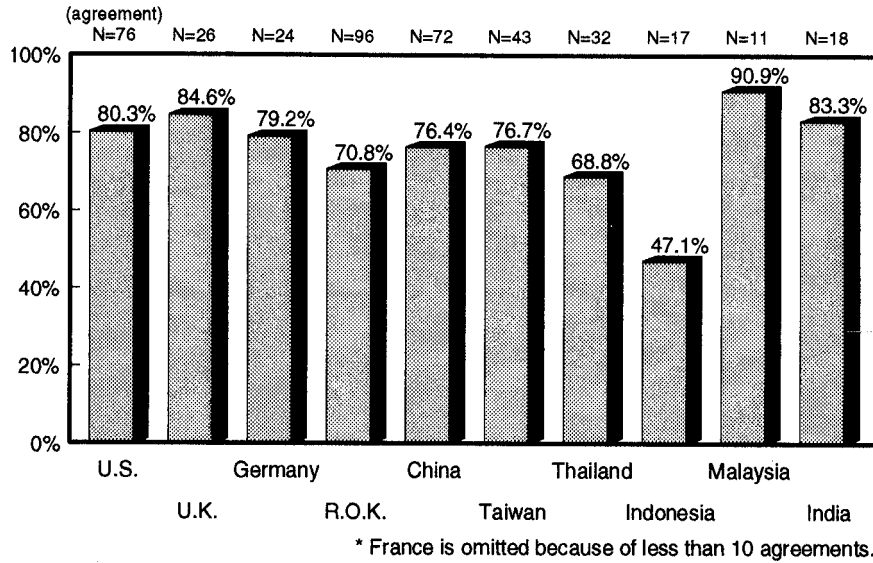


Figure 3-12 Agreements with Running Royalties (by country/area)



Next we took a look at combinations of initial payments and running royalties. Overall, 45.8% (\$38.9%) of agreements required both initial payments and running royalties, 32.2% (\$35.6%) required running royalties but no initial payments, 16.9% (\$17.9%) required initial payments but not running royalties, and 5.2% (7.7%) fell into the “other” *⁸ category. Compared to the previous fiscal year, there was a slight increase in agreements requiring both initial payments and running royalties.

Finally, 73.3% of agreements required initial payments for export to companies in which no financial interest was held, 59.0% to companies in which less than a 50% interest was held, and only 31.9% to companies in which a 50% or greater interest was held; thus initial payments are most often required in transactions with companies in which no financial interest is held.

The results of this survey seem to show that the presence or absence of a financial interest is considered an important factor in deciding whether or not to require initial payments (see Figure 3-13).

Under this fiscal year’s survey, an inquiry was made into companies which replied that they required running royalties as to whether they had employed a minimum payment clause. The results show that 12.0% of 407 agreements requiring running royalties required a minimum payment.

Generally, a minimum payment clause is included to secure a minimum return for exclusive rights where they are provided, and in this survey, too, one out of four companies with agreements involving exclusive rights (25.2%) require a minimum payment, whereas the proportion of agreements requiring a minimum payment is only 3.6% among those not involving exclusive rights (see Figure 3-14).

In terms of financial interest in partner companies, 15.9% of agreements for export to companies in which no financial interest was held required minimum payments, 13.0% of agreements for export to companies in which less than a 50% interest is held did so, and the figure was only 1.9% with companies in which a 50% or greater interest is held; thus minimum payments are most often required in transactions with companies in which no financial interest is held, as in the case of initial payments (see Figure 3-15).

⁸ “Other” payments refer to flat sum and other payments.

Figure 3-13 Initial Payment and Running Royalty Combinations (by financial interest)

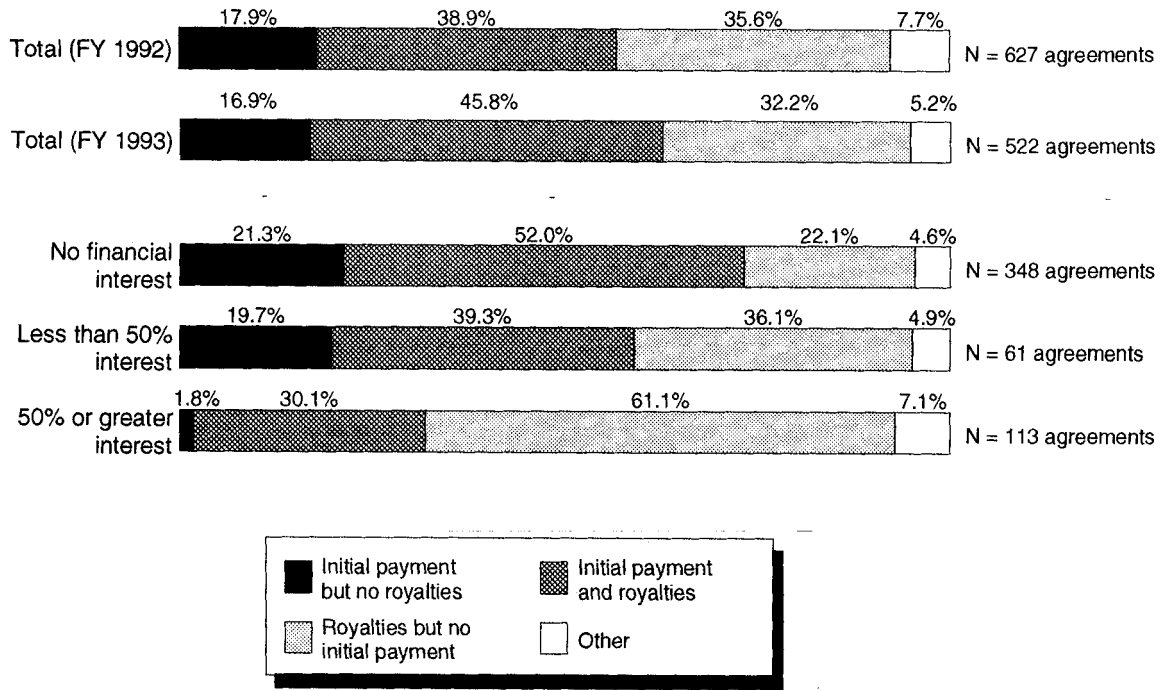


Figure 3-14 Agreements with Minimum Payments (by exclusive rights status)

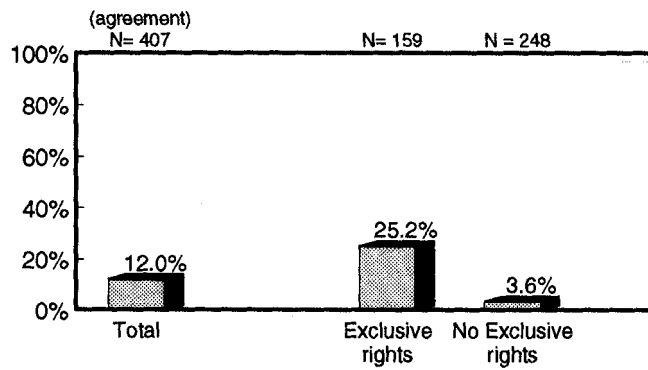
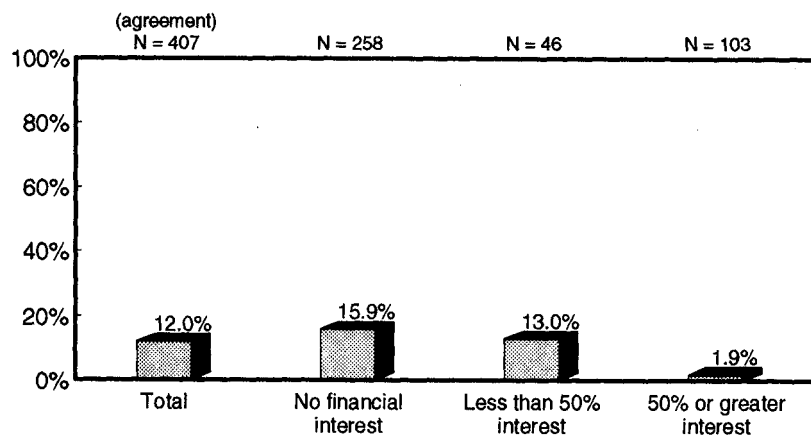


Figure 3-15 Agreements with Minimum Payments (by financial interest status)



By region, the proportion of agreements requiring a minimum payment does not vary greatly, although it is somewhat high for Europe (15.5%) and somewhat low for Asia (10.2%) (see Figure 3-16).

However, a closer look at individual countries/areas reveals that there are large country to country variations for Asia. With Taiwan, Thailand and Malaysia, there are no agreements requiring minimum payments, while, with India and R.O.K., approximately one in every five companies require them. The result is similar to the proportion of agreements requiring initial payments that is low with Taiwan, Thailand and Malaysia and high with R.O.K. and India, and this seems to suggest that the payment method is largely determined by local conditions in the home/countries of agreement partners (see Figure 3-17).

Figure 3-16 Agreements with Minimum Payments (by region)

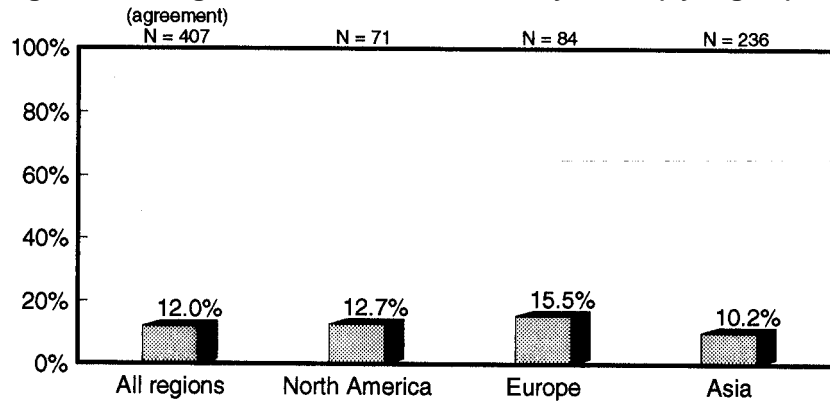
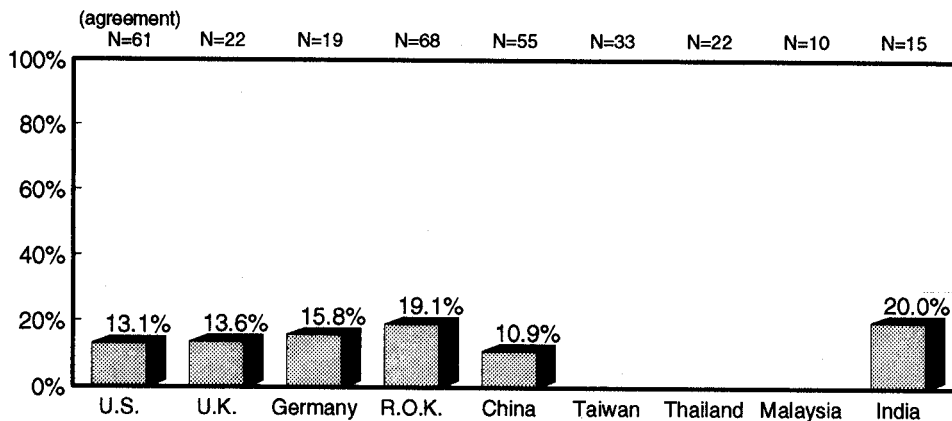


Figure 3-17 Agreements with Minimum Payments (by country/area)



* France and Indonesia are omitted because of less than 10 agreements.

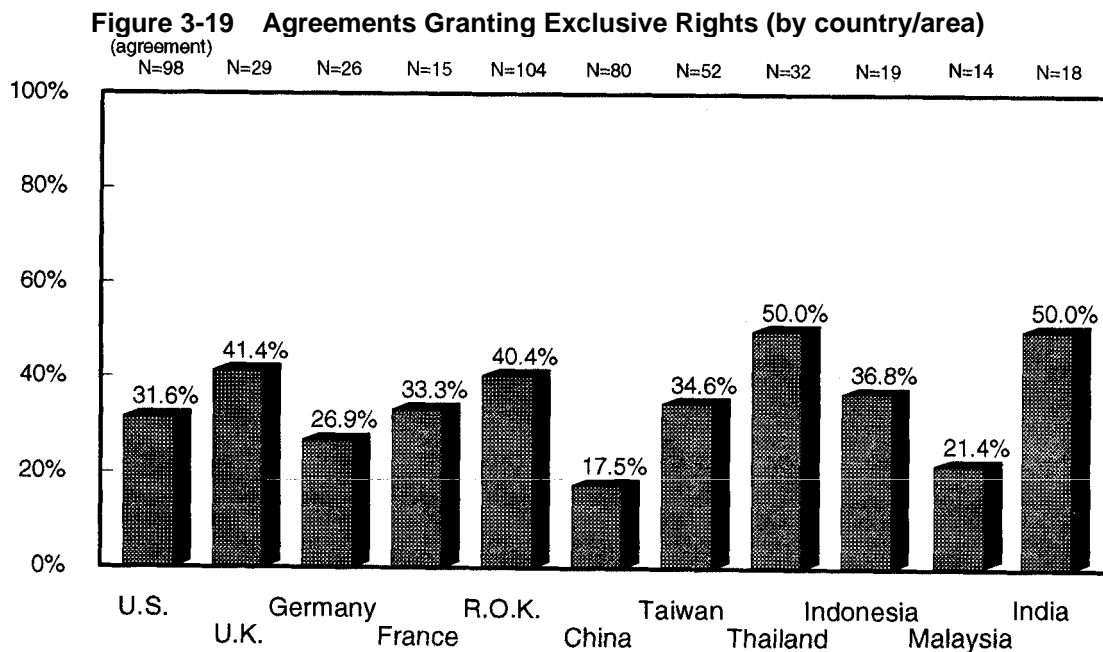
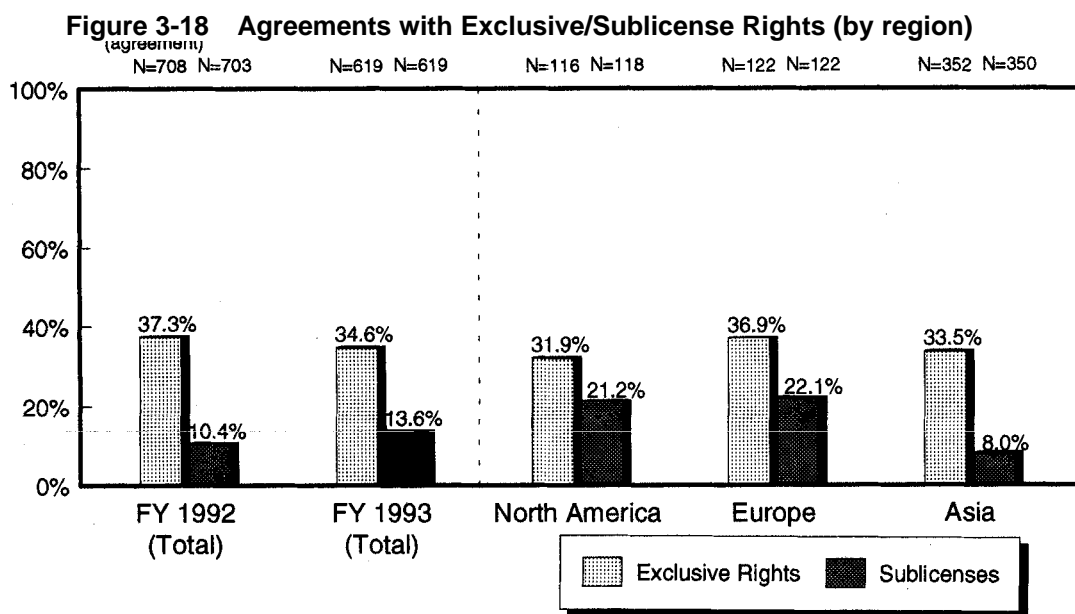
7. Exclusive Rights and Sublicense Rights

Exclusive rights and sublicense rights are typical rights set out in technological trade agreements, apart from payment methods; what percentage of new technological export agreements in FY 1993 established these rights?

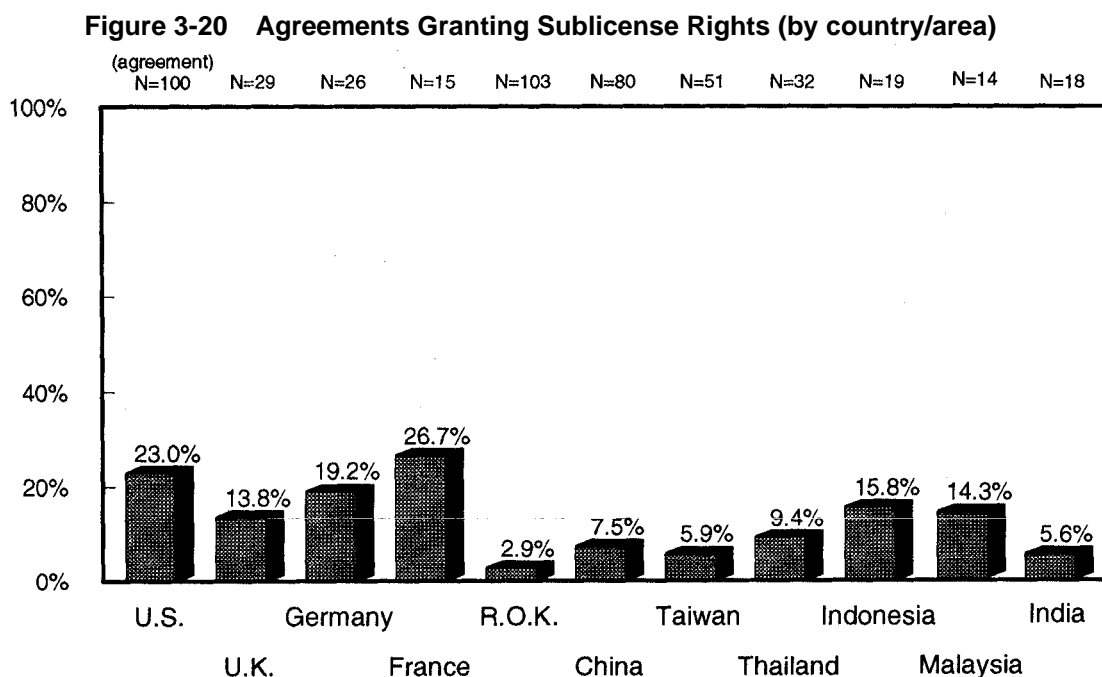
Agreements with exclusive rights clauses accounted for 34.6% (§37.3%), i.e. over one-third, of the total number of technological export agreements. Europe (36.9%) has the highest proportion, followed by Asia (33.5%) and North America (31.9%), and, as in the previous fiscal year, there is little variation between regions.

Agreements granting sublicense rights make up 13.6% (§10.4%) of the total. Europe (22.1%) and North America (21.2%) have high proportions, while Asia's (8.0%) is low (see Figure 3-18).

Let us look closer here at the presence or absence of exclusive/sublicense rights by country/area. Thailand (50.0%) and India (50.0%) have high rates of technological export agreements granting exclusive rights, while the rates are low for China (17.5%) and Malaysia (21.4%) (see Figure 3-19).



With regard to agreements granting sublicense rights, the U.S. and European countries' rates are relatively high, while those for Asian countries are generally low (see Figure 3-20).



8. Forms of Technology

We studied the categories of technology included in technological export agreements by classifying agreements into those with patents, know-how, trademarks, patents pending, utility models, and designs. All applicable answers were requested in cases where these technological categories overlapped.

Let us first look at the proportion of technological export agreements including patents, know-how, or trademarks. 42.8% (§46.1%) of the total number of agreements included patents and 87.7% (§86.6%) included know-how, while trademarks were included in 18.8% (§20.1%) of agreements. Thus, as in the previous year, the vast majority of agreements included know-how.

North America (58.8%) and Europe (49.6%) had high proportions of agreements that included patents, while the proportion for Asia (35.8%) was low. Asia was at the top (95.7%) with agreements including know-how, with Europe (83.7%) and North America (67.2%) at lower levels. Compared to the previous fiscal year, the percentage of agreements including patents for Europe fell sharply (§60.3%) (see Figure 3-21).

Let us now examine this more closely in terms of individual countries/areas, starting with the ratio of agreements with patents to the total number of technological export agreements. We see that the U.S. has a high ratio of agreements with patents (61.0%), while the ratio is generally low for Asian countries, most notably Thailand (21.9%) and Indonesia (5.0%) (see Figure 3-22).

Figure 3-21 Agreements with Patents/Know-how/Trademarks (by region)

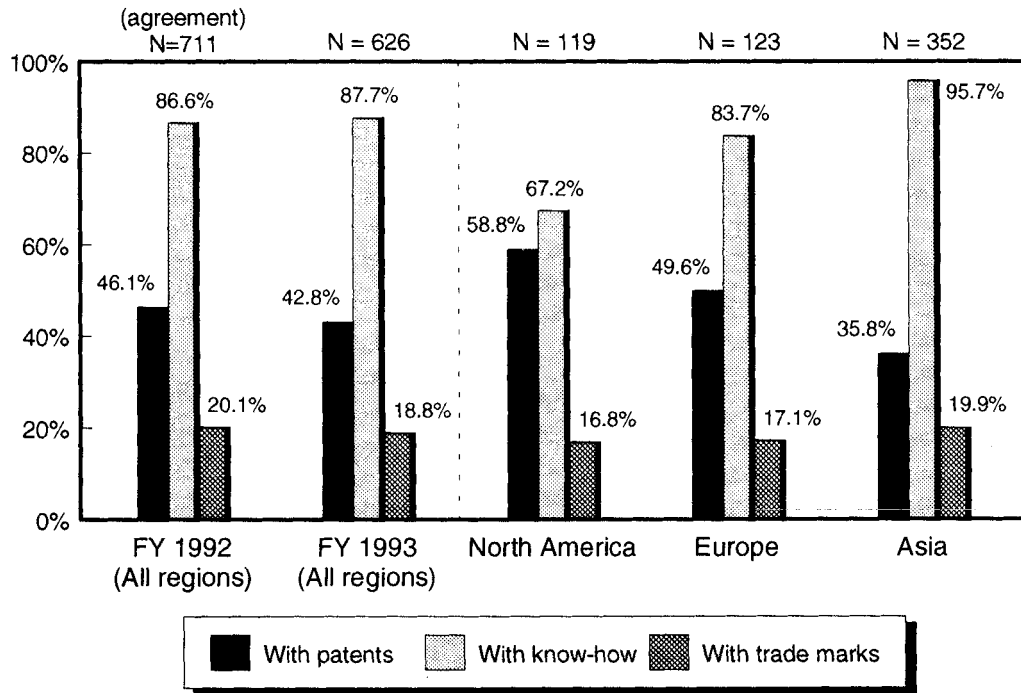
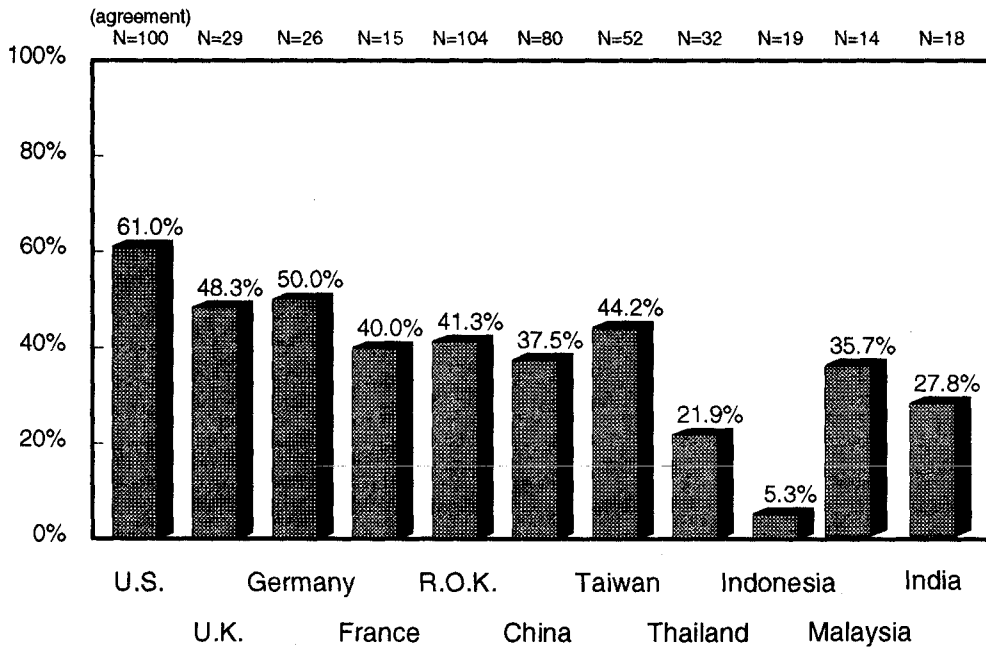


Figure 3-22 Agreements with Patents (by country/area)



Conversely, the ratio of agreements including know-how is low for the U.S. (65.0%) but high for Asian countries, particularly Malaysia and India, for which all agreements include know-how. This difference is considered to reflect differences in the nature of the technology exported, agreement forms, technological infrastructure, etc. (see Figure 3-23).

Figure 3-23 Agreements with Know-how (by country/area)

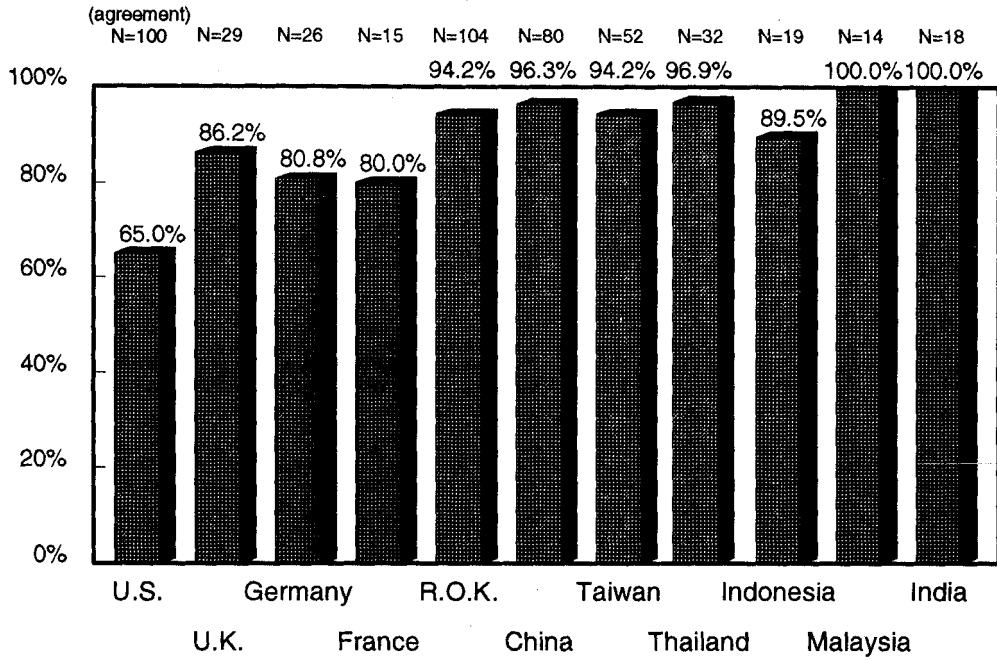
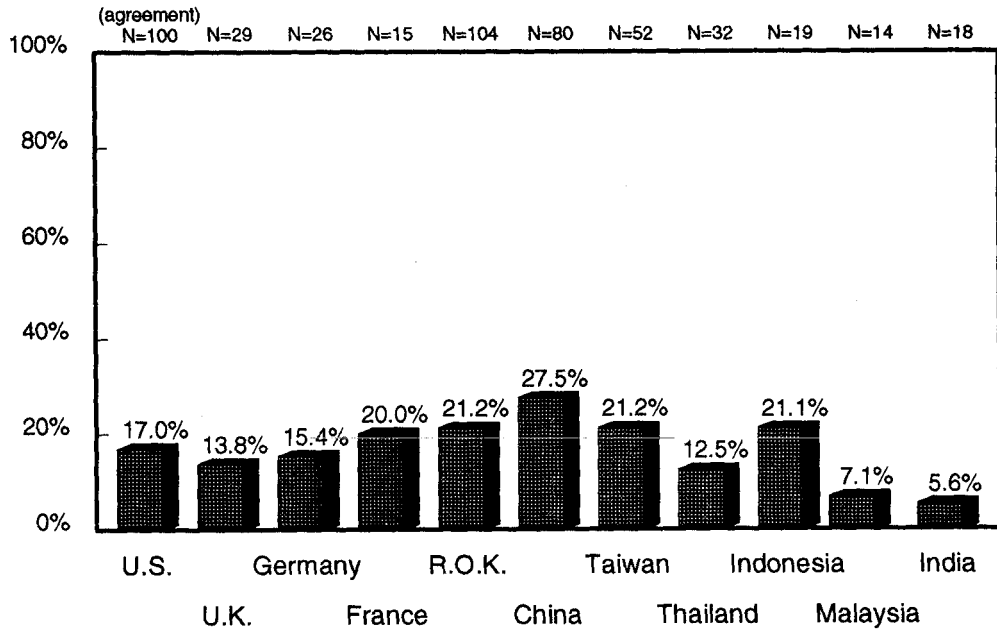


Figure 3-24 Agreements with Trademarks (by country/area)

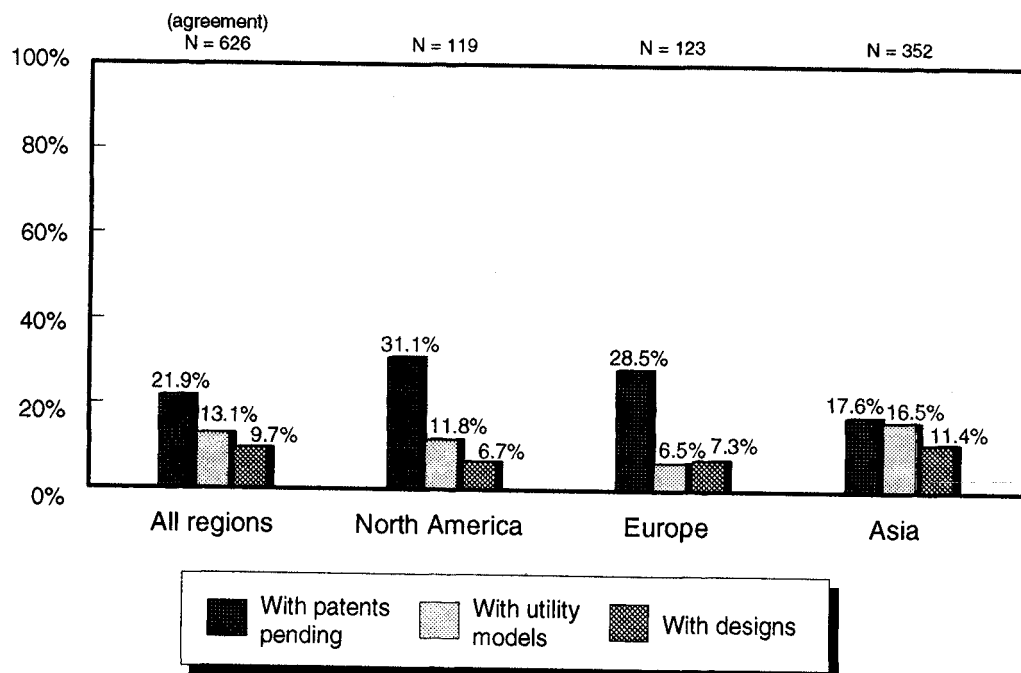


The ratios of agreements including trademarks is high for China (27.5%) but low for India (5.6%) and Malaysia (7.1%), although differences from one country/area to another are not particularly large. (see Figure 3-24).

Let us now examine the ratio of agreements which include patents pending, utility models, and designs, to the total number of technological export agreements. The ratio of agreements including patents pending was 21.9% (\$24.3%), those including utility models 13.1% (\$14.2%), and those including design 9.7% (\$6.2%).

The ratio of those agreements including patents pending was highest with North America (31.1%), followed by Europe (28.5%) and Asia (17.6%), and, as in the case of patents, the ratio was high for Europe and North America but low for Asia. The ratio of agreements with utility models was high for Asia (16.5%) and low for Europe (6.5%). Similarly, Asia had the highest ratio (11.4%) of agreements with designs; North America (6.7%) and Europe (7.3%) had nearly equivalent figures (see Figure 3-25).

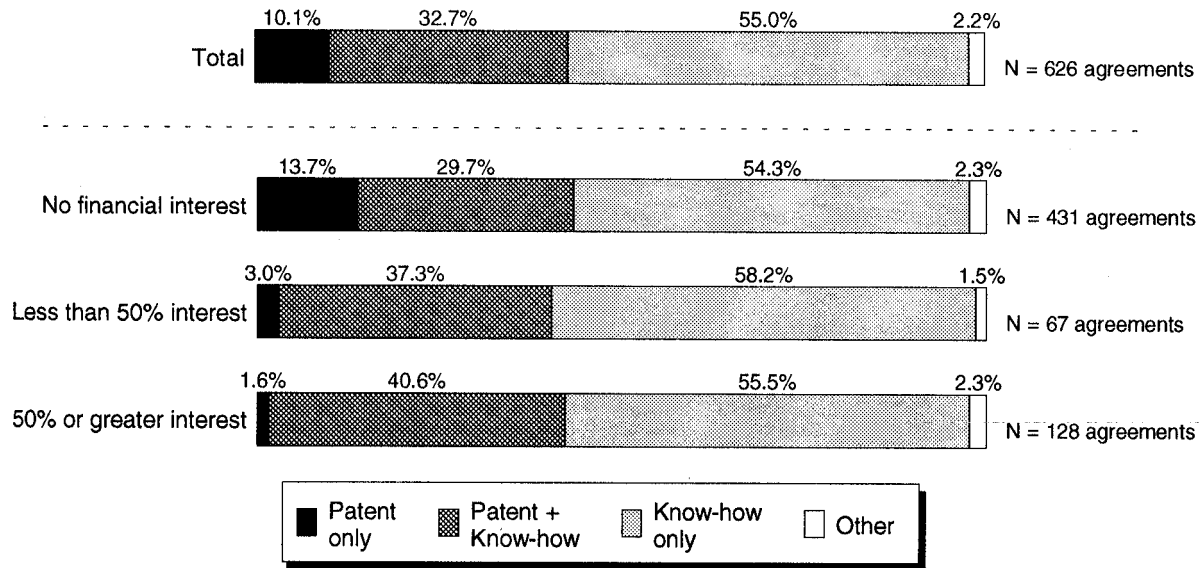
Figure 3-25 Agreements with Patents Pending/Utility Models/Designs (by region)



We have analyzed individual forms of technology included in technological export agreements by export destination region. We will now study the correlation between forms of technology and financial interest in agreement partner companies in terms of combinations of patents and know-how. We first look at such combinations for all technological export agreements without classifying them in terms of financial interest status. ‘Know-how only’ agreements were greatest in number, accounting for 55.0% of the total, followed by ‘patent + know-how’, 32.7%, ‘patent only’, 10.1%, and ‘other’, 2.2%.

The ratio of ‘patent only’ agreements varied greatly with regard to the degree of financial interest in agreement partner companies. ‘Patent only’ agreements accounted for 13.7% of exports to companies in which no financial interest is held, while this figure dropped markedly for companies where financial interest was involved, 3% for a less than 50% interest and 1.6% for a 50% or greater interest (see Figure 3-26).

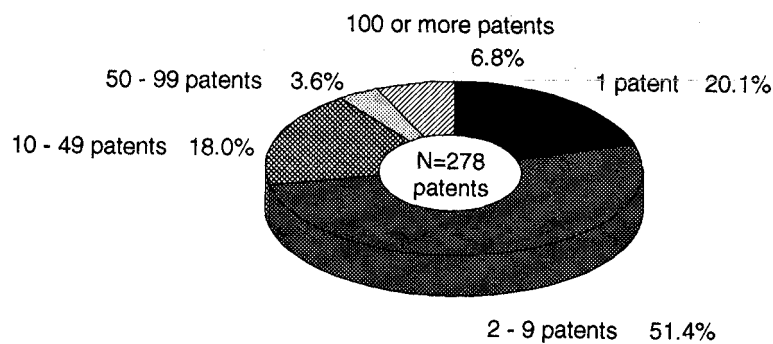
Figure 3-26 Types of Technology in Technological Export Agreements (by financial interest)



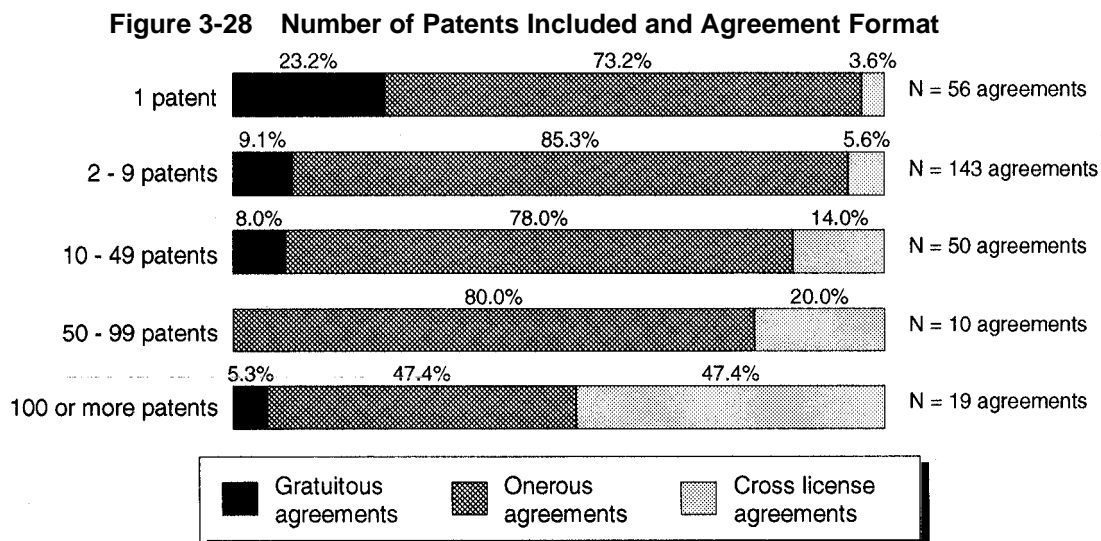
9. Number of Patents in Patent-inclusive Agreements

How many patents on average are included in a patent-inclusive agreement? We examined the number of patents included in the 278 new technological export agreements listed as including ‘patents’ or ‘patents pending’. 51.4% (\$46.4%) of these agreements had 2 to 9 patents and 18.0% (\$25.2%) had 10 to 49 patents; agreements with a single patent accounted for no more than 20.1% (\$14.6%) of such agreements. 6.8% (\$8.4%) of agreements included 100 or more patents, while 3.6% (\$5.3%) had 50 to 99 patents. Thus the ratio of agreements including 50 or more patents exceeded 10% (see Figure 3-27).

Figure 3-27 Number of Patents in Patent-Inclusive Agreements



We will now examine the relationship between the number of patents included per agreement and the agreement format. 23.2% of agreements with only one patent were gratuitous agreements but cross license agreements made up only 3.6%; for agreements containing 100 or more patents, however, the proportion of gratuitous agreements dropped to 5.3% while cross license agreements accounted for 47.4%. For agreements which included multiple patents per agreement, the ratio of gratuitous agreements dropped, while that of cross license agreements was higher (see Figure 3-28).



IV. Results of Analysis by Technology Classification

Chapter III presented an overview of general trends in technological export, and this chapter will take a more detailed look at technological export by focusing on the nature of the technology exported.

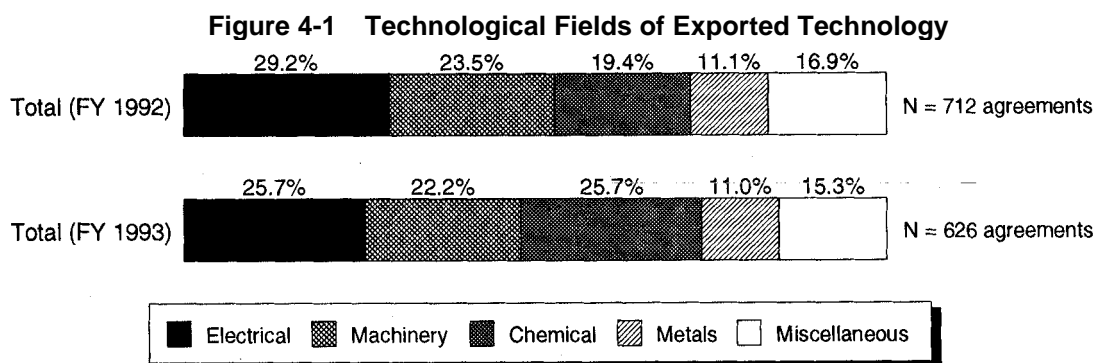
1. Technological Categories

In classifying the technology exported, this survey used the “Technological Classification” (48 categories) prepared by this institute based on the “Japan Standard Industrial Classification” in the course of compiling the “Trend Analysis of Foreign Technology Introduction” [hereafter, ‘technological categories’] (see Appendix 2, Reference Material 1).

This total of 48 technological categories has been broadly grouped into five fields (electrical, machinery, chemical, metals, and miscellaneous) [hereafter, ‘technological fields’] and these will be used in addition to technological categories (see Reference Material 2).

2. Technological Export by Technological Categories

What was the nature of the technology newly exported in FY 1993? The ‘electrical’ (29.2%) and ‘chemical’ (19.4%) fields accounted for 48.6% of total technological export. This was followed by ‘machinery’ at 23.5% (\$23.5%), ‘miscellaneous’ at 15.3% (\$16.9%), and ‘metals’ at 11.1% (\$11.1%). Compared to the previous fiscal year, the “chemical” field showed an increasing trend. (see Figure 4-1).



The technological category with the largest share was ‘transportation equipment’ at 10.4%, followed by ‘drugs and medicines’ (8.0%), ‘oils and paints’ (6.5%), ‘electronics and communications parts’ (6.2%) and ‘computers’ (6.1%). Compared to the previous fiscal year, the share of ‘transportation equipment’ (13.9%) fell, while those of ‘drugs and medicines’ (5.9%) and ‘oils and paints’ (3.7%) rose. The top ten technological categories are discussed below (see Table 4-1).

Table 4-1 Classification of Technological Export Agreements by Technological Category

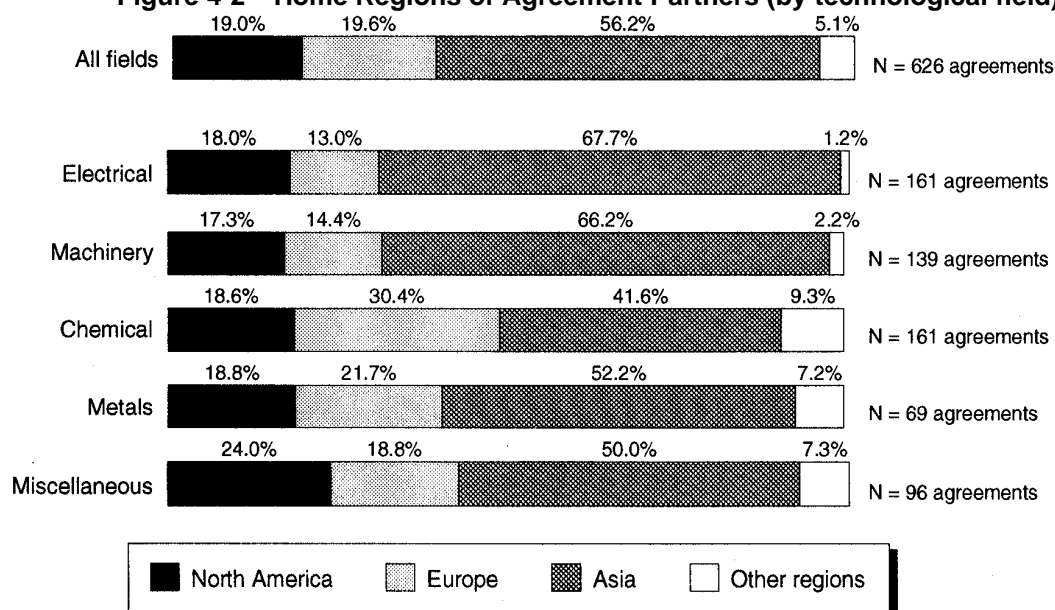
FY 1992			FY 1993		
Technological Category	Share	No. of Agreements	Technological Category	Share	No. of Agreements
Transportation equipment	13.9%	99	Transportation equipment	10.4%	65
Electronics/communications parts	6.6%	47	Drugs and medicines	8.0%	50
Computers	6.3%	45	Oils and paints	6.5%	41
Drugs and medicines	5.9%	42	Electronics/communications parts	6.2%	39
Fabricated metal products	4.6%	33	Computers	6.1%	38
Home appliances	4.5%	32	Fabricated metal products	5.4%	34
Organic chemicals	3.9%	28	Home appliances	4.8%	30
Ceramics	3.7%	26	Organic chemicals	4.6%	29
Oils and paints	3.7%	26	Communications equipment	3.7%	23
Television and audio equipment	3.5%	25	Ceramics	3.5%	22
Other	43.4%	30	Other	40.8%	255
Total	100.0%	712	Total	100.0%	626

3. Home Regions and Countries/Areas of Agreement Partners

In comparison with overall trends in technological export agreements, can any particular characteristics be noted by region within technological fields/categories?

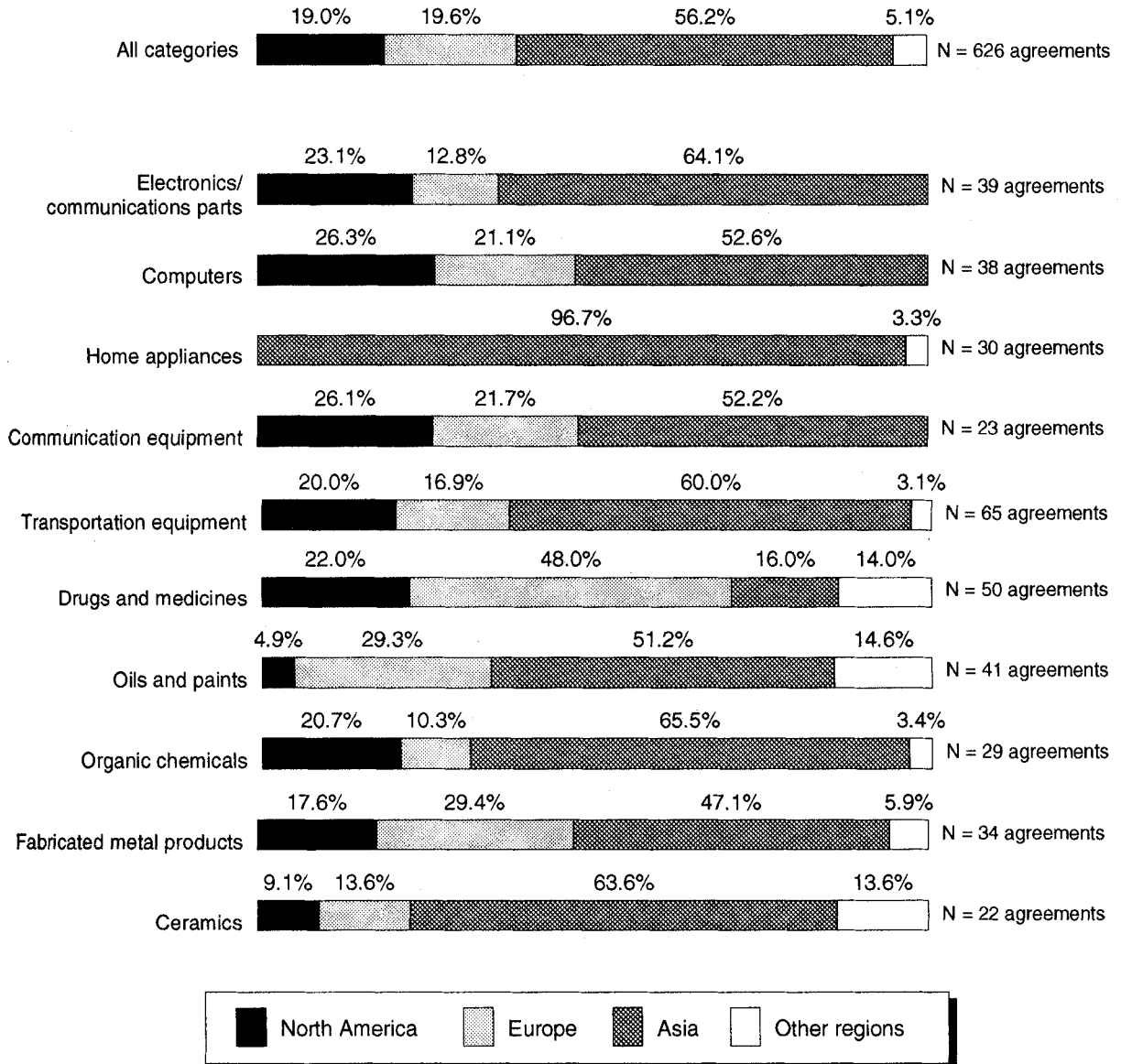
Exports in the ‘electrical’ and ‘machinery’ fields show similar trends, and the proportion of exports to Asia is high, while that of exports to Europe is low. The proportion of exports to Europe is relatively high in the ‘chemical’ field, while that of exports to Asia is relatively low. Trends in the ‘metals’ and ‘miscellaneous’ fields are similar to overall trends. Compared to the previous fiscal year, the percentage of exports to North America decreased in the ‘chemical’ (\$29.7%) and ‘metals’ (\$30.4%) fields (see Figure 4-2).

Figure 4-2 Home Regions of Agreement Partners (by technological field)



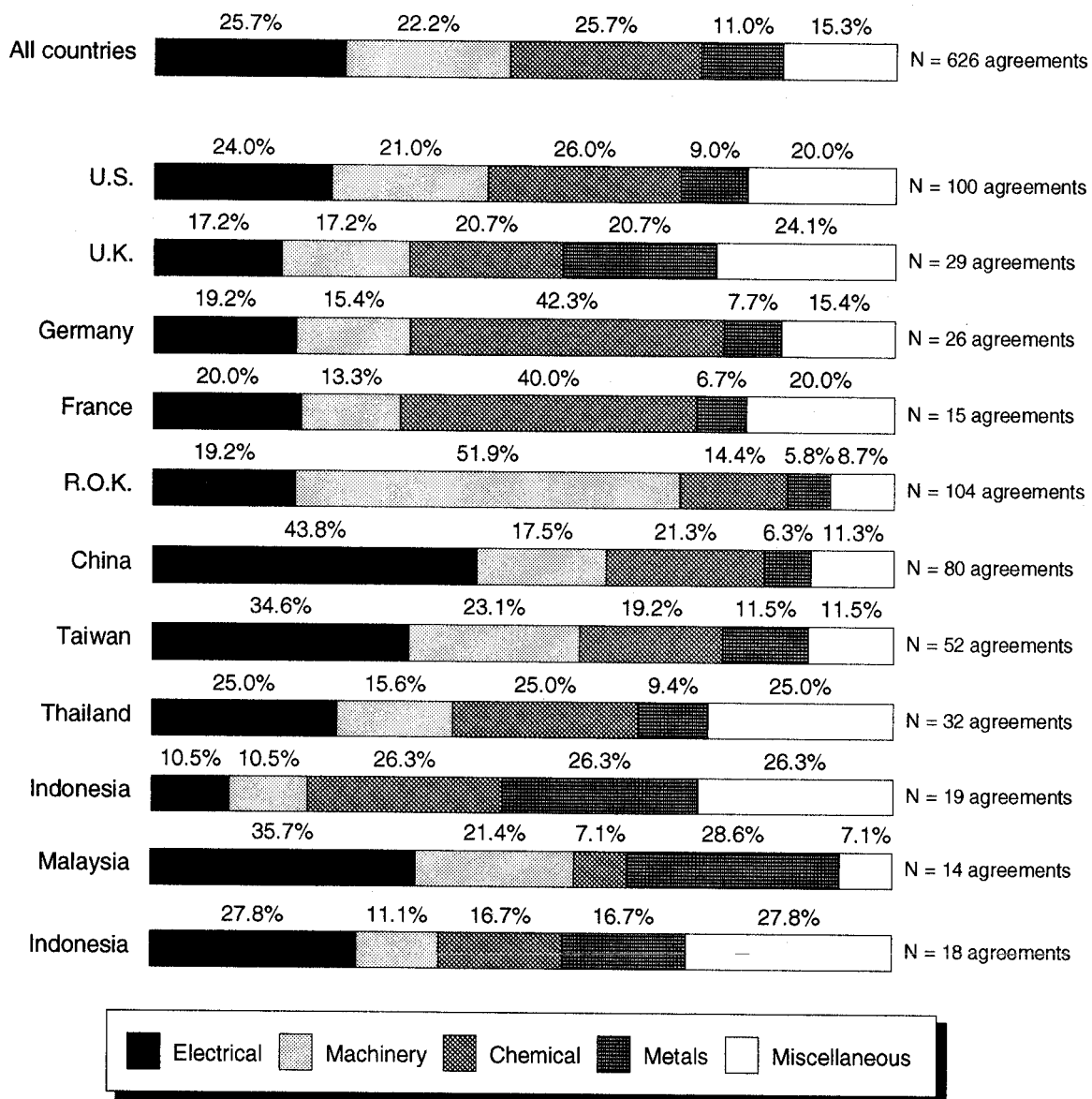
Looking at technological categories, the ratios of exports to North America in ‘computers’ and ‘electronics and communications parts’ were higher than the general trend for technological export agreements. The highest ratios of exports to Europe were in the categories of ‘drugs and medicines’, ‘metals’, and ‘oils and paints’. In the ‘drugs and medicines’ category, exports to Europe and North America accounted for 70% of the total, exhibiting a vastly different trend from other technological categories. Exports to Asia were highest in ‘home appliances’, ‘organic chemicals’, and ‘electronics and communications parts’ in that order — particularly ‘home appliances’, in which an overwhelming 96.7% of all technological exports went to Asia. A closer look reveals substantial differences by export destination region, depending on the technology (see Figure 4-3).

Figure 4-3 Home Regions of Agreement Partners (by technological category)



Finally, let us examine the trends in exported technology by country/area. Compared to the overall trend, the share of the 'electrical' field was high for China, Malaysia and Taiwan, while the 'machinery' field stood out for R.O.K., accounting for more than half of the total. The share of the 'chemistry' field exceeds 40% for both Germany and France. The 'metals' field accounts for a large proportion of technological export to Malaysia as well as Indonesia. (see Figure 4-4).

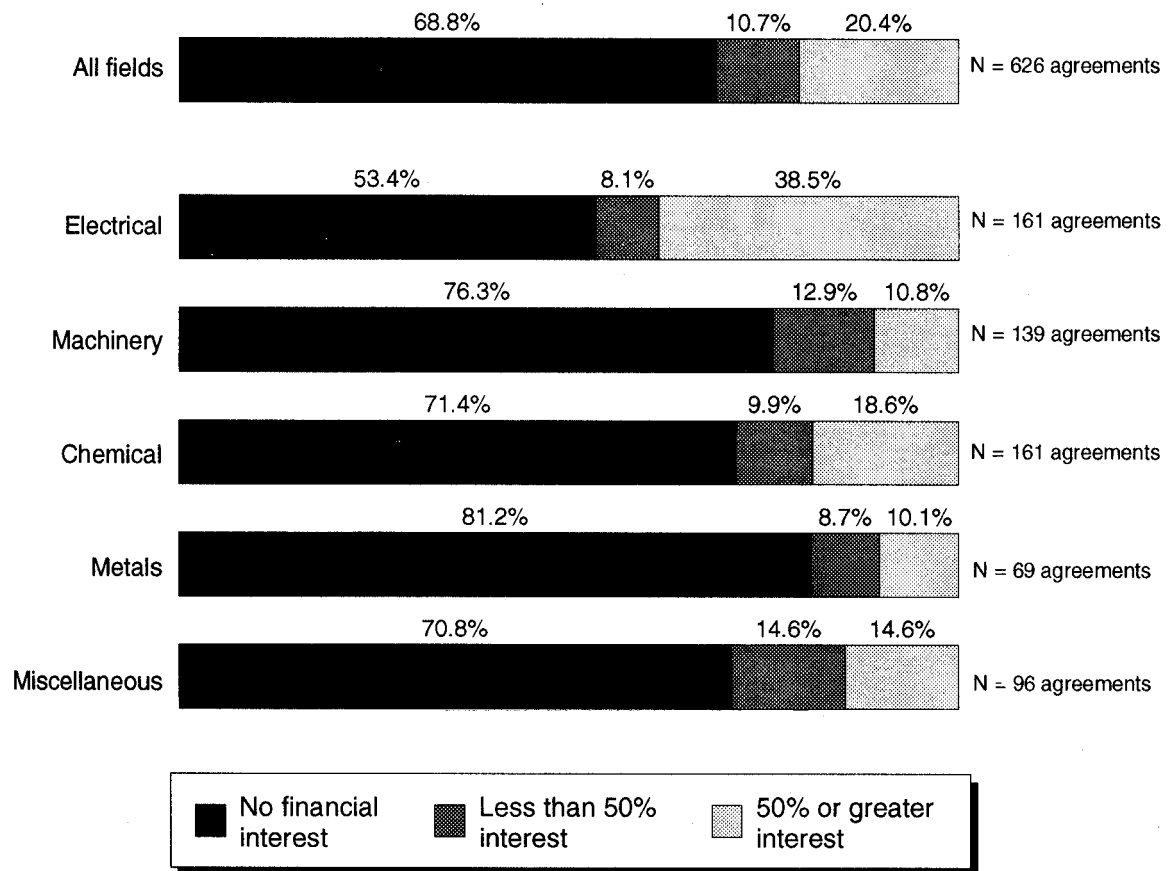
Figure 4-4 Technological Fields of Exported Technologies (by country/area)



4. Financial Interest in Agreement Partner Companies

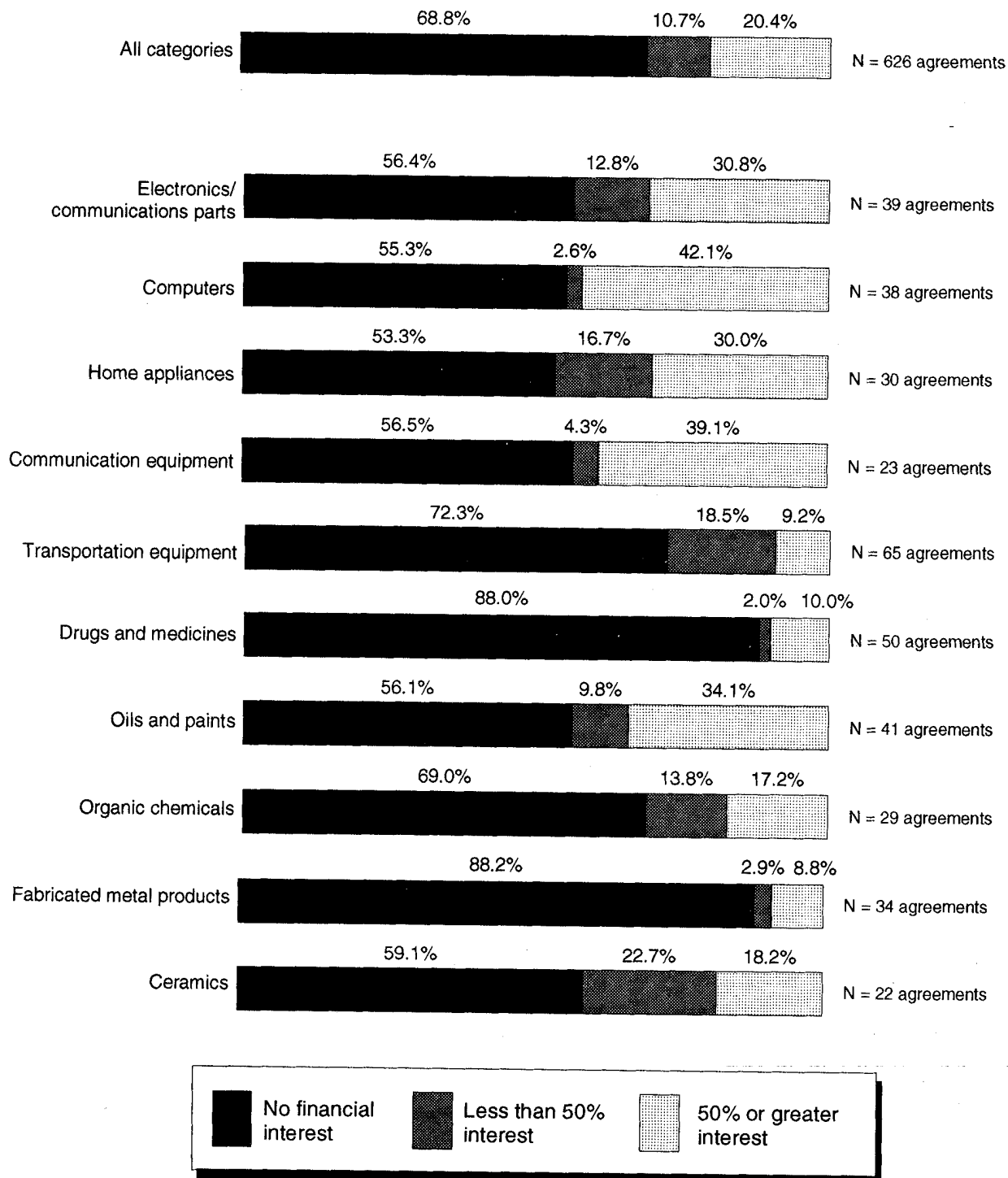
Can any particular trends be spotted involving financial interest in agreement partner companies by technological category? Comparing overall trends for technological export agreements with trends in individual technological fields, we see that the proportion of exports to companies in which a financial interest is held was markedly high in the ‘electrical’ field. Looking just at the proportion of technological exports to companies in which the Japanese exporter had a 50% or greater interest, i.e., ones considered to have stronger financial ties, the top spot was still claimed by the ‘electrical’ field, in which such exports accounted for nearly 4 in 10 (38.5%). Compared to the previous fiscal year, export to companies in which the Japanese exporter had no interest, on the whole, increased (§64.9% Æ 68.8%), with the trend particularly marked in the ‘machinery’ (§62.9% Æ 76.3%) and ‘metals’ (§69.6% Æ 81.2%) fields (see Figure 4-5).

Figure 4-5 Financial Interest in Agreement Partner Companies (by technological field)



The technological categories in which the proportion of export going to companies in which a financial interest was held was high were 'home appliances', 'computers', and 'oils and paints', in that order. Conversely, 'metals', 'drugs and medicines', 'organic chemicals', and 'transportation equipment' had low proportions of export directed to companies in which a financial interest was held (see Figure 4-6).

Figure 4-6 Financial Interest in Agreement Partner Companies (by technological category)



5. Agreement Terms

Are any trends discernible in agreement terms in relation to technological categories? The 'electrical' field, in which agreements valid for less than 5 years account for 37.9% of the total, has a high proportion of short-term agreements, compared to the overall trends, and, at 7.0 years, its average agreement term [*Note 5] is somewhat short. A notable trend in the 'machinery' field is that agreements for '5 to less than 10 years' account for nearly half the total (46.8%). In the 'chemical' field, the share of agreements for less than 5 years is low, while the proportion of long-term agreements, e.g. valid for '10 or more years' (31.6%) or until the expiration of industrial property rights' (16.8%), is very high, with the average agreement term exceeding 10 years. The 'metals' field, in which agreements for less than 5 years account for 50.7%, has an extremely high proportion of short-term agreements, along with the shortest average agreement term of 6.4 years (see Figure 4-7 and Table 4-2).

Figure 4-7 Agreement Terms of Technological Export Agreements (by technological field)

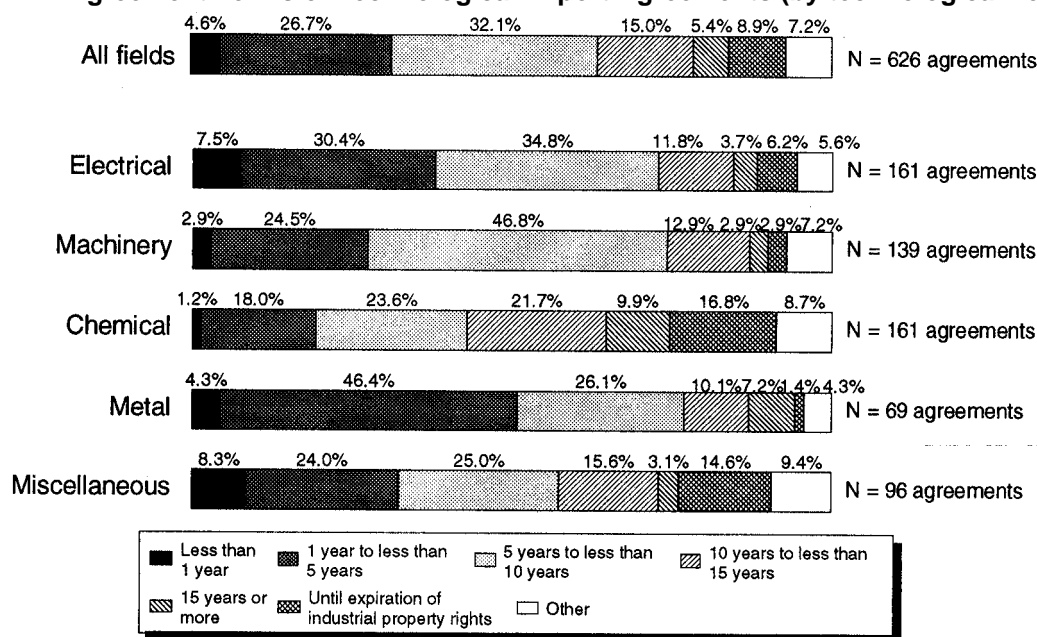


Table 4-2 Variation of Agreement Terms by Technological Field/Technological Category

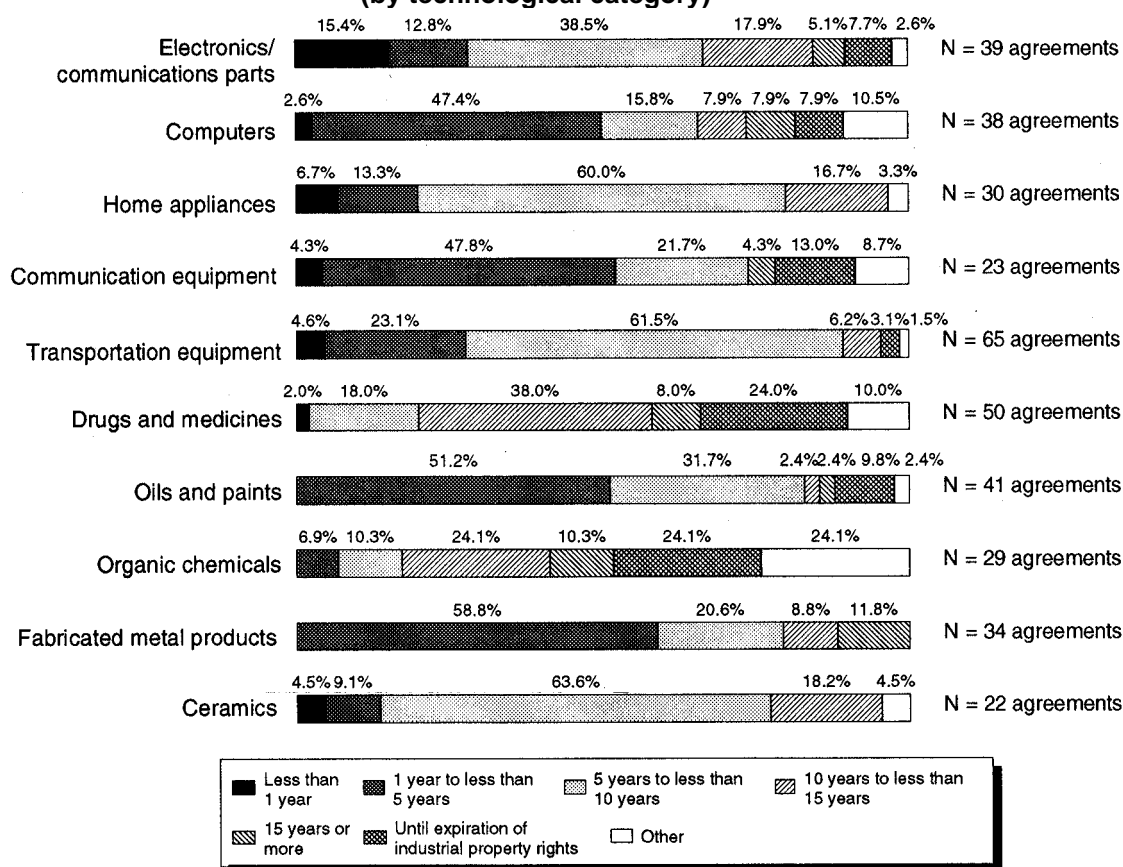
(Unit: years)

Technological Field/Category	Average Agreement Term	Technological Field/Category	Average Agreement Term
Overall	8.0	Chemical field	10.2
Electrical field	7.0	Drugs and medicines	12.3
Electronic parts	7.8	Oils and paints	6.3
Computers	6.9	Organic chemicals	12.4
Home appliances	7.3	Metals field	6.4
Communications equipment	6.4	Fabricated metal products	6.5
Machinery field	7.3	Miscellaneous field	8.1
Transportation equipment	6.7	Ceramics	7.7

Let us now look at this more closely in terms of technological categories. In the categories of ‘computers’, ‘electronics and communications parts’, ‘oil and paints’ and ‘fabricated metal products’, the majority of agreements are short-term, valid for less than 5 years. Conversely, such agreements are quite rare in ‘drugs and medicines’ and ‘organic chemicals’, in which the ratio of long-term agreements, valid for 10 or more years or until the expiration of industrial property rights, is very high, accounting for 70.0% and 58.5%, respectively. In ‘home appliances’, ‘transportation equipment’ and ‘ceramics’, agreement terms are concentrated in the “5 to less than 10 years” range, accounting for more than 60% of the total. This shows that trends in agreement terms vary greatly according to technological categories. ‘Drugs and medicines’ and ‘organic chemicals’ also have longer agreement terms, about 12 years, while this is halved to some 6 years with ‘oil and paints’ and ‘electronics and communications parts’.

Long agreement terms seem to be attributable to high proportions of agreements including patents with ‘drugs and medicines’ and ‘organic chemicals’, and, in the case of ‘drugs and medicines’, extremely high development costs of new technologies as well. Conversely, short agreement terms with ‘oil and paints’ and ‘electronics and communications parts’ appear to be due to low proportions of agreements including patents, with agreements mostly concerned with know-how (see Figure 4-8).

**Figure 4-8 Agreement Terms of Technological Export Agreements
(by technological category)**



6. Value Receiving Methods

Are there any identifiable patterns in methods of receiving value with respect to technological fields/categories? The ratio of agreements with initial payments was high in the 'machinery' and 'chemical' fields but low in the 'electrical' and 'metals' fields. The ratio of agreements requiring running royalties was high in the 'electrical', 'machinery' and 'chemical' fields, but low in the 'metals' and 'miscellaneous' fields. Compared to the previous fiscal year, the ratio of agreements with initial payments increased greatly in the 'chemical' (\$53.0% Æ 67.9%) and 'miscellaneous' (\$50.5% Æ 62.5%) fields (see Figure 4-9).

By technological category, the ratio of agreements with initial payments was high in 'organic chemicals' and 'ceramics' but low in 'fabricated metal products', 'computers' and 'electronics and communications parts' (see Figure 4-10).

The ratio of agreements requiring running royalties was high in 'oils and paints', 'home appliances' and 'ceramics', particularly 'oils and paints', where the figure was 100%, but low in 'computers' and 'organic chemicals' (see Figure 4-11).

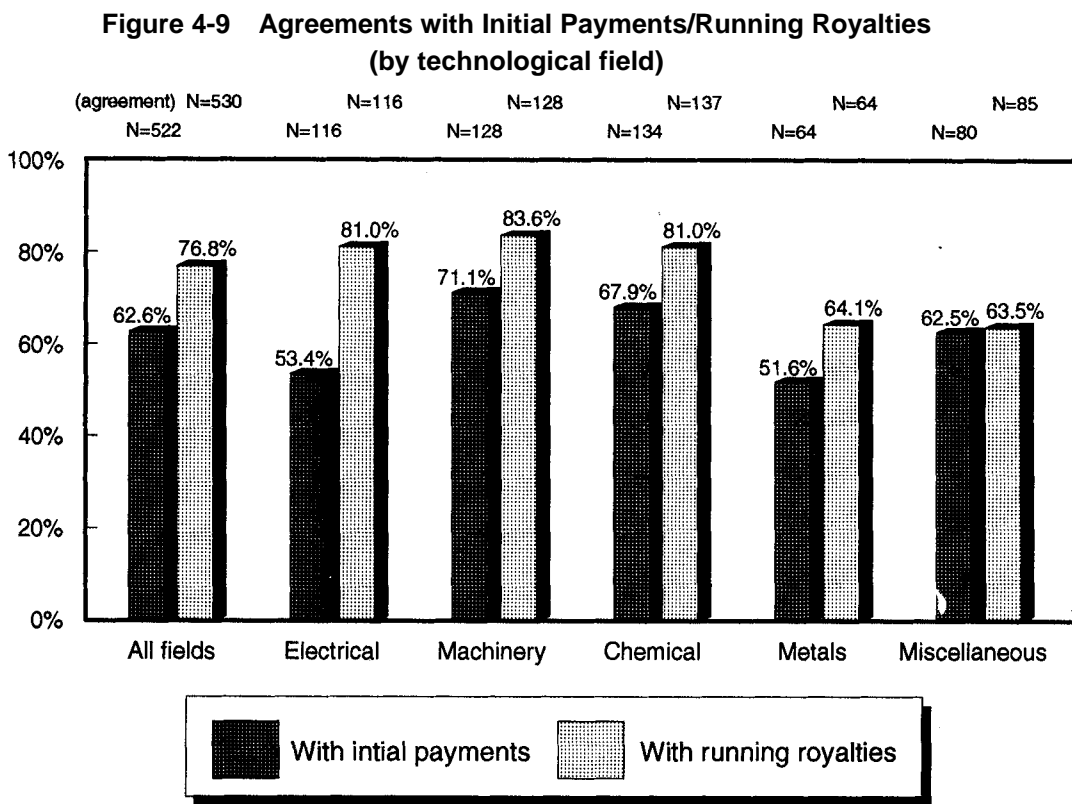


Figure 4-10 Agreements with Initial Payments (by technological category)

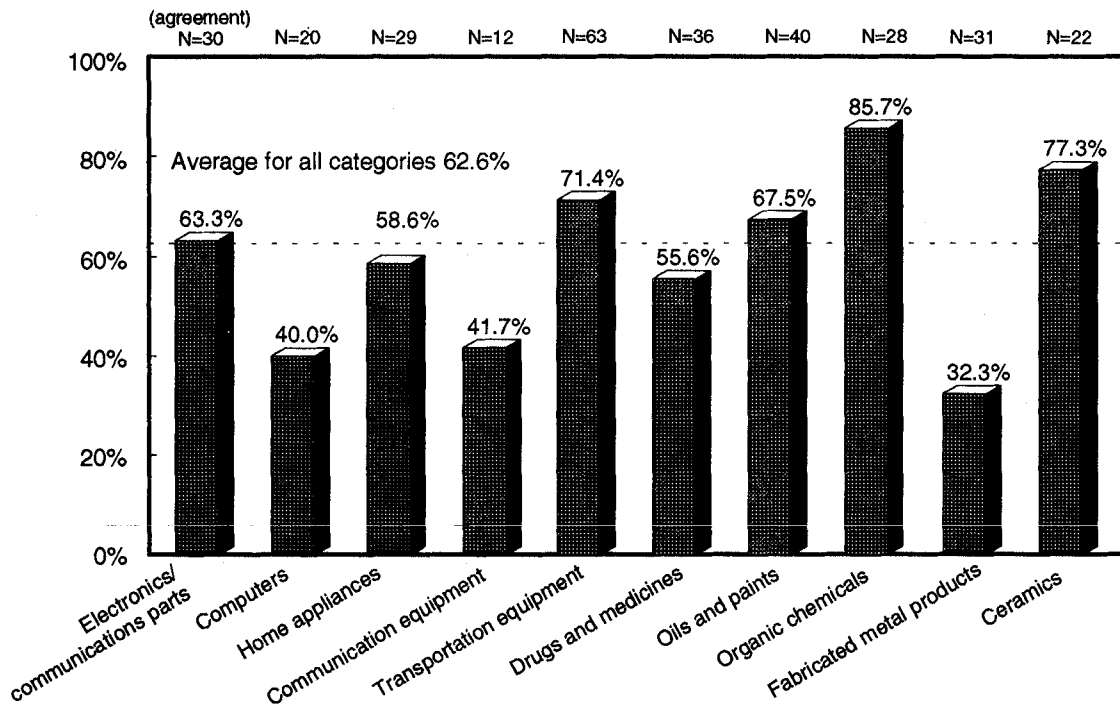
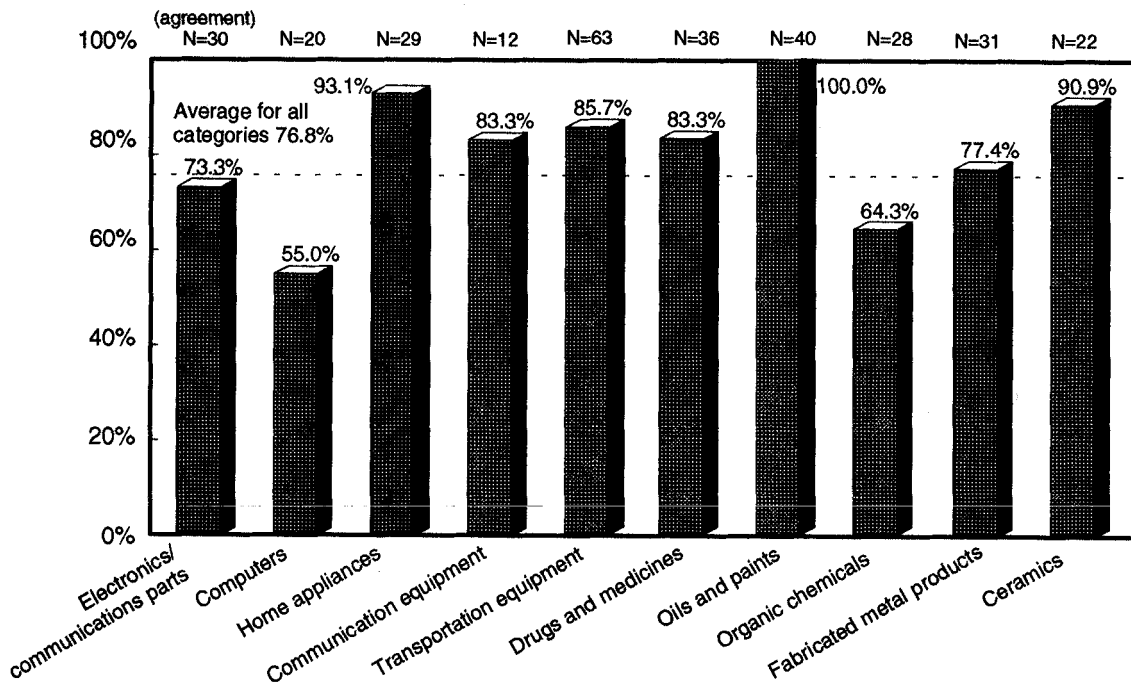


Figure 4-11 Agreements with Running Royalties (by technological category)



7. Exclusive/Sublicense Rights

There are occasions when exclusive rights or sublicense rights are granted in a technological trade agreement; are there any connections between the ratio of agreements granting exclusive/sublicense rights and technological fields/categories? The ratio of agreements granting exclusive rights is very high in the 'chemical' and 'miscellaneous' fields but low in the 'electrical' field. The ratio of agreements granting sublicense rights is also exceptionally high in the 'chemical' field and low in the 'electrical' and 'machinery' fields. Compared to the previous fiscal year, the proportion of agreements granting both exclusive (39.7% \pm 54.0%) and renewal (18.4% \pm 31.7%) rights has increased in the 'chemical' field, widening the gap between this and other fields (see Figure 4-12).

Technological categories with high ratios of agreements granting exclusive rights included 'drugs and medicines', 'oils and paints' and 'ceramics', and those with low ratios included 'communications equipment', 'home appliances' and 'electronics and communications parts'; major differences thus arose in the ratio of agreements granting exclusive rights between technological categories (see Figure 4-13).

Of particular note with sublicense rights is a high ratio of agreements granting them in the categories of 'drugs and medicines' and 'oils and paints' (see Figure 4-14).

Figure 4-12 Agreements Granting Exclusive/Sublicense rights (by technological field)

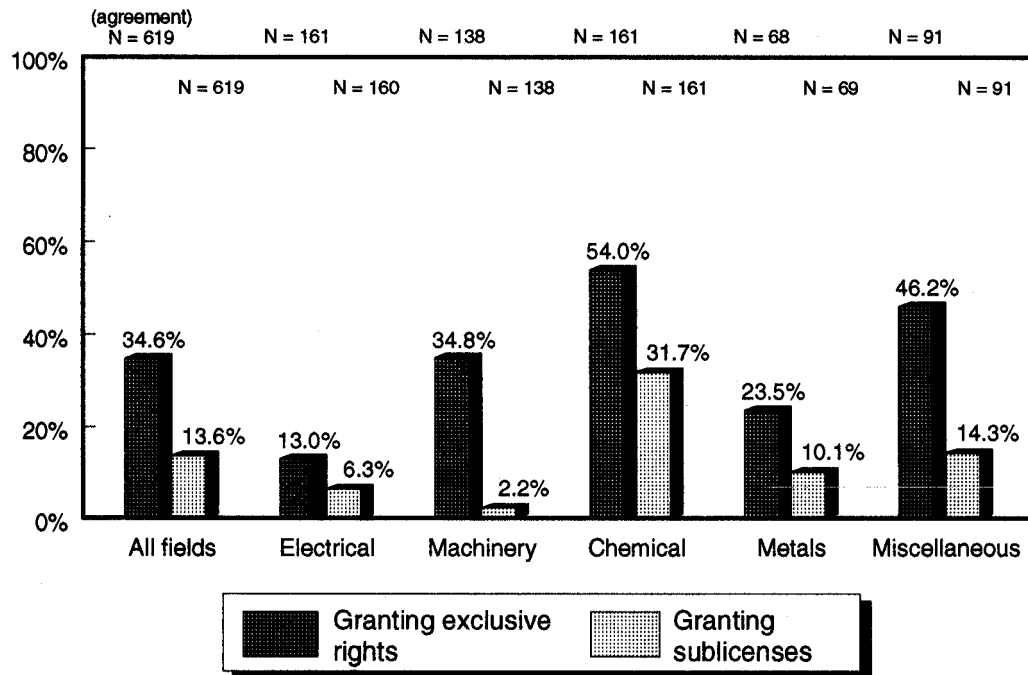


Figure 4-13 Agreements Granting Exclusive Rights (by technological category)

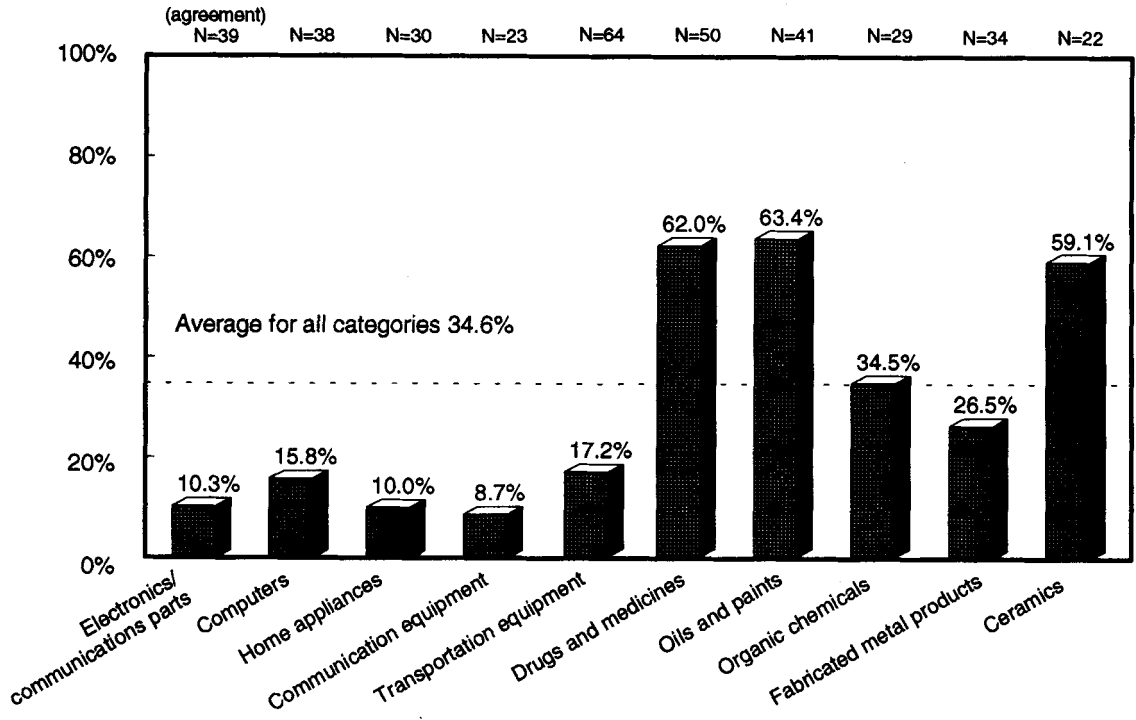
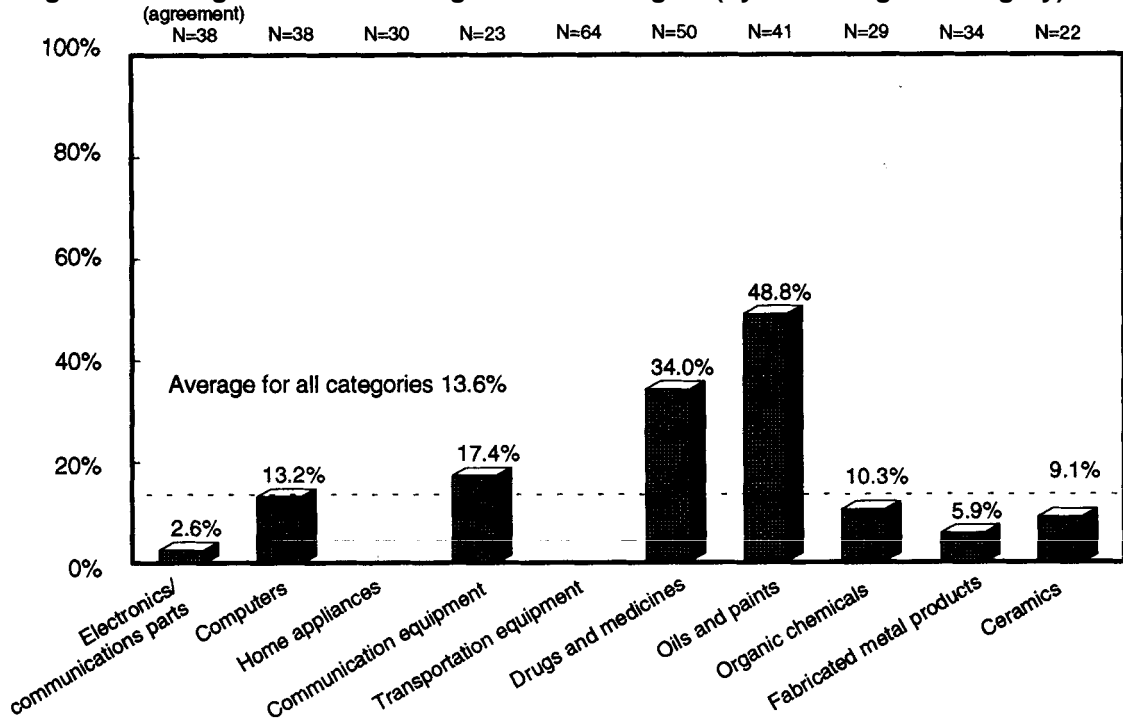


Figure 4-14 Agreements Granting Sublicense Rights (by technological category)



8. Forms of Technology

Examining the forms of the technology included in export agreements by technological field, we see that, compared to the previous year, the ratio of agreements including patents in the 'chemical' field increased to over 50% (42.0% \pm 52.2%), while it fell sharply in the 'electrical' (51.2% \pm 41.6%) and 'machinery' (55.1% \pm 36.0%) fields. There is no great variation in the percentage of agreements including know-how between technological fields, despite a large increase in the 'electrical' field compared to the previous fiscal year (77.8% \pm 87.6%). The proportion of agreements including trademarks was high in the 'chemical' field but low in the 'metals' field (see Figure 4-15).

Figure 4-15 Agreements with Patents/Know-how/Trademarks (by technological field)

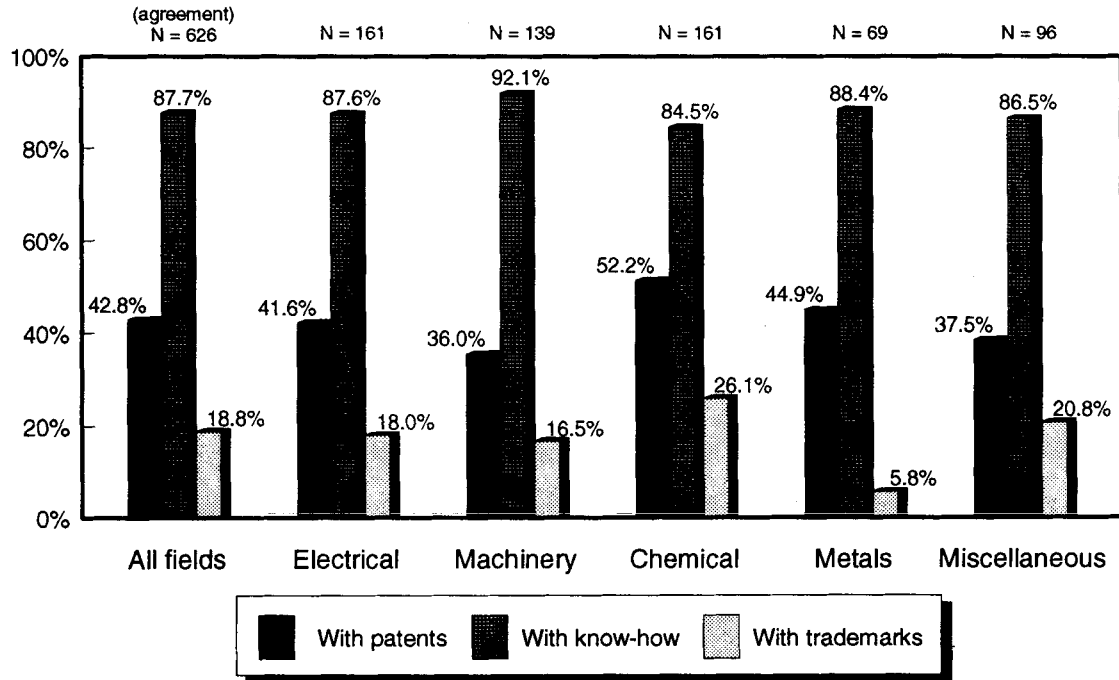
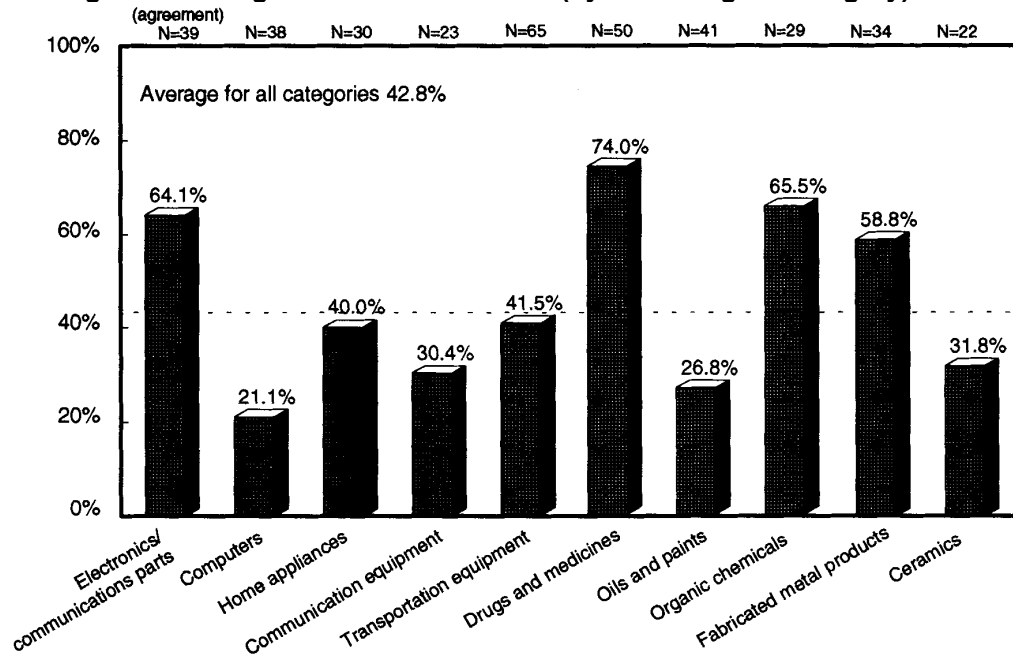


Figure 4-16 Agreements with Patents (by technological category)



By technological category, the ratio of agreements including patents was high in ‘drugs and medicines’, ‘organic chemicals’, ‘electronics and communications parts’ and ‘fabricated metal products’, but low in computers, ‘oils and paints’ ‘communications equipment’ and ‘ceramics’. This shows that there were substantial differences between technological categories, even within the same technological field (see Figure 4-16).

The ratio of agreements including know-how is low in ‘electronics and communications parts’ and ‘drugs and medicines’, where the ratio of agreements with patents is high. In ‘ceramics’, however, the proportion of agreements including know-how is 100% (see Figure 4-17).

Technological categories such as ‘drugs and medicines’ and communications equipment’ show particularly high rates of agreements with trademarks (see Figure 4-18).

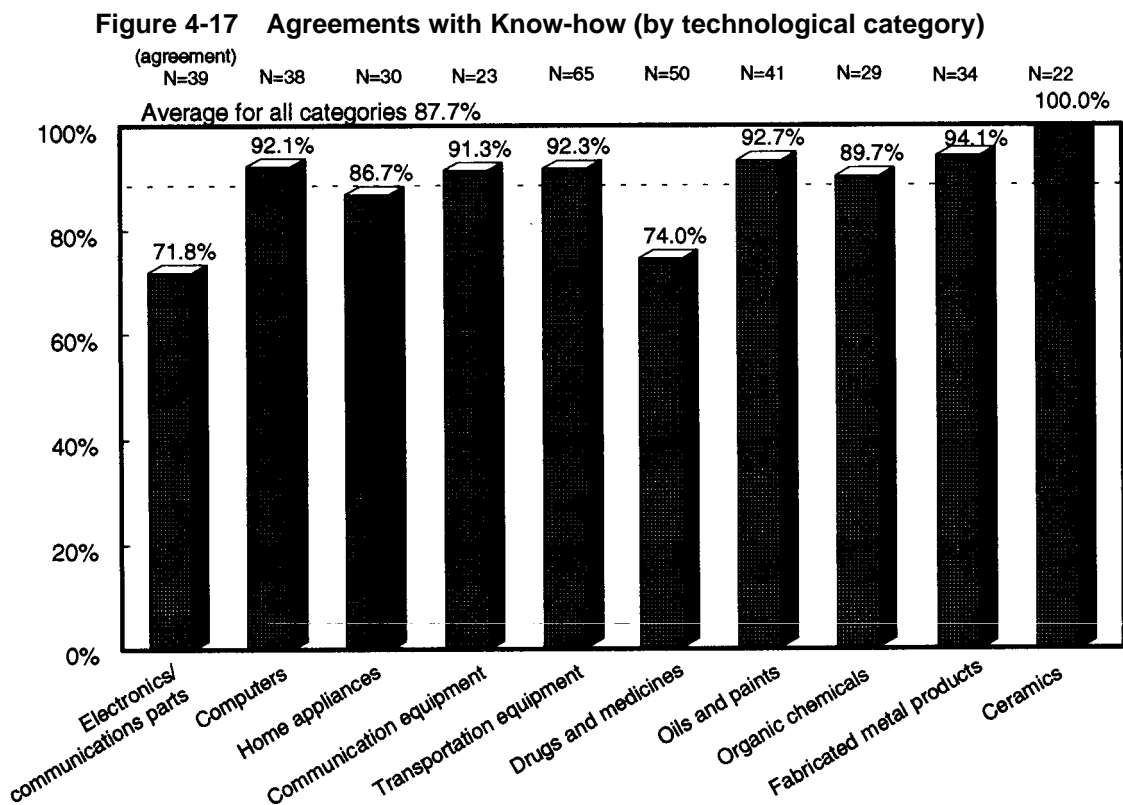
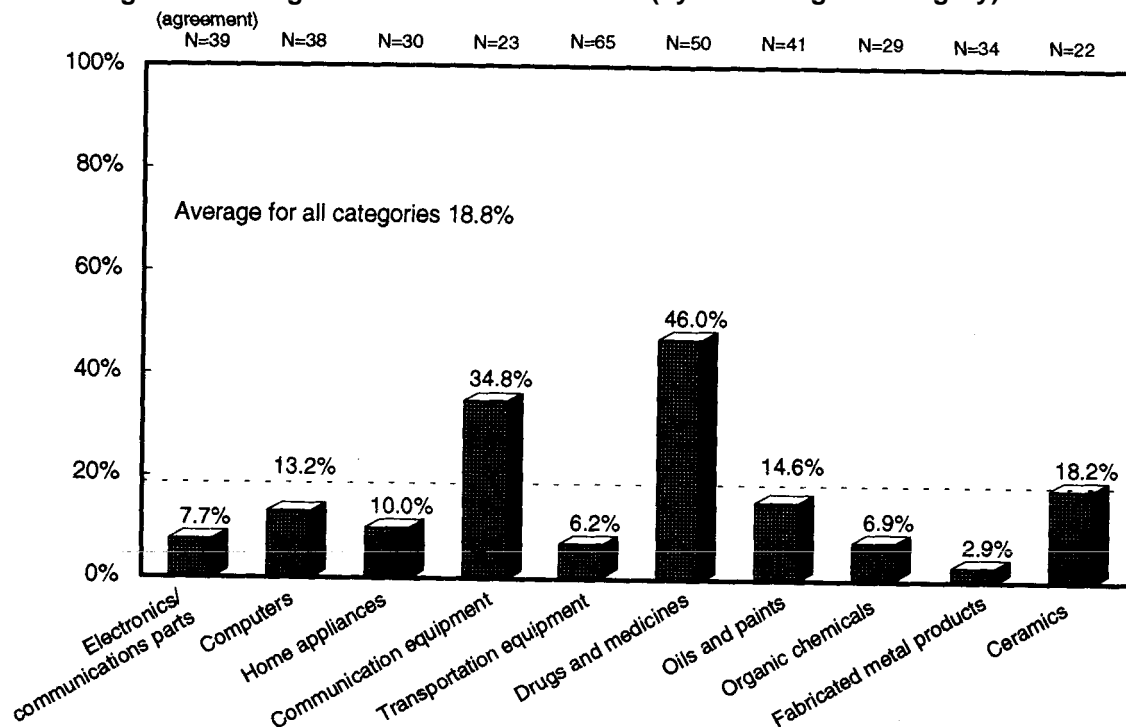


Figure 4-18 Agreements with Trademarks (by technological category)



9. Specified Technological Areas

To this point we have looked primarily at technological categories, but here we take a different approach and focus on technologies in eight specified technological areas — ‘computers’ (‘hardware’, ‘software’, ‘service’ *1, ‘semiconductors’, ‘nuclear power’, ‘aerospace’ and ‘biotechnology’ — in our study of technological export. Where these technologies overlapped, we requested all applicable answers.

Dominant ones were ‘drugs and medicines’, which accounted for 8.0% (\$5.9%) of the total, ‘software’ 4.8% (\$4.4%), ‘hardware’ 1.8% (\$2.2%) and ‘semiconductors’ 3.5% (\$2.2%). Compared to the previous fiscal year, the increases in ‘drugs and medicines’ and ‘semiconductors’ (see Table 4-3) were quite remarkable.

Table 4-3 Export in Specified Technological Areas

Special Technological Field	Share (*)	Export Agreements
Computers (hardware)	1.8%	11
(software)	4.8%	30
(service)	1.0%	6
Semi-conductors	3.5%	22
Nuclear power	0.2%	1
Aerospace	0.2%	1
Drugs and medicines	8.0%	50
Biotechnology	0.3%	2

(*) Share of the total of 626 export agreements

¹ ‘Computer service’ refers to technical support in the operation and management of computers.

Let us look a little more closely at technologies in specified technological areas that claim large shares of total technological export. We have already examined 'drugs and medicines', so here we will investigate 'computer software'. Compared to the previous fiscal year, the volume of software export destined for Asia fell to 50% from a high of \$61.3% (see Figure 4-19).

Although export of software to companies in which no financial interest was held increased from the previous year (\$35.5% Æ 56.7%), its export to companies in which a financial interest was held was still higher than the overall trend (see Figure 4-20).

Figure 4-19 Export Destination Regions

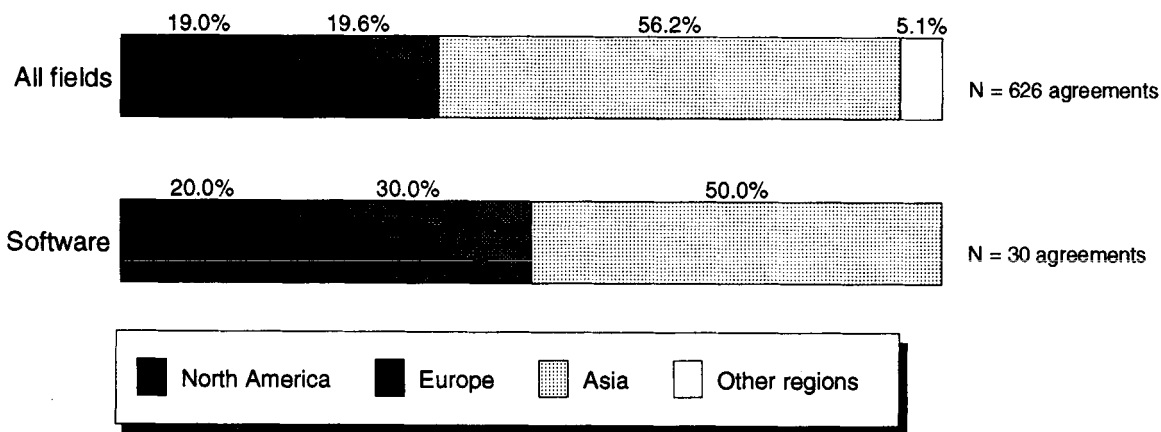
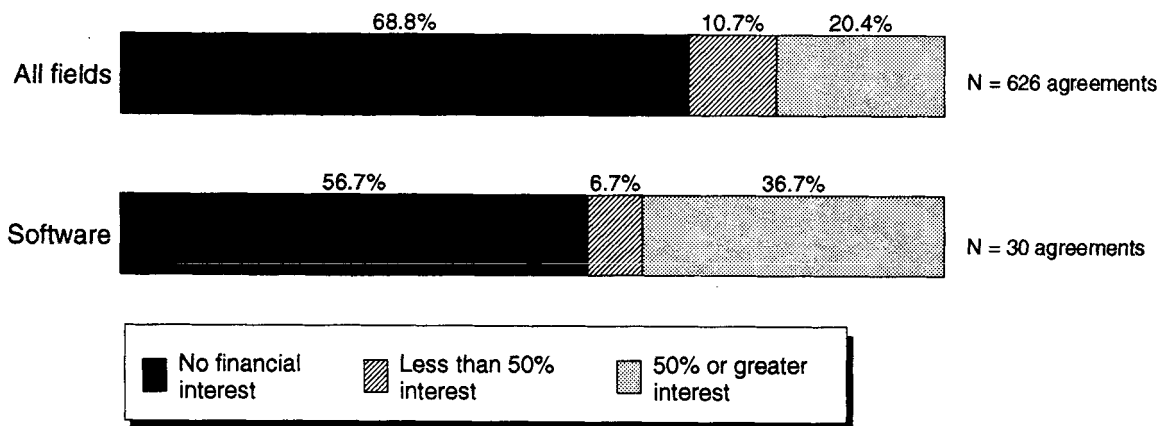


Figure 4-20 Financial Interest in Export Destination Companies



V. Comparison with Technological Import

We have thus far only examined technological export by focusing on and analyzing technological export data, but in this chapter we will attempt to illustrate the state of technological trade overall through a comparison of trends in new technological export in FY 1993, which emerged from our questionnaire survey, with the findings of the “Trend Analysis of Foreign Technology Introduction (FY 1993)” (NISTEP Report No. 39), also published by our institute.

1. Introduction

Because of several differences between the data in our survey and the technological import data in the “Trend Analysis of Foreign Technology Introduction”, it is necessary to bear the following points in mind when drawing comparisons (see Table 5-1).

Table 5-1 Comparative Table of Technological Export and Import Statistics

	Technological Export	Technological Import
Survey Report	This survey report	“Analysis of Trends in Technology Imports” (†)
Survey Target	Companies with more than 1 billion yen in capital engaged in R&D or involved in technological trade (1568 companies)	All companies (for this comparison, only those companies with 1 billion yen or more in capital have been selected)
Survey Method	Questionnaire survey by mail; 920 companies responded; response rate 58.7%	Total sample survey using reports submitted as required by law (†)
Survey Scope for Technological Trade	Transfer or the granting of usufructuary rights for patents, utility models, designs, trademarks, know-how	Same as for export
Agreements Covered in Survey	Agreements dated between 1 April 1993 and 31 March 1994 (inclusive)	Same as for export (reports dated within period stipulated at left)

(†) We have used the data from the FY 1993 version of “Analysis of Trends in Technology Imports” (NISTEP Study Material No. 39) published annually by our institute; this data is based on reports on technological import prepared in accordance with the Foreign Exchange and Foreign Trade Control Law.

First of all, our technological export survey was a sampling survey using questionnaires, while the technological import survey utilized the total sample method based on reports. Furthermore, there is a considerable difference in the companies surveyed. Only those companies with 1 billion yen or more in capital were considered in the technological export survey; thus companies with less than 1 billion yen of capital were excluded. Technological import data, however, covers all technological import agreements and thus technological import agreements struck by companies with less than 1 billion yen of capital are included. How many new technological import agreements for FY 1993 were concluded by companies with less than 1 billion yen of capital? An examination of the number of companies engaged in new technological import and breakdown of import agreements concluded by capitalization shows that 45.7% of the companies which concluded new technological import agreements in FY 1993 had less than 1 billion yen in capital, and these companies accounted for 31.0% of such agreements. To compare this data to the technological export data

obtained in the survey on an equal basis as far as possible, technological import agreements concluded by companies with less than 1 billion yen in capital were excluded from the total new technological import agreements in FY 1993, which stood at 3,029 (\$3,224), leaving only 2,090 (\$2,071) technological import agreements, all concluded by companies capitalized at 1 billion yen or more, for use in the comparison below (see Figure 5-1).

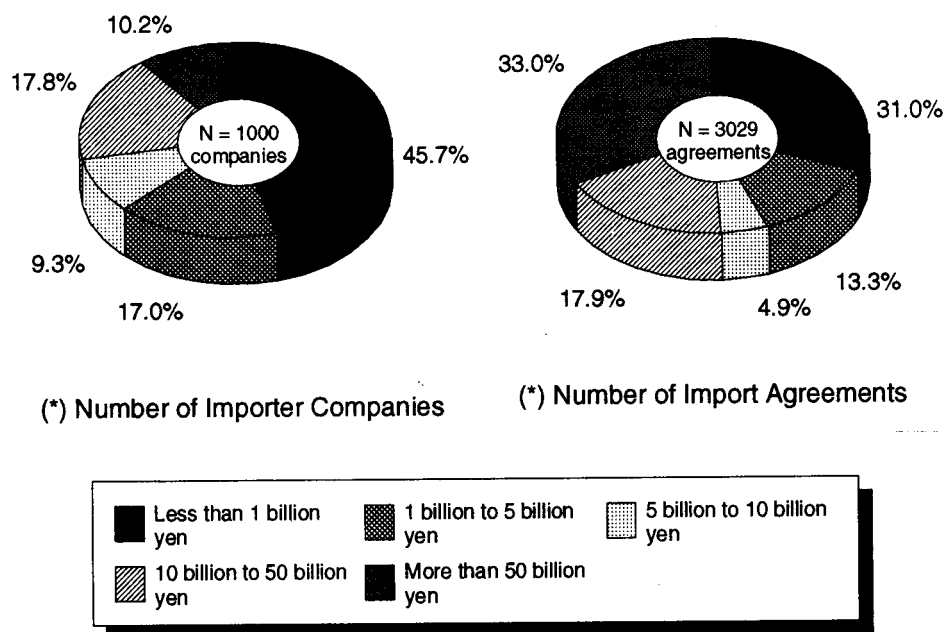
Keeping in mind the above differences, then, let us attempt a comparative study.

2. Technological Import Agreements by Technological Field/Category

What differences exist between export and import in new technological trade agreements for FY 1993? Let us compare export and import by technological field.

An extremely high proportion of technological import agreements (68.4%), nearly two-thirds of the total, belong to the 'electrical field', while the proportion of those in the 'metals' field is low (2.1%). Thus, the distribution of agreements across fields, fairly even in the case of export, shows a clear concentration in the 'electrical' field for technological import (see Figure 5-2).

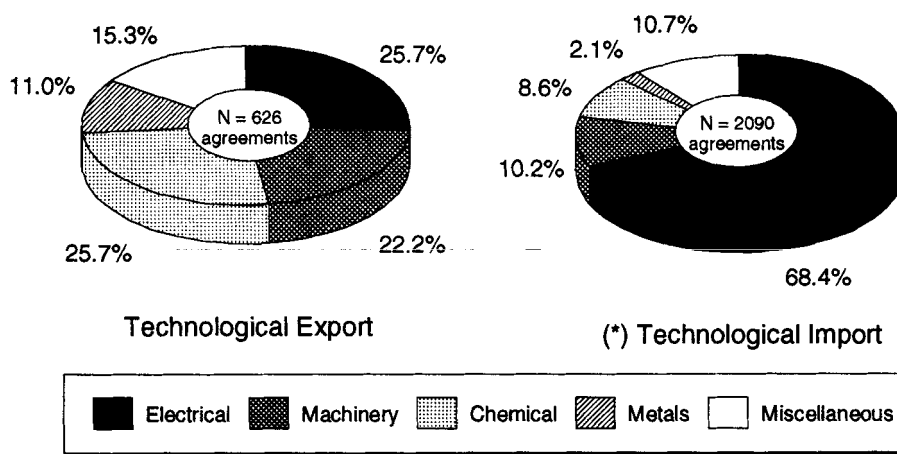
Figure 5-1 Companies with Technological Import Agreements and Number of Import Agreements (by capitalization)



[Remarks]

As was mentioned in the main text, the technological import data was not obtained in the survey connected with this report but rather is that used in the preparation of the "Trend Analysis of Foreign Technology Introduction". An asterisk (*) marks all graphs and tables relating to technological import to make this distinction.

Figure 5-2 Technological Fields of Technological Export/Import Agreements



By technological category, technological export in ‘transportation equipment’, though still topping the list, decreased from the previous year (§13.9% Æ 10.4%), while that in such categories as ‘drugs and medicines’ (§5.9% Æ 8.4%) and ‘oils and paints’ (§3.7% Æ 6.5%) increased. With technological import, on the other hand, the top spot was claimed by ‘computers’, with its share further increasing from the previous year to over 50% (§48.2% Æ 54.1%). Notably, export agreements are distributed relatively evenly among technological categories, while the ‘computers’ category totally dominates technological import (see Table 5-2).

Table 5-2 Technological Export/Import Agreements by Technological Category (top ten)

Technological Export			(*) Technological Import		
Type of Technology	Share	No. of Agreements	Type of Technology	Share	No. of Agreements
Transportation equipment	10.4%	65	Computers	54.1%	1131
Drugs and medicines	8.0%	50	Electronics/communications parts	6.8%	142
Oils and paints	6.5%	41	Drugs and medicines		
Electronics/communications parts	6.2%	39	Outer garments	3.7%	78
Computers	6.1%	38	Boilers/motors	3.0%	63
Fabricated metal products	5.4%	34	Transportation equipment	2.4%	50
Home appliances	4.8%	30	Communications equipment	2.2%	46
Organic chemicals	4.6%	29	Television and audio equipment	2.2%	45
Communications equipment	3.7%	23	Chemical machinery and equipment	2.2%	45
Ceramics	3.5%	22	Applied electronics equipment	2.0%	41
Other	40.7%	255	Other	1.9%	39
				19.6%	410
Total	100.0%	626	Total	100.0%	2071

3. Home Regions and Countries/Areas of Agreement Partners

Over half of all technological export agreements were made with companies in Asia, the remainder divided approximately equally between companies in North America and Europe. There was almost no technological import from Asia, however, with imports originating predominantly in North America and Europe. Export and import thus present very different images indeed (see Figure 5-3).

Looking at the top five export destination countries and import source countries, one finds Asian countries/areas have taken up all the places for import, except for the U.S., which still holds a 16% share after being overtaken by R.O.K. as the No. 1 importer, while the U.S. is the source country of nearly 70% of technological import by Japan, with the rest accounted for by European countries (see Figure 5-4).

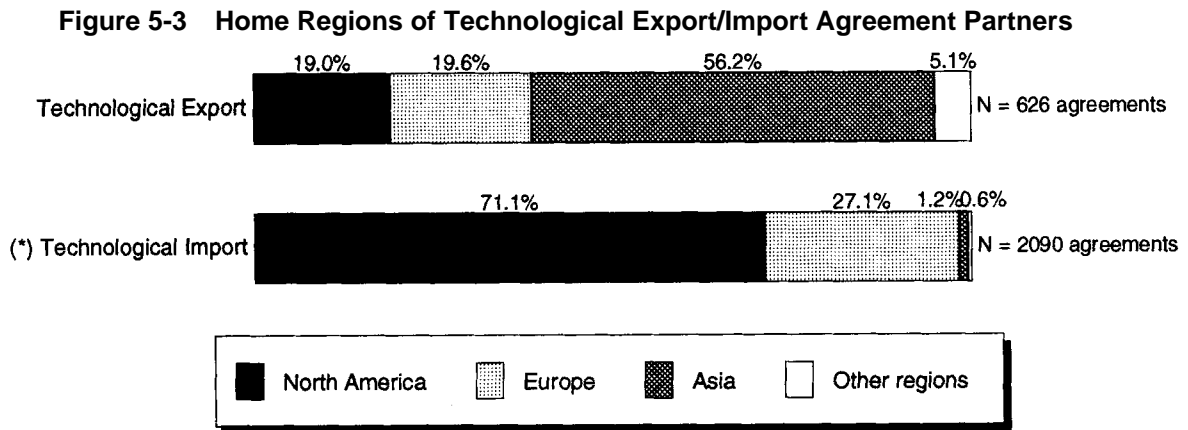
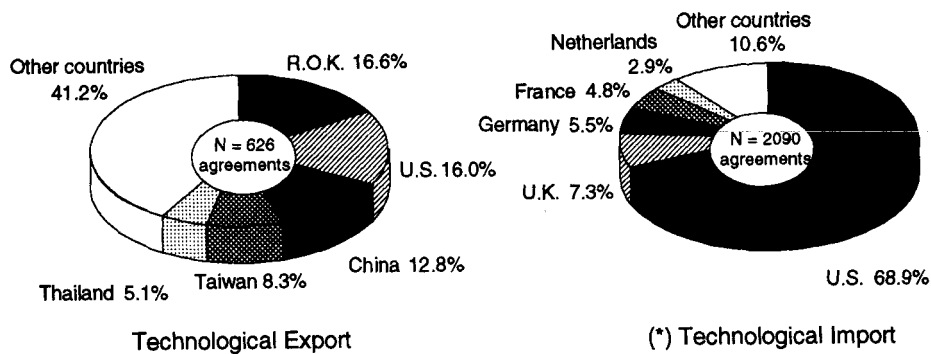


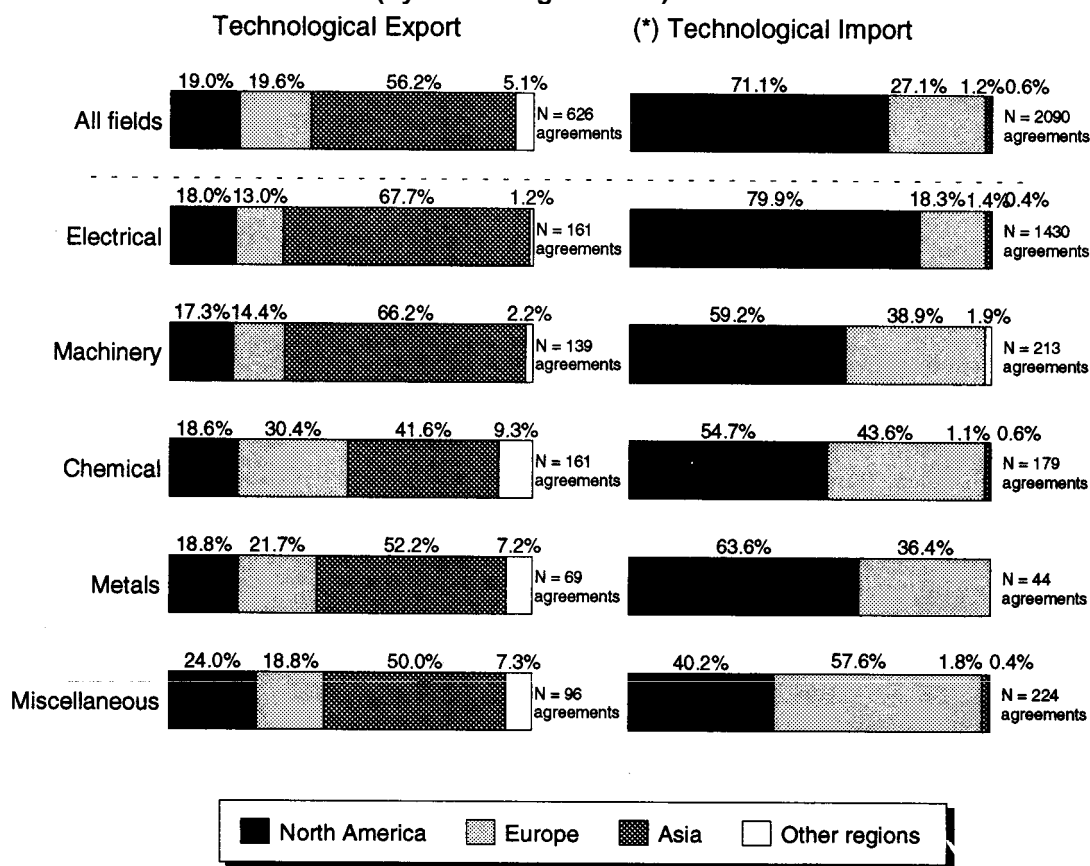
Figure 5-4 Home Countries/Areas of Technological Export/Import Agreement Partners



Now let us look at the home regions of the agreement partners in individual technological fields in comparison with the overall average. The proportion of export agreement partners in the ‘electrical’ field is high for Asia but low for Europe. In import, however, North America has an extremely high share, nearly four-fifths of the total. In the ‘machinery’ field, Asia has a large share in export, while Europe has a large share in import. In the ‘chemical’ field, Europe’s share is high in export, with North America’s share declining compared to the previous fiscal year (§29.7 Æ 18.6%), while that of Asia remains low; Europe’s share is also high in import, but North America’s share is low. In the ‘metals’ field, North America’s share decreased (§30.4 Æ 18.8%) from the previous fiscal year, and the trends are similar to the overall average.

Regional shares of exports in the 'miscellaneous' field are generally the same as the overall average, but North America has an extremely low share in import in contrast to the extremely high level of imports from Europe. All in all, regional shares of agreement partners appear to differ substantially by technological field (see Figure 5-5).

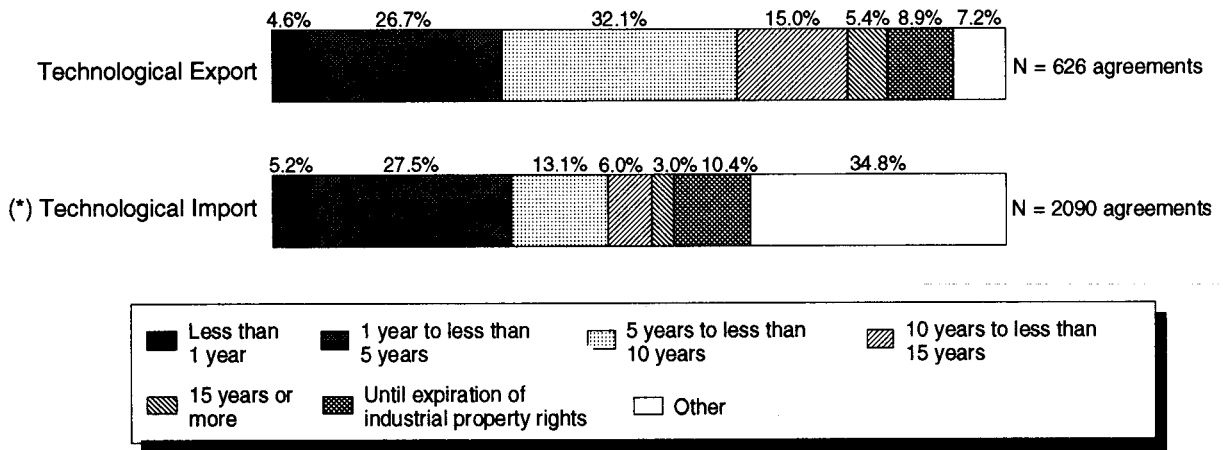
Figure 5-5 Home Regions of Technological Export/Import Agreement Partners (by technological field)



4. Agreement Terms

Are there any differences in agreement terms between export and import agreements? A high proportion of export agreements are for 5 years to less than 10 years, while the highest proportion of import agreements have 'other' terms. Apart from this, though, there do not appear to be any major disparities in the proportions of agreement terms as expressed in validity ranges (see Figure 5-6).

Figure 5-6 Agreement Terms of Technological Export/Import Agreements



5. Agreement Format

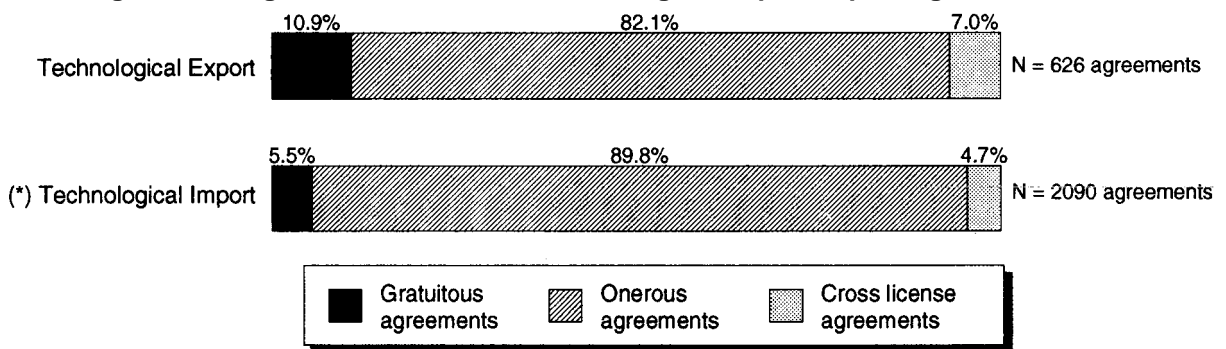
Are there any characteristic differences in agreement format between import and export? While onerous agreements make up the bulk of both import and export agreements, export agreements tend to have higher proportions of gratuitous and cross license agreements (see Figure 5-7).

The proportion of technological export agreements requiring initial payments is lower than for technological import agreements, while the ratio of export agreements requiring running royalties *2 is higher. This difference appears to be due to the high proportion of software-related agreements in technological import, agreements in which initial payments are believed to be most common (see Figure 5-8).

A somewhat higher percentage of technological export agreements grant exclusive rights than that of import agreements but the proportion of export agreements granting sublicense rights is lower (see Figure 5-9).

As in the previous year, a characteristic disparity can be seen in value payment methods and agreement conditions (exclusive/sublicense rights).

Figure 5-7 Agreement Formats of Technological Export/Import Agreements



² In the data for technological import, single payments are calculated as initial payments and flat sum payments as running royalties for statistical purposes.

Figure 5-8 Agreements with Initial Payments/Running Royalties

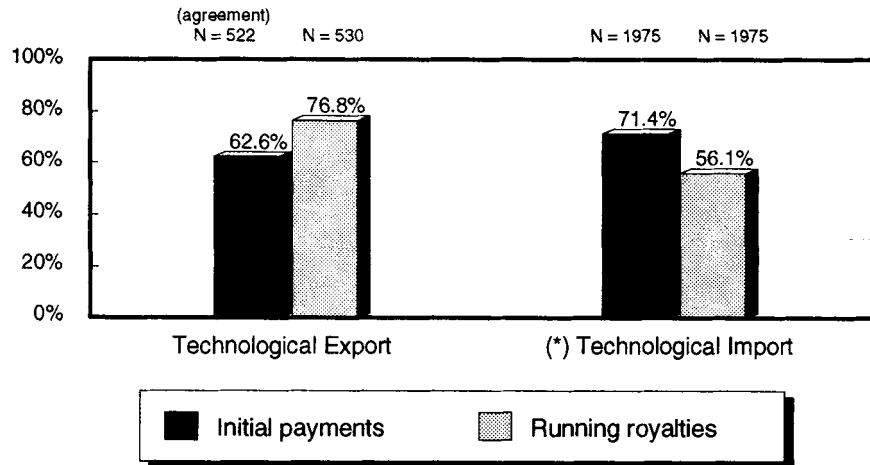
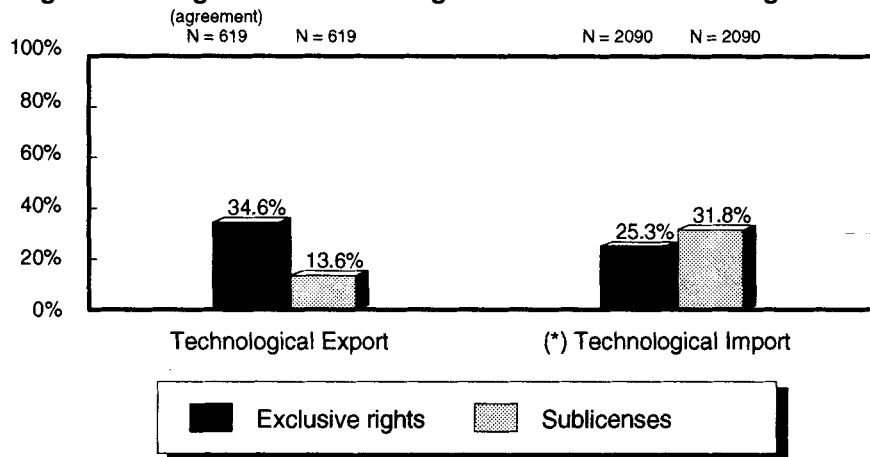


Figure 5-9 Agreements Granting Exclusive/Sublicense Rights

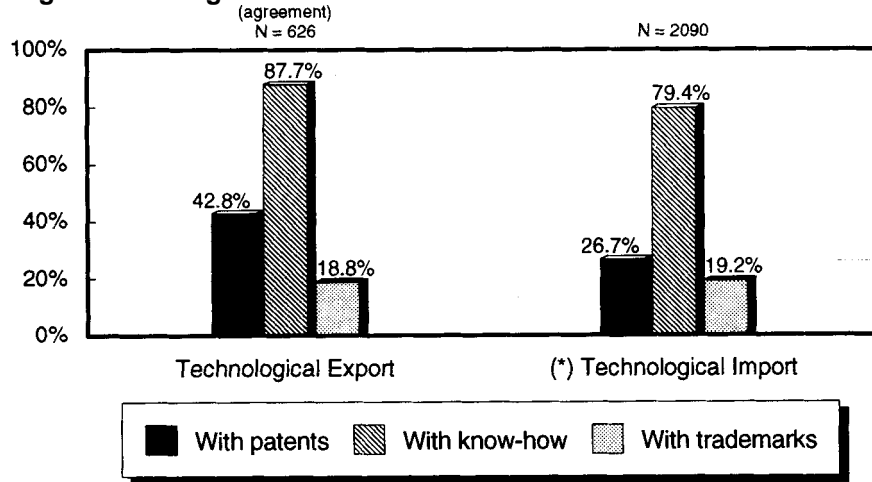


6. Forms of Technology

Let us compare the forms of technology included in import and export technological trade agreements. Included in most agreements in both import and export, know-how³ is the most common form of technology, followed by patents and trademarks; the number of technological export agreements including patents are far greater than that of technological import agreements including patents (see Figure 5-10).

³ Utility models and designs are included with patents and patents pending are included with know-how in calculations of technological import statistics.

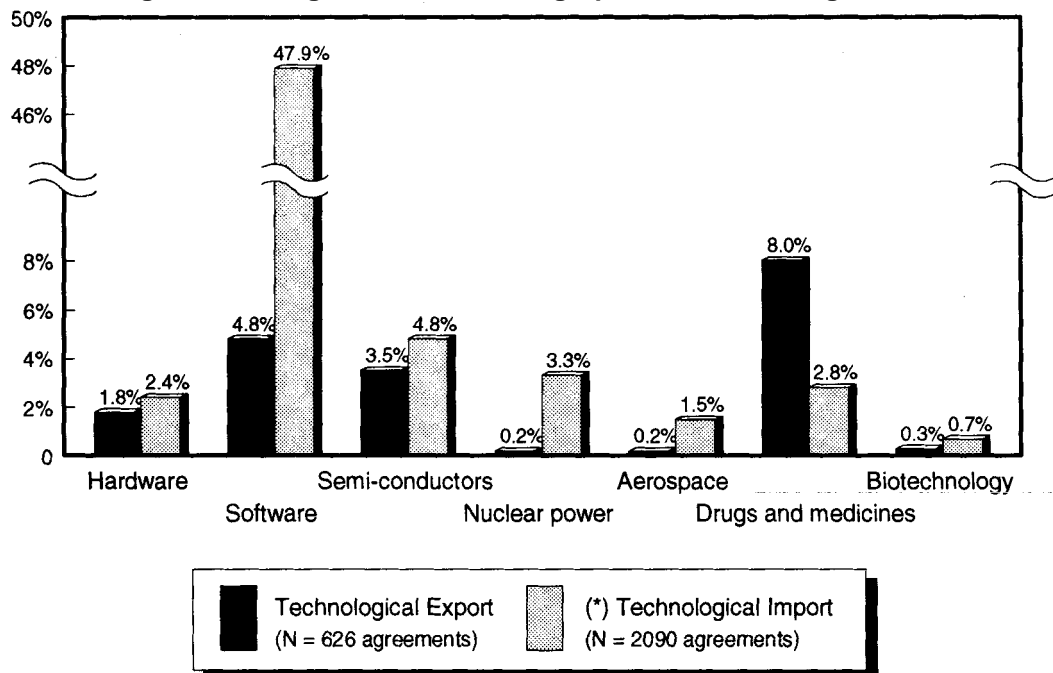
Figure 5-10 Agreements with Patents/Know-how/Trademarks



7. Specified Technological Areas

How do the proportions of agreements for technologies in the specified technological areas differ between import and export? Even discounting the differences in survey methods used for gathering import and export data, the proportion of agreements including software is a mere 4.8% of the whole in the case of export but a much larger 47.9% in the case of import; this disparity merits much attention (see Figure 5-11).

Figure 5-11 Agreements Including Specified Technologies

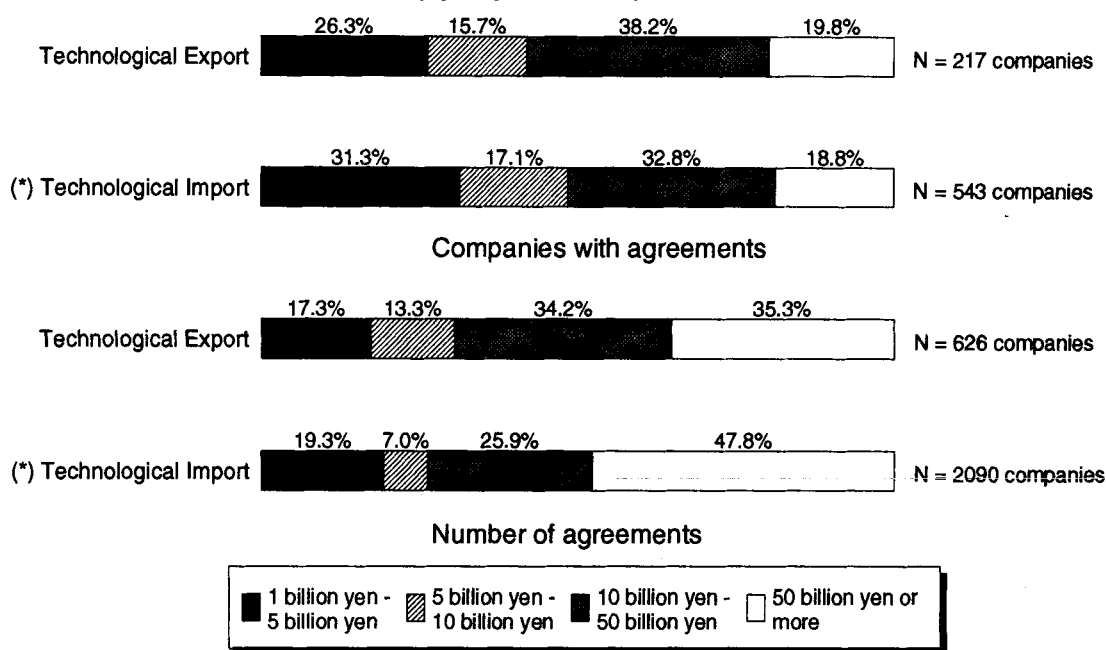


8. Companies Engaged in Technological Import and Export

(1) Technology Importing/Exporting Companies by Capitalization

Let us now look at the number of companies engaged in technological trade and that of agreements concluded by them in terms of capitalization. For both import and export, the largest proportion of companies involved had capital of 10 billion to less than 50 billion yen, with the next highest grouping being that of companies with capital of 1 billion to less than 5 billion yen; the proportion of companies in each capitalization range was about the same for both import and export. In terms of the number of agreements, the highest share in both import and export was held by companies with capital of 50 billion yen or more, and, at 47.8%, its share is nearly half in import, much larger than that in export, which stands at 35.3% (see Figure 5-12).

Figure 5-12 Companies with Technological Export/Import Agreements and Number of Agreements (by capitalization)



(2) Importing/exporting Companies by Technological Field

Are there any definable trends by technological field in terms of the industrial categories of importing/exporting companies? Dividing all technology imported and exported into technological fields, we will look here at the top five ranking industries in each technological field.

In the 'electrical' field, the 'communication and electronics equipment' and 'electrical machinery, equipment and supplies' industries hold the top spots in both import and export, but while these two industries accounted for 79.0% of exports, they accounted for only 44.4% of imports. Notably, 'wholesale trade' ranked second (15.9%) in imports. (see Figure 5-13).

Figure 5-13 Technological Export/Import Agreements in Electrical Field by Industry

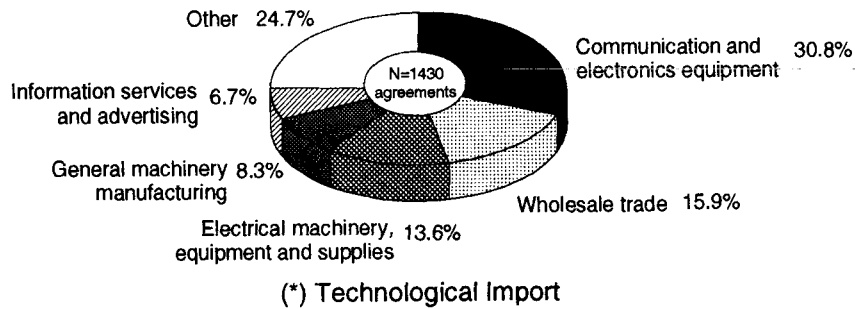
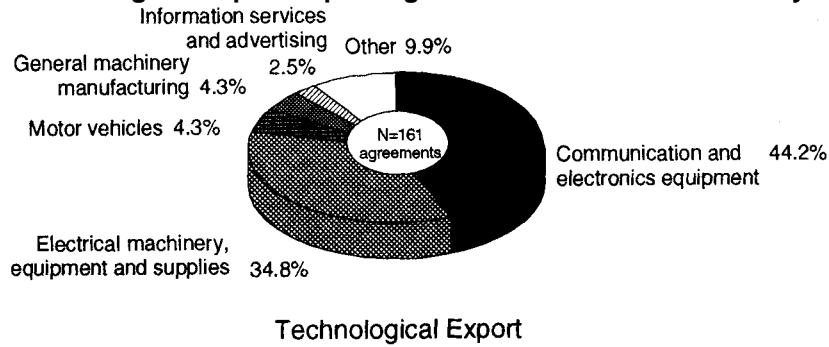
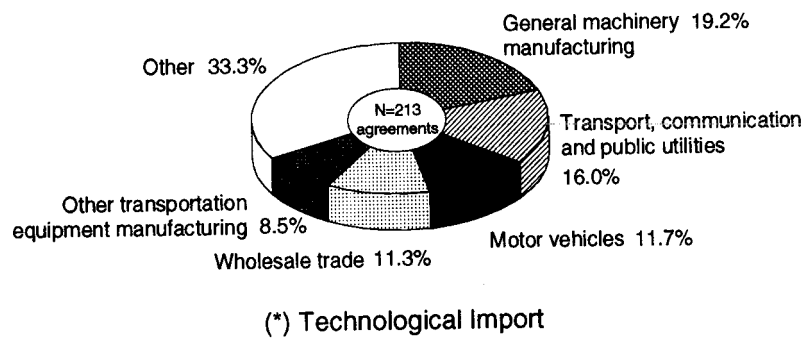
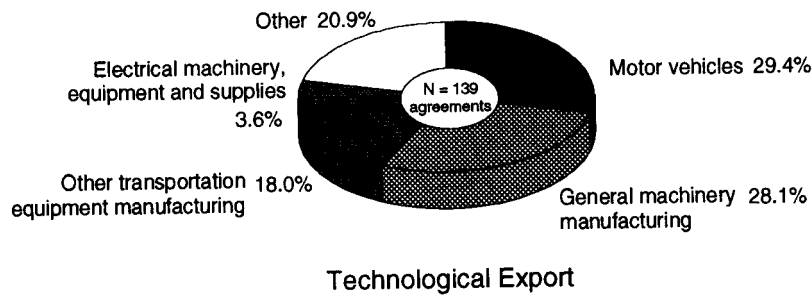


Figure 5-14 Technological Export/Import Agreements in Machinery Field by Industry



The top ranks in both import and export in the ‘machinery’ field were held by the ‘motor vehicles’, ‘general machinery manufacturing’, and ‘other transportation equipment manufacturing’ industries in that order, but while these three industries accounted for 75.5% of exports, they claimed no more than 39.4% of imports. Here, ‘transport, communication, and public utilities’ and ‘wholesale trade’ ranked high in imports (see Figure 5-14).

In the 'chemical' field, the top ranks were held in both import and export by the 'drugs and medicines' and 'industrial chemicals manufacturing' industries; in export these two industries accounted for 60.3% while in import they accounted for 36.4%. Also among the top industries for import were 'wholesale trade' and 'construction' (see Figure 5-15).

Figure 5-15 Technological Export/Import Agreements in Chemical Field by Industry

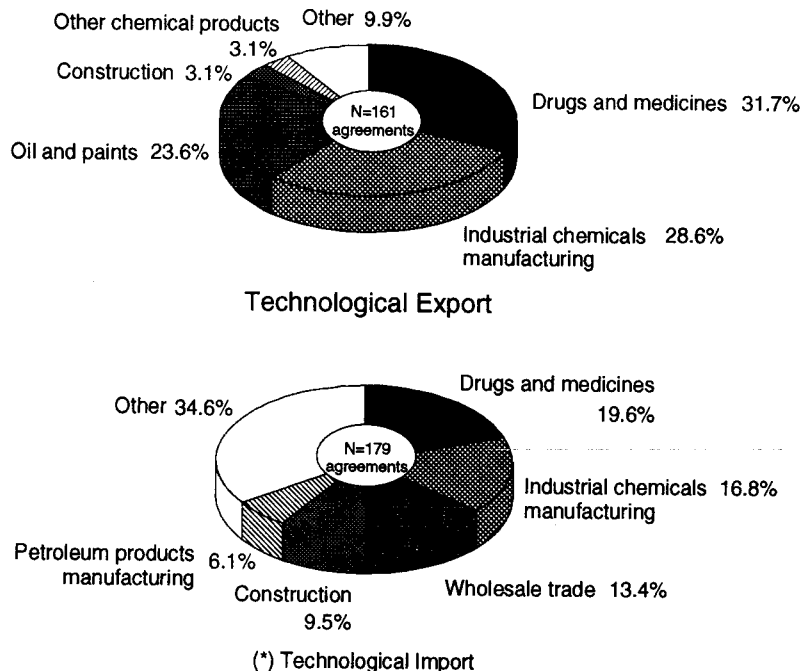
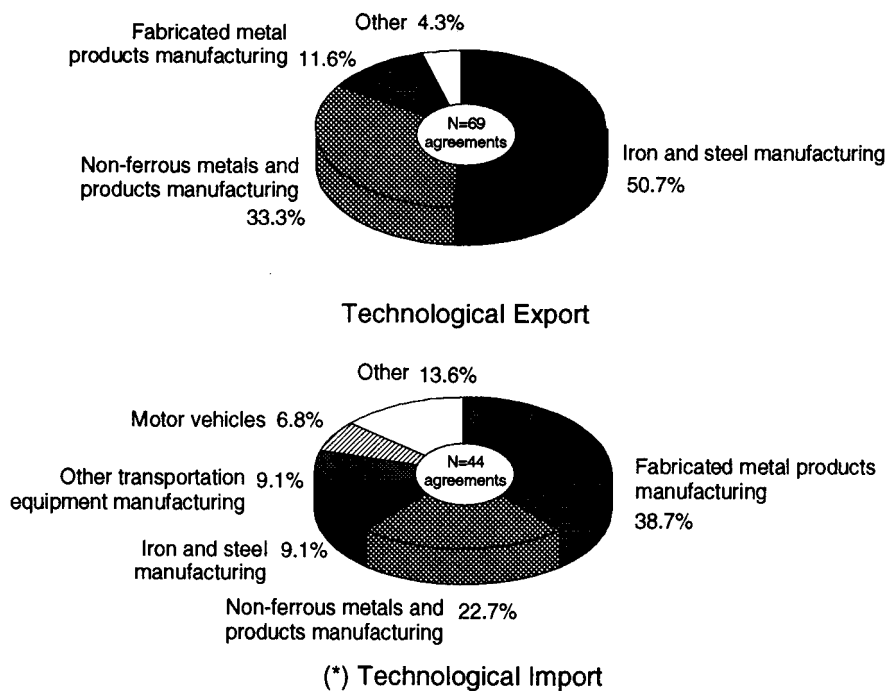


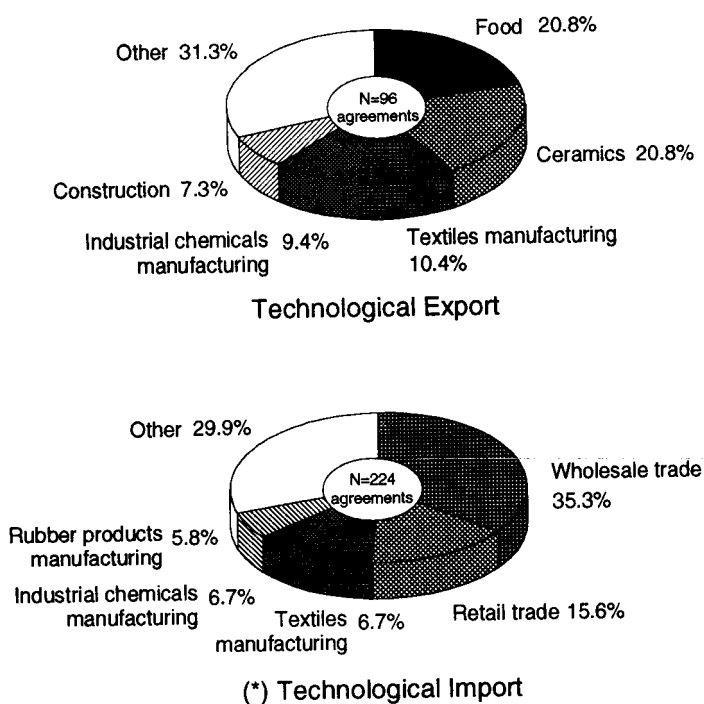
Figure 5-16 Technological Export/Import Agreements in Metals Field by Industry



In the 'metals' field, the top ranking export industry was 'iron and steel manufacturing', with a share of over 50%, followed by 'non-ferrous metals and products manufacturing', and 'fabricated metal products manufacturing'; while these three industries together accounted for 95.7% of exports, they only accounted for 70.5% of imports, of which 38.7% went to 'fabricated metal products manufacturing', with 'iron and steel manufacturing' only responsible for 9.1% (see Figure 5-16).

In the 'miscellaneous' field, there were some substantial differences between import and export. In export, a variety of industries including 'food manufacturing', 'ceramics' and 'textiles manufacturing' took part, while tertiary industries such as 'wholesale trade' and 'retail trade' accounted for more than half of all imports (see Figure 5-17).

Figure 5-17 Technological Export/Import Agreements in Miscellaneous Field by Industry



In all technological fields, including 'electrical', 'machinery', 'chemical' and 'metals', technological export is carried out by industries closely tied to these fields. In technological import, too, industries directly involved in the technological fields concerned are ranked high, but their shares are relatively small, with companies in industries other than these widely taking part.

[Remarks]

The wholesale and retail trade industries include companies which only engage in contracting activities and do not directly utilize the technology traded (trading companies, etc.).

VI. Results of Analysis by Industrial Category

In Chapters IV and V we classified exported technologies by nature and analyzed them from the perspective of technological fields/categories. In this chapter, we will examine exported technologies in terms of industrial categories, focusing mainly on the relationship between individual industries and exported technologies.

1. Export

From which industries was the greatest amount of technology newly exported in FY 1993? Looking at the distribution by industry, we see that the single largest share was that of the 'communication and electronics equipment' industry, followed by the 'electrical machinery equipment and supplies', 'industrial chemicals manufacturing', 'drugs and medicines' and 'motor vehicles' industries; compared to the previous fiscal year, the shares of the 'communication and electronics equipment' and 'motor vehicles' industries fell sharply, while that of 'drugs and medicines' increased (see Table 6-1).

Table 6-1 Breakdown by Industrial Category of Technological Export Agreements

	FY 1992			FY 1993		
	Industrial Category	No. of Agreements	Share	Industrial Category	No. of Agreements	Share
1	Communication and electronics equipment	110	15.4%	Communication and electronics equipment	79	12.6%
2	Motor vehicles	88	12.4%	Electrical machinery, equipment and supplies	61	9.7%
3	Electrical machinery, equipment and supplies	70	9.8%	Industrial chemicals manufacturing	56	8.9%
4	Industrial chemicals manufacturing	54	7.6%	Drugs and medicines	51	8.1%
5	General machinery manufacturing	50	7.0%	Motor vehicles	50	8.0%
6	Non-ferrous metals and products manufacturing	38	5.3%	General machinery manufacturing	49	7.8%
7	Iron and steel manufacturing	36	5.1%	Iron and steel manufacturing	42	6.7%
8	Drugs and medicines	35	4.9%	Oils and paints	38	6.1%
9	Oils and paints	28	3.9%	Non-ferrous metals and products manufacturing	32	5.1%
10	Ceramics	28	3.9%	Other transportation equipment manufacturing	28	4.5%
11	Construction	25	3.5%	Ceramics	26	4.2%
12	Other transportation equipment manufacturing	25	3.5%	Food manufacturing	23	3.7%
13	Food manufacturing	19	2.7%	Construction	16	2.6%
14	Textiles manufacturing	18	2.5%	Textiles manufacturing	13	2.1%
15	Fabricated metal products manufacturing	16	2.2%			
	Other	72	10.1%	Other	62	9.9%
		712	100.0%		626	100.0%

2. Characteristics by Industry

Here we will consider individually the top five industries in which 50 or more technological export agreements were concluded in FY 1993.

(1) Communication and electronics equipment industry

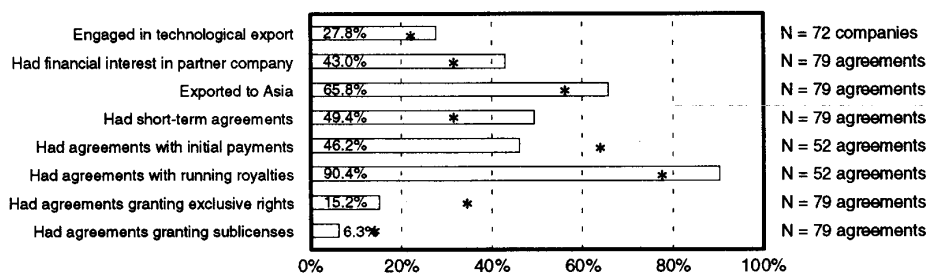
About 30% of companies in this industry are engaged in technological export. The U.S. accounts for the largest number of agreement partners, followed by Asian countries/areas such as China, R.O.K., Taiwan and Thailand. Compared to the average for all industries, this industry is marked by a large proportion of exports to companies in which a financial interest is held, a high percentage of short-term agreements, and low ratios of agreements requiring initial payments and those granting exclusive rights. 90% of all exports by this industry are in the 'electrical' field. Below is shown a breakdown of the technologies exported by this industry under 79 agreements (see Figure 6-1).

Technological Category	Breakdown
Computers (23)	Software (13), printers (3), PCs (1), hard disks (1), other (5)
Wire and wireless communications equipment (15)	Communications equipment technology (14), FAX machines (1)
Electronics and communications parts (10)	Electronics parts (6), semi-conductors (3), other (1)
Home appliances (9)	Air conditioners (5), refrigerators (2), washing machines (1), electric heaters (1)
Television and audio equipment (8)	Audio equipment (5), television equipment (3)
Other (14)	VCRs (3), films (2), ink ribbons (2), motors (1), valves (1), other (5)

* Figures in parentheses indicate the number of agreements (same applies below).

Figure 6-1 Communication and Electronics Equipment Industry

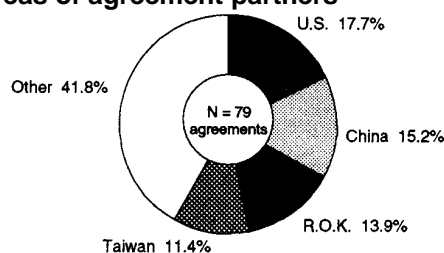
(1) Agreement details



The figures with asterisks (*) show the average of all industries (Same applies below).

(Note) Short-term agreements are agreements whose term is less than 5 years (same applies below).

(2) Home countries/areas of agreement partners



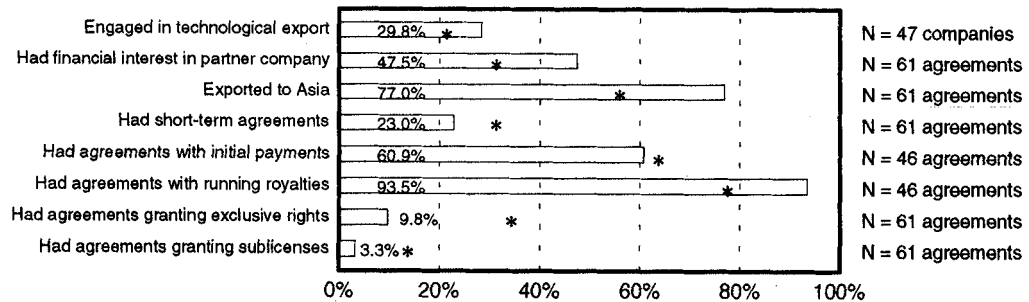
(2) Electrical machinery, equipment and supplies industry

Some 30% of companies in this industry are engaged in technological export. China is ranked No. 1 export destination, accounting for about 30% of agreement partners, followed by R.O.K., the U.S. and Taiwan; the combined share of the top 4 countries/areas is some 70%. Compared to the average for all industries, this industry is noted for large proportions of exports to companies in which a financial interest is held, those bound for Asia, and those requiring initial payments, as well as low ratios of those granting exclusive/sublicense rights. 'Electrical' is the technological field in which the largest number of exports were conducted by this industry, accounting for 92% of the total. Below is shown a breakdown of the technologies exported by this industry under 61 agreements (see Figure 6-2).

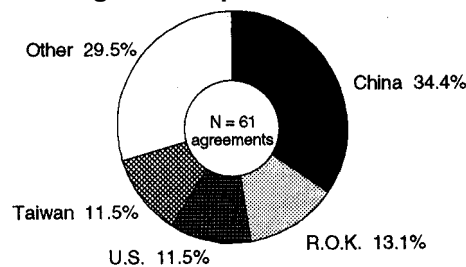
Technological Category	Breakdown
Home appliances (19)	Electric refrigerators (7), lighting fixtures (3), air conditioners (2), wiring accessories (2), washing machines (1), other (4)
Electronics and communications parts (19)	Semi-conductors (7), electronic parts (6), Braun tubes (3), other (3)
Industrial-use electrical machinery (6)	Motors (5), electrical equipment for motor vehicles (1)
Transportation equipment (5)	Electrical wiring for motor vehicles (5)
Other electrical machinery (5)	Batteries (4), other (1)
Other (7)	Communications equipment (2), audio equipment (2), magnetic discs (1), other (2)

Figure 6-2 Electrical Machinery, Equipment and Supplies Industry

(1) Agreement details



(2) Home countries/areas of agreement partners



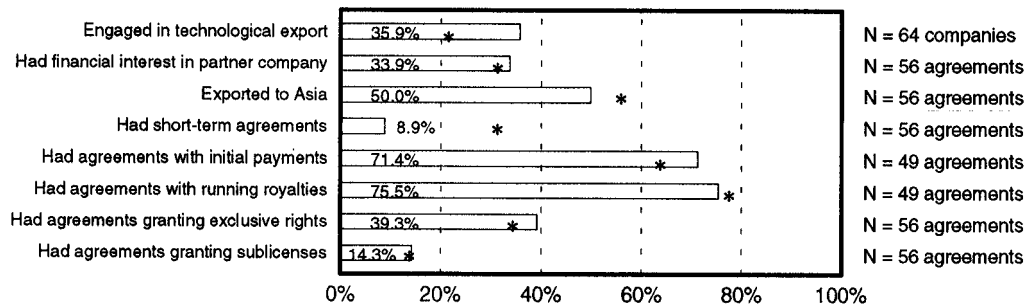
(3) Industrial chemicals manufacturing industry

Over 30% of companies in this industry are engaged in technological export. The U.S. accounts for the largest number of agreement partners, followed by R.O.K. and Taiwan. The proportion of exports to Asia and the proportion of short-term agreements are lower than the average for all industries. ‘Chemical’ is the technological field in which the largest number of exports were made by this industry, accounting for 82% of the total. Below is shown a breakdown of the technologies exported by this industry under 56 agreements (see Figure 6-3).

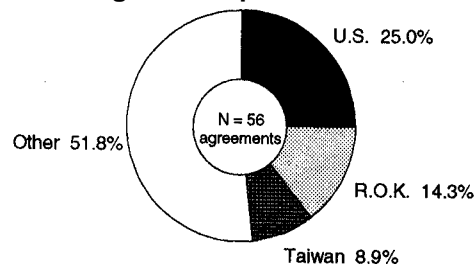
Technological Category	Breakdown
Organic chemicals (21)	Resins (13), raw materials (6), other (2)
Plastic products (8)	Composite materials (5), plastic forming methods (2), other (1)
Petroleum products (7)	Lubricating oil (5), other (2)
Miscellaneous chemical products (7)	Agricultural chemicals (2), adhesives (2), chemicals for papermaking (2), other (1)
Oils and paints (4)	Paints (2), surface active agents (2)
Other (9)	Drugs and medicines (3), inorganic chemicals (3), cement (1), other (1)

Figure 6-3 Industrial Chemicals Manufacturing Industry

(1) Agreement details



(2) Home countries/areas of agreement partners



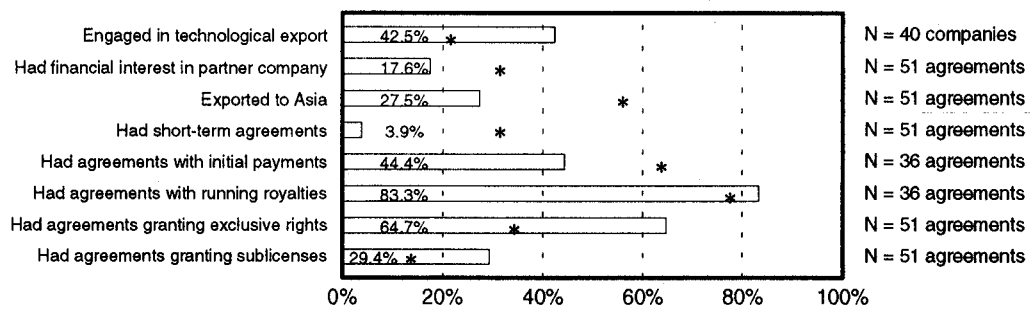
(4) Drugs and medicines

About 40% of companies in this industry are engaged in technological export. While the U.S., Germany and China are ranked high, export destinations are well spread among a fairly large number of companies. Compared to the average for all industries, the proportion of agreements granting exclusive/sublicense rights is high, while the proportion of exports to companies in which a financial interest is held, the proportion of exports to Asia, the proportion of short-term agreements and the proportion of agreements requiring initial payments are low. All exports by this industry are in the ‘chemical’ field. Below is shown a breakdown of the technologies exported by this industry under 51 agreements (see Figure 6-4).

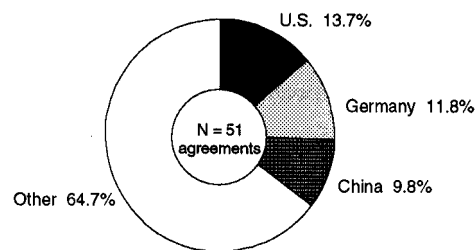
Technological Category	Breakdown
Drugs and medicines (44)	Drugs and medicines (42), veterinary drugs and medicines (2)
Miscellaneous chemical products (5)	Insecticides (3), agricultural chemicals (2)
Other (2)	Organic chemical products (2)

Figure 6-4 Drugs and Medicines Industry

(1) Agreement details



(2) Home countries/areas of agreement partners



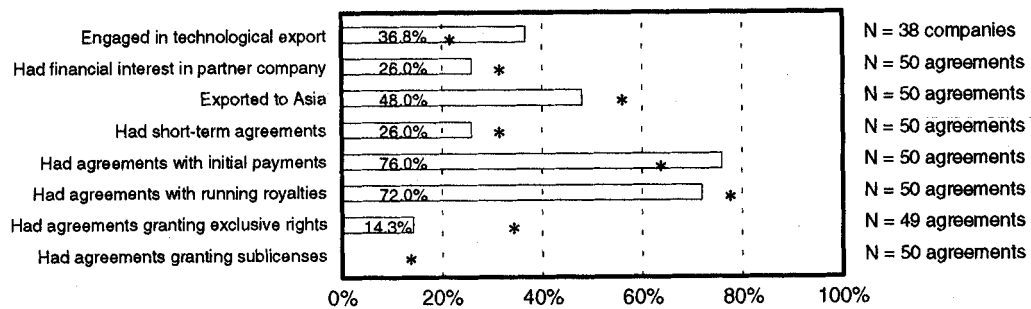
(5) Motor Vehicles

A little less than 40% of the companies in this industry are engaged in technological export. R.O.K. is the No. 1 export destination, accounting for about a quarter of agreement partners. The proportion of agreements granting exclusive/sublicense rights is lower than the all-industry average. 'Machinery' is the technological field in which the largest number of exports occur, accounting for 82% of the total. Below is shown a breakdown of the technologies exported by this industry under 50 agreements (see Figure 6-5).

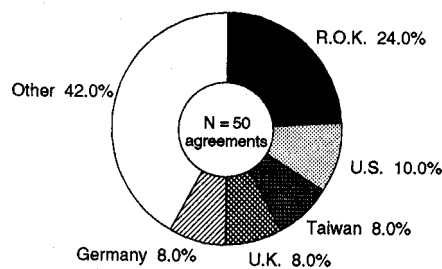
Technological Category	Breakdown
Transportation equipment (37)	Motor vehicles [bodies] (8), motor vehicles [power systems] (8), motor vehicles [drive systems] (5), motor vehicles [heaters/air conditioners] (4), motor vehicles [control systems and instrumentation] (4), motor vehicles [other] (4), buses (2), motorcycles (1), Ships (1)
Other (13)	Industrial machinery (4), software (2), Electric equipment for motor vehicles (2), communications equipment (1), other (4)

Figure 6-5 Motor Vehicles Industry

(1) Agreement details



(2) Home countries/areas of agreement partners



Technology breakdowns are also shown for industries ranked 6th to 14th, which exported 10 or more technologies in FY 1993 below. In addition, Table 6-2 shows export destination countries/areas by industry, while Table 6-3 summarizes the technological export trends in various industries.

(6) General machinery manufacturing

Technological Category	Breakdown
Other general industrial machinery (10)	Industrial furnaces (5), environmental equipment (4), other (1)
Other machinery (9)	Freezers (5), copying machines (1), other (3)
Transportation equipment (7)	Ships (2), motor vehicles [heaters/air conditioners] (2), motorbikes (1), other (2)
Metals processing machinery (6)	Machine tools (4), other (2)
Wire and wireless communications equipment (4)	FAX machines (2), information equipment (2)
Other (13)	Parking equipment (2), pumps (2), computer accessories (2), looms (1), boilers (1), dust collectors (1), other (4)

(7) Iron and steel manufacturing

Technological Category	Breakdown
Fabricated metal products (18)	Joints (16), other (2)
Iron and steel (16)	Production technology (11), processing technology (3), other (2)
Other (8)	Superconductivity (3), environmental equipment (1), other (4)

(8) Oils and paints

Technological Category	Breakdown
Oils and paints (36)	Paints (30), synthetic detergents (3), inks (2), surface active agents (1)
Other (2)	Cosmetics (1), other (1)

(9) Non-ferrous metals and products manufacturing

Technological Category	Breakdown
Non-ferrous metals (16)	Electric wires/cables (14), copper smelting (1), aluminum (1)
Fabricated metal products (7)	Machine parts (4), tools (2), other (1)
Transportation equipment (3)	Motor vehicles [air conditioning] (2), motor vehicles [drive systems] (1)
Other (6)	Software (2), packaging materials (1), plastic products (1), other (2)

(10) Other transportation equipment manufacturing

Technological Category	Breakdown
Transportation equipment (10)	Ships (5), forklifts (2), trucks (1), other (2)
Boilers/engines (5)	Boilers (5)
Power machinery (3)	Parking equipment (3)
Other (10)	Construction machinery (2), Pumps (2), power generating equipment (2), environmental equipment (1), air conditioners (1), other (2)

(11) Ceramics

Technological Category	Breakdown
Ceramics (20)	Fireproof materials (13), sanitary earthenware (3), glass (2), concrete (1), enamel (1)
Other (6)	Environmental equipment (2), software (1), other (3)

(12) Food manufacturing

Technological Category	Breakdown
Food products (12)	Confectionery (4), beer (3), condiments/sweeteners (2), frozen foods (1), instant noodles (1), drinks (1)
Agriculture, forestry and fisheries (8)	Plant cultivation (6), new plant varieties (2)
Drugs and medicines (3)	Drugs and medicines (3)

(13) Construction

Technological Category	Breakdown
Construction (6)	Construction technologies (6)
Chemical machinery and equipment (5)	Environmental equipment (5)
Other (5)	Parking equipment (4)

(14) Textiles manufacturing

Technological Category	Breakdown
Textiles (7)	Dyeing control (7)
Organic chemicals (2)	Resins (2)
Other (4)	Plastic forming materials (2), other (2)

Table 6-2-(1) Export Destination Countries/Areas by Industrial Category

	Overall		Communication and electronics equipment		Electrical machinery, equipment and supplies	
	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993
1	U.S. (142)	R.O.K. (104)	U.S. (19)	U.S. (14)	China (10)	China (21)
2	R.O.K. (98)	U.S. (100)	China (16)	China (12)	R.O.K. (10)	R.O.K. (8)
3	China (56)	China (80)	R.O.K. (13)	R.O.K. (11)	Taiwan (9)	U.S. (7)
4	Taiwan (53)	Taiwan (52)	Taiwan (12)	Taiwan (9)	U.S. (9)	Taiwan (7)
5	Thailand (51)	Thailand (32)	Germany (8)	Thailand (4)	India (7)	India (3)
6	U.K. (35)	U.K. (29)	Hong Kong (7)	Hong Kong (4)	Thailand (4)	Hong Kong (3)
7	Malaysia (34)	Germany (26)	Malaysia (6)	Malaysia (3)	Indonesia (4)	Thailand (2)
8	Germany (24)	Indonesia (19)	Singapore (6)	Singapore (3)	Malaysia (3)	Germany (2)
9	Indonesia (23)	India (18)	Brazil (6)	U.K. (3)	Other (14)	Canada (2)
10	India (20)	France (15)	Other (17)	France (3)		Other (6)
	Other (176)	Other (151)		Other (13)		
Total	712 agreements	626 agreements	110 agreements	79 agreements	70 agreements	61 agreements

	Industrial chemicals manufacturing		Drugs and medicines		Motor vehicles	
	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993
1	U.S. (21)	U.S. (14)	U.S. (7)	U.S. (7)	R.O.K. (19)	R.O.K. (12)
2	Thailand (7)	R.O.K. (8)	R.O.K. (6)	Germany (6)	U.S. (10)	U.S. (5)
3	U.K. (5)	Taiwan (5)	China (3)	China (5)	U.K. (10)	Taiwan (4)
4	Singapore (4)	Germany (4)	U.K. (3)	R.O.K. (3)	Malaysia (8)	U.K. (4)
5	R.O.K. (3)	China (4)	Germany (3)	Taiwan (3)	China (7)	Germany (4)
6	Italy (3)	Thailand (4)	Italy (3)	France (3)	Taiwan (6)	Thailand (3)
7	Belgium (3)	Indonesia (3)	Denmark (2)	Italy (3)	France (5)	Malaysia (3)
8	Taiwan (2)	Singapore (3)	Other (8)	Mexico (3)	Mexico (5)	Hungary (3)
9	Other (6)	U.K. (3)		Chile (3)	India (4)	Mexico (3)
10		Other (8)		Other (15)	Other (14)	Other (9)
Total	54 agreements	56 agreements	35 agreements	51 agreements	88 agreements	50 agreements

	General machinery manufacturing		Iron and steel manufacturing		Oils and paints	
	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993
1	R.O.K. (13)	R.O.K. (25)	U.S. (10)	U.S. (8)	R.O.K. (4)	China (4)
2	China (7)	U.S. (6)	Thailand (5)	U.K. (6)	U.S. (4)	U.K. (3)
3	Thailand (7)	China (4)	Taiwan (2)	R.O.K. (4)	Thailand (3)	R.O.K. (2)
4	U.S. (5)	Taiwan (4)	Indonesia (2)	Indonesia (4)	Turkey (3)	Taiwan (2)
5	Taiwan (3)	Thailand (3)	U.K. (2)	Taiwan (3)	Taiwan (2)	India (2)
6	Malaysia (2)	Italy (2)	Venezuela (2)	China (2)	Malaysia (2)	Philippines (2)
7	India (2)	Other (5)	Other (13)	Malaysia (2)	Indonesia (2)	Germany (2)
8	Germany (2)			Singapore (2)	U.K. (2)	Netherlands (2)
9	France (2)			Canada (2)	Other (6)	Australia (2)
10	Italy (2)			Other (9)		New Zealand (2)
	Other (5)					Other (15)
Total	50 agreements	49 agreements	36 agreements	42 agreements	28 agreements	38 agreements

Table 6-2-(2) Export Destination Countries/Areas by Industrial Category

	Non-ferrous metals and products manufacturing		Other transportation equipment manufacturing		Ceramics	
	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993
1	U.S. (10)	China (7)	R.O.K. (7)	R.O.K.(10)	R.O.K. (5)	China (6)
2	R.O.K. (6)	U.S. (6)	U.S. (4)	U.S. (4)	Thailand (5)	India (5)
3	Taiwan (4)	Taiwan (3)	China (2)	China (3)	Indonesia (3)	U.K. (3)
4	Malaysia (4)	Australia (3)	Taiwan (2)	Italy (3)	Brazil (3)	R.O.K. (2)
5	Thailand (3)	R.O.K. (2)	Thailand (2)	Taiwan (2)	Philippines (2)	U.S. (2)
6	Indonesia (3)	Malaysia (2)	Netherlands (2)	Thailand (2)	Other (10)	Brazil (2)
7	China (2)	Sweden (2)	Other (6)	Other (4)		Other (6)
8	India (2)	Other (7)				
9	Other (4)					
10						
Total	38 agreements	32 agreements	25 agreements	28 agreements	28 agreements	26 agreements

	Food manufacturing		Construction		Textiles manufacturing	
	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993
1	U.S. (7)	U.S. (5)	R.O.K. (5)	R.O.K. (4)	Indonesia (4)	Indonesia (3)
2	Thailand (3)	Thailand (3)	Taiwan (4)	Taiwan (3)	U.S. (3)	Thailand (3)
3	Other (9)	R.O.K. (2)	Germany (3)	Germany (2)	Taiwan (2)	France (3)
4		Australia (2)	China (2)	Canada (2)	Thailand (2)	Taiwan (2)
5		Other (11)	Singapore (2)	Other (5)	U.K. (2)	Other (2)
6			Italy (2)		Other (5)	
7			Netherlands (2)			
8			Other (5)			
9						
10						
Total	19 agreements	23 agreements	25 agreements	16 agreements	18 agreements	13 agreements

Table 6-3 Results of Comprehensive Analysis by Industrial Category (%)

Industrial category	Engaged in technological export		Financial interest in partner		Export to Asia		Short-term agreement	
	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993
Overall	26.8	23.6	35.1	31.2	54.1	56.2	27.8	31.3
Communication and electronics equipment	29.0	27.8	43.6	43.0	60.0	65.8	26.4	49.4
Electrical machinery, equipment and supplies	40.0	29.8	34.3	47.5	74.3	77.0	30.0	23.0
Industrial chemicals manufacturing	31.6	35.9	25.9	33.9	35.2	50.0	14.8	8.9
Drugs and medicines	26.5	42.5	5.7	17.6	28.6	27.5	8.6	3.9
Motor vehicles	58.8	36.8	44.3	26.0	52.3	48.0	20.5	26.0
General machinery manufacturing	36.6	29.1	34.0	30.6	74.0	79.6	20.0	34.7
Iron and steel manufacturing	33.3	34.5	16.7	9.5	38.9	42.9	58.3	52.4
Oils and paints	58.3	50.0	30.8	42.1	71.4	50.0	30.8	52.6
Non-ferrous metals and products manufacturing	38.5	44.4	28.9	31.2	63.2	59.4	28.9	31.3
Other transportation equipment manufacturing	45.0	36.4	36.0	14.3	60.0	64.3	20.0	28.6
Ceramics	25.0	30.0	35.7	38.5	71.4	61.5	46.4	11.5
Food manufacturing	24.5	20.0	31.6	21.7	42.1	30.4	31.6	13.0
Construction	14.5	10.1	24.0	25.0	64.0	56.3	52.0	31.3
Textiles manufacturing	39.1	20.8	55.6	7.7	66.7	69.2	38.9	61.5

Industrial category	With initial payment		With running royalties		With exclusive rights		With sublicense rights	
	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993	FY 1992	FY 1993
Overall	56.8	62.6	75.2	76.8	37.3	34.6	10.4	13.6
Communication and electronics equipment	45.1	46.2	83.3	90.4	14.5	15.2	6.4	6.3
Electrical machinery, equipment and supplies	53.7	60.9	89.6	93.5	31.4	9.8	4.3	3.3
Industrial chemicals manufacturing	60.0	71.4	76.0	75.5	25.9	39.3	18.5	14.3
Drugs and medicines	43.5	44.4	78.3	83.3	42.9	64.7	34.8	29.4
Motor vehicles	60.5	76.0	86.0	72.0	44.3	14.3	8.0	0
General machinery manufacturing	79.6	62.8	81.6	83.7	56.0	44.9	2.0	4.1
Iron and steel manufacturing	45.5	36.8	75.8	73.7	22.9	14.3	0	7.1
Oils and paints	50.0	76.3	100.0	94.7	53.8	57.9	7.7	50.0
Non-ferrous metals and products manufacturing	78.9	66.7	73.7	59.3	32.4	19.4	13.2	16.1
Other transportation equipment manufacturing	81.0	84.6	85.7	92.3	72.0	50.0	0	3.6
Ceramics	64.3	76.9	50.0	84.6	32.1	53.8	3.6	11.5
Food manufacturing	54.5	58.8	36.4	47.1	42.1	66.7	21.1	33.3
Construction	54.2	80.0	8.3	46.2	44.0	43.8	20.0	18.8
Textiles manufacturing	26.7	71.4	66.7	41.7	50.0	15.4	21.4	0

VII. Comparison with Previous Fiscal Year

The following changes were observed from the results of two consecutive annual surveys of the state of technological export conducted in FY 1992 and FY 1993.

1. General Trends

(i) Conclusion of technological export agreements

The number of companies engaged in technological export among those covered in the survey in FY 1993 was 217, which is about the same as the previous fiscal year's figure (216), but the overall number of agreements decreased from 712 to 626, thus reducing the number of agreements per company from 3.3 to 2.9, i.e. by 12.1% (see Figure 3-4).

(ii) Home countries/areas of agreement partners

As in the previous fiscal year, Asia accounts for the majority (56.2%) of the destinations. By country/area, the U.S. lost ground dramatically to be taken over by R.O.K. as the No. 1 destination of Japanese technological exports. Of the Asia-bound exports, those to Southeast Asian countries decreased considerably, while those to China increased (see Figure 3-5 and Table 3-1).

(iii) Nature of technology

The 'electrical' field accounts for 25.7% of the total, down 3.5% from the previous fiscal year (29.2%), while the share of the 'chemical' field increased by 6.3% from the previous year (19.4%) to 25.7%, a figure identical to the 'electrical' field. By technological category, the proportion of technologies relating to 'transportation equipment' fell sharply, while 'drugs and medicines' saw an increase (see Figure 4-1 and Table 4-1).

(iv) Other

Agreement details such as financial interest, the agreement term, value receiving method, and granting of exclusive/sublicense rights do not vary much as a whole, although there are minor difference from region to region and from one technological field to another.

However, it is difficult to identify general trends based on small numerical changes in the data from the previous fiscal year for the following reasons:

- (1) The survey only targeted companies capitalized at 1 billion yen or more.
- (2) The survey was based on a questionnaire so that the compiled data and analysis only covered those companies that replied, instead of dealing with all the technological exports that had actually taken place.
- (3) The number of available export agreements for each criterion became extremely small in the course of detailed analyses by export destination country/area, technological category, etc., thus preventing a proper reflection of the reality.
- (4) Given that this is only a second survey, the first being a year earlier, it is difficult to assess changes in terms of whether they are one-off phenomena or genuine trends.

Therefore, we would like to focus our analysis on Southeast Asia *¹(Note *11) and China, which exhibited dramatic changes in terms of the number of agreements and agreement details over the two-year period during which the surveys were undertaken.

2. Shift from Southeast Asia to China

(1) Changes in export numbers

In FY 1992 technological exports to Southeast Asia stood at 127, accounting for 17.8% of the total, but the numbers fell sharply across the board in FY 1993, by 40% to 76, which is 12.1% of the total. The number of technological exports to China, on the other hand, was only 56 or 7.9% of the total in FY 1992, but climbed to 80 in FY 1993, and China has now surpassed Southeast Asia, accounting for 12.8% of the total. For this reason, we will analyze the nature of the reduction in technological exports to Southeast Asia and the increase in those to China below (see Table 7-1). (No significant numerical changes have been observed regarding technological exports to the other major Asian destinations, i.e. R.O.K., Taiwan, India and Hong Kong.)

Table 7-1 Trends in Technological Exports to Asia

	FY 1992		FY 1993	
	Export Agreements	Share	Export Agreements	Share
Overall	712	100.0%	626	100.0%
Asia	385	54.1%	352	56.2%
R.O.K.	98	13.8%	104	16.7%
China	56	7.9%	80	12.8%
Taiwan	53	7.4%	52	8.3%
Hong Kong	12	1.7%	14	2.2%
India	20	2.8%	18	2.9%
4 Southeast Asian countries	127	17.8%	76	12.1%
Thailand	51	7.2%	32	5.1%
Malaysia	34	4.8%	14	2.2%
Indonesia	23	3.2%	19	3.0%
Singapore	19	2.7%	11	1.8%
Other	19	2.7%	8	1.3%

(2) Nature of technology

First of all, technological exports to China increased dramatically in the 'chemical' (§6 Æ 17 agreements) and 'electrical' (§25 Æ 35) fields. With Southeast Asia, on the other hand, numbers fell in all fields, with the electrical (§36 Æ 19) and 'miscellaneous' (§31 Æ 15) fields experiencing particularly dramatic dives (see Figure 7-1).

1 'Southeast Asia' here refers to Thailand, Indonesia, Malaysia and Singapore, which, among ASEAN countries, were found to have received a large number of technological exports from Japan in this fiscal year's survey.

Figure 7-1 Trends in Technological Exports to China and Southeast Asia (by technological field)

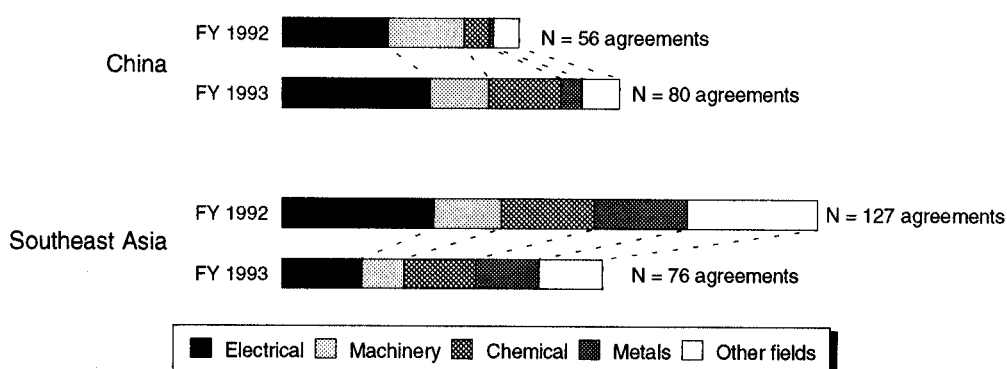


Table 7-2 Trends in Technological Exports to China and Southeast Asia (by technological category)

	FY 1992	FY 1993
China	Home appliances (8)	Home appliances (15)
	Electronics/communications parts (7)	Electronics/communications parts (10)
	Transportation equipment (7)	Oils/paints (5)
	Power generation/transmission equipment (4)	Transportation equipment (4)
	Drugs and medicines (3)	Other chemical products (4)
	Applied electronics equipment (3)	Ceramics (4)
	Total (56)	Total (80)
Southeast Asia	Computers (14)	Transportation equipment (9)
	Transportation equipment (11)	Computers (8)
	Home appliances (8)	Iron and steel (6)
	Ceramics (8)	Organic chemicals (6)
	Oils/paints (7)	Oils/paints (6)
	Textiles (7)	
	Total (127)	Total (76)

By technological category, growth is particularly noticeable in ‘home appliances’ (§8 Æ 15) and ‘electronics/communications parts’ (§7 Æ 10), which were at the top of the list in the last fiscal year as well. With Southeast Asia, on the other hand, numbers fell dramatically in ‘computers’ (§14 Æ 8), ‘home appliances’ (§8 Æ 2) and ‘ceramics’ (§8 Æ 1) (see Table 7-2).

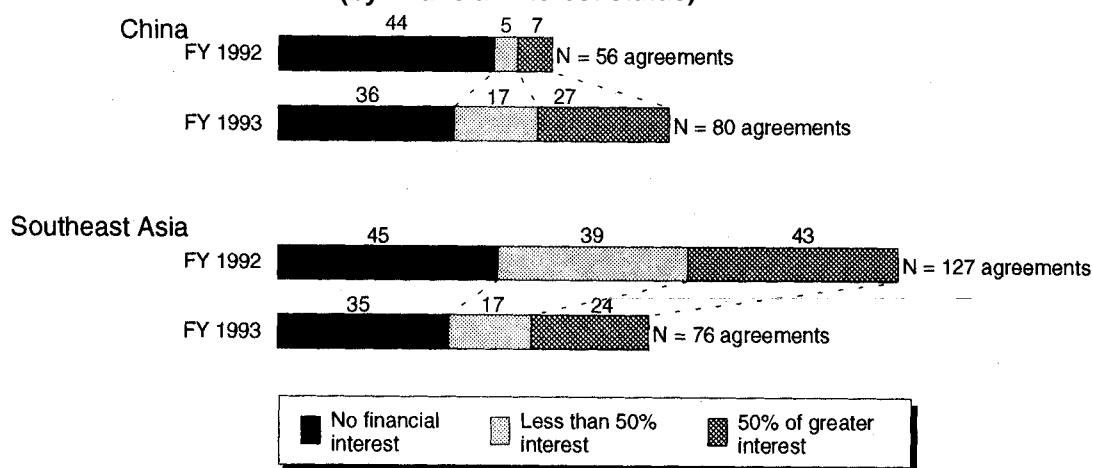
(3) Financial interest

We will now change our perspective to the status of financial interest. Exports to companies in which no interest is held decreased for both China and Southeast Asia, while those in which an interest is held at all levels, i.e. both ‘less than 50%’ and ‘50% or more’, increased dramatically for China but decreased for Southeast Asia. The dramatic change from FY 1992 to FY 1993 in the ratio of export partner companies

in which a financial interest was held, to those in which no financial interest was held, only involved China and Southeast Asia, and this seems to be attributable to a direct shift from Southeast Asia to China in exports to companies 'in which interest is held', which is believed to have occurred on a major scale (see Figure 7-2).

To cope with the strong yen or in search of a cheap and abundant labor supply, many companies, centering on manufacturing industries, have set up production bases in Southeast Asia with capital investment, and have been carrying out local production for some time now. However, labor has recently become too expensive even in Southeast Asia, and overseas factories are being moved to areas where labor costs are still low, such as China. Labor costs weigh particularly high in the production of 'home appliances' compared to other technology areas, and China, with its population in excess of 1 billion, holds promise as a lucrative future market as well. These facts seem to explain why the move to set up factories in China is being pursued so briskly.

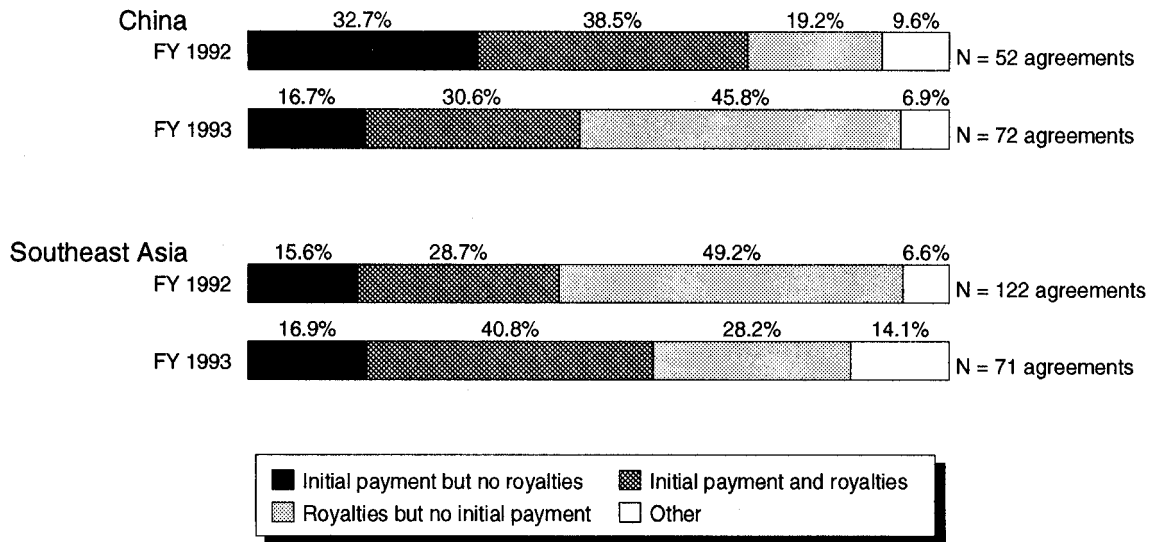
Figure 7-2 Trends in Technological Exports to China and Southeast Asia (by financial interest status)



(4) Value receiving methods

The change in the proportions of export partner companies in which a financial interest is held and those in which no financial interest is held has resulted in a change in value receiving methods. With China, the proportion of agreements requiring 'initial payments only' has decreased, while that of agreements requiring 'running royalties only' has increased. Conversely, with Southeast Asia, the proportion of agreements requiring 'initial payments only' has increased, while that of agreements requiring 'running royalties only' has decreased. This can easily be inferred from the relationship between the proportion of agreements requiring initial payments and the presence or absence of financial interest in the partner companies, as discussed in Chapter III (see Figure 7-3).

Figure 7-3 Trends in Value Receipt Methods



VIII. Analysis of Companies not Engaging in Technological Export

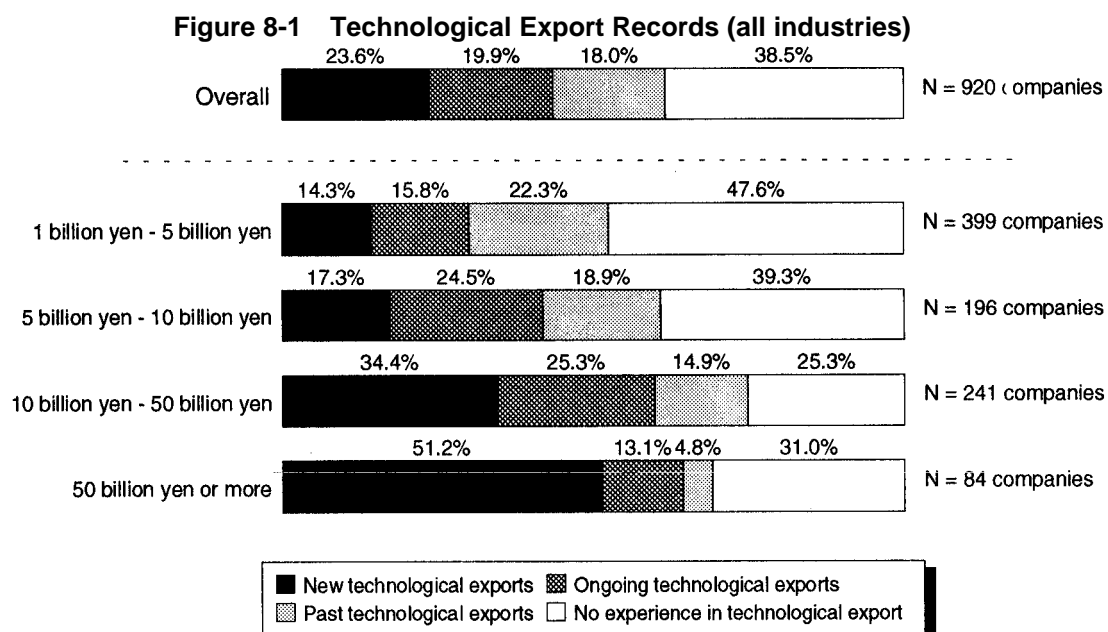
Up until Chapter VII, we have only analyzed companies which undertook new technological exports in FY 1993. We will now present the results of an investigation into companies which did not undertake new technological exports in FY 1993 — covered for the first time in the survey.

1. Companies not Engaging in New Technological Export in FY 1993 (in terms of conclusion of technological export agreements)

Of the 920 companies which responded, 217 were found to have concluded at least one new technological export agreement during FY 1993, i.e. about one in four companies (23.6%), the same level as the previous fiscal year. In this case, do the remaining three quarters have no past experience in technological export at all?

In addition to the 23.6% engaged in new technological export as mentioned above, 19.9% had ‘ongoing technological exports’, and another 18.0% had previously ‘engaged in technological export’. This brings the ratio of companies which have experience in concluding technological export agreements to about 6 out of 10 (61.5%), leaving only 4 in 10 (38.5%) as companies which have never engaged in technological export.

By capitalization, about half the companies ‘capitalized at 1 billion to less than 5 billion yen’ (47.6%) have never engaged in technological export, while the ratio falls to 39.3% and 25.3% for companies ‘capitalized at 5 billion to less than 10 billion yen’ and those ‘capitalized at 10 billion to less than 50 billion yen’, respectively. This means that the proportion of companies which have never engaged in technological export tends to decrease as the capitalization level increases, although the trend is somewhat reversed towards the top end of the scale, with 31.0% of companies ‘capitalized at 50 billion yen or more’ having never engaged in technological export (see Figure 8-1).



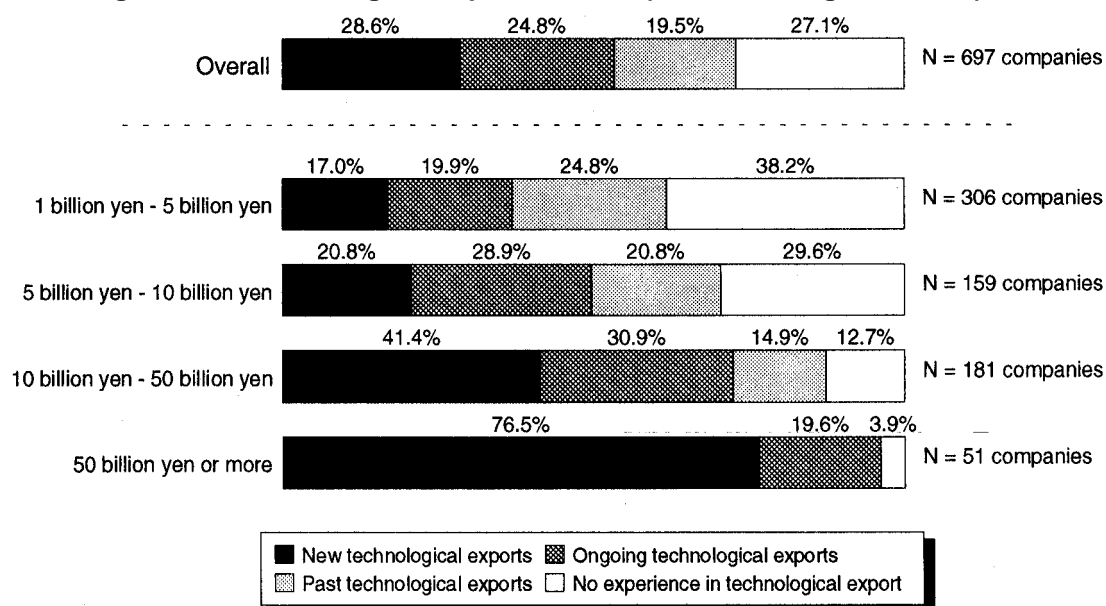
An examination focusing on manufacturing industries *2 has revealed that 28.6% of companies engaged in new technological export in FY 1993 and that overall about 7 out of 10 companies (72.9%) have at some stage engaged in technological export; both of these figures are higher than the respective all-industry averages.

Starting at 38.9% for companies 'capitalized at 1 billion to less than 5 billion yen', the proportion of companies which have never engaged in technological export fell steadily as the capitalization level increased, with only 3.9% for companies in the category of 'capitalized at 50 billion yen or more'. A similar trend still holds even about companies that previously engaged in technological export. in FY 1993 are excluded.

Companies 'capitalized at 50 billion yen or over' include many who only serve domestic markets, such as public utilities and transportation businesses, resulting in a high proportion of companies with no experience in technological export. However, within manufacturing industries, which do not include such enterprises, most companies were found to be engaged in new or ongoing technological export (see Figure 8-2).

By industrial category, it is clear that the proportion of companies which have never engaged in technological export increases in non-manufacturing industries, such as transport, communication and public utilities, wholesaling and retailing, and construction. Among manufacturing industries, the proportion of companies which have no experience in technological export is high in fabricated metal products manufacturing. This seems to be attributable to the fact that the companies in fabricated metal products manufacturing which were surveyed contained those capitalized at less than 5 billion yen at a high ratio, 21 out of 28.

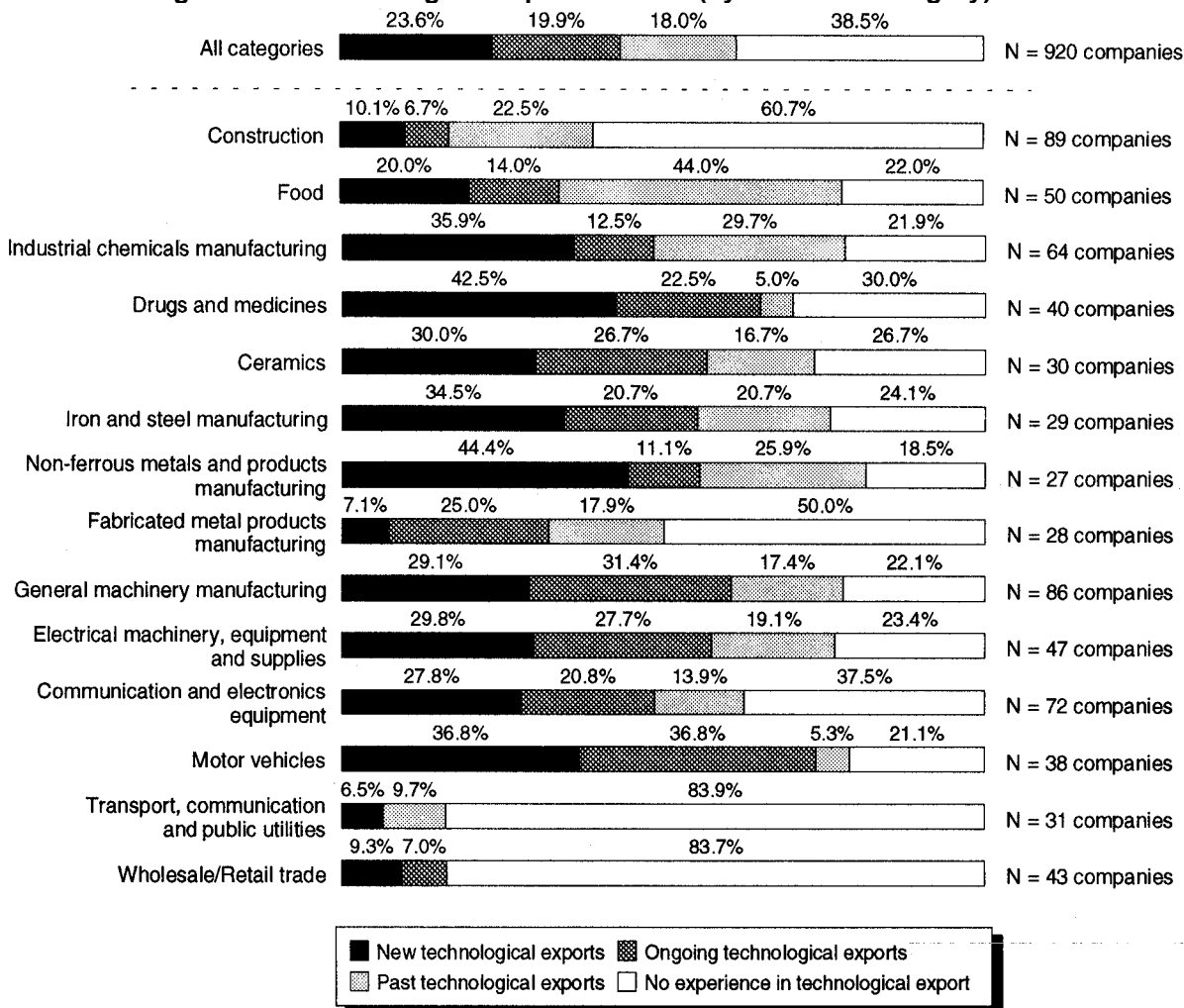
Figure 8-2 Technological Export Records (manufacturing industries)



² 'Manufacturing industries' refer to industries numbered 4 - 25 in Appendix 2, Reference Material 1, i.e. all industries listed there excluding agriculture, forestry and fisheries, mining, construction, transport, communication and public utilities, wholesaling and retailing, etc.

Other notable trends include a high proportion in the motor vehicles industry of companies currently engaged in technological export, which stands at 73.6%, compared to other industries, where companies currently engaged in technological export are defined as consisting of those which have technological export agreements newly concluded in FY 1993 and those which have ongoing technological export agreements (see Figure 8-3).

Figure 8-3 Technological Export Records (by industrial category)



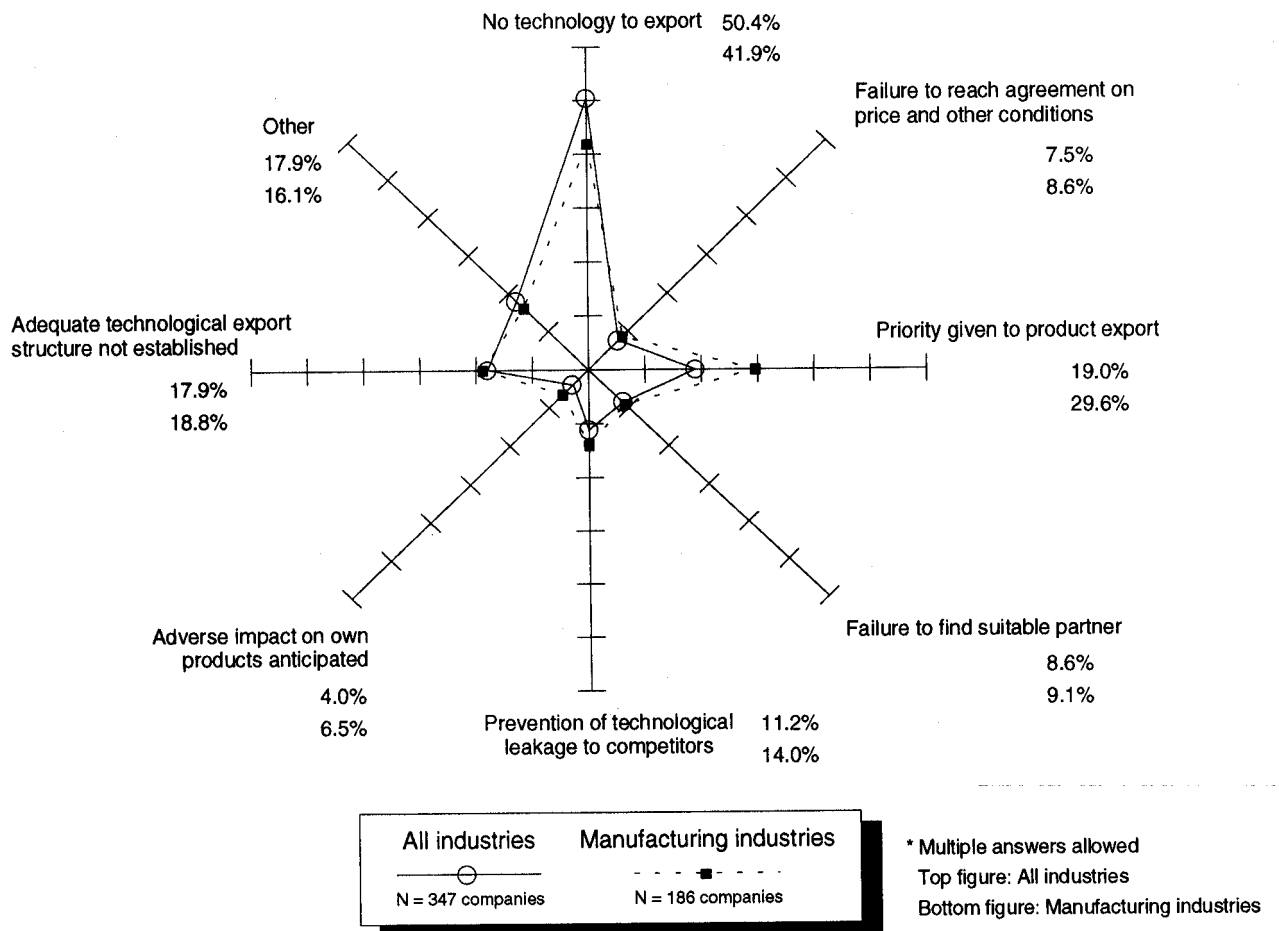
* Industries with 25 or more responding companies selected.

2. Companies with No Experience in Technological Export

(1) Reasons for not engaging in technological export

Companies which had ‘never engaged in technological export’ were surveyed for reasons why they had shunned technological export. Overall, the most commonly reason was ‘no technology to export’, which was cited by the majority (50.4%) of the responding companies, followed by ‘priority given to product export’ (19.0%), ‘adequate technological export structure not established’ (17.9%) and other (17.9%). With manufacturing industries only, the proportion of ‘no technology to export’ is lower, though it is still the most common reason (41.9%), while that of ‘priority given to product export’ is greater (29.6%) (see Figure 8-4).

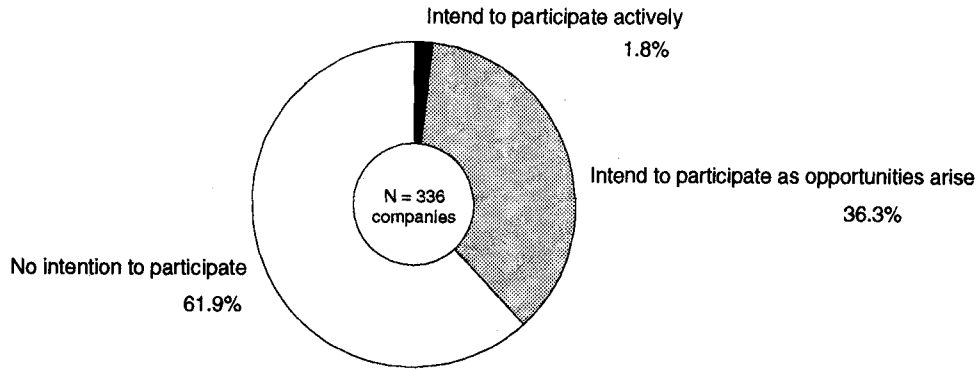
Figure 8-4 Reasons for Not Engaging in Technological Export (all industries)



(2) Future directions

Companies which had never engaged in technological export were also investigated regarding their future technological export policies. The results revealed that some 4 out of 10 companies were considering embarking on technological export in the future, with 36.3% expressing intention to ‘participate as opportunities arise’, although the proportion of companies that intended to ‘participate actively’ was only 1.6% (see Figure 8-5).

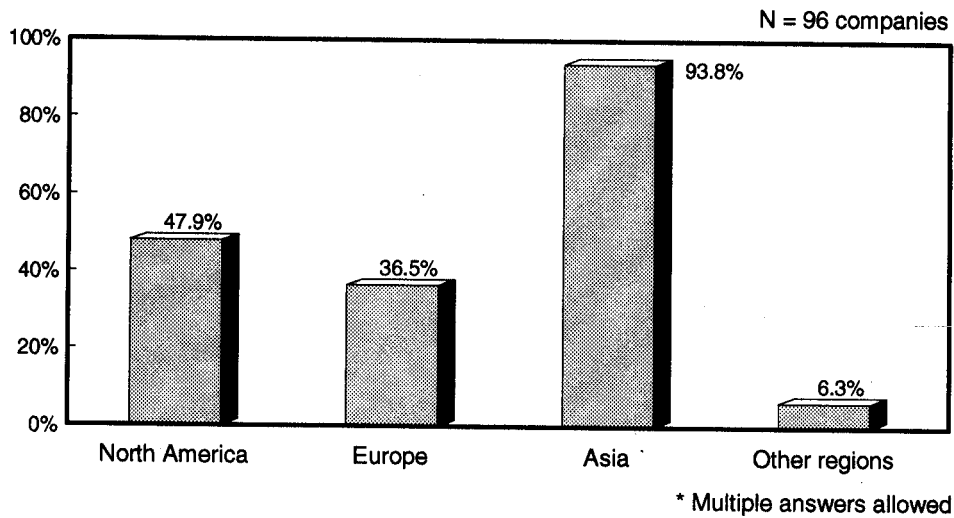
Figure 8-5 Company Policy on Future Technological Export



Then, what kinds of technological trade partners do these companies have in mind? To answer this question, the 128 companies that expressed an intention to ‘participate actively’ or ‘participate as opportunities arise’ in the above inquiry were asked to elaborate on their preferred technological trade partners in terms of their home regions and financial interest status.

While 26 out of the 122 companies which responded (21.3%) had no definite plans regarding the home region of the partner, 93.8% of the remaining 96 companies mentioned Asia as the preferred destination of future technological export, followed by North America, 47.9%, and Europe, 36.5%. Consequently, the proportion of Asia, to which 54.1% and 56.2% of Japan’s new technological export was directed in FY 1992 and FY 1993, respectively, looks set to increase further in the future as a destination of technology transfer by Japanese companies (see Figure 8-6).

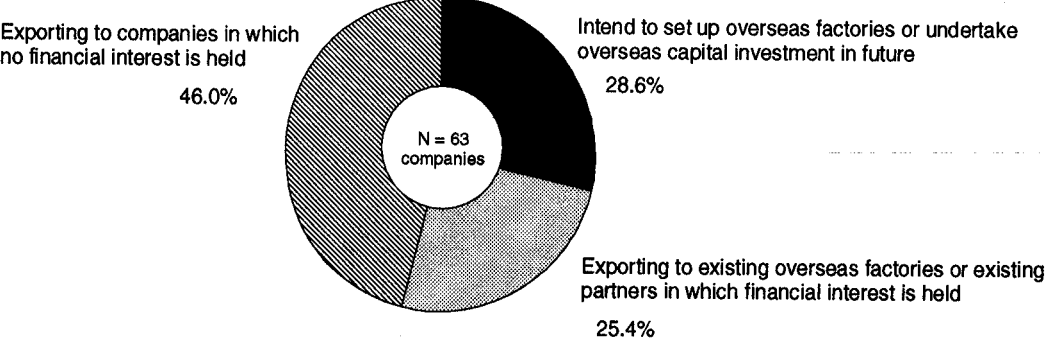
Figure 8-6 Preferred Technological Export Destinations



About half (48.4%) of the responding companies had not decided on the financial interest status of possible technological trade partners. 46.0% of the remaining 63 intended export to ‘companies in which no financial interest is held’, 28.6% intended to set up overseas factories or undertake overseas capital investment in future and export to such factories or other entities, and 25.4% intended to export to ‘existing overseas factories or existing partners in which a financial interest is held’. Thus, as far as this investigation is concerned, more companies are considering technological export to partners in which

financial interest is held rather than those intending to direct their technological export to partners in which no financial interest is held. This contrasts with the finding of this report that 68.8% of all new technological exports in FY 1993 was directed to companies in which no financial interest was held, suggesting a trend such that Japan's technological trade centers on transactions with partners in which no financial interest is held (see Figure 8-7).

Figure 8-7 Export Partners and Financial Interest



IX. Summary

Continuing from FY 1992, this report was compiled to elucidate the present status of technological export and examine it in detail from a quality perspective by conducting a questionnaire survey on various aspects of new technological export undertaken during FY 1993, such as technology details, forms of technology (patents, know-how, trademarks, etc.) and value receiving methods, followed by cross-calculations of survey results by the nature of technology, export destination country/area, and industrial category. In addition, the FY 1993 survey also covered companies which did not engage in technological export in terms of reasons and future directions. In examining the results of the survey, one should bear in mind the following:

- (1) This survey targeted only those companies with capital of 1 billion yen or more which are involved in R & D activities or connected in some way to technological trade.
- (2) This survey compiles and analyzes only the responses given by companies on the survey form and does not cover all technological exports.
- (3) This survey covers new technological exports in FY 1993 and there are certain aspects that may have been influenced by economic conditions at that time.

1. General Trends

- (i) About one in four (23.6%) of the companies which responded to this survey concluded new technological export agreements in FY 1993, the average number of technological export agreements for each technology exporting company being 2.9 (§3.3). The proportion of companies engaged in technological export increases with the scale of capitalization, as does the average number of technological export agreements per company (see Figures 3-1, 2 and 3).
- (ii) In only 31.2% (35.1%) of technological export agreements did the Japanese exporter hold a financial interest in the agreement partner company. This shows that Japanese technological export has been taking place primarily through transactions with companies in which no financial interest is held (see Figure 3-6).

2. Trends by Region and Country/Area

By region, 56.2% (§54.1%) of technological exports went to Asia, 19.6% (§19.1%) to Europe, 19.0% (§21.8%) to North America, and 5.1% (§5.1%) to other regions (see Figure 3-5). The characteristics of exports to each region are laid out below.

- (i) 32.1% (§32.4%) of agreements were for terms of 5 years to less than 10 years and 26.7% (§24.6%) for terms of 1 year to less than 5 years; together these two ranges accounted for almost 60% of all agreements. Export to Asia was marked by a higher proportion of short-term agreements than export to North America and Europe, with the estimated average agreement term for Asia (7.0 years) shorter than that for North America (9.5 years) or Europe (9.3 years) by more than 2 years (see Figure 3-8, Table 3-2).
- (ii) By country/area, top export destinations were R.O.K., 16.6% (§13.8%), the U.S., 16.0% (§19.9%), China 12.8% (§7.9%), Taiwan 8.3% (§7.4%), and Thailand 5.1% (§7.2%), with Asia accounting for 4 of the top 5 destinations. Compared to the previous fiscal year, exports to the U.S. and Southeast Asia fell, while those to China rose (see Table 3-1).

- (iii) Analysis at the country/area level revealed fair differences among individual countries/areas within Asia. Namely, the proportion of exports to companies in which a financial interest was held was low for R.O.K., Indonesia, and India, but high for Thailand, Malaysia and China. The proportion of agreements requiring initial payments was high for India, R.O.K. and Indonesia, but low for Malaysia and China, and the proportion of agreements requiring running royalties was low for Indonesia. Thus, countries/areas of Asia do not necessarily follow the same trends, and differing circumstances and policies in individual countries/areas give rise to major disparities in technological export status (see Figures 3-7, 11 and 12).

3. Trends by Nature of Technology

- (i) Dividing exported technology into 5 technological fields — ‘electrical’, ‘machinery’, ‘chemical’, ‘metals’, and ‘miscellaneous’ — the respective shares of exports were as follows: 25.7% (§29.2%) ‘electrical’, 25.7% (§19.4%) ‘chemical’, 22.2% (§23.5%) ‘machinery’, 15.3% (16.9%) ‘miscellaneous’, and 11.0% (§11.1%) ‘metals’. Although the share of the ‘chemical’ field increased from the previous fiscal year, exports are still distributed relatively evenly among the fields. A closer examination by technological category resulted in the following ranking: transportation equipment 10.4% (§13.9%), drugs and medicines 8.0% (§5.9%), oils and paints 6.5% (§3.7%), electronics/communications parts 6.2% (§6.6%) and computers 6.1% (§6.3%). Compared to the previous fiscal year, the share of transportation equipment fell, while those of drugs and medicines, and oils and paints rose (see Figure 4-1, Table 4-1).
- (ii) A study by technological field of the characteristics of exports to various destination regions relative to overall technological export trends revealed a high proportion of exports to Asia and a low proportion of exports to Europe in the ‘electrical’ and ‘machinery’ fields. In the ‘chemical’ field, the proportion of exports to Europe was high and that of exports to Asia low (see Figure 4-2).

4. Comparison of Technological Import and Export

Comparing the results of this survey and the FY 1993 edition of the “Trend Analysis of Foreign Technology Introduction” (NISTEP Report No. 39), also prepared by our institute, we obtained the following results:

- (i) As already mentioned, there was a fairly even distribution across technological fields in technological export, but technological import was clearly concentrated in the ‘electrical’ field, with more than two-thirds of imports belonging to this field. This bias is due to the high share of software in computer-related technological imports, which is almost half (47.9%) (see Figures 5-2 and 11).
- (ii) The proportion of technological export agreements requiring initial payments is lower than that of technological import agreements (export: 62.6%; import 71.4%), but the proportion of agreements requiring running royalties is higher (export: 76.8%; import 56.1%). This difference can be attributed to the high percentage of technological import agreements that include software, agreements in which initial payments are believed to be dominant (see Figure 5-8).

The proportion of technological export agreements granting exclusive rights is somewhat higher than that of import agreements (export: 34.6%; import: 25.3%), but the proportion of agreements granting sublicense rights is lower (export: 13.6%; import: 31.8%) (see Figure 5-9).

The proportion of export agreements which include patents is higher than that of import agreements (export: 42.8%; import 26.7%); know-how is included in most agreements, both export and import (export: 87.7%; import: 79.4%) (see Figure 5-10).

- (iii) Technological export in all technological fields — ‘electrical’, ‘machinery’, ‘chemical’, ‘metals’, and ‘miscellaneous’ — is carried out by industries closely tied to these fields. Technological import, on the other hand, involves a wide array of companies in industries other than those directly related to specific technological fields as well (see Figures 5-13 - 17).

5. Comparison with Previous Fiscal Year

- (i) Of all the companies targeted in the survey, those engaged in technological export stand at 217, virtually unchanged from the previous fiscal year (216), while the number of agreements decreased from 712 to 626, causing the number of export agreements per company to fall from 3.3 to 2.9 (by 12.1%) (see Figure 3-4).
- (ii) As in the case of the previous fiscal year, exports to Asia account for more than half the total (56.2%). By country/area, exports to the U.S. fell sharply, allowing R.O.K. to take over as the No. 1 destination of Japanese technological exports (see Figure 3-5, Table 3-1).
- (iii) Technologies in the ‘electrical’ field account for 25.7% of the total, down 3.5% from the previous year (§29.2%), while the technology share of the ‘chemical’ field increased by 6.3% from the previous year (§19.4%) — to 25.7%, the same percentage as the electrical field. By technological category, the number of technologies belonging to ‘transportation equipment’ fell sharply, while those in ‘drugs and medicines’ and ‘oils and paints’ increased (see Figure 4-1, Table 4-1).
- (iv) Agreement details such as financial interest status, agreement terms, value receiving methods and exclusive/sublicense rights have not changed much overall, although there have been minor variations among regions and technical fields.
- (v) By country/area, exports to China increased by about 40%, while those to Southeast Asia decreased by about 40%, causing China to overtake Southeast Asia in terms of the number of exports. By technological field, there is a marked increase in exports to China in the ‘electrical’ and ‘chemical’ fields, and decrease in exports to Southeast Asia in the ‘electrical’ and ‘miscellaneous’ fields. By financial interest status, the proportion of exports to companies in which a financial interest is held fell sharply for China, but increased for Southeast Asia. This seems to reflect a shift in investment targets out of Southeast Asia, where the advantages for Japanese companies have diminished due to a recent rise in labor costs, into China, which is attractive as both a source of cheap labor supply and a consumer market (see Figures 7-1 and 2).

6. Trends in Companies Not Engaging in Technological Export

- (i) Although the proportion of companies which concluded at least one new technological export agreement during FY 1993 was only 23.6%, 19.9% had ‘ongoing technological exports’, and another 18% had ‘engaged in technological export’ previously, bringing the number of companies which have never engaged in technological export down to 38.5%. The proportion of companies that have never engaged in technological export decreased as the capitalization level increased, and, limiting the discussion to manufacturing industries, 96.1% of all companies ‘capitalized at 50 billion yen or over’ had new or ongoing technological export projects. By industrial category, the percentage of companies which have never engaged in technological export was high in non-manufacturing industries, such as transport, communication and public utilities, wholesaling and retailing, and construction, while, among manufacturing industries, it was high in the ‘fabricated metal products industry’.
- (ii) Cited by 50.4% of companies never engaged in technological export, the most common reason for staying away from technological export was ‘no technology to export’, followed by ‘priority given to product export’ (19.0%) and ‘adequate technological export structure not established’ (17.9%).
- (iii) Regarding future technological export policies of companies that have never engaged in technological export, some 4 out of 10 were found to be considering embarking on technological export in the future,

with 36.3% expressing an intention to ‘participate as opportunities arise’, though the proportion of companies that intended to ‘participate actively’ was very small, at only 1.8%. Apart from those saying they had no definite plans yet, most of these companies cited Asia as the home region of their preferred technological trade partners. As a result, Asia’s position as a destination of Japanese technological exports looks set to strengthen further in the future.

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[Postscript]

On the heels of the ‘Trends in Technology Exports from Japan (FY 1992 edition)’, this report has compiled the results of a survey undertaken to obtain an understanding of the actual state of Japan’s technological export.

As in the previous year, Mr. Yamanaka Takashi, formerly a special research fellow, played the central role in carrying out the major tasks of the survey, such as the preparation of survey forms and computation of data.

We would like to take this opportunity to thank Mr. Awatsuji Yasuhiro, Researcher, and Mr. Yoon, Dae-Soo, Special Research Fellow, of Survey Research Group No. 3, and numerous other people from various sections of the Institute, including the Information Analysis Division for the assistance and cooperation provided in the course of the survey and research. We would also like to express our gratitude to the Institute for Future Technology for the help provided in conducting the survey and tallying the data.

Our thanks also go to all the people from companies covered in this survey who took the time to cooperate in this survey and provide us with valuable information and views.