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SMALL-MEDIUM SIZED CANADIAN FIRMS
AND THEIR INTERNATIONAL BUSINESS
AND R & D ACTIVITIES

by

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March 1984

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The views and opinions expressed in this report are those of the authors and are not necessarily endorsed by the Department of Regional Industrial Expansion.

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1. INTRODUCTION

In 1979, Mitel Corporation initiated a major microelectronics development program. Certain expenditures for this program became eligible in 1980 for assistance under a Special Electronics Program of the Enterprise Development Board. Pursuant to an agreement between the company and the Board, the company was entitled to receive assistance of up to approximately \$21 million for expenditures incurred between June 1, 1979 and March 31, 1983.

The terms of the agreement included, among other conditions, the following provisions:

1. That Mitel undertake to manufacture in Canada not less than 75% of all microelectronic products (integrated circuits and hybrids) produced by it during the term of the agreement, and to limit the number of personnel in its microelectronics facilities outside Canada to 25 persons.
2. That Mitel may not transfer technical data or inventions to any person for the purpose of manufacturing outside Canada the products or processes which are the subject of the agreement without permission of the Board.
3. That the two major shareholders of Mitel, Dr.

M.C.J. Copeland and T.H. Matthews agree not to sell to a non-Canadian, prior to March 31, 1983, any of their shares, if this means that either major shareholder would hold less than 15% of the company's shares unless the shares are first offered to the federal government at the same price for a period of 90 days, and the government declines to purchase the shares.

Details of this agreement are referred to in a Mitel Corporation Prospectus issued by Burns and Fry Ltd. and dated May 29, 1981.

The implications of this agreement include the following: that without some constraint the company would have a tendency to expand its R&D outside of Canada; that such foreign expansion would not be in the interests of Canada, and therefore that Canada benefits from R&D conducted domestically; that an agreement is required to ensure that the R&D would be conducted in Canada; and that it is possible for the government to monitor and enforce such an agreement.

The purpose of this study is to examine the determinants of the location of R&D activities by small and medium size Canadian firms. Some assessment will also be made of whether it is possible to enforce an agreement, such as that between Mitel and the federal government.

The study is divided into the following parts:

1. A survey of the literature associated with the determinants of the R&D function in multinational enterprises.

2. A description of the sample of companies from which data were collected via a questionnaire, followed by an analysis of the data.

3. A discussion of the data in terms of present and prospective Canadian government policies.

2. REVIEW OF LITERATURE

Some research on multinational enterprises (MNEs) is functionally oriented so that examinations have been made of topics such as production, marketing, financing and labour relations. Research and development (R&D) as a functional activity has also received considerable attention. For example, it is argued that the relationship between R&D and direct foreign investment (DFI) is two-way. The performance of R&D may cause firms to engage in DFI as a way of spreading the costs of research over a larger market, due to the public good aspects of R&D. Alternatively, the undertaking of DFI encourages firms to do R&D, as the firms learn of opportunities, through their international network of companies, which can be exploited through engaging in R&D. In fact, both factors could be at work, but the influence of one or the other could be greater at a particular point in time [1].

The relationship between R&D and MNEs also occurs because there are often strong incentives to commercialize the results of R&D through foreign investment as opposed to trade (exports). This incentive is associated with the

desire by the owners of the results of R&D to protect their property rights from those who would steal or copy them.

The product cycle theory of international trade and investment can be viewed as a theory of technology transfer first through exports and then investment as the technology becomes disseminated [2].

The determinants of the location of R&D within the MNE focus on the reasons why R&D may be centralized or decentralized. In almost all cases, centralization is assumed to take place in the parent company and home country. Decentralization is associated with R&D occurring in the subsidiary company and host country. The various propositions can be summarised as follows [3]:

1. Decentralization of R&D increases with firm size. The larger the firm, the more likely there will be at least some R&D undertaken in subsidiaries. The reasons given are that there may be economies of scale in the conduct of R&D, and that once these are exhausted in the parent company, some R&D may be located abroad. Implicit in this proposition is a view of the nature of the production function for R&D. Another view is that scale economies in R&D are unimportant, that there are no diseconomies in splitting up R&D and thus decentralization is encouraged from the outset.

2. Decentralization increases with corporate diversification. It is argued that, as diversification occurs, a company becomes acquainted with a greater range of experience and opportunities. Diversification may

dictate the need for R&D to be undertaken for different products and processes, and some of this may be performed best in locations other than the parent company or home country.

3. The degree of centralization/decentralization will vary with the stage of technological development being undertaken. If it can be assumed that R&D can be broken into three parts, invention or basic research, innovation, and development or applied research, then it is suggested that the extremes of basic research and applied research are more likely to be decentralized than the intermediate stage of innovation. The implication of this proposition is that there is a different production function for each stage of the R&D process.

Basic research will be located where the intellectual resources, for example, can be found. This may be the U.S., but may also be western Europe, Japan or even eastern Europe. Intellectual resources may work best in their own national environment. On the other hand, applied research may involve a type of product modification or process adaptation to a particular set of circumstances, and may again be performed best in a host country where the good is produced and sold. A variation of this proposition is that decentralization of R&D is more likely to occur where a product is near the end of its life cycle, although previously there may be little R&D being done at this stage.

4. Firms in industries which stress product modification are more likely to diversify their R&D than firms which stress process modification. Centralization of process modification R&D is more likely to occur, except where the process is being adapted to local conditions. The suggestion here is that those R&D activities that are associated with a local environment, for product or process reasons, are more likely to be decentralized so as to ensure conformity with local conditions.

5. Decentralization will occur where it is necessary for the performers of R&D to keep in touch with local manufacturing operations, where product or process modification/adaptation to local conditions is taking place. (This proposition may be viewed as an extension of 4. above.)

6. A need to monitor and to use scientific and technical knowledge in another country will cause R&D to be decentralized. It is known for example that foreigners are present in Silicon valley in order to monitor R&D developments in U.S. electronic firms. Locating a foreign firm's R&D activities in this area might achieve similar results.

7. R&D will be decentralized the greater the production and sales by subsidiaries as a percentage of total production and sales of the MNE. The larger the relative importance of the subsidiary to the MNE, the greater will be the likelihood that R&D will be decentralized.

8. Government policies will influence the location of R&D, especially R&D grants and subsidies, taxation, patents, copyright and persuasive-bargaining policies, as conducted by an agency such as the Foreign Investment Review Agency.

These propositions have been derived from a combination of theorising and empirical research. They are indicative of the present state of knowledge. The U.S. National Science Foundation (NSF) reports that, in 1979, U.S. firms did \$2.7 billion or 11% of their R&D abroad, a rise from about 7% in 1975. Large firms have been mainly responsible for the increase in the following areas: transportation, machinery, electrical equipment and chemicals. The reasons these firms went abroad was, according to the NSF, due mainly to the need to conform to foreign government regulations[4].

R&D in Canada

The nine propositions are based on the global activities of large U.S. firms, and need to be modified for the case of small and medium size firms in Canada, where some of these firms are foreign- and others Canadian-controlled. Studies of R&D in Canada show that foreign-controlled firms are less research intensive, more technology intensive and less export intensive than their Canadian controlled counterparts. The foreign controlled firms come from technology intensive industries where the

R&D is done in the parent company and transferred to Canada in the parent-subsidiary linkage; the output of these firms services the Canadian market. Canadian controlled firms, on the other hand, perform the R&D in Canada, usually associated with a narrower range of products, sell products in Canada and then engage in export sales[5]. In a further questionnaire-based study of Canadian firms, it was found that small firms with less than 50 employees financed a high proportion of their R&D from internal sources, and had problems with raising external financing of R&D and with marketing. These firms tended not to diversify but to fill gaps in existing product markets[6].

For R&D by Canadian-controlled firms the nine propositions can be modified as follows. First, the Canadian firms are small or medium size and produce a narrow range of products. The size and diversification factors would not encourage decentralization of R&D. Second, the U.S. sales of the Canadian firms can be expected to be a high proportion of total sales, and this would encourage decentralization of R&D, with an emphasis on applied (adaptation) and product-oriented R&D, because of the need to keep in touch with local manufacturing operations. Third, lower cost conditions in the U.S. and the need to conform to local government regulation could be expected to influence the decisions to decentralise R&D. In the case of U.S. controlled-subsidiaries in Canada, any R&D conducted abroad will be performed by their parent company rather than by an affiliate of the subsidiary in Canada.

Canadian Entrepreneurship

A further set of findings is relevant to understanding why and when small and medium size Canadian-controlled firms may undertake R&D abroad. These findings can be gleaned from our previous studies of technical entrepreneurship and investment in the U.S. by small and medium-size Canadian firms. A study of the factors which advance and obstruct Canadian entrepreneurship was made in 1970-71. Forty-seven small firms were surveyed as being representative of ventures founded by technologically-oriented entrepreneurs[7]. Ten years later the same group of firms was surveyed in order to determine the reasons for subsequent success and failure[8]. Both studies showed that the investor-owners tended to be excessively possessive of their firms, reluctant to give up financial and management control even when the survival of the firm dictated such a course of action.

A second finding was that the firms attempted to find a niche in their market or industry, and to avoid competition with larger firms as far as possible. Third, when the technologically-oriented firms did decide to diversify, they stressed geographic over product diversification in order to remain in their niche, but in a larger market. Finally, over time, thirteen of the group of surviving firms had become threshold firms[9] in transition between small-medium and large firms, where they were undergoing managerial and organizational changes as well as the need for different financial and marketing arrangements. At a

certain point, product as well as geographic diversification had to be contemplated.

A second set of characteristics are suggestive of the reasons why and how such firms invest abroad, especially in the U.S. market. A study on this topic was published in 1978, involving a group of 25 small and medium size Canadian firms with investments in the U.S. The findings of this study noted the following[10]:

1. The firms had established themselves in a product market niche, were unwilling to diversify except by way of geographic expansion and this led them to the U.S. as their first foreign market.
2. The firms had both technological and international business experience, the latter usually gained from exporting.
3. Exporting to the U.S. had usually been undertaken prior to establishing production operations in the U.S.
4. The subsidiaries in the U.S. were wholly-owned by their Canadian parent companies, and had little management autonomy. All key management decisions were made in Canada.
5. Twenty-two of the firms had entered the U.S. market by establishing new facilities, and only three had followed the acquisition route.

In the context of the present study, the literature on both R&D in large MNEs, and on R&D and foreign investment by small-medium size Canadian firms should be kept in mind. In almost all cases Canadian parent companies with foreign investments are smaller than their U.S. counterparts, and the U.S. market is ten times the size of the Canadian market. For a U.S. firm to sell in Canada is comparable to the U.S. firm servicing one of the U.S. regional markets. For a Canadian firm to service the whole U.S. market is a tremendous undertaking, which may shift the specific gravity of the firm from Canada to the U.S.

The Canadian government is concerned not only about foreign investment in Canada, but about losing Canadian investment to the U.S. If that loss is accompanied by a shift of the R&D function to the U.S., then R&D employment opportunities for Canadians may be lost as well as general employment and growth opportunities. This will only be the case if the alternative is for the Canadian firms to locate R&D, investment and employment in Canada. No one can be sure that this is the alternative which would be chosen. In order to throw some preliminary light on these issues, a questionnaire was designed and sent to a group of Canadian companies.

3. QUESTIONNAIRE SURVEY

Sample and Questions

During September-October 1983, a five page pre-tested questionnaire was sent to 102 small and medium sized, research and development oriented companies. The purpose of the questionnaire was to obtain information about the international business and research and development activities of these companies, with particular reference to their activities and operations in the United States. A pre-condition for selection was that each company be Canadian controlled, engage in research and development activity, and, as a minimum, have a sales subsidiary in the United States.

The list of companies was compiled with the assistance of a number of business, association and government officials, and augmented by information drawn from various directories and newspaper clippings. The Canadian Advanced Technology Association, the USAF Systems Command Liaison Office and the Conference Board were especially helpful in the initial compilation process. Of the original 102 firms, 10 were later dropped for a variety of reasons such as, the company having no "research and development expenditure"; it did not qualify as "Canadian controlled"; it has no affiliate in the United States; or it had moved and was unreachable.

Of the completed and returned questionnaires, 41 were deemed to be useable--i.e., a 44.6 percent response rate.

The 41 respondents were further subdivided into three groups:

Group A. This group includes 25 companies, and each one of them has at least one foreign operating affiliate in the United States engaged in the manufacture and sale of products or services. All U.S. affiliates are wholly-owned subsidiaries, and ten of them are engaged in some research and development work, primarily in the developmental area. Nine of the 25 parent companies have subcontracted some of their research and development work to non-affiliated organizations in the United States. Again, most of this work is in the development phase of R&D. Besides the U.S. affiliates, 5 of the 25 companies have foreign affiliates based in other countries, primarily located in the European Economic Community.

Group B. Six companies are included in this group. Unlike Group A, these companies only have sales subsidiaries in the United States; however, all six have at least one foreign manufacturing affiliate located abroad. The primary function of the U.S. sales subsidiary is to merchandise the Canadian parent company's product line in the U.S. market. Four of the six companies conduct some research and development work in at least one of their overseas subsidiaries, and two of the parent companies have subcontracted certain of their research and development requirements

to non-affiliates in the European Economic Community. As in the case of Group A, the R&D emphasis is on development.

Group C. The ten companies in this group have no foreign manufacturing subsidiary, but they all have at least one sales subsidiary in the United States. The research and development activity of the ten firms is exclusively based in Canada.

Some of the lines of business engaged in by the 41 firms are listed in Exhibit 1. It should be noted that with few exceptions, most of the firms manufactured single or narrow product lines. Almost three-fourths of the respondents had their head office in Ontario, followed by Quebec, British Columbia, Alberta, with one representative each from Manitoba, Saskatchewan and Nova Scotia. In addition to the questionnaires, personal interviews were conducted with sixteen of the respondents.

Exhibit 1

SELECT LINES OF BUSINESS

Laboratory Instruments
Exploration Instrumentation
Software and Computer Services
Telecommunications Equipment
Office Automation Systems
Energy Monitoring Equipment
Fibre Optic Systems
Radio Frequency Filters
Microwave, Broadcast Systems Transmitters
Design, Development & Manufacture of Marine Towing Systems
Industrial Electronics
Special Die Casting Machines
Data Communications
Aerospace Advanced Technology Products
Computer Based Control Systems
Automotive Parts Systems
Cellular Communications Systems
Vision Systems for Robots
Avionics Equipment
Electronic Security Systems
Magnetics
Local Area Networks
Off-Road Transport Vehicles
Electro-Optical Instrumentation
Design & Manufacture of Integrated Circuits
Laser Development

SURVEY RESULTS

Tables 1A, 1B, 1C

1. As might be expected, firms with overseas operating subsidiaries (Groups A & B) are significantly larger than Group C firms. Of the 19 firms with annual sales in excess of \$25 million, only one Group C firm is represented.

2. Six of the 41 firms have an annual sales volume in excess of \$100 million, and 7 have a labour force in excess of 1000. None of these firms are from the Group C category. While these firms may at first blush appear large, they are in fact medium-sized in their respective industries.

3. The Group C firms are largely owner-managed, produce very narrow product lines and are relatively young in terms of corporate existence.

RESULTS OF QUESTIONNAIRE SURVEY

Table 1A: Sales in \$ Millions (41 Observations)

	Groups:	A	B	C	Total
Less than 1.9		2	-	1	3
2 - 9.9		5	2	4	11
10 - 24.9		4	-	4	8
25 - 99.9		11	1	1	13
100 +		<u>3</u>	<u>3</u>	<u>-</u>	<u>6</u>
Total		25	6	10	41

Table 1B: Assets in \$ Millions (38 Observations)

	Groups:	A	B	C*	Total
Less than 1.9		6	1	1	8
2 - 9.9		5	1	3	9
10 - 24.9		6	1	3	10
25 - 99.9		7	-	-	7
100 +		<u>1</u>	<u>3</u>	<u>-</u>	<u>4</u>
Total		25	6	7	38

* No responses in 3 cases.

Table 1C: Employees (38 Observations)

	Groups:	A	B	C*	Total
Less than 49		4	-	-	4
50 - 249		6	2	5	13
250 - 999		11	1	2	14
1000 +		<u>4</u>	<u>3</u>	<u>-</u>	<u>7</u>
Total		25	6	7	38

* No responses in 3 cases.

Tables 2A, 2B, 2C

1. For the majority of the respondents, foreign sales as a percentage of total sales represent a very significant percentage of their business. In the case of 26 of the 41 respondents (63%), sales outside of Canada exceeded 50% of total corporate sales.

2. The U.S. is the single most important foreign market for the respondents. Twelve of the 41 respondents, realized more than 50% of their total corporate sales in the United States.

3. Non-North American sales are significantly less important for the majority of the respondents. Nonetheless the overseas markets are emerging as important new market opportunities, as witness the fact that for 12 of the respondents, non-North American sales account for more than 25% of total annual sales.

4. The picture becomes quite different when one moves from the geographic sales analysis to that of assets and employees. Although all 41 firms are internationally oriented in terms of sales, this is not the case with their assets and employees. In essence they are largely Canadian-based international companies, rather than Canadian multinational companies. For example, only 1 company has less than 50% of its assets in Canada, while 32 of them have more than 75% of total corporate assets located in Canada. The one company exception noted has most of its corporate assets located in the U.S. (in excess

of 50%). The U.S., as one might expect, is the location for most of the non-Canadian corporate based assets.

Location of assets outside of North America is relatively insignificant. Twenty-two of the firms have zero assets outside of North America, while only five firms have any significant overseas investment.

5. A similar pattern can be noted in terms of the geographic location of company personnel.

RESULTS OF QUESTIONNAIRE SURVEY

Table 2A: Geographic Distribution of Sales as a % of Company
Total (41 Observations)

<u>Region</u>	Groups:	A	B**	C	Total
<u>Canada</u>					
< 25		6	2	6	14
25 - 49		8	3	1	12
50 - 74		4	1	1	6
75 +		<u>7</u>	<u>-</u>	<u>2</u>	<u>9</u>
Total		(25)	(6)	(10)	(41)
<u>U.S.</u>					
< 25		8	-	4	12
25 - 49		10	4	3	17
50 - 74		5	1	3	9
75 +		<u>2</u>	<u>1</u>	<u>-</u>	<u>3</u>
Total		(25)	(6)	(10)	(41)
<u>Non-North America</u>					
0		4	1	1	6
<25		14	5	4	23
25 - 49		6	-	3	9
50 - 74		1	-	-	1
75 +		<u>-</u>	<u>-</u>	<u>2</u>	<u>2</u>
Total		(25)	(6)	(10)	(41)

** No response in 1 case.

Table 2B: Geographic Distribution of Assets as a % of
Company Total (40 Observations)

<u>Region</u>	Groups:	A	B**	C	Total
<u>Canada</u>					
< 25		-	-	-	-
25 - 49		1	-	-	1
50 - 74		7	-	-	7
75 - 99		17	5	5	27
100		<u>-</u>	<u>-</u>	<u>5</u>	<u>5</u>
Total		(25)	(5)	(10)	(40)
<u>U.S.</u>					
0		-	3	5	8
1 - 9		7	1	5	13
10 - 24		14	1	-	15
25 - 49		3	-	-	3
50 +		<u>1</u>	<u>-</u>	<u>-</u>	<u>1</u>
Total		(25)	(5)	(10)	(40)
<u>Non-North America</u>					
0		14	-	8	22
1 - 9		6	5	2	13
10 - 24		4	-	-	4
25 +		<u>1</u>	<u>-</u>	<u>-</u>	<u>1</u>
Total		(25)	(5)	(10)	(40)

** No response in 1 case.

Table 2C: Geographic Distribution of Employees as a % of
Company Total (40 Observations)

<u>Region</u>	Groups:	A	B**	C	Total
<u>Canada</u>					
< 50		2	-	-	2
50 - 74		3	-	-	3
75 - 99		19	5	5	29
100		<u>1</u>	<u>-</u>	<u>5</u>	<u>6</u>
Total		(25)	(5)	(10)	(40)
<u>U.S.</u>					
0		-	2	6	8
1 - 9		7	2	4	13
10 - 24		13	1	-	14
25 +		<u>5</u>	<u>-</u>	<u>-</u>	<u>5</u>
Total		(25)	(5)	(10)	(40)
<u>Non-North America</u>					
0		16	-	8	24
1 - 9		5	3	1	9
10 - 24		1	1	1	3
25 +		<u>3</u>	<u>1</u>	<u>-</u>	<u>4</u>
Total		(25)	(5)	(10)	(40)

** No response in 1 case.

Tables 3 and 4

All of the respondents had a research and development budget. Only 8 of the respondents spent less than 2% of their sales on research and development. On the other hand, in the case of 59% (24 of 41) of the respondents, research and development expenditure accounted for more than 5% of total sales.

Table 5

A critical point to note is that 29 of the 41 (71%) firms do their research and development activity exclusively in Canada. Furthermore, only 3 of the 41 respondents allocate more than 20% of their research and development expenditure outside of Canada. As might be expected, the U.S. is the key site for this expenditure involving some 10 of the 41 respondents, all members of Group A.

RESULTS OF QUESTIONNAIRE SURVEY

Table 3: Approximate Range of Company's Expenditure on
R & D in 1982 (in 000's \$) (41 Observations)

Groups:	A	B	C	Total
Less than 100	5	1	-	6
101 - 249	3	-	2	5
250 - 499	2	-	1	3
500 - 999	2	-	1	3
1,000 - 1,999	2	1	5	8
2,000 - 4,999	8	1	1	10
5,000 - 9,999	3	1	-	4
10,000 +	<u>-</u>	<u>2</u>	<u>-</u>	<u>2</u>
Total	25	6	10	41

Table 4: R & D Expenditure as a Percent of Total Sales
(41 Observations)

	Groups:	A	B	C	Total
< 1%		4	-	-	4
1 - 1.9		3	-	1	4
2 - 2.9		3	2	1	6
3 - 4.9		3	-	-	3
5 - 9.9		6	2	3	11
10 - 14.9		3	1	2	6
15 - 19.9		2	-	2	4
20 +		<u>1</u>	<u>1</u>	<u>1</u>	<u>3</u>
Total		25	6	10	41

Table 5: Geographic Location of Total R & D Expenditure by
Percent (41 Observations)

<u>Region</u>	<u>Groups:</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Total</u>
<u>Canada</u>					
	100%	15	4	10	29
	90 - 99	6	1	-	7
	80 - 89	1	1	-	2
	< 80	<u>3</u>	<u>-</u>	<u>-</u>	<u>3</u>
Total		(25)	(6)	(10)	(41)
<u>U.S.</u>					
	0%	15	6	10	31
	.01 - 10%	7	-	-	7
	11% - 38%	<u>3</u>	<u>-</u>	<u>-</u>	<u>3</u>
Total		(25)	(6)	(10)	(41)
<u>Non-North America</u>					
	0%	22	2	10	34
	.01 - 1.9	-	2	-	2
	2 - 20	2	2	-	4
	60%	<u>1</u>	<u>-</u>	<u>-</u>	<u>1</u>
Total		(25)	(6)	(10)	(41)

Tables 6 and 7

As for the future, the majority of the respondents (26 of 41) expect to increase their R&D budget, and this will be largely assigned to the Canadian-based research and development activity. In essence, the Canadian parent company is expected to be the location for most, if not all, corporate research and development efforts.

Table 8

Most of the research and development funding originates from the Canadian parent company. However, Canadian government R&D incentives play an important role with the majority of the respondents (22 of 41 or 54%) having received some government support.

RESULTS OF QUESTIONNAIRE SURVEY

Table 6: Anticipated R & D Expenditure in 1985 (Compared to 1982 Level) - (41 Observations)

Groups:	A	B	C	Total
Increase	16	4	6	26
Decrease	-	1	1	2
No Change	<u>9</u>	<u>1</u>	<u>3</u>	<u>13</u>
Total	25	6	10	41

Table 7: Anticipated Foreign-Based R & D Expenditure in 1985 (Compared to 1982 Level) - (41 Observations)

Groups:	A	B	C ¹	Total
Increase	9	1	1	11
Decrease	1	-	-	1
No Change	<u>15</u>	<u>5</u>	<u>9</u>	<u>29</u>
Total	25	6	10	41

1 In 1982 no foreign-based research and development expenditure was incurred by this group of firms.

Table 8: Source of R & D Funds by Percent (41 Observations)

<u>Source</u> ¹	Groups:	A	B	C	Total
<u>Canadian Parent Company</u>					
100%		11	-	3	14
80 - 99		3	1	2	6
60 - 79		4	4	2	10
35 - 59		2	1	1	4
1 - 34		3	-	2	5
0%		<u>2</u>	<u>-</u>	<u>-</u>	<u>2</u>
Total		(25)	(6)	(10)	(41)

<u>Canadian Government</u>					
0%		15	1	3	19
1 - 19		3	-	2	5
20 - 39		3	3	4	10
40 - 59		3	2	-	5
60% +		<u>1</u>	<u>-</u>	<u>1</u>	<u>2</u>
Total		(25)	(6)	(10)	(41)

1 Other sources of funding were considered to be of minor importance; e.g., foreign affiliate(s), foreign government(s), customers and suppliers.

Tables 9A and 9B

In rank importance, the key external factors which influence Canadian corporate research and development activity in Canada are as follows:

Factor	Scale			Total
	1	2	3	Observations
Competency of Work Force	23	12	1	(36)
Tax Laws	21	13	5	(39)
Canadian Government Funding	21	11	5	(37)
Non-Government Funding	13	6	7	(26)

In rank importance, the key external factors which influence Canadian companies to engage in corporate research and development activity in the U.S. are as follows:

Factor	Scale			Total
	1	2	3	Observations(a)
Competence of Work Force	7	3	-	(10)
Non-Governmental Funding	5	1	3	(9)
Political Climate	3	4	2	(9)
Government Funding	3	1	5	(9)

(a) Please note that only ten of the 25 Group A firms are engaged in some research and development activity in the U.S. Thus the competence of the work force factor is all the more significant. A major difference between the U.S. findings and the Canadian findings is the greater importance attached to tax and government incentives in Canada. On the other hand, non-government funding and the U.S. political climate (stability and free enterprise) emerge as more important in influencing corporate decisions to conduct research and development in the U.S.

Table 9A: Key External Factors Which Influence Canadian
R & D Expenditure (on a scale of 1-3:1 = very important,
2 = somewhat important, 3 = unimportant)

<u>External Factor</u>	<u>Scale</u>	Groups:	A	B	C	Total
<u>Tax Laws</u>	1		13	4	4	21
	2		8	2	3	13
	3		3	-	2	<u>5</u>
			<u>Total Observations</u>			(39)
<u>Government</u>						
(a) Funding	1		12	3	6	21
	2		6	2	3	11
	3		4	-	1	<u>5</u>
			<u>Total Observations</u>			(37)
(b) Regulation	1		4	1	1	6
	2		8	2	4	14
	3		5	1	2	<u>8</u>
			<u>Total Observations</u>			(28)
(c) Political Climate	1		3	1	1	5
	2		5	1	1	7
	3		6	2	5	<u>13</u>
			<u>Total Observations</u>			(25)

Table 9A: (Continued)

		Groups:	A	B	C	Total
		<u>Scale</u>				
<u>Favorable Climate</u>						
(a) Non-Governmental Funding	1		7	1	5	13
	2		3	2	1	6
	3		5	1	1	<u>7</u>
		<u>Total Observations</u>				(26)
(b) Availability of Raw Materials	1		-	-	2	2
	2		2	-	3	5
	3		12	3	2	<u>17</u>
		<u>Total Observations</u>				(24)
(c) Geographic Location	1		1	-	4	5
	2		7	2	3	12
	3		8	1	1	<u>10</u>
		<u>Total Observations</u>				(27)
(d) Competency of Work Force	1		14	3	6	23
	2		7	2	3	12
	3		-	1	-	<u>1</u>
						(36)

Table 9B: Key External Factors Which Influence R & D

Expenditure to be Made in the U.S. (on a scale
of 1-3; 1=very important, 2=somewhat important,
3=unimportant

<u>External Factor</u>	<u>Scale</u>	<u>Group A</u>	<u>Total Observations</u>
<u>Tax Laws</u>	1	2	
	2	4	
	3	<u>3</u>	9
<u>Government</u>			
(a) Funding	1	3	
	2	1	
	3	<u>5</u>	9
(b) Regulation	1	1	
	2	4	
	3	<u>4</u>	9
(c) Political Climate	1	3	
	2	4	
	3	<u>2</u>	9
<u>Favorable Climate</u>			
(a) Non-Governmental Funding	1	5	
	2	1	
	3	<u>3</u>	9

Table 9B: (Continued)

<u>External Factor</u>	<u>Scale</u>	<u>Group A</u>	<u>Total Observations</u>
(b) Availability of Raw Materials	1	-	
	2	2	
	3	<u>6</u>	8
(c) Geographic Location	1	1	
	2	5	
	3	<u>3</u>	9
(d) Competency of Work Force	1	7	
	2	3	
	3	<u>2</u>	10

Table 10

This table highlights those internal factors which influence corporate research and development expenditure to take place outside of Canada. The respondents of Groups A & B tackled this question, even if they had not decentralized any of their R&D efforts to their non-Canadian affiliates at this time. Long term corporate growth and competition within the industry were the two most important considerations. This finding appears to be consistent with other studies. Exhibit 2 lists the comments supplied by the respondent firms. Government support through funding and tax incentives is noted as being important to the location of R&D.

Table 10: Key Internal Factors Which Influence Corporate R & D
Expenditure Outside of Canada (on a scale of 1-3:
1=very important, 2=somewhat important, 3=unimportant)

<u>Internal Factor</u>	Scale	<u>Groups</u>		Total
		A	B	
Long-Term Corporate Growth Strategy	1	11	3	14
	2	2	2	4
	3	2	-	<u>2</u>
		<u>Total Observations</u>		(20)
Industry Competitiveness	1	8	2	10
	2	5	2	7
	3	1	-	<u>1</u>
		<u>Total Observations</u>		(18)
Acquisition of Foreign Business with Existing R & D Facility	1	2	-	2
	2	1	2	3
	3	11	1	<u>12</u>
		<u>Total Observations</u>		(17)
Need for a Foreign Support Lab	1	2	1	3
	2	5	1	6
	3	8	1	<u>9</u>
		<u>Total Observations</u>		(18)

Table 10; (Continued)

Internal Factor	Scale	Groups		Total
		A	B	
Availability of Foreign Manpower Skills	1	7	-	7
	2	3	3	6
	3	3	1	<u>4</u>
<u>Total Observations</u>				(17)
Past Success in R & D Activities Abroad	1	3	-	3
	2	3	3	6
	3	6	-	<u>6</u>
				(15)

EXHIBIT 2

SELECT COMMENTS REGARDING CANADIAN GOVERNMENT VS.
U.S. GOVERNMENT SUPPORT OF R&D ACTIVITIES BY GROUP A
RESPONDENTS

"In the field of high technology, there is far better and more contact between business, government and universities in the U.S. than in Canada."

"In both countries, tax incentives are a major factor in research and development planning."

"The political climate for business is more stable in the U.S. than in Canada because the Canadian federal-provincial system is divisive."

"Concerned that proposed changes in the Canadian tax law regarding research and development incentives will reduce the incentives to perform research and development work in Canada."

"The Canadian government has been an excellent source of funding."

"For small amounts (\$) of R&D support, the required paperwork in Canada is disproportionate to the government help."

"Canadian government support has been essential to developing export business."

"R&D is being done in Canada because it makes business sense, not because of government support, and the same is true in the U.S."

"Canadian government support has been substantial and exceptionally important."

"Inadequate commitment by Canadian Government to properly support Canadian industrial research and development."

"Canadian government support is superior to that of the U.S."

"R&D in defence production is necessary to be competitive with foreign suppliers, and Canadian support has been lacking."

"U.S. Government is more consistent, has longer range plans, and therefore, climate in the U.S. is more stable and favourable."

4. SUMMARY OBSERVATIONS

The three groupings of firms A, B and C were characterised according to their manufacturing, sales and R&D activities.

<u>Group A</u>	<u>Canada</u>	<u>U.S.</u>	<u>Other Foreign</u>
Manufacturing	25	25	5
Sales	25	25	
R&D	25	10	
<u>Group B</u>			
Manufacturing	6		6
Sales	6	6	6
R&D	6		4
<u>Group C</u>			
Manufacturing	10		
Sales	10	10	
R&D	10		

Ten of the Group A and four of the Group B firms, or 14 out of the 41 firms did some R&D abroad, mainly in the U.S.; or 14 out of the 31 firms which had manufacturing and sales operations abroad did some R&D abroad. There is really no difference between the size of the firms, in terms of sales, assets and employment, which did or did not do R&D abroad. Thus, when looking at this group of small to medium size Canadian firms, i.e., those with sales up to around \$100 million, the larger firms in this group are just as likely to do some R&D abroad as are the smaller firms.

The sense of what these firms are doing and which can be gleaned more from conversations with representatives of the firms, than from the questionnaire statistics is as follows.

In accordance with our previous studies, our impression is that the owner-managers of small firms are not excessively anxious to establish R&D units abroad, and when they do they want to maintain control of them through wholly-owned subsidiaries. The move into foreign markets will be to achieve geographic diversification, and if R&D units are established it will be to support the foreign sales-manufacturing operations in terms of developmental research. The owner-managers will not want to give up control and they will be attempting to specialise in the niche which they have established for themselves. The sequence is domestic R&D-manufacturing-sales, followed by foreign sales, foreign manufacturing and possibly foreign R&D. The respondents did not really distinguish between 'Basic', 'Applied', and 'Development' Research, but most of the foreign R&D appeared to be of the applied or developmental kind, which is consistent with previous literature.

If a small firm does contemplate doing R&D abroad, and as many do not as do, it will not occur until sales reach \$20 to \$25 million. When foreign R&D does take place it will be of a developmental nature, and, certainly among the group of small firms, the problem implied in the EDB agreement with Mitel does not exist. At the time of the

agreement Mitel had sales of \$21.6 million (1979). The case of firms such as Northern Telecom Ltd., Alcan and Mitel at its present (1984) sales size may present a different set of circumstances not covered by the research undertaken for this study of small firms. The fact that small and medium size Canadian firms are not rushing to locate R&D abroad is not surprising given our earlier statement that large U.S. firms only do 11% of their R&D abroad, and do so because of pressure from foreign government regulations. Small U.S. firms are not active performers of foreign R&D.

Canadian and U.S. government policies probably play a marginal role in the decision by Canadian firms to locate R&D in the U.S., but competency of the workforce and availability of non-government sources of funding are factors which are mentioned. Of course, both competency and availability may themselves result from government policies, but ones which are not directly concerned with R&D, such as government funding for education, and competition amongst financial institutions.

On the question of whether an agreement, such as the one between EDB and Mitel Corporation, if needed, could be enforced and monitored, the following points should be noted. R&D is a notoriously difficult process to define, and the determination of what constitutes a dollar spent on R&D has been difficult for taxation officials to administer. At the same time, the performance of R&D can be undertaken by a firm's own employees in Canada or

abroad, or by work contracted out to persons in Canada or abroad. While a Mitel-type agreement places limits on how many R&D employees may work abroad, it does not appear to constrain the expenditures of funds to Canada. The agreement also lasted for almost four years, a period in which a company could be expected to need the flexibility to alter both its R&D, production and marketing plans as developments took place in the markets it serviced. It would probably not make much sense for the firm to be constrained by an agreement which could limit its commercial flexibility.

The constraint placed on the principal shareholders concerning the sale of shares to foreigners would be easier to monitor. However, this aspect of the agreement would not cover shares owned by members of the shareholders' families or associates with whom there could be mutually beneficial agreements. It is much the same type of problem as insider trading where the transactions of the insider directors and managers can be monitored, but not those of their relatives, friends and associates.

In sum, the EDB-Mitel agreement is an example of the type of transaction, which is difficult to define, and where opportunism may be exercised. Thus, our conclusion would be that if such an agreement was required it would be difficult to monitor and enforce.

Explanation for the Evolution of R&D in Small and
Medium-Size Canadian Firms

On the basis of the present findings and those of earlier surveys of small technologically-oriented firms in Canada, such firms appear to evolve through the following stages. The firm starts up as a result of an entrepreneur developing on his own, or in his previous occupation with some other firm, some new product or process, which will find a niche in an existing related market. The management of the firm is tightly controlled by the owner-entrepreneur-manager. Control over the technology and equity ownership are uppermost in the owner's mind.

As the firm's sales increase, commercial success may doom the firm to failure, unless the owner is willing to adapt his management and financial structure to the requirements of increasing size. If the firm passes through this stage, it then examines the opportunities for larger markets, and automatically turns to the U.S. which is ten times the size of the Canadian market. In fact, the whole Canadian market is about equivalent to that of the state of California in terms of both population and Gross Domestic Product. Selling into the U.S. market requires the need to become familiar with export documentation and financing. While exports may be used at first to service the U.S. market, it soon becomes clear that it may be easier to assemble or manufacture in the U.S. The technology can be easily transferred, workers can be hired and trained, and the firm can perceive itself to be a truly

international enterprise.

The owner may also experience a demonstration effect from a similar sequence followed previously by other Canadian firms. Success at this stage leads to the realisation by some firms that some R&D performed in the U.S. may be useful to adapt the product to the U.S. market. The firm also becomes identified as one performing R&D. The disadvantage, from the owner's point-of-view, is that decentralization may lead to some loss of control over the technology and the firm. The owner may also recall that he started up by leaving his former company with an idea or product that he had been working on, and perhaps some of his managers will develop the same thoughts, especially if they are located far from their home base.

This is the stage reached by most of the firms in the group studied, at least those with R&D operations in the U.S. The next stage in their development is more speculative, but once sales exceed \$100 million, it is possible that a technologically oriented firm may find the attractions of the U.S. market of 220 million people irresistible, such that a part of the corporate infrastructure may move out of Canada. At this point, the core of the R&D activities may leave with a rump group remaining in Canada. No such conclusion can be derived from the findings in our present study, but developments in firms such as Northern Telecom Ltd. and Alcan deserve watching.

The question that arises for Canadian policy-makers is

the effect of such a sequence of events for Canadian employment, R&D, balance of payments and economic growth. If a decision is made to discourage such a sequence when firms become large, and we are not suggesting that it should be considered without further research, there is a need to determine what policy instruments the government possesses. At the same time there is a need to assess the policy incentives and disincentives which may exist in the U.S., causing Canadian firms to locate their R&D there.

Some Policy Implications

Recent attention has been drawn to Canadian policies in the 1983 Federal Budget, and in a statement on "A Technology Policy for Canada" by the Hon. D.J. Johnston, Minister of State for Science and Technology and for Economic Development, May 3, 1983. New initiatives were announced for the Industrial Research Assistance Program (\$20 million over next two years), revised R&D tax incentives, joint university-industry research, university research and research training, a proposed Canadian Communications, Informatics and Space Research and Development Institute, a national biotechnology strategy, and a national microelectronics design network. More recently it was reported that National Revenue has made new rulings on what constitutes R&D in areas such as computer software[11]. These Canadian initiatives need to be contrasted with comparable U.S. policies which may attract Canadian firms to do R&D in the U.S. Two points should be kept in mind.

First, employment in high technology industries is viewed in the U.S. as a potential cure for unemployment. Second, state and city governments in the U.S. provide incentives to such firms. The scope of R&D policy in the U.S. is broad in terms of both type of policy and level of government - see Appendix A.

Assistance to small firms undertaking R&D in the U.S. is recognised in the passage of the Small Business Innovation Development Act (1982) and in the promotion of government procurement from small firms[12]. Some studies note that R&D can be a footloose activity which will migrate to available skilled labour, favourable tax structures, proximity to academic institutions, and a living environment favoured by such employees[13].

Our impression is that, in the U.S., a great deal of attention is being given at all levels of government to the development of policies to promote R&D. Consideration is being given to a broad range of direct and indirect policies for new plant location, and the use of university expertise and resources. Canada is conducting a similar examination of policy alternatives at both the federal and provincial levels. In addition, cities, such as Ottawa, have become involved through organizations like the Commercial and Industrial Development Corporation of Ottawa-Carleton, which facilitates the start-up of new R&D intensive (and other) firms in the region[14].

The small and medium-size firms included in our survey are influenced to some extent by government policies

affecting both the supply of R&D, and the demand for R&D intensive products and services. The stage of the firms' development and their size are probably the major factors influencing the location of R&D. Thus firms may contemplate doing R&D abroad, when servicing the foreign (usually U.S.) market is assisted by such a move, but not otherwise. Government policies which influence their decision vary with their stage of development. A small firm requires not only venture capital, but assistance in marketing, in dealing with government regulation and in applying for R&D incentives. Knowledge of what incentives are available and how to apply for them can itself be a challenge to such a firm. One stop shopping, as set out in the new regional and industrial incentive program[15], may assist in this regard, but any new program is a challenge at the outset, and the more frequently the policies are changed the greater this obstacle becomes. In any event, the response to a policy by small firms can be expected to be different to that of larger firms, which may be able to adjust more easily.

Since relatively few small firms will undertake R&D, it is possible that a direct approach by government to business is required, i.e., government should lobby business to do R&D in Canada. The initiatives taken by U.S. state and city governments seem to adopt this approach

Our overall conclusion is that there does not appear to be a strong move by small Canadian firms to locate more than a limited amount of developmental R&D in the U.S., and

that this does not occur until sales reach about \$20 to \$25 million. Beyond sales of \$100 million a year, the tendency to locate R&D abroad may be greater. At these larger sizes, which were not the focus of this survey, attention should be paid to the relative attractiveness of U.S. and Canadian direct and indirect R&D policies as suggested above. The situation is constantly evolving, new policies are being developed in both countries. A major lure of the U.S. to these larger Canadian firms will be the substantially larger U.S. market. Once a number of Canadian firms locate R&D in the U.S., the demonstration effect may pull others, and protectionist U.S. policies may alert Canadian firms to the advantages of such a move.

These observations suggest that small Canadian firms will not locate R&D abroad, but if they are successful and grow beyond a certain size, then such a move may be made partially in response to the policies of foreign governments. No judgement is made here on whether this is good or bad for Canada. In one sense it may be inevitable, but an understanding of the forces at work could lead to policies which mitigate the undesirable effects. One final proposal is that the phenomenon of Canadian investment abroad and its impact on Canada should receive increased attention. The investment is taking place anyway both in research intensive and in other areas. We need to know why and what the consequences are to Canada. The process is a part of the growing internationalization of firms, industries and economies to which policies must adapt.

Footnotes

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APPENDIX A

U.S. DEVELOPMENT INCENTIVES BY STATE

Financial Programs for Industry
Tax incentives and other laws
Special services and industrial development
Industrial revenue bond financing

Part 2/Development Incentives

State Financial Programs For Industry

	State Sponsored Industrial Development Authority	Privately Sponsored Development Credit Corporation	State Authority or Agency Revenue Bond Financing	State Authority or Agency General Obligation Bond Financing	City and/or County Revenue Bond Financing	City and/or County General Obligation Bond Financing	State Loans for Building Construction	State Loans for Equipment, Machinery	City and/or County Loans for Building Construction	City and/or County Loans for Equipment, Machinery	State Loan Guaranties for Building Construction	State Loan Guaranties for Equipment, Machinery	City and/or County Loan Guaranties for Building Construction	City and/or County Loan Guaranties for Equipment, Machinery	State Financing Aid for Existing Plant Expansions	State Matching Funds for City and/or County Industrial Financing Programs	State Incentives for Establishing Industrial Plants in Areas of High Unemployment	City and/or County Incentives for Establishing Industrial Plants in Areas of High Unemployment
Alabama	19					1									2			
Alaska						3												
Arizona		4																
Arkansas																		
California		5	10						1	1	13	13						
Colorado																		
Connecticut																		
Delaware																		
Florida																	22	
Georgia																		
Hawaii																		
Idaho																		
Illinois																		
Indiana																		
Iowa																		
Kansas																		
Kentucky																		
Louisiana		4	2				4	4			9	9			4			
Maine																		
Maryland									63							7		
Massachusetts																		
Michigan		4																
Minnesota									9	9								
Mississippi																		
Missouri								8								2		
Montana									17									
Nebraska																2		
Nevada																		
New Hampshire																		
New Jersey						10												
New Mexico		4																
New York																	12	12
North Carolina																		
North Dakota																		
Ohio																		
Oklahoma																		
Oregon			3		10													
Pennsylvania							14	8	14									
Rhode Island																		
South Carolina																		
South Dakota																		
Tennessee															15		18	
Texas																		
Utah																		
Vermont																		
Virginia																		
Washington					3	3			3									
West Virginia																		
Wisconsin						16												
Wyoming																		
STATE TOTALS	32	33	25	9	47	75	23	18	14	10	19	17	1	1	31	10	18	18
Puerto Rico																		

State Tax Incentives and Other Laws

	Corporate Income Tax Exemption	Personal Income Tax Exemption	Excise Tax Exemption	Tax Exemption or Moratorium on Land Capital Improvements	Tax Exemption or Moratorium on Equipment Machinery	Inventory Tax Exemption on Goods in Transit (Freight)	Tax Exemption on Manufacturers' Inventories	Sales/Use Tax Exemption on New Equipment	Tax Exemption on Raw Materials Used in Manufacturing	Tax Incentive For Creditors of Jails	Tax Incentive For Industrial Investment	Tax Credits for Use of Specified State Products	Tax Subsidies/Agreements for Specified Industries	Tax Exemption to Encourage Research and Development	Accelerated Depreciation of Industrial Equipment	State Right to Offset Tax	State Minimum Wage Law	State Fair Employment Practice Act	Statewide Uniform Property Tax Evaluation Act	Statewide Industrial Noise Abatement Law
Alabama	•	•	•	•	•	•	•	•	•				•			•			•	
Alaska			•												• 59		•		•	
Arizona	•	•																•	•	
Arkansas												• 20							•	
California										• 88					• 12				•	•
Colorado	• 75	•	•			• 21	• 21	•	• 21	•	•								•	•
Connecticut	• 10	• 25			• 23					• 89	• 89				• 59					•
Delaware	•		• 24	•	•															
Florida	•	• 25	• 24	• 31	• 31	•	• 26					• 5					•		•	
Georgia				•											• 59					
Hawaii			•									•							•	•
Idaho																				
Illinois				• 11	•			• 56							• 49					•
Indiana				• 36	•	• 85	• 85				• 36								•	
Iowa	• 27	• 86		• 87	• 82		• 78		• 29						• 59					•
Kansas	• 75			• 10	• 10		• 83	• 1	• 84						• 49					
Kentucky				• 11	• 11	• 31	• 31	• 1	• 11											•
Louisiana	• 32			• 13	•			• 32	• 84	• 90										•
Maine									• 14						• 49					•
Maryland				• 11	•									• 1						•
Massachusetts	•																			•
Michigan	•	•		• 18	•										• 59					•
Minnesota	•	•	•	• 16				• 41							• 49					•
Mississippi		•													• 59					•
Missouri	•	•																		•
Montana	• 35			•	•		• 39	• 41		• 35										•
Nebraska							• 42		• 42											•
Nevada	• 25	• 25																		•
New Hampshire		• 25						• 41												•
New Jersey				• 82	• 41										• 82					• 45
New Mexico															• 59					•
New York	• 12 46 47	• 46	• 24	• 12	• 48	• 48	• 48			• 12	• 12 46			• 46						•
North Carolina						• 43		• 49	• 50											•
North Dakota	•		•	• 51	• 48	• 48	• 48							• 31						•
Ohio	•	•																		•
Oklahoma													• 93		• 59					•
Oregon	•	•	• 52	• 52		• 53									• 10					•
Pennsylvania					• 54	• 55	• 55	• 54	• 54											•
Rhode Island																				•
South Carolina																				•
South Dakota	•	•	•																	•
Tennessee		•		• 31	• 31			• 64	• 76		• 54	• 57								•
Texas	• 25	• 25		• 58	• 58															•
Utah																				•
Vermont															• 59					•
Virginia				• 31	• 31	• 44			• 61					• 51	• 59					•
Washington	• 25	• 25	•																	•
West Virginia	•	•	•																	•
Wisconsin	• 62																			•
Wyoming	• 25	• 25	•																	•
STATE TOTALS	25	20	14	29	31	48	43	36	46	14	15	5	4	11	28	20	42	41	42	19
Puerto Rico	•	•	•	•	•	•	•	•	•						•	•	•	•	•	•

State Special Services for Industrial Development

	State Financed Speculative Building	City and/or County Financed Speculative Building	State Provides Free Land for Industry	Cities and/or Counties Provide Free Land for Industry	State Owned Industrial Park Sites	City and/or County Owned Industrial Park Sites	State Funds for City and/or County Development Related Public Works Projects	State Funds for City and/or County Market Plans	State Funds for City and/or County Recreational Projects	State Funds for Private Recreational Projects	State Program to Promote Research and Development	State Program to Increase Export of Products	University R&D Facilities Available to Industry	State and/or Universities Can conduct Feasibility Studies to Attract or Assist New Industry	State Recruiting, Screening of Industrial Employees	State Sponsored Training of Industrial Employees	State Re-Training of Industrial Employees	State Sponsored Training of "Hard Core" Unemployed	State Incentive to Industry to Hire "Hard Core" Unemployed	State Help in Obtaining or Federal Promotional Capital	State Sponsored for Technology Advisory Council
Alabama		•		• 65	•	•	•	•	•		•	•	•	•	•	•	•	•		•	
Alaska						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Arizona	•	•				•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Arkansas				• 65		•	•	•	•		•	•	•	•	•	•	•	•	•	•	
California		• 65		• 65		•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Colorado		• 65		• 65		•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Connecticut						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Delaware	•					•	•	• 66	•		•	•	•	•	•	•	•	•	•	•	
Florida						•	•	•	•		•	•	•	•	•	•	•	• 68	• 68	•	
Georgia		•				•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Hawaii					•		•	•	•		•	•	•	•	•	•	•	•	•	•	
Idaho						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Illinois						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Indiana				• 65		•	•	•	•	• 91	•	•	•	•	•	•	•	•	•	•	
Iowa	• 92					•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Kansas		• 69		• 65		•	•	•	•		•	•	• 71	•	•	•	•	•	•	•	
Kentucky						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Louisiana	•	•		• 74		•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Maine	•	•		• 71		•	•	•	•	• 72	•	•	• 67	•	•	•	•	•	•	•	
Maryland	•	•			•	•	•	•	•	• 73	•	•	•	•	•	•	•	•	•	•	
Massachusetts		•				•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Michigan		•		•		•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Minnesota		•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Mississippi		•		• 74	•		•	•	•		•	•	•	•	•	•	•	•	•	•	
Missouri						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Montana						•	• 78	• 76	•		•	•	•	•	•	•	•	•	•	•	
Nebraska		• 69				•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Nevada						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
New Hampshire	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
New Jersey	•				•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	
New Mexico		•				•	•	•	•		•	•	•	•	•	•	•	•	•	•	
New York		•				•	•	•	•		•	•	•	•	•	•	•	•	• 12	•	
North Carolina	•	•				•	•	•	•		•	•	•	•	•	•	•	•	•	•	
North Dakota		•		•		•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Ohio						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Oklahoma		•		•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Oregon						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Pennsylvania		•				•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Rhode Island					•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	
South Carolina		•		• 65		•	•	•	•		•	•	•	•	•	•	•	•	•	•	
South Dakota		•		• 74		•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Tennessee		•			•	•	• 80	• 81	•		•	•	•	•	•	•	•	•	•	•	
Texas						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Utah						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Vermont	•					•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Virginia		• 69				• 69	•	•	•		•	•	•	•	•	•	•	•	•	•	
Washington						• 79	•	•	•		•	•	•	•	•	•	•	•	•	•	
West Virginia		•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Wisconsin						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
Wyoming						•	•	•	•		•	•	•	•	•	•	•	•	•	•	
STATE TOTALS	9	75	0	18	9	49	38	35	39	8	35	49	50	50	50	50	49	40	28	33	41
Puerto Rico	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Industrial Revenue Bond Financing

PROJECTS PERMITTED UNDER BOND FINANCING LAWS

USES FOR PROCEEDS OF BOND FINANCING

	Industrial Buildings	Industrial Parks	Office Buildings	Warehouses	Recreational Attractions	Retail Merchandise Establishments	Medical Facilities	Pollution Control Systems	Purchase Land	Purchase Equipment, Machinery	Refinance Existing Facilities at Lower Interest Rates	Company May Buy Bond-Financed Plant on Installment Purchase	Provision Of Utilities	Engineering Fees	Landscaping of Plant Site	Construction Financing	Legal Fees Associated with Project	Financing Fees	Debt Service Reserve
Alabama	•		•	•			•	•	•	•	•	•	•	•	•	•	•	•	•
Alaska	•	•	•	•	•			•	•	•			•	•	•	•	•	•	•
Arizona	•	•		•		•	•		•	•	•	•	•	•	•	•	•	•	•
Arkansas	•	•	•	•				•	•	•	•	•	•	•	•	•	•	•	•
California	•			•					•	•	•	•	•	•	•	•	•	•	•
Colorado	•	•	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•
Connecticut	•		•	•				•	•	•	•	•	•	•	•	•	•	•	•
Delaware	•			•				•	•	•	•	•	•	•	•	•	•	•	•
Florida	•		•	•	•		•		•	•	•	•	•	•	•	•	•	•	•
Georgia	•		•	•					•	•	•	•	•	•	•	•	•	•	•
Illinois	•			•				•	•	•	11	•	•	•	•	•	•	•	•
Indiana	•	•	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•	•
Iowa	•		12	•			•	•	•	•		•	•	•	•	•	•	•	•
Kansas	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Kentucky	•		•	•					•	•	•	•	•	•	•	•	•	•	•
Louisiana	•	•	•	•		•	•		•	•	•	•	•	•	•	•	•	•	•
Maine	•		•	•	•				•	•		•	3	3	3	7	3	1	•
Maryland	•	•		•			4		•	•	•	•	•	•	•	•	•	•	•
Massachusetts	•		2	•					•	•	•	•	•	•	•	•	•	•	•
Michigan	•	•	•	•	•	•	•	6	•	•	•	•	•	•	•	•	•	•	•
Minnesota	•		•	•	•		•		•	•	•	•	•	•	•	•	•	•	•
Mississippi	•	•		•					•	•	•	•	•	•	•	•	•	•	•
Missouri	•		•	•			•		•	•	•	•	•	•	•	•	•	•	•
Montana	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
Nebraska	•	•		•					•	•	•	•	•	•	•	•	•	•	•
Nevada	•		•	•					•	•	•	•	•	•	•	•	•	•	•
New Hampshire	•		•	•			•		•	•	•	•	•	•	•	•	•	•	•
New Jersey	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
New Mexico	•	•	•	•			•		•	•	•	•	•	•	•	•	•	•	•
New York	•	•	•	•	•	•	4		•	•	•	•	•	•	•	•	•	•	•
North Carolina	•			•				•	•	•	•	•	•	•	•	•	•	•	•
North Dakota	•	•	•	•			•		•	•	•	•	•	•	•	•	•	•	•
Ohio	•		8	8	8	8			•	•	•	•	•	•	•	•	•	•	•
Oklahoma	•	•		5	•		•		•	•	•	•	•	•	•	•	•	•	•
Oregon	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pennsylvania	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
Rhode Island	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
South Carolina	•			•			•		•	•	1	•	•	•	•	•	•	•	•
South Dakota	•	•	•	•		•	•		•	•	•	•	•	•	•	•	•	•	•
Tennessee	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
Texas	•			•					•	•	•	•	•	•	•	•	•	•	•
Utah	•	•		•	•		•		•	•	•	•	•	•	•	•	•	•	•
Vermont	•	•	•	•			•		•	•	•	•	•	•	•	•	•	•	•
Virginia	•	•	12	•		•	•		•	•	•	•	•	•	•	•	•	•	•
Washington	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•	•
West Virginia	•	•		5	•			•	•	•	•	•	•	•	•	•	•	•	•
Wisconsin	•	•	7	•		10	•		•	•	•	•	•	•	•	•	•	•	•
Wyoming	•	•	•	•		•	•		•	•	•	•	•	•	•	•	•	•	•
Puerto Rico	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•

Source: Conway Publications' survey of state development agencies

1—Applicable when existing facility is for an entirely new type of operation

2—In downtown urban revitalization districts only

3—Applicable if part of total project

4—Applicable to research facilities only

5—Permitted only if related to manufacturing operations

6—Applicable to any structure suitable for, intended for, or incidental to use as a factory, mill, shop, processing plant, assembly plant, fabricating plant, warehouse, research and development facility, engineering, architectural or design facility, or tourist and resort facility

7—Applicable if structure is a national or regional headquarters facility

8—Applicable only if facility is occupied by company obtaining bonds not permitted by speculative buildings

9—Refinancing is limited to 10% of net bond proceeds

10—If located in a blighted, urban renewal or UDAG area

11—Permitted for medical facilities only

12—Limited to multistate, regional or national headquarters buildings and operations centers

Industrial Revenue Bond Financing 1979 and 1980

	Amount of Industrial Revenue Bonds 1979 (\$ Millions)	Total Number of Issues in 1979	Amount of Industrial Revenue Bonds 1980 (\$ Millions)	Total Number of Issues in 1980	Amount of Pollution Control Revenue Bonds 1980 (\$ Millions)	Number of Issues for Pollution Control in 1980
Alabama	—	—	—	—	—	—
Alaska	—	—	—	—	—	—
Arizona	—	—	—	—	—	—
Arkansas	151.3	63	85.4	60	—	—
California	0	0	0	0	62.3	12
Colorado	—	—	—	—	—	—
Connecticut	201.0	156	—	—	—	—
Delaware	40.2	22	—	—	—	—
Florida	11.01	4	—	—	—	—
Georgia	—	—	—	—	—	—
Hawaii	0	0	0	0	0	0
Idaho	0	0	0	0	0	0
Illinois	44.2	23	19.9	22	60.8	17
Indiana	—	—	—	—	—	—
Iowa	75.1	64	—	—	—	—
Kansas	169.4	111	326.1	87	—	—
Kentucky	70.9	27	—	—	—	—
Louisiana	45.7	14	138.6	42	129.6	8
Maine	49.6	13	48.6	24	8.8	2
Maryland	131.7	47	20.0	14	—	—
Massachusetts	402.0	207	—	—	—	—
Michigan	914.4	—	—	—	—	—
Minnesota	672.9	358	488.5	239	46.9	10
Mississippi	210.3	43	369.4	51	163.8	5
Missouri	66.9	15	41.0	5	174.7	7
Montana	18.4	12	7.0	4	0	0
Nebraska	52.8	44	14.8	14	0	0
Nevada	—	—	—	—	—	—
New Hampshire	25.9	26	45.9	31	—	—
New Jersey	573.3	408	536.8	414	31.0	4
New Mexico	34.5	3	—	—	—	—
New York	263.0	147	—	—	—	—
North Carolina	276.0	69	312.0	84	68.0	3
North Dakota	165.7	27	19.8	7	0	0
Ohio	796.3	458	830.0	500	446.7	44
Oklahoma	—	—	—	—	—	—
Oregon	46.2	14	50.6	18	05	1
Pennsylvania	1,900.0	1,824	900.0	836	—	—
Rhode Island	46.6	22	62.0	30	0	0
South Carolina	178.5	56	88.0	26	20.7	5
South Dakota	4.0	3	66	2	0	0
Tennessee	160.5	98	151.0	106	4.3	2
Texas	1.5	1	320.0	65	—	—
Utah	7.0	1	—	—	—	—
Vermont	19.0	16	—	—	—	—
Virginia	348.9	187	—	—	—	—
Washington	0	0	0	0	0	0
West Virginia	—	—	—	—	—	—
Wisconsin	157.9	157	169.4	136	35.1	13
Wyoming	16.0	12	57	30	0	0
Puerto Rico	24.7	3	77.4	6	7.0	1

Source: Moody's Publications survey of state economic development agencies, December 1980

- 1—Through 7/80
- 2—Through 5/80
- 3—Through 3/80
- 4—Through 6/80
- 5—Through 11/80
- 6—Through 10/80
- 7—Through 4/80
- 8—Fiscal year

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Footnotes for Charts on Pages 386, 388, and 390

Source: Conway Publications survey of state economic development agencies. Data are current as of 12/31/80

- 1—Permitted only in specified municipalities.
- 2—State allows cities or counties to offer financial aid for existing plant expansions. In Louisiana, state financing aid is directly involved only in the case of those port authorities whose obligations are backed by the full faith and credit of the state.
- 3—Activity is limited to Ports Authority in Georgia and to port districts in Oregon and Washington. The Washington Legislature has approved placing a constitutional amendment on the November 1981 ballot. The amendment, if approved, would allow issuance of industrial revenue bonds on a broad basis.
- 4—Authorized but none is active.
- 5—State-sponsored but privately operated non-profit Regional Job Development Corporations may be established in low-income areas to provide loans to small businesses.
- 6—Available through the Minority Business Development Agency.
- 7—Limited to EDA-designated areas.
- 8—Loans also cover working capital, site improvements and inventories.
- 9—Permitted for processing products of agriculture, including forestry and timber production.
- 10—Applies only to pollution control equipment.
- 11—Available in Cook County (Chicago area).
- 12—Under the New York Job Incentive Program, a corporate franchise or unincorporated business tax credit is allowed to firms locating, expanding or improving facilities in the state. The firm must create or retain at least five jobs, provide an approved training program, and the largest share of the facility's volume of business must be from other than the retailing of goods or services or the furnishing of accommodations. The credit is given for up to 10 years. The credit described in footnote 46 may be taken instead of the job incentive credit. Under the Job Incentive Program real property tax exemption is a local option.
- 13—Guarantee applies to Act 9 industrial revenue bonds up to \$1 million.
- 14—State and local program of participation in building construction.
- 15—Loan guarantee of up to 90% of the project amount, not to exceed \$250,000.
- 16—For acquiring and developing sites.
- 17—Authorized if a one-mill, multi-purpose tax levy is approved by local voters.
- 18—Priority given to companies applying for assistance under the Tennessee Industrial Development Authority program. Program is a loan guarantee only at present.
- 19—State grants to assist in industrial site preparation.
- 20—7-year ad valorem tax exemption on textile plants.
- 21—Law allows reduction in taxes but not exemption. Goods in transit, inventories and raw materials are assessed at 5%.
- 22—A corporate tax credit for wages of employees hired from a blighted area. A corporate tax credit for ad valorem school taxes of firms located in a blighted area. Also, any commercial project in a blighted area qualified for industrial revenue bond financing.
- 23—Equipment and machinery acquired after the 1973 assessment date is exempt from local property tax.
- 24—Delaware, Florida and New York do not collect an excise tax.
- 25—Nevada, Texas, Washington and Wyoming do not tax corporate or personal income. Connecticut, Florida and New Hampshire do not tax personal income.
- 26—Finished goods are assessed at 10% of just valuation rather than 100% for property tax purposes. Raw materials and goods in process are assessed at 1% of just value.
- 27—50% of the tax paid is exempt from corporate income tax. The tax is figured on the basis of the taxable income from sales outside the state. The taxable income is figured on the basis of the net income from sales outside the state.
- 28—Personal property taxes are being phased out. First \$145,000 of assessed taxable value of personal property is exempt. An additional exemption is added by the county, and the amount varies by county.
- 29—Inventory, goods in process and finished goods are taxed only the value of raw materials.
- 30—Applicable to Industrial Revenue Bond financed property only. A twenty-year exemption is allowed.
- 31—In Kentucky and Tennessee, the exemption is applicable at the local level only. In Maryland, the exemption may be applicable at the county or local level. In Virginia, localities have the option of totally or partially exempting certified pollution control and solar energy facilities and equipment from real or personal property taxes. In Florida, the exemption is a local option, and school and special district taxes are excluded from the exemption.
- 32—Applicable under the tax equalization law only.
- 33—Exemption applicable to capital improvements only.
- 34—Allowed except for sales/use tax when purchased for use as an ingredient in tangible personal property for sale.
- 35—A 1% tax credit, based on wages paid, is allowed for the first three years to new and expanding industry engaged in the mechanical or chemical transformation of materials or substances into new products. "Expanding" means to expand a present operation so as to increase total permanent jobs by 30%.
- 36—10-year partial property tax abatement in designated areas of all cities and towns for renovation or new construction of facilities.
- 37—R&D equipment is classified as manufacturer's machinery and equipment and, as such, is eligible for tax exemptions.
- 38—Lump-sum option, in designated redevelopment areas.
- 39—All inventories reduced to 4% of market value.
- 40—Exemption is allowed on separate, detachable accessory tools and equipment which have a useful life of less than 12 months.
- 41—State does not collect sales/use tax.
- 42—Business inventories exemption increased to 100% on 1/1/79.
- 43—Applicable to goods stored in bonded warehouses.
- 44—Applies to imported goods if they have not lost their status as imports.
- 45—Noise abatement codes recommended by state for adoption by municipalities.
- 46—A tax credit equal to 4% of qualified capital invested in new production facilities may be applied against a business corporate franchise, unincorporated business income or personal income tax liability. The tax credit is restricted to investment in buildings, equipment and facilities which have a useful life of at least four years and are used in manufacturing, processing, assembling, refining, mining, agricultural or commercial fishing. Experimental research and development facilities may elect this option in place of the write-off described in footnote 47. A particular investment is not eligible for both the investment credit and other state tax incentives, except that corporations maintaining or increasing employment in the state may deduct an additional credit of one-half of the original credit in each of the three years succeeding the investment. This results in a potential credit of 10% over four years. Corporate franchise taxpayers will continue to be required to pay a minimum tax of \$250 annually. Any credit remaining may be carried forward.
- 47—Costs paid or incurred in a taxable year by incorporated or unincorporated business for experimental R&D facilities, for industrial waste treatment facilities and/or for air pollution control facilities may be deducted from net income for tax purposes. The credit described in footnote 46 may be taken in lieu of this credit.
- 48—Tangible and intangible personal property is not subject to ad valorem taxes.
- 49—New equipment is allowed a preferential rate of 1%, with a maximum tax of \$80 per article.
- 50—Leaf tobacco is allowed an exemption of 60% of tax rate, bales of cotton, 50% and peanuts, 20%.
- 51—In North Dakota, exemption extends only to new construction. In Oregon, exemption is allowed while facility is under construction only.
- 52—Tax credits allowed to manufacturers and processors for property taxes paid on goods in process.
- 53—Inventory tax will be eliminated by 1980.
- 54—Exclusion from sales and use tax on industrial purchases used directly in industrial production and research.
- 55—Exclusion of tangible personal property from taxation at local level. State has no inventory tax.
- 56—Phased exemption, fully exempt by 1984.
- 57—In Tennessee, tax credits are allowed for products of state soil. In Florida, tax credit applies only to alcoholic beverages produced from specified Florida-grown agricultural products.
- 58—Seven-year annexation or de-annexation exemption.
- 59—Allowable depreciation is similar to that which is permitted under federal laws.
- 60—Exempt from sales/use tax, but not from business capital tax.
- 61—Local governments may classify separately the tangible personal property of research and development firms from that of other taxpayers and tax it at different rates.
- 62—A credit is allowed for sales tax paid on energy.
- 63—Has been used in city of Baltimore.
- 64—State tax rate of 1% will be phased out by 7/1/83.
- 65—Provided only in rare instances. In California, a few cities and counties will lease land they own at nominal rates.
- 66—Limited to technical assistance.
- 67—Facilities available on contract basis.
- 68—State vocational education program keyed to federally funded program.
- 69—Carried out through local development corporations.
- 70—Available to industry on a contract and/or consulting basis.
- 71—City-owned land only. Cities may not purchase land for purpose of providing free land to industry.
- 72—Highway Commission will build first two miles of road into new ski areas.
- 73—Maryland Industrial Development Financing Authority will guarantee up to 80% of the mortgages for land and 70% for equipment for recreational projects.
- 74—Activity limited to certain units.
- 75—An income tax credit is allowed for a period of 10 years against the income taxes generated by the operation of a new business activity. The credit is based on the number of new jobs created as well as the capital investment involved.
- 76—Raw materials for processing are exempt from sales and use taxes. However, a personal property inventory tax is levied at the local level on raw materials a manufacturer has on hand on Jan. 1. Finished goods are exempt from taxation.
- 77—Credit allowed for federal taxes paid.
- 78—A coal tax fund is available to areas directly impacted by coal development.
- 79—Port districts only.
- 80—Funds are from Public Health for solid wastes disposal projects.
- 81—State matches funds from U.S. Dept. of Housing and Urban Development.
- 82—The business personal property tax on machinery, equipment and other tangible property is 1% of 50% of original cost or cost at acquisition. This tax has been repealed for equipment purchased after 1/1/77.
- 83—Applicable to goods stored in licensed and bonded warehouse, provided that 35% or more of the previous year's sales or shipments from the storage area were shipped in interstate commerce to a point outside the state.
- 84—Sales/use tax exemption.
- 85—Finished goods stored in public or private warehouses destined for out-of-state shipment are exempt.
- 86—During 1979, state personal income tax was indexed to compensate for inflation.
- 87—Five-year tax abatement on building, equipment and machinery. Can also apply to expansions.
- 88—Targeted jobs tax credit program.
- 89—Connecticut Urban Jobs Program available in 18 "distressed" and 29 "high unemployment" communities.
- 90—\$100 per job created by any business enterprise. Manufacturing industries may elect to use either the job tax credit or the property tax exemption, but not both.
- 91—State matching funds for private non-profit organizations for recreational projects.
- 92—State pays interest on spec buildings until they have been sold or leased.
- 93—A gross production tax on textile mills in lieu of property tax.
- 94—1% of investment in industrial machinery against corporate excise tax. Fully effective 7/1/84.

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