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R & D TAX TREATMENT IN CANADA:
A PROVINCIAL COMPARISON

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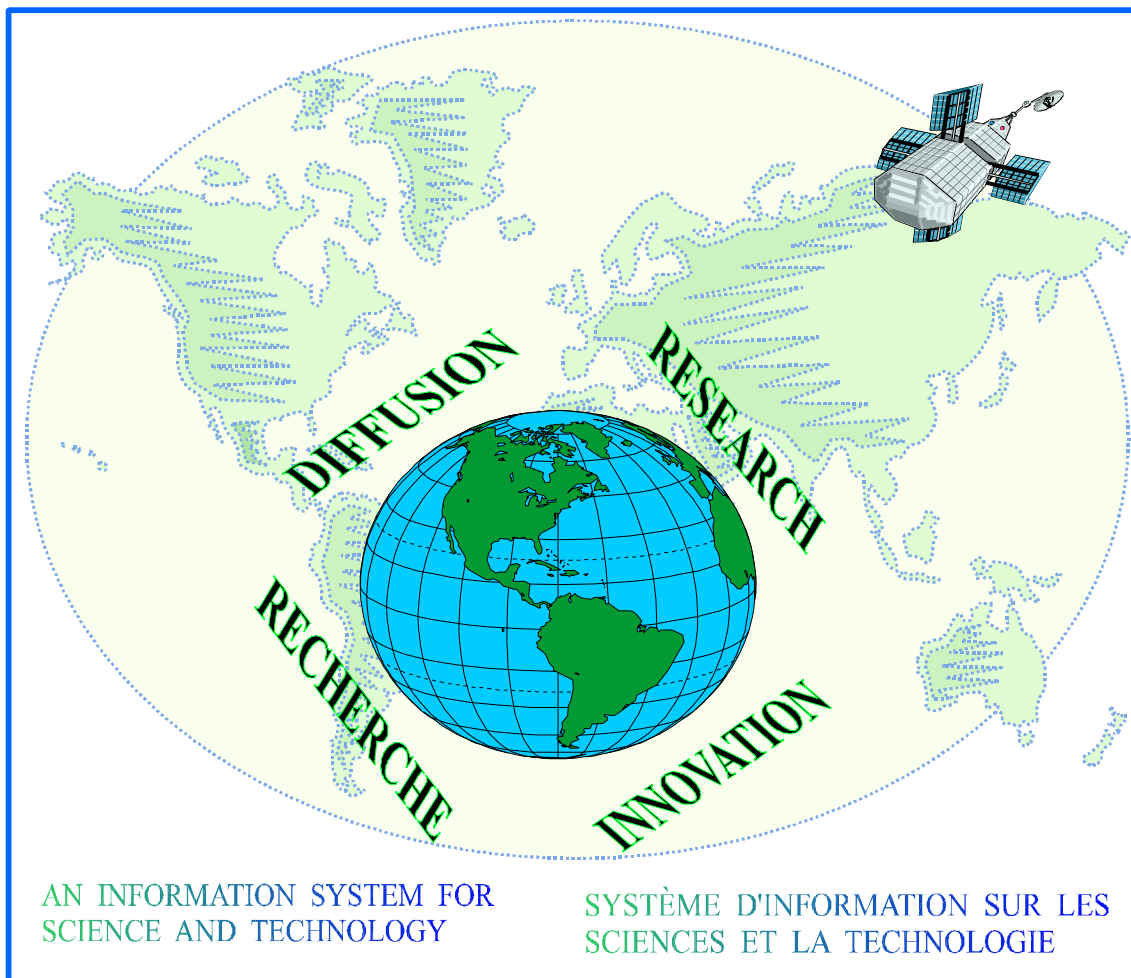
Canada

R&D TAX TREATMENT IN CANADA:
A PROVINCIAL COMPARISON

A Report

Prepared for

The Science and Technology Redesign Project,
Statistics Canada

by

Jacek Warda

The Conference Board of Canada

THE INFORMATION SYSTEM FOR SCIENCE AND TECHNOLOGY PROJECT

The purpose of this project is to develop useful indicators of activity and a framework to tie them together into a coherent picture of science and technology in Canada.

To achieve the purpose, statistical measurements are being developed in five key areas: innovation systems; innovation; government S&T activities; industry; and human resources, including employment and higher education. The work is being done at Statistics Canada, in collaboration with Industry Canada and with a network of contractors.

Prior to the start of this work, the ongoing measurements of S&T activities were limited to the investment of money and human resources in research and development (R&D). For governments, there were also measures of related scientific activity (RSA) such as surveys and routine testing. These measures presented a limited and potentially misleading picture of science and technology in Canada. More measures were needed to improve the picture.

Innovation makes firms competitive and more work has to be done to understand the characteristics of innovative, and non-innovative firms, especially in the service sector which dominates the Canadian Economy. The capacity to innovate resides in people and measures are being developed of the characteristics of people in those industries which lead science and technology activity. In these same industries, measures are being made of the creation and the loss of jobs as part of understanding the impact of technological change.

The federal government is a principal player in science and technology in which it invests over five billion dollars each year. In the past, it has been possible to say how much the federal government spends and where it spends it. The current report, released early in 1997, begins to show what the S&T money is spent on. As well as offering a basis for a public debate on the priorities of government spending, all of this information will provide a context for reports of individual departments and agencies on performance measures which focus on outcomes at the level of individual projects.

By the final year of the Project in 1998-99, there will be enough information in place to report on the Canadian system on innovation and show the role of the federal government in that system. As well, there will be new measures in place which will provide a more complete and realistic picture of science and technology activity in Canada.

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Working Papers

The Working Papers publish research related to science and technology issues. All papers are subject to internal review. The views expressed in the articles are those of the authors and do not necessarily reflect the views of Statistics Canada.

PREFACE

The paper, **R&D Tax Treatment in Canada: A Provincial Comparison**, uses a method developed by the Conference Board of Canada to compare the tax incentives to do R&D in each of the provinces. The results contribute to the analysis of regional differences in science and technology activity in Canada, as part of the Information System for Science and Technology Project at Statistics Canada.

The objective of the Project is to develop useful indicators of activity and a framework to tie them together into a coherent picture of science and technology in Canada. The indicators can provide the picture at the national level or at provincial or sub-provincial levels to reflect regional differences. An example of a regional difference is the tax incentive to do R&D in a province. There is the federal Scientific Research and Experimental Development tax programme, which has regional variations. Six out of ten provinces have their own incentive programmes and tax rates which differ from province to province. The 'B-Index' analysis of the Conference Board provides a means of comparing tax incentives and of providing an indicator.

A single indicator does not provide a coherent picture. It must be supplemented by other indicators and information, and some examples of regional indicators are found in other issues of this working paper series and in the catalogue publications of the Project (The papers and publications are listed on the last two pages.). There are estimates of R&D expenditure and personnel for universities, for the federal government, for industry and for provincial research organizations. Much of this work is summarized in the forthcoming working paper, '**An Overview of Statistical Indicators of Regional Innovation in Canada**'. Indicators of the innovative activities of firms in the provinces are being developed, both at Statistics Canada and in academic groups in various parts of the country.

To advance the knowledge of regional innovation in Canada, the Project sponsored a workshop at the University of Ottawa in March of 1997 which brought together measurement experts, policy makers, and academics. Some of the papers given at the workshop will appear in this series, or the Research Paper Series, and others will be published in a book to be released in 1998.

The objective of all of this work is to highlight regional differences in R&D and innovation and to pose questions about why these differences arise. Tax incentives may make some of the difference.

Introduction

The purpose of this paper is to present a measure of the relative attractiveness of R&D tax treatment among Canadian provinces. In order that this comparison only measures differences in the tax treatment of R&D, the study makes several simplifying assumptions; for example, it ignores subsidies, as well as taxes that do not pertain to corporate income. Non-fiscal factors that affect the decision to invest in R&D, like the availability of competent researchers and skilled workforce and presence of knowledge infrastructure, are beyond the scope of this work. Hence, while the comparison can inform policy discussion, it cannot replace the detailed examination of alternatives for any particular private sector decision.

About the B-Index Model

The R&D tax system of each province was ranked by comparing the minimum benefit-cost ratio -- termed the B-index -- at which an R&D investment becomes profitable given a province's income tax treatment for firms performing this work. In this way, the B-index reveals the relative support for private-sector investment in R&D delivered through a tax system or, stated alternatively, a tax system's impact on the private-sector decision to invest in R&D. Specifically, the B-index is calculated as the present value of before-tax income that a firm needs to generate to cover the cost of an initial R&D investment and to pay the applicable income taxes. The lower the index, the greater the incentive for a firm to invest in R&D.

The B-index model used in this paper makes it possible to measure and rank the relative attractiveness of R&D tax systems among jurisdictions. Within any single region, a firm's R&D opportunities can be regarded as a series of projects, each of which will have a benefit-cost ratio. The firm will find it profitable to undertake all projects with benefit-cost ratios in excess of B. Generally, the lower B is, the greater will be the amount of R&D that a firm will undertake.

Across provinces, interest focuses on the effect of differences in the provinces' tax systems on identical projects. The value of the B-index depends on the income tax treatment of R&D. The more favourable its tax treatment of R&D, the lower is a jurisdiction's B-index and, other things being equal, the greater the amount of R&D that will be conducted by its corporate residents.

Technically speaking, the B-index formula is simple; it represents a ratio of the after-tax cost (ATC) of a $1 expenditure on R&D divided by 1 less the corporate income tax rate. The generic formula for the B-index is as follows:

$B = ATC/(1-t)$ where, t = corporate income tax rate

The after-tax cost (ATC) enters the numerator of the B-index equation. It is defined as the net cost to the company of investing in R&D, taking account of all available tax incentives for R&D[1].

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[1] For more information on the model, see Donald G. McFetridge and Jacek P. Warda, *Canadian R&D Tax Incentives: Their Adequacy and Impact*, (Toronto: Canadian Tax Foundation, 1983), and Jacek P. Warda,

Tax incentives lower ATC of the R&D project. Corporate income tax rates influence the level of ATC, as well. The higher the tax rate the lower is the ATC of R&D and vice versa. As can be seen, using ATC as a measure of the relative attractiveness of R&D tax incentives can yield a distorted result, complicated by the size of the corporate income tax rate that enters the ATC equation. To isolate the impact of tax incentives from the impact of the corporate income tax rate, the study applies the measure of B-index. Since the B-index is expressed as a before-tax ratio, it reduces the impact of tax rates and makes the inter-provincial or international comparison possible.

The Assumptions

At times, the model can be complicated by the fact that the labour, current, capital and building components of R&D expenditures are taxed differently. To ensure comparability in this case, all R&D is assumed, based on OECD averages for those expenditures from the earlier study[2] to follow these proportions: labour - 60 per cent, other current expenses - 30 per cent, machinery and equipment - 5 per cent and buildings - 5 per cent.

Elements Included in the B-index
This study examines the following features of the corporate income tax systems of Canadian provinces as they relate to scientific R&D:

- the time period over which both current and capital expenditures on scientific research may be written off against taxable income;

- the existence of any deductions, including accelerated and bonus deductions, from taxable income that are based on the level or the change in the level of R&D spending;

- the availability of any tax credits (reductions in taxes payable) that are based on the level or the change in the level of R&D spending; and

- the rate at which corporate income is taxed, including the impact of major provincial or state tax systems.

Elements Not Included
A number of features of provincial tax systems that relate to R&D decisions as well as to other investment decisions are outside the scope of the research. Important tax factors involved in corporate decisions to invest in R&D, such as personal income taxes, commodity taxes, property taxes, payroll taxes and taxes on capital, grants and subsidies for R&D are also excluded. This is

International Tax Competitiveness of Canadian R&D Tax Incentives: An Update, (Ottawa: The Conference Board of Canada, 1990).
[2] See, McFetridge and Warda (1983), p. 27. This distribution does not differ substantially from that of Canada today, with the exception of labour component which in Canada hovers around 50 per cent. Assuming 50 per cent for wages would lower the attractiveness of R&D tax incentives in Quebec for this province's tax credit is based on wages.

particularly relevant to tax jurisdictions that rely on capital, property and commodity taxes as main sources of their revenues rather than on corporate income tax.

Other assumptions

The analysis is focused on the tax treatment of R&D expenditures of both small[3] and large manufacturing companies. The study assumes that firms have sufficient taxable income to claim the full amount of R&D tax incentives in the current year, and, therefore, certain dynamic aspects of R&D tax incentives, particularly the use of carryforward/carryback provisions, do not alter B-index values. To incorporate them would require restrictive assumptions regarding the distribution of income over time. In the case of graduated income tax rates or graduated tax incentives, the analysis assumes a tax rate or tax incentive available on top eligible income. Because of the assumption that firms are able to claim full value of tax incentives, this rules out certain limits on income and caps on claimability of tax incentives, often based on size, that may exist in the jurisdictions examined. In this respect, the index makes no difference between non-refundability and refundability provisions of tax incentives.

Key Elements of the R&D Tax Treatment in Canada

This paper identifies the elements of the corporate income tax system that affect directly R&D expenditure in Canada. These items include the statutory corporate income tax rate, treatment of current and capital R&D expenditures, depreciation allowance on R&D capital assets (machinery, equipment and buildings), and availability of tax credits and other allowances for R&D.

The elements of the R&D corporate income tax environment enter the calculation of the B-index. (See, Exhibit 1.) As a general rule, the description of the pertinent tax incentives and tax rates existing in the provinces is based upon information available for 1996.

Federal Level

The federal corporate income tax system in Canada provides a number of significant tax incentives for companies conducting R&D in Canada. Its Scientific Research and Experimental Development (SR&ED) programme allows for 100 per cent deduction for qualifying current R&D expenditures, as well as for qualifying capital expenditures made on R&D machinery and equipment. Buildings, whether for R&D purposes or not, are depreciated on an ordinary basis, typically at 4 per cent declining balance per annum.

The programme also allows an investment tax credit on qualifying SR&ED expenses incurred in Canada. The qualifying expenses are generally the same as for the current deduction. For large companies, the rate of the credit is 20 per cent of R&D expenditures. The rate of SR&ED tax credit for companies eligible for small business deduction is 35 per cent. Both current expenses and expenditures on machinery and equipment qualify for the credit. The SR&ED tax credit is taxable, however, in the sense that it must be deducted in calculating the base for current and capital expenses eligible for a 100 per cent deduction from business income. The federal SR&ED

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[3] Equivalent to Canadian Controlled Private Corporation (CCPC)

tax credits and deduction are based on qualifying expenditures net of government assistance. For small companies, with non-taxpaying position, the credit is refundable.

Canada's corporate income tax system is a combination of federal and provincial income taxes. All provinces generally follow federal rules in respect of the deductibility of current and capital expenditures on R&D. Because of variations in the tax treatment of R&D expenditures among provinces, it is necessary to provide analysis of those provinces that offer R&D tax incentives in addition to federal SR&ED tax incentives. Under federal income tax rules, provincial investment tax credits are considered to be government assistance and reduce the amount of expenditures available for the federal SR&ED tax incentives in the year in which the provincial credits are earned.

Currently, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia and Newfoundland provide additional R&D tax treatment at the corporate income tax level. The remaining four provinces: British Columbia, Alberta, Saskatchewan and Prince Edward Island do not offer any R&D tax incentives at the provincial level, but rely solely on the federal R&D tax treatment. Nevertheless, they are included in the study, providing a full comparison of Canadian provinces (See, Tables 1, 2 and 4).

Manitoba
Since the 1992 budget, Manitoba has provided a non-refundable 15 per cent R&D tax credit. It is calculated on the expenditure that is eligible for the federal credit and applies to R&D carried out in the province. The Manitoba R&D tax credit claimed reduces the amount of R&D expenditures eligible for the federal R&D tax credit and the 100 per cent R&D deduction for both federal and provincial income tax purposes.

Ontario
In 1988, the Ontario budget introduced a new R&D superallowance. Expenditures eligible for the federal SR&ED tax credit can qualify for the superallowance. The incentive is based on the amount of qualifying expenditures incurred less the federal investment tax credit claimable. The R&D superallowance has two components: base level and incremental. All corporations performing R&D in Ontario are eligible for a base level R&D superallowance deductible from income. The base amount of allowance is equal to 25 per cent of qualifying expenditures for large corporations and 35 per cent for small companies. The incremental component is 37.5 per cent for large firms and 52.5 per cent for small firms of qualifying incremental expenditures incurred in the year. The average of R&D expenditures incurred in the three immediately preceding taxation periods constitutes the basis for determining incremental expenditures. Current and capital expenditures in excess of the base average are considered incremental.

As the federal R&D tax credit reduces the 100 per cent deduction for Ontario tax purposes, the purpose of the superallowance is to nullify the Ontario tax impact of this reduction, while the incremental allowance rewards growth in R&D. The value of the benefit from this incentive is not taxable federally.

Since January 1, 1995, Ontario has had a 10 per cent refundable Ontario Innovation Tax Credit (OITC) to Ontario-based small companies for R&D carried on in the province. The OITC reduces the amount of R&D expenditures eligible for the federal tax credit, and the 100 per cent R&D deduction for both federal and provincial income tax purposes, including the allowable deduction for the superallowance. The impact of OITC is included in the B-index model.

Quebec
The 1988 Quebec budget enacted a host of tax relief measures for R&D conducted in the province. These measures were further expanded in the 1989 Quebec budget. Of the tax incentives that are applicable to this study, the province of Quebec makes available a fully refundable tax credit of 20 per cent of wages paid in Quebec for carrying out R&D. The credit is increased to 40 per cent for small firms. The Quebec investment tax credit does not reduce the base for the R&D deduction for Quebec income tax purposes, but reduces the amount of R&D expenditures eligible for the federal R&D tax credit and the 100 per cent R&D deduction for federal income tax purposes. As per the 1996 provincial budget, the federal R&D tax credit is now taxable for Quebec income tax purposes.

Nova Scotia
Corporations that have a permanent establishment in Nova Scotia are eligible for a refundable tax credit equal to 15 per cent of R&D expenditures made in the province. The credit is applied against the corporation's Nova Scotia income tax liability. Similar to the Manitoba provisions, the qualified R&D expenditures conform to expenditures eligible for a federal R&D tax credit, and reduce the amount of R&D expenditures eligible for the federal R&D tax credit and the 100 per cent R&D deduction for both federal and provincial income tax purposes.

New Brunswick
As of the February 1994 New Brunswick budget, the province offers a non-refundable R&D tax credit. The rate of the R&D tax credit is 10 per cent, and its interaction with the federal tax systems is similar to those of Manitoba and Nova Scotia.

Newfoundland
Effective January 1, 1996, a fully refundable tax credit is available at a rate of 15 per cent for qualifying expenditures made on qualifying activities in Newfoundland. Qualifying activities and expenditures are the same as those for the federal R&D tax credit. The Newfoundland R&D tax credit may be used to reduce provincial income taxes otherwise payable. Amounts of the provincial tax credit claimed will reduce the amount of qualifying expenditures eligible for the federal tax credit and the 100 per cent deduction for both federal and provincial income tax purposes. Basic 1996 corporate income tax rates in the province are: 5 per cent for small companies; 5 per cent for manufacturing and processing; and 14 per cent for all other firms.

Other Canadian Provinces and Territories

There are no specific provisions for R&D in other Canadian provinces and territories. As the result, the corporate income tax provisions for R&D in the remaining provinces employ the federal R&D tax system. (See, Table 3.)

Canadian Corporate Income Tax Rates
Canada offers different tax rates for small business of all sectors and for large companies. Within the latter category, manufacturing sector receives a rebate of 7 percentage points while non-manufacturing sectors have to pay at full rate of corporate income tax. These differences are included in the model. Corporate taxpayers must also pay a 4 per cent surtax applicable to all businesses on the top of federal rates. The surtax is included in the rates presented below. These combined provincial/federal tax rates are incorporated in the B-index calculation.

Small company. The applicable top combined tax rates are : British Columbia 23.1 per cent, Alberta 19.1 per cent, Saskatchewan 21.1 per cent, Manitoba 22.1 per cent, Ontario 22.6 per cent, Quebec 18.9 per cent, New Brunswick 20.1 per cent, Prince Edward Island 20.6 per cent, Nova Scotia 18.1 per cent, and Newfoundland 18.1 per cent.

Large company. The applicable top combined tax rates for manufacturing companies are: British Columbia 38.6 per cent, Alberta 36.6 per cent, Saskatchewan 39.1 per cent, Manitoba 39.1 per cent, Ontario 35.6 per cent, Quebec 31.0 per cent, New Brunswick 39.1 per cent, Prince Edward Island 29.6 per cent, Nova Scotia 38.1 per cent, and Newfoundland 27.1 per cent.

Canada and the Provinces

The Canadian provinces' corporate income tax systems continue to offer an attractive incentive for companies to engage in R&D. The conclusions apply equally to R&D tax treatment for large corporations and for small corporations. In 1990, there were only three provinces operating their own R&D incentives: Ontario, Quebec and Nova Scotia. In 1992, Manitoba, in 1994 , New Brunswick, and in 1996, Newfoundland joined the group of provinces that provide tax incentives for R&D. These constitute the G-6 group of provinces. Large companies conducting R&D in these provinces need to make less than 80 cents and small firms less than 60 cents before tax in order to break even on their $1 investment in R&D. (See, Table 1 and 2.)

The remaining four provinces, and the two territories, rely only on federal tax support for R&D. And the difference in ranking between these two groups is quite pronounced. The four jurisdictions that do not provide R&D tax incentives at the provincial level - British Columbia, Alberta, Saskatchewan, and Prince Edward Island - all fare less favourably in the interprovincial competitiveness ranking. Their B-indexes, comprising only federal R&D tax support, range from .825 to .833 for large firms and .676 to .679 for small firms. They are some 100 basis points higher (or less attractive) than the B-indexes of the G-6 provinces, meaning that companies in these jurisdictions require to derive a higher before tax income (on average by 10 cents) in order to break even. All things being equal, the theoretical implication of this result is that companies located in G-6 regions would be spending more on R&D for the very reason that they require (thanks to increased government assistance) a lower rate of return to make a profit.

Still, the four provinces who rely only on the federal R&D tax incentives are very competitive internationally. Their B-indexes show that British Columbia, Alberta, Saskatchewan and Prince Edward Island would place close to the top of the international ranking, if they were used for international comparisons instead of Quebec and Ontario[4]. The use of either province in this group would still permit Canada to place second among OECD countries (behind Spain) in the large companies category. Canada would be third (after Italy and Spain) in the small company ranking. In other words, the international ranking of the attractiveness of Canada's R&D tax system would not be altered. This result points out to the high overall level of the Canadian federal R&D tax support. Indeed, this support has not diminished over time, but continues to be one of the most generous and stable offerings in the industrialized world.

The top ranking of Canada's R&D tax treatment internationally is the combination of the federal tax incentive package enhanced by the tax treatment of R&D in the provinces that offer it. Quebec has the most attractive R&D tax treatment with regard to small companies. Interestingly enough, in the large company category, it handed the lead to the newcomer, Newfoundland. Top place in the small firm category is largely due to Quebec's generous tax credit on R&D wages and salaries applicable to small firms at double the regular rate of 20 per cent. However, because of the 1996 Quebec Budget's provision to tax federal R&D tax credits, the Quebec's advantage in the large company category has narrowed, yielding the close first place to Newfoundland, a province with a significant (15 per cent) R&D tax credit and a low rate (5 per cent) of provincial corporate income tax.

Overall, provinces that provide direct tax credits (Newfoundland, Quebec, Manitoba, Nova Scotia and New Brunswick) are slightly better off in the ranking than provinces that apply R&D allowances (Ontario). This is because their tax credits, even though reducing the amount of federal tax credit available, are deducted directly from the provincial tax due rather than from taxable income (on which a provincial corporate income tax rate applies). Therefore, the marginal effect of the tax credit on the B-index is greater than the marginal effect of an R&D allowance.

In summary, together with the significant provincial R&D tax incentives, Canada's combined corporate income tax system has become very attractive in its treatment of R&D. In other words, greater provincial sharing in the package of R&D tax incentives has elevated and kept Canada at the top in the B-index ranking. However, by international standards, the federal tax system itself provides a very attractive treatment for R&D.

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[4] See, Jacek Warda, *R&D Tax Incentives in OECD Countries: How Canada Compares*, (Ottawa: The Conference Board of Canada, 1997, Members' Briefing 190-97), Table 1, p.4.

Exhibit 1
Detailed Calculation of the B-index: Results for Provinces, 1996

Ontario B-index Formula

Large company
$$B_{ont} = (1 - .90z_1t - .05t(z_2 + z_3) - .95c_f(1-t) - ((1-.171)(.95)(1- c_f)c_p t_p + .95(1-c_f) t_p c_{pi}(1- (1/3)\Sigma(1+i)^{-n})))/(1-t)$$
Small company
$$B_{ont} = (1 - .90z_1t - .05t(z_2 + z_3) - .95c_f(1- c_{po})(1-t) - ((1-.171)(.95)(1- c_{po})(1- c_f)c_p t_p + .95(1- c_{po})(1-c_f)t_p c_{pi}(1- (1/3)\Sigma(1+i)^{-n})) - .95c_{po}(1-t))/(1-t)$$

where: t = combined federal and provincial corporate income tax rate (= 0.356 or 0.226)
$\quad t_p$ = provincial corporate income tax rate (= 0.135 or 0.095)
$\quad z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
$\quad c_f$ = federal R&D tax credit rate (=0.20 or 0.35)
$\quad c_p$ = provincial R&D tax credit rate - level component (= 0.25 or 0.35)
$\quad c_{pi}$ = provincial R&D tax credit rate - incremental component (= 0.375 or 0.525)
$\quad c_{po}$ = Ontario innovation tax credit rate (=0.10)
$\quad 0.90$ = proportion of current R&D expenditure
$\quad 0.05$ = proportion of R&D expenditure incurred on M&E and buildings, respectively
$\quad 0.171$ = proportion of incremental R&D expense on which an incremental tax credit is assessed
$\quad n$ = 1 to 3

Large company
$$(1-.95 \cdot .356-.356(.05 \cdot .300)-.95 \cdot .20 (1-.356) -((1-.171) \cdot .95(1-.20) \cdot .25 \cdot .135+.95(1-.20) \cdot .135 \cdot .375(1- (1/3)\Sigma(1+.10)^{-n})))/(1-.356) = .787$$

Small company
$$(1-.95 \cdot .226-.226 (.05 \cdot .300) -.95 \cdot .35(1-.10) (1-.226) - ((1-.171) \cdot .95(1-.10) (1-.35) \cdot.375 \cdot.095 + .95(1-.10) (1-.35) \cdot .095 \cdot .525(1- (1/3)\Sigma(1+.10)^{-n})) -.95 \cdot .10(1-.226))/(1-.226) = .588$$

Quebec B-index Formula

$$B_{que} = (1 - .90z_1t - .05t(z_2 + z_3) - .60c_f(1- c_p)(1-t) -.35c_f(1-t)- .60c_p(1-t_f))/(1-t)$$

where: t = combined federal and provincial corporate income tax rate (= 0.31 or 0.189)
$\quad t_f$ = federal corporate income tax rate (= 0.221 or 0.131)
$\quad z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
$\quad c_f$ = federal R&D tax credit rate (=0.20 or 0.35)
$\quad c_p$ = provincial R&D tax credit rate (= 0.20 or 0.40)
$\quad 0.90$ = proportion of current R&D expenditure
$\quad 0.05$ = proportion of R&D expenditure incurred on M&E and buildings, respectively
$\quad 0.60$ = proportion of wages and salaries on which Quebec R&D tax credit is assessed

Large company
$$(1-.95 \cdot .31-.31(.05 \cdot .300) -.6 \cdot .2(1-.2)(1-.31) -.35 \cdot .2(1-.31) -.6 \cdot .2(1-.221))/(1-.31) = .714$$

Small company

$(1-.95 \cdot .189-.189 (.05 \cdot .300) -.6 \cdot .35(1-.4)(1-.189) -.35 \cdot .35(1-.189)$
$-.6 \cdot .4(1-.131))/(1-.189) = .502$

Manitoba B-index Formula

$B_{man} = (1 - .90z_1t - .05t(z_2 + z_3) - .95 \cdot c_f (1- c_p)(1-t)-.95 \cdot c_p(1-t))/(1-t)$

where: t = combined federal and provincial corporate income tax rate (= 0.391 or 0.221)
$z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
c_f = federal R&D tax credit rate (=0.20 or 0.35)
c_p = provincial R&D tax credit rate (= 0.15)
0.90 = proportion of current R&D expenditure
0.05 = proportion of R&D expenditure incurred on M&E and buildings, respectively

Large company
$(1-.95 \cdot .391-.391(.05 \cdot .300)-.95 \cdot .20(1-.15)(1-.391)-.95 \cdot .15(1-.391))/(1-.391) = .719$
Small company
$(1-.95 \cdot .221-.221 (.05 \cdot .300)-.95 \cdot .35(1-.15)(1-.221)-.95 \cdot .15(1-.221))/(1-.221) = .585$

New Brunswick B-index Formula

$B_{nb} = (1 - .90z_1t - .05t(z_2 + z_3) - .95 \cdot c_f (1- c_p)(1-t)-.95 \cdot c_p(1-t))/(1-t)$

where: t = combined federal and provincial corporate income tax rate (= 0.391 or 0.201)
$z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
c_f = federal R&D tax credit rate (=0.20 or 0.35)
c_p = provincial R&D tax credit rate (= 0.10)
0.90 = proportion of current R&D expenditure
0.05 = proportion of R&D expenditure incurred on M&E and buildings, respectively

Large company
$(1-.95 \cdot .391-.391(.05 \cdot .300)-.95 \cdot .20(1-.10)(1-.391)-.95 \cdot .10(1-.391))/(1-.391) = .757$
Small company
$(1-.95 \cdot .201-.201(.05 \cdot .300)-.95 \cdot .35(1-.10)(1-.201)-.95 \cdot .10(1-.201))/(1-.201) = .615$

Nova Scotia B-index Formula

$B_{ns} = (1 - .90z_1t - .05t(z_2 + z_3) - .95 \cdot c_f (1- c_p)(1-t)-.95 \cdot c_p(1-t))/(1-t)$

where: t = combined federal and provincial corporate income tax rate (= 0.381 or 0.181)
$z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
c_f = federal R&D tax credit rate (=0.20 or 0.35)
c_p = provincial R&D tax credit rate (= 0.15)
0.90 = proportion of current R&D expenditure
0.05 = proportion of R&D expenditure incurred on M&E and buildings, respectively

Large company
$(1-.95 \cdot .381-.381(.05 \cdot .300)-.95 \cdot .20(1-.15)(1-.381)-.95 \cdot .15(1-.381))/(1-.381) = .717$
Small company
$(1-.95 \cdot .181-.181(.05 \cdot .300)-.95 \cdot .35(1-.15)(1-.181)-.95 \cdot .15(1-.181))/(1-.181) = .582$

Newfoundland B-index Formula

$B_{ns} = (1 - .90z_1t - .05t(z_2 + z_3) - .95 \cdot c_f (1- c_p)(1-t)-.95 \cdot c_p(1-t))/(1-t)$

where: t = combined federal and provincial corporate income tax rate (= 0.271 or 0.181)
$z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
c_f = federal R&D tax credit rate (=0.20 or 0.35)
c_p = provincial R&D tax credit rate (= 0.15)
0.90 = proportion of current R&D expenditure
0.05 = proportion of R&D expenditure incurred on M&E and buildings, respectively

Large company
$(1-.95 \cdot .271-.271(.05 \cdot .300)-.95 \cdot .20(1-.15)(1-.271)-.95 \cdot .15(1-.271))/(1-.271) = .709$
Small company
$(1-.95 \cdot .181-.181(.05 \cdot .300)-.95 \cdot .35(1-.15)(1-.181)-.95 \cdot .15(1-.181))/(1-.181) = .582$

British Columbia B-index Formula

$B_{bc} = (1 - .90z_1t - .05t(z_2 + z_3) - .95 \cdot c_f (1-t))/(1-t)$

where: t = combined federal and provincial corporate income tax rate (= 0.386 or 0.231)
$z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
c_f = federal R&D tax credit rate (=0.20 or 0.35)
0.90 = proportion of current R&D expenditure
0.05 = proportion of R&D expenditure incurred on M&E and buildings, respectively

Large company
$(1-.95 \cdot .386-.386(.05 \cdot .300)-.95 \cdot .20(1-.386))/(1-.386) = .831$
Small company
$(1-.95 \cdot .231-.231(.05 \cdot .300)-.95 \cdot .35(1-.231))/(1-.231) = .679$

Alberta B-index Formula

$B_{ab} = (1 - .90z_1t - .05t(z_2 + z_3) - .95 \cdot c_f (1-t))/(1-t)$

where: t = combined federal and provincial corporate income tax rate (= 0.366 or 0.191)

$z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
c_f = federal R&D tax credit rate (=0.20 or 0.35)
0.90 = proportion of current R&D expenditure
0.05 = proportion of R&D expenditure incurred on M&E and buildings, respectively

Large company
$(1 - .95 \cdot .366 - .366(.05 \cdot .300) - .95 \cdot .20(1 - .366))/(1 - .366) = .831$
Small company
$(1 - .95 \cdot .191 - .191(.05 \cdot .300) - .95 \cdot .35(1 - .191))/(1 - .191) = .676$

Saskatchewan B-index Formula

$B_{ab} = (1 - .90z_1t - .05t(z_2 + z_3) - .95 \cdot c_f (1-t))/(1-t)$

where: t = combined federal and provincial corporate income tax rate (= 0.391 or 0.211)
$z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
c_f = federal R&D tax credit rate (=0.20 or 0.35)
0.90 = proportion of current R&D expenditure
0.05 = proportion of R&D expenditure incurred on M&E and buildings, respectively

Large company
$(1 - .95 \cdot .391 - .391(.05 \cdot .300) - .95 \cdot .20(1 - .391))/(1 - .391) = .833$
Small company
$(1 - .95 \cdot .211 - .211(.05 \cdot .300) - .95 \cdot .35(1 - .211))/(1 - .211) = .678$

Prince Edward Island B-index Formula

$B_{ab} = (1 - .90z_1t - .05t(z_2 + z_3) - .95 \cdot c_f (1-t))/(1-t)$

where: t = combined federal and provincial corporate income tax rate (= 0.296 or 0.206)
$z_1 = 1$; $z_2 = 1$; $z_3 = 0.300$
c_f = federal R&D tax credit rate (=0.20 or 0.35)
0.90 = proportion of current R&D expenditure
0.05 = proportion of R&D expenditure incurred on M&E and buildings, respectively

Large company
$(1 - .95 \cdot .296 - .296(.05 \cdot .300) - .95 \cdot .20(1 - .296))/(1 - .296) = .825$
Small company
$(1 - .95 \cdot .206 - .206(.05 \cdot .300) - .95 \cdot .35(1 - .206))/(1 - .206) = .676$

Note: A nominal discount rate of 10 per cent was used in calculating present values of depreciation allowances and incremental tax incentives. The present value of depreciation allowances was calculated using the end-of-period rule.

Source: The Conference Board of Canada.

Table 1
Ranking of Canada's Provinces According to the Value of the B-index:
Manufacturing Firms, 1996

Province/Territory	Large Firm		Small Firm	
	B-index	Rank	B-index	Rank
*Newfoundland	.709	1	.582	2-3
*Quebec	.714	2	.502	1
*Nova Scotia	.717	3	.582	2-3
*Manitoba	.719	4	.585	4
*New Brunswick	.757	5	.615	6
*Ontario	.787	6	.588	5
Prince Edward Island	.825	7	.676	7-8
British Columbia	.831	8-9	.679	10
Alberta	.831	8-9	.676	7-8
Saskatchewan	.833	10	.678	9

* Provinces offering R&D tax credit

Source: The Conference Board of Canada.

Table 2
Summary Interprovincial Comparison of ATC and B-Indexes:
Manufacturing Firms, 1996

Province/Territory	After-tax cost of $1 R&D expenditure		B-index ATC/(1–tax rate)	
	Large firm	Small firm	Large firm	Small firm
British Columbia	.510	.522	.831	.679
Alberta	.527	.547	.831	.676
Saskatchewan	.507	.535	.833	.678
*Manitoba	.438	.456	.719	.585
*Ontario	.507	.431	.787	.588
*Quebec	.493	.407	.714	.502
*Newfoundland	.517	.477	.709	.582
Prince Edward Island	.581	.537	.825	.676
*New Brunswick	.461	.491	.757	.615
*Nova Scotia	.444	.477	.717	.582

* Provinces offering R&D tax credit

Source: The Conference Board of Canada.

Table 3
Summary of Federal SR&ED Tax Credit Rates and Rates of Refundability (Per Cent)

	Credit Rate	Refundability Rate -- Current	Refundability Rate -- Capital
Unincorporated businesses	20	40	40
CCPCs with prior-year taxable income,			
- of $200,000 or less:			
Expenditures up to expenditure limit[1]	35	100	40
Expenditures over expenditure limit	20	40	40
- between $200,000 and $400,000:			
Expenditures up to expenditure limit[2]	35	100	40
Expenditures over expenditure limit	20	0	0
CCPCs with prior-year taxable capital employed in Canada between $10 million and $15 million			
Expenditures up to expenditure limit[3]	35	100	40
Expenditures over expenditure limit	20	0	0
All Other Corporations	20	0	0

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1. Expenditure limit is generally $2,000,000 per annum.
2. Expenditure limit for CCPCs is phased out for prior-year taxable income between $200,000 and $400,000.
3. Expenditure limit for CCPCs is phased out for prior-year taxable capital employed in Canada between $10 million and $15 million.

Source: Gordon J. Lenjosek, *Income Tax Incentives for Research and Development in Canada*, Department of Finance, January 1997 (manuscript, unpublished)

Table 4
Summary of Provincial R&D Tax Incentives

Province	Tax Incentive	Rate
Manitoba	Non-refundable ITC	15%
New Brunswick	Non-refundable ITC	10%
Newfoundland	Fully refundable ITC	15%
Nova Scotia	Fully refundable ITC	15%
Ontario	Partially refundable ITC Super Allowance deduction	10% -- for certain CCPCs on SR&ED expenditures up to $2 million per year CCPCs: 35% up to base amount (average spending of previous three years); 52.5% on incremental R&D spending Non-CCPCs: 25% up to base amount (average spending of previous three years); 37.5% on incremental R&D spending
Quebec	Fully refundable tax credits for R&D salaries and eligible expenditures under various types of research contracts	40% -- for small firms (assets under $25 million) on R&D salaries up to $2 million 40% to 20% -- for medium firms (assets between $25 million and $50 million) on R&D salaries up to $2 million 20% -- for large firms (assets over $50 million) and R&D salaries over $2 million 20% to 40% -- for eligible expenditures under contract

Source: Gordon J. Lenjosek, *Income Tax Incentives for Research and Development in Canada*, Department of Finance, January 1997 (manuscript, unpublished)

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