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Tax Incentives and Innovation: 
The Canadian Treatment of R&D

Robert Hamilton*

I. INTRODUCTION

It is widely accepted that innovation is an important factor in an economy's ability to grow and prosper. Virtually every business that wants to be positioned to compete in the world markets of tomorrow has a strategic interest in innovation. That interest may be in indigenous Research and Development ("R&D") leading to the development of new products or technological advancements enabling more efficient production. Businesses can also have a strategic interest in the innovation efforts of other firms with a view to incorporating these products or processes into their own operations. A report released in 1992 by the Steering Committee on Prosperity in Canada identified innovation as one of the most important factors for Canada's prosperity.¹

Although the tax system is only one of many factors that influence these activities, it can affect them both directly and indirectly. At a general level, overall tax revenues and the structure of the tax system influences the macroeconomic environment which affects the climate for innovation. More directly, specific tax measures can either provide an incentive for or impede these activities. In this vein, there are a number of specific tax incentives that can be and have been used to encourage certain activities, including innovation.

One of the important areas where these incentives have been used is to encourage R&D. Canada has had considerable experience with these incentives and currently has one of the most attractive systems of tax incentives in the world.

The purpose of this paper is three-fold. First, to describe the basic types of tax incentives that are used to encourage economic activity, including the Canadian experience in these areas. Second, to discuss specific tax incentives for R&D — the motivation for these incentives

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The views expressed in this paper are those of the author and do not necessarily reflect those of the Department of Finance. The author would like to acknowledge the helpful comments received by Paul Dick, Gerry Goodchild and Bill Toms in preparing this paper.

and several of the key design issues. Finally, to provide a brief overview of the Canadian system of tax incentives — how it has evolved and some of the lessons that have been learned.

II. TAX INCENTIVES

Tax policies can affect the environment for innovation in a wide range of ways. At the most general level, the level of tax revenues has implications for the size of fiscal deficits which, in turn, can affect important macroeconomic variables such as interest rates and inflation. These variables are important in setting the environment for innovation as they help determine the cost of capital and other factors that influence business decisions.

The structure of the tax system, including the tax mix, also affects the environment for innovation. A tax system that is neutral and allows business decisions to be made more in line with economic factors and less on tax considerations will result in a more efficient allocation of the economy’s resources and will, generally, be supportive of innovative activity. In an international context, the level of a country’s taxes on businesses, particularly those heavily involved in innovation, can also affect the allocation of innovative activities across international jurisdictions. The level of taxation on businesses is affected by the overall level of taxation and by the mix of tax sources between businesses, consumers and individuals.

The most direct way that taxes can influence innovation is through specific measures to encourage innovative activity. These measures can be designed to influence the activity itself, or to influence the financing of the activity by affecting the cost or availability of capital. In this regard, there are four basic types of tax incentives that can be used to encourage innovation;

- investment tax credits;
- accelerated depreciation deductions;
- preferential tax rates;
- financing incentives.

A. Investment Tax Credits

An investment tax credit ("ITC") provides the investor with a credit that can be used to reduce taxes otherwise payable. For example, with a ten percent ITC, a taxpayer acquiring a piece of equipment for $100 would be eligible for a credit of ten dollars which could be used to reduce taxes otherwise payable. An ITC provides the incentive upfront, at the time of the investment and, therefore, is a very direct way to encourage investment. It can be designed to encourage either a very broad range of investments or it can be targeted to very specific investments. The targeting can be based on a variety of criteria such as the
size of the enterprise or the activity or region in which the investment is to be used.

However, some studies have suggested that ITCs may not be an efficient way to encourage investment. One of the key issues is that although an ITC may stimulate some new incremental investment, it also typically provides benefits to investments that would have taken place without the incentive. Therefore the cost to the government can be much greater than the tax incentive provided on incremental investments. In addition, by encouraging certain investments over others, an ITC can distort business decisions, thereby reducing the efficiency of the tax system and leading to a misallocation of the economy's resources. Nevertheless, ITCs are a policy instrument used by many countries to encourage certain activities.

B. Accelerated Depreciation Deductions

Another means of providing an incentive for investment is to allow taxpayers to claim depreciation deductions that are, in the early years, larger than the economic depreciation. For example, if a certain type of equipment depreciates at a declining balance rate of twenty percent per annum, the tax system could provide an incentive by allowing taxpayers to deduct thirty percent per annum on a declining balance basis. This acceleration of depreciation deductions provides larger deductions up front — in the early years of the investment — but results in smaller deductions in later years. Table 1 shows the actual depreciation and tax deductions for a piece of equipment that actually depreciates at twenty percent per annum, but receives tax deductions at thirty percent per annum. At a discount rate of ten percent, the net present value of the deductions is higher (74.2 versus 63.9) because of the acceleration.

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2 See, e.g., Economic Effect of Cape Breton Investment Tax Credit, Department of Finance (1990) (Can.).
Table 1

Illustration of Effects of Accelerated Depreciation

<table>
<thead>
<tr>
<th>Year</th>
<th>Depreciation Actual (20%)</th>
<th>Tax (30%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>12.8</td>
<td>14.7</td>
</tr>
<tr>
<td>4</td>
<td>10.2</td>
<td>10.3</td>
</tr>
<tr>
<td>5</td>
<td>8.2</td>
<td>7.2</td>
</tr>
<tr>
<td>6</td>
<td>6.6</td>
<td>5.0</td>
</tr>
<tr>
<td>7</td>
<td>5.2</td>
<td>3.5</td>
</tr>
<tr>
<td>8</td>
<td>4.2</td>
<td>2.5</td>
</tr>
<tr>
<td>9</td>
<td>3.4</td>
<td>1.7</td>
</tr>
<tr>
<td>10</td>
<td>2.7</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Present Value of the Deductions 63.9 74.2

As an investment incentive, accelerated deduction suffer from many of the same drawbacks as noted above for ITCs. However, there are several key differences. Unlike ITCs, this incentive does not reduce taxes directly, but instead reduces the income that is subject to tax. One effect of this is that the benefit of such an incentive is affected by the firm’s tax rate -- the value of the benefit increases as the tax rate increases. Therefore, the value of an accelerated depreciation deduction is relatively less for a firm that faces a lower tax rate than one that faces a higher tax rate.

Another issue, and one that is relevant in Canada, is that these deductions provided by one level of government can affect the revenues of another level of government if both levels levy their income tax on the same tax base. This interaction is in contrast to ITCs which do not directly affect the tax base and revenues of another level of government.

In the Canadian system, capital cost allowances rates are generally slightly accelerated relative to actual depreciation rates which can act to encourage the acquisition of innovative equipment. Furthermore, eligible equipment used in R&D not only receives ITCs but is also depreciated at a very accelerated rate.

C. Preferential Tax Rates

An activity can be encouraged by providing a preferential tax rate for income accruing from that activity. Statutory tax rates have a number of important effects on economic activity. First, by reducing the tax collected on the return from an activity, a lower statutory tax rate increases the rate of return from that activity. Because this incentive is
not provided up front, but rather operates on the return to the investment, it targets the benefits more toward successful investments rather than simply the investment itself.

Second, statutory tax rates can have important effects on locational decisions of multinational firms — particularly where there is excess capacity in more than one jurisdiction. This consideration is becoming more important as markets become global rather than domestic and as multinational firms become a more important part of the economy.

This type of incentive is not typically used to stimulate innovative activity directly, although it can be used to encourage sectors where innovation is particularly important. In Canada, preferential tax rates are provided for small businesses and manufacturing and processing.

D. Financing Incentives

ITCs and accelerated depreciation deductions are directed at investments in physical or tangible assets. Another way to encourage activity is by affecting the financing of investments. That is, incentives can be used to either lower the cost of capital or to increase the supply of capital. These incentives can also be used to shift some of the risk associated with the investment from the investor to the government.

These incentives can be provided either up-front (such as a tax credit) or on the return (such as a lower rate of tax). An example in the Canadian tax system of an up-front investment incentive is the tax credit provided for investments in a labor-sponsored venture capital fund. Another form of up-front financing incentive allows taxpayers who cannot fully use their deductions to transfer them to other taxpayers or investors.

An example of a results-based financing incentive is the preferred tax treatment of capital gains. In the Canadian system, only seventy-five percent of capital gains are taxed and there is an exemption for the first $100,000 of capital gains. The $100,000 exemption is extended to $500,000 for gains earned on qualifying shares of small businesses.

Several issues have been raised regarding the effectiveness of these financing incentives — particularly in a small open economy like Canada’s. If one assumes that capital markets operate efficiently and that Canada is a relatively small player in these markets and, therefore, cannot influence the world prices, then domestic financing incentives should have little or no effect on the cost or availability of capital. They can, at best, influence the mix of domestic and foreign capital in Canada. However, these incentives can play a role if capital markets do not operate efficiently or even if particular segments of the capital market are domestic rather than international.

A further issue with up-front financing incentives is that they can give rise to inefficient investments that are tax motivated rather than
economically motivated. That is, because of the tax incentive, there may be more emphasis placed on getting money into investments and relatively less emphasis placed on finding sound investments. In fact, tax incentives that have this effect can be counter-productive if they cause investors to retreat from the market due to below-normal returns.

E. The Canadian Experience

In recent years in Canada, the trend has been to move away from tax incentives, keeping the base broad and tax rates down. This was accomplished by sweeping reforms to the income tax system in the late 1980s and to the sales tax system in 1991. Prior to these reforms, the income tax system had a wide range of tax incentives which resulted in a narrow corporate tax base, necessitating high corporate tax rates. Many of these incentives were found to be inefficient and served to increase complexity in the tax system. They also led to large build-ups of unused tax losses and tax credits which, in turn, led to instability of corporate tax revenues.

Tax reform eliminated many of these incentives. For example, the general investment tax credit was eliminated, the accelerated capital cost allowance ("CCA") rates for manufacturing and processing equipment were reduced from a two-year write-off to a twenty-five percent declining balance. These base broadening measures allowed for a reduction in the general rate from thirty-six percent to twenty-eight percent.

However, some incentives were retained, most notably incentives for regional development and R&D. It is the latter of these that is discussed in the balance of the paper.

III. R&D Tax Incentives

A. Why Encourage R&D

It is generally accepted that R&D has a positive effect on an economy. However, a more difficult issue is the extent to which the government should be involved in encouraging R&D. That is, should the economy be left to find the optimal level of R&D based on market forces, or should the government implement policies to encourage this activity.

Government assistance for R&D can be justified on the grounds that there are externalities associated with R&D that cause market failure. Specifically, the benefits of R&D extend beyond R&D performers and "spillover" to the external economy and R&D performers are unable to appropriate the value of the knowledge conferred. Where

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* This CCA rate was increased from twenty-five percent to thirty percent in the 1992 budget.
technology is diffused throughout an economy, the market price that an R&D-performing firm receives for a patent, licensing agreement, or product, may be below the social value of the knowledge conferred. Also, the value to an R&D-performing firm of hiring more engineers and scientists will depend on their expected contribution to profit, and not on the social value of the knowledge and experience that is gained by them. In the absence of policy actions, this inability of firms to appropriate within the market the social benefit of the R&D efforts financed by them would tend to result in an economy performing a less than optimal amount of R&D. In light of this, government incentives for R&D can provide a more efficient allocation of the country's resources.

There are a variety of related ways by which R&D can benefit technological development in the economy. First, there are the direct benefits to the R&D-performing firm of increased knowledge leading to reduced unit production costs and the development of new products and processes for sale or application. Second, there are the benefits of the spin-off technological applications outside of the R&D-performing firm, in other firms and sectors of the economy. Third, indigenous R&D tends to push firms to technological frontiers thus allowing them to imitate quickly. Fourth, there are the spillover benefits conferred upon the engineers and scientists conducting the R&D.

B. Grants or Tax Incentives

If one accepts the argument that government assistance for R&D is warranted, the issue then becomes how to deliver that assistance. Two key mechanisms through which governments can deliver assistance to businesses to increase R&D are grant programs and special provisions in the tax system.

Tax incentives are generally more efficient and equitable in delivering assistance to a broad range of businesses. On the other hand, grant programs generally have a greater degree of bureaucratic discretion and tend to be more effective when the assistance is delivered to a small number of firms for very specific projects.

Tax incentives normally require less administration and can be easier for companies to access than a grant program. The government can utilize the administrative structure already in place for the tax sys-


tem. In addition, the tax system may also be more effective in encouraging long-term research. Firms that are familiar with the benefits and eligibility criteria of a tax incentive can reasonably expect to receive ongoing benefits when multi-year projects are undertaken. In contrast, funding for grant programs is often on a year-by-year basis, depending on the budget made available to the granting authority in that year.

Since each approach has its own strength and weaknesses, most countries typically provide both types of incentives. Chart A shows the current breakdown of spending by the federal government on R&D. Total spending is on the order of four billion dollars per annum, about one quarter of which is in the form of tax credits.

C. Key Design Issues

There are several key design issues to consider in designing a system of R&D tax incentives:

- encourage all R&D or only incremental R&D;
1. Tax Credits for Incremental Activity

Recall that one of the reasons that ITCs can be inefficient is because they are provided even in cases where the investment would have taken place anyway. This consideration leads one to consider providing the incentive only for incremental activity. An incremental tax credit is intended to stimulate R&D without providing windfall gains on R&D spending that would have taken place in the absence of such assistance. The United States uses this incremental approach to encourage R&D, as does Ontario in its R&D "Super Allowance".

Restricting tax incentives to incremental activity raises a number of significant issues. The first issue is to define precisely what investments qualify as incremental—that is, incremental with respect to what base. Possible bases include the previous year's R&D, an average over a number of previous years' R&D, the previous year's ratio of R&D to sales. All of these approaches suffer from difficulties and will be inappropriate in certain cases, such as companies that have cyclical investment patterns.

Incremental credits can have perverse incentive effects by linking future benefits to current R&D. Where an incremental credit is determined with reference to a moving-average base, a linkage is established between current R&D spending and future tax credits—that is, qualifying R&D expenditures today can reduce the firm's access to tax credits in the future. Robert Altshuler, using a dynamic model that takes into account unused tax benefits to evaluate the marginal incentive effects of the U.S. R&D tax credit, estimates that the average effective R&D credit rate was just over two percent in 1981, at which time the statutory rate was twenty-five percent.

Indeed, a tax credit based on incremental spending can actually discourage R&D by firms whose desired level of R&D expenditures (in the absence of a tax credit) in a year is less than its average R&D expenditure over the previous base years. This negative incentive effect results from the fact that an additional (marginal) investment would not earn credits in the current year but would reduce the base for cred-

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8 For example, in the case where a firm had spent on average $20m per year over the previous three years, but in the current year intends to spend only $10m, then the current year base and credit would be $20m and $0 respectively. Thus, any additional R&D expenditures above $10m (and below $20m) would not earn any current credit, and would disadvantage the taxpayer by increasing the base in each of the following three years.
its in future years.

Restricting assistance to expenditures in excess of a moving-average base also creates an incentive for businesses to make R&D investments in a staggered, lumpy manner rather than adopt a smooth expenditure pattern.9

These problems led the federal government in Canada to eliminate its incremental credit in 1983 and replace it with the current approach which provides a credit for all qualifying R&D. The R&D credit in the United States is incremental, although there have been a number of changes made to attempt to address some of the problems noted above.

2. Refundability or Transfer of Incentives

Tax incentives are attractive to taxable firms because they reduce tax otherwise payable. However, the benefits of tax incentives are reduced when firms are non-taxable and are unable to use the incentives to offset tax in the current year. These firms may be non-taxpaying for a variety of tax and non-tax reasons. For example, small, growing R&D firms can be non-taxable due to large investments in initial capital requirements.

This issue can be addressed in two ways: the provision of direct refunds for unused credits; or permitting a “flow-through” mechanism under which firms can transfer unused R&D credits to investors.

Tax incentives which flow-through to investors may be less efficient than direct refunds in providing assistance to non-taxable firms comparable with that available to taxable firms. The value to a taxable firm of a credit that can be used to fully offset current tax equals the cost of the credit to the government. Similarly, the value of a fully refundable credit to a non-taxable firm equals the cost to the government.

On the other hand, unused credits that are flowed through to investors are usually discounted, often heavily. For example, the price that can be attached to an instrument that flows through a dollar in credits to investors will range between the value of the credit to the investor (usually one dollar) and the value of the credit to the firm earning the credit in the absence of the flow-through (usually zero). Recent estimates by Glenn Jenkins indicate that flow-through share provisions lead, on average, to revenue leakage in excess of 1.8 times

9 This can be illustrated by the following simple example. Assume a three year moving-average base, and consider a taxpayer that has spent $10m per year on qualifying R&D over the past three years, implying a three year average of $10m. Compare two investment plans: one where the taxpayer continues to spend $10m in each year over the following two year period, and another where the taxpayer delays investment in the current year for a $20m investment in the following year. While the taxpayer spends $20m in total over the two year period in each case, zero expenditures qualify for the credit in the first case, while $13.3m qualifies in the second.
that implied by a full refund.\textsuperscript{10} The Canadian system did contain a flow-through mechanism in the 1980s — the Scientific Research Tax Credit. However, this system proved to be very costly and difficult to administer and has been eliminated.

The Canadian system now provides refundability rather than a flow-through mechanism for Scientific Research and Experimental Development ("SR&ED") expenditures. However, this refundability is limited to certain situations. Canadian controlled private corporations ("CCPCs") whose taxable income in the prior year is less than $200,000 are eligible for full refundability on the credits earned in respect of the first two million dollars of qualifying current R&D expenses in a year. Other credits earned by these CCPCs are partially refundable. These special rules reflect the fact that cash-flow and other financing sources are generally more limited for small private firms.

3. Administration/Compliance

A very important consideration for a system of tax incentives is the administrative and compliance burden. An otherwise good system can break down if businesses are not able to access the incentives easily and efficiently. Firms want up-front certainty as to their eligibility for incentives and want them delivered in a timely manner.

In Canada, there has recently been considerable effort placed on administrative changes. Examples of recent changes included instituting a system of fast-track refunds for smaller R&D performers. This system allows small R&D performers who meet certain conditions to receive their refund much faster than normal — generally within two months. In addition, recent changes to the legislation have been proposed that would simplify the system to allow for easier claims and auditing.

IV. CANADIAN SYSTEM

A. Federal System

At the federal level, Canada has provided tax assistance for R&D since 1944. The system has undergone significant changes since that time. Annex A lists the key changes since 1961. Currently, Canada provides one of the most attractive systems of tax incentives for R&D in the world — with firms earning about one billion dollars of tax credits per annum. The basic structure of the system has remained unchanged since 1985.

The existing system of tax incentives for SR&ED performed in Canada provides for a general tax credit of twenty percent. This rate is

increased to thirty percent for SR&ED expenditures made in Atlantic Canada, and further increased to thirty-five percent for the first two million dollars of SR&ED expenditures made in a year by qualifying small business corporations. SR&ED expenditures include current and capital expenditures (other than buildings) that are all or substantially all (ninety percent or more) attributable to SR&ED. The thirty-five percent credit earned in respect of up to two million dollars per year of SR&ED expenditures of a current nature is fully refundable. A portion (forty percent) of other SR&ED credits earned by small business is refundable. Unused investment tax credits may be carried forward ten years and back three years. Table 2 summarizes the key features of the current system.

**Table 2**

**Summary of Current Federal SR&ED Tax Credits**

<table>
<thead>
<tr>
<th></th>
<th>Rates (%)</th>
<th>Refundability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large Corporations</strong></td>
<td>20*</td>
<td>0</td>
</tr>
<tr>
<td><strong>Individuals and</strong></td>
<td><strong>20</strong></td>
<td><strong>40</strong></td>
</tr>
<tr>
<td><strong>Unincorporated</strong></td>
<td><strong>35</strong></td>
<td><strong>40</strong></td>
</tr>
<tr>
<td><strong>Businesses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CCPC’s</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxable Income less than $200,000 in prior year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditures under $2 million</td>
<td>35</td>
<td>100</td>
</tr>
<tr>
<td>Expenditures over $2 million</td>
<td>20*</td>
<td>40</td>
</tr>
<tr>
<td>Taxable Income exceeds $200,000 in prior year</td>
<td>20*</td>
<td>0</td>
</tr>
</tbody>
</table>

* Increases to 30 percent for expenditures in Atlantic provinces and Gaspé.

**B. Provincial Incentives**

The provinces of Quebec, Ontario, Nova Scotia and Manitoba also offer income tax incentives for SR&ED. These provisions are summarized in Table 3. Under federal income tax rules, provincial investment tax credits are considered to be government assistance and thus taxpayers must subtract the amount of provincial tax credits in determining the base for calculating federal tax credits. This netting results in federal credits being based on actual costs, net of government assistance.
It also prevents credits from being stacked upon one another which could result in firms receiving tax incentives on amounts greater than their actual costs.

Table 3

Summary of Provincial SR&ED Tax Assistance

Nova Scotia:
- Non-refundable tax credit at a rate of 10 percent.

Manitoba:
- Non-refundable tax credit at a rate of 15 percent.

Quebec:
- Fully refundable tax credit at a rate of 20 percent-increased to 40 percent based on wages for qualified Canadian-Controlled Private Corporations.
- Deductions are not reduced by the amount of federal or provincial tax credits.

Ontario:
- An additional 25 percent deduction for large firms and 35 percent for small firms.
- "Incremental Super Allowance" increases these deductions by 50 percent for incremental R&D (i.e. deduction rises to 37.5 percent and 52.5 percent).

C. Comparison With Other Countries

Most of Canada's major trading partners have also chosen to use income tax incentives to encourage research and development. This section compares the Canadian system of tax incentives with those provided in other G-7 countries.

In all G-7 countries, R&D current expenditures are fully deductible in the year they are incurred. However, there are significant differences in the treatment of R&D capital expenditures and the use of tax credits. Table 4 summarizes the incentives in different countries.

The rates at which capital expenditures can be depreciated for tax purposes varies considerably across G-7 countries. In Canada and the United Kingdom, R&D capital expenditures are fully deductible from taxable income in the year they are incurred. In the remaining countries, the expenditures are depreciated over prescribed time periods. In the U.S., expenditures on machinery and equipment for R&D purposes generally fall in a five-year double-declining balance depreciation category, while buildings are depreciated over 31.5 years on a straight-line
Japanese tax depreciation rules provide for a mix of ordinary depreciation, increased initial depreciation and accelerated depreciation measures, depending on the circumstances. Similarly, France and Germany provide alternatives — machinery and equipment can be depreciated either over three years on a straight-line basis, or on a declining-balance basis of fifty percent per annum in France and thirty percent in Germany.

<table>
<thead>
<tr>
<th>Country</th>
<th>Current Expenses Credits</th>
<th>Capital Expenditure Deprec</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Yes</td>
<td>Immediate</td>
<td>Yes</td>
</tr>
<tr>
<td>U.S.</td>
<td>Incremental</td>
<td>Normal</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Incremental</td>
<td>Accelerated</td>
<td>Incremental</td>
</tr>
<tr>
<td>U.K.</td>
<td>No</td>
<td>Immediate</td>
<td>No</td>
</tr>
<tr>
<td>Germany</td>
<td>No</td>
<td>Accelerated</td>
<td>Incremental</td>
</tr>
<tr>
<td>France</td>
<td>Incremental</td>
<td>Accelerated</td>
<td>Incremental</td>
</tr>
<tr>
<td>Italy</td>
<td>No</td>
<td>Accelerated</td>
<td>No</td>
</tr>
</tbody>
</table>

In the United States, an incremental federal tax credit is earned at twenty percent on the increase in current qualifying R&D expenses over a specified expenditure base. The expenditure is determined by the product of the company’s fixed-base percentage and its average annual gross receipts over the preceding four tax years. The amount of the federal investment tax credit received reduces the amount of the R&D deduction.

France provides two non-taxable research tax credits: a “marginal” incremental credit and a “volume” credit, based on the volume of research expenditures. The marginal tax credit is equal to fifty percent of the increase in R&D expenditures over the previous year. The volume tax credit, applicable only to businesses that did not use the research credit prior to 1987, is equal to thirty percent of the R&D expenses incurred in the year, and these expenses must exceed those incurred in 1987. The credit is applied on current R&D expenditures and fixed assets other than buildings.

Japan provides a non-taxable twenty percent incremental tax credit, earned on R&D expenditures above a base amount defined as the largest amount of R&D expenditure incurred in any of the previous accounting years since 1966. Eligible expenditures include current R&D expenses and depreciation allowance for R&D machinery and equipment. Germany provides a non-taxable tax credit of 7.5 percent on R&D fixed assets costs in excess of DM 500,000.

Jacek Warda of the Conference Board of Canada undertook a
study which compared the level of tax assistance in Canada to that in other developed countries. The index used in this comparison is referred to as a "B index". The B index accounts for the influence of R&D tax credits on the after-tax cost of undertaking R&D, as well as the influence of income tax rate(s) in determining both the value of qualifying R&D deductions and the after-tax value of the returns from R&D. The index represents a minimum benefit-cost ratio at which, in a given tax jurisdiction, an R&D investment becomes profitable. The graph below (see Graph A) shows the results of this study for the G-7 countries — with Canada being the most attractive jurisdiction for R&D incentives (i.e., lowest B index).

Graph A
Comparison of R&D incentives
In G-7 countries

Canada
France
United States
United Kingdom
Japan
Germany
Italy

0 0.2 0.4 0.8 0.9 1 1.2


12 The B index is an analytic tool used to rank the relative attractiveness of a country's R&D tax system. Other things being equal, the lower the B index, the greater the amount of R&D a firm will undertake.
V. RECENT CHANGES

Despite the fact that Canada's system of R&D tax incentives is attractive by international standards, there are continuing pressures for refinements and adjustments in both policies and administration. These pressures have surfaced, in part, in response to changes in the importance of R&D and changes in the way R&D is carried out. For example, many of the pressures for change over the last few years have been as a result of the trend toward R&D being carried out in conjunction with production activities — shop-floor research. It is no longer the case that the vast majority of R&D is being carried out in isolated facilities, distinct from production activities. This trend has exposed shortcomings in the existing system in two key areas: the treatment of overhead expenses; and the treatment of capital expenditures.

Consultations between industry and government led to the announcement in the February 1992 Budget that there would be changes in these two areas to help make the system more effective. Furthermore, it was announced that the changes would enrich the program by about $230 million over a five year period.

On October 5, 1992, the federal government released draft legislation for these proposed changes. Modifications to the proposals were announced by the Minister on December 2 of that year. This section discusses the motivation for these proposed changes, describes their key features and discusses several key policy issues involved in their design. Changes were also proposed to the definition of SR&ED and the administration of the program. The change in definitions are discussed below and further details on the administrative changes can be found in R. Shultis's recent work.18

A. Overhead Expenses

Consultations with R&D performers revealed concerns over the uncertainty and administrative burden resulting from the existing treatment of overhead and administration expenditures. Currently, these expenditures qualify for SR&ED benefits if they are either directly attributable, or all or substantially all attributable to the prosecution of SR&ED activities. In many cases, taxpayers find that demonstrating that an expenditure meets this condition is a complex and uncertain exercise, especially in cases when SR&ED and other activities are carried out in the same facility.

The proposed changes would allow taxpayers to elect to use an easier, more certain, method of determining tax credits for overhead

expenditures. The use of this easier method would be optional; that is, the taxpayer would have the choice of using either the new method or the existing method. However, once the choice is made, it would be irrevocable for that taxation year.

This new optional method involves calculating a notional or proxy amount for certain overhead expenditures rather than specifically identifying and allocating these expenditures. In determining a taxpayer's SR&ED tax credit, the proxy amount representing these overhead expenditures would be calculated as a fixed percentage (sixty-five percent) of the salaries or wages (the salary base) of the employees directly engaged in the SR&ED.

The salary base would include only the salaries of those employees directly engaged in SR&ED. For example, the salaries of researchers carrying out experiments and preparing equipment for experiments would be included in the salary base. The base would also include salaries of managers to the extent that they are directly engaged in supervising or directing the technical aspects of the SR&ED.

The salary base would not include the salaries of support and administrative staff that are providing a service to the SR&ED staff. These amounts would be captured as part of the overhead proxy. There would be restrictions on the amount of salaries paid to non-arm's length parties. These restrictions are discussed below.

In order to keep the new system as simple as possible, all taxpayers would use the same percentage (sixty-five percent) in determining the proxy amount. While this percentage provides an appropriate amount for overheads on average, it does not reflect the variation of the ratio of overheads to salaries across taxpayers. This is one of the trade-offs encountered in designing a simpler system.

However, in an effort to make the proxy method as fair as possible across taxpayers, certain expenses would continue to be claimed separately and, therefore, would not be captured by the proxy amount. Examples of expenses that would be claimed separately are materials consumed in the prosecution of SR&ED and contract payments for SR&ED.

The relative importance of these expenditures can vary considerably across industries and even across firms within an industry. Therefore using a proxy amount to claim these expenditures could result in large discrepancies between actual overhead expenses and the proxy. Furthermore, these expenditures are typically easier to allocate between SR&ED and other activities and, therefore, having them claimed separately should not give rise to significant administrative problems.

While the approach outlined above works well in cases where wages and salaries are paid to arm's length parties, it raises concerns where salaries are paid to non-arm's length employees. Salaries to non-
arm’s length employees may not be comparable to the salaries paid in arm’s length situation. They may represent more than the return to labor services provided and are not subject to the same market test as arm’s length payments. This issue is of particular concern under the proposed proxy method because the salary is such a critical determinant of the amount of tax credits received. Indeed in cases where there is flexibility in determining the salary, there is potential to artificially increase the tax credits. For example, with a tax credit rate of thirty-five percent and proxy percentage of sixty-five percent, a $100 increase in the salary generates about fifty-seven dollars in additional credits. This fifty-seven dollar credit exceeds the income taxes paid by the employee which would be on average about fifty dollars for an employee in the top marginal tax bracket.

As a result of this concern, there are special rules for salaries paid to a specified employee — an employee who does not deal at arm’s length with the employer or who is a specified shareholder of the employer. These rules place a ceiling on the amount of wages and salaries paid to specified employees that would be eligible to be included in the salary base.

Table 5 summarizes the treatment of various expenses under the old and new systems.

<table>
<thead>
<tr>
<th>Treatment of Expenses Under Old and New Systems</th>
</tr>
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<tbody>
<tr>
<td><strong>Old</strong></td>
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<tr>
<td>Direct Wages</td>
</tr>
<tr>
<td>Salaries</td>
</tr>
<tr>
<td>Overhead</td>
</tr>
<tr>
<td>Expenditures</td>
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<td></td>
</tr>
</tbody>
</table>

B. Capital Expenditures

SR&ED performers can earn investment tax credits for capital expenditures. These credits are earned on the purchase of capital equipment intended to be used to carry on SR&ED in Canada. They are earned up-front, in the year that the equipment is purchased and available for use.
A capital expenditure qualifies for SR&ED treatment if it is incurred for, and is all or substantially all attributable to, the prosecution of SR&ED in Canada. Concern had been expressed over the fact that equipment used primarily in SR&ED, but less than ninety percent, was not eligible for ITCs. The absence of a credit was particularly important for companies that perform SR&ED in a shop-floor setting, where equipment can often be used for both SR&ED and production activities.

The proposed changes would provide partial ITCs (one-half of the normal rate) for expenditures in respect of equipment that is used primarily, but not exclusively, for SR&ED in Canada. This treatment could involve equipment used for dual purposes in the same year, or equipment whose use changes over time.

Extending the credit to include equipment used primarily in SR&ED raises the issue of when the credit is earned. The existing credit for equipment used all or substantially all in SR&ED is earned up-front, based on the taxpayer's intention at the time of acquisition. The taxpayer must intend to use the equipment all or substantially all over the course of its useful life. This intent test works reasonably well in conjunction within these fairly restrictive confines. However, it would be difficult to extend this treatment to partial use equipment as the intent test would be much more difficult to administer in cases of mixed use. For example, it would be more difficult to determine the taxpayer's intent with respect to equipment that is initially used significantly in both SR&ED and other activities.

Under the proposed changes, the partial credit for equipment used primarily in SR&ED would be delivered over time, depending on the actual use of the equipment. These credits would be earned over a three year period — one half of the partial credit (i.e., one quarter of the full credit) — being earned at the end of the first taxation year in which the equipment has been used primarily in SR&ED for at least twelve months. The remaining portion is earned at the end of the first taxation year in which the equipment has been so used for twenty-four months. These credits would only be available to equipment that is used primarily in SR&ED during the initial (at least twelve months) period after it is available for use. That is, equipment not used primarily in SR&ED during that period would never be eligible for partial tax credits.

Table 6 provides a simple numeric example of how the tax credit would be calculated.
Table 6

Proposed Rules for Capital Equipment:
(Investment Tax Credits @ 20 percent, $100 Capital Expenditure)

Percentage of Asset used for SR&ED

<table>
<thead>
<tr>
<th></th>
<th>0-50%</th>
<th>above 50% (primarily)</th>
<th>exceeds 90% (ASA(^{1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Year 2</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Year 3</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Tax Credit</strong></td>
<td><strong>0</strong></td>
<td><strong>$10</strong></td>
<td><strong>$20</strong></td>
</tr>
</tbody>
</table>

(1) All or substantially all attributable to the prosecution of SR&ED.

Extending the tax incentives for capital expenditures to equipment used primarily in SR&ED would be of assistance in a number of circumstance, for example, the case where equipment is used primarily in SR&ED but also simultaneously in a production activity such as quality control. Furthermore, it would provide additional benefits in cases where the equipment is used initially in SR&ED but subsequently in other activities, so that it does not meet the all or substantially all attributable test.

However, certain equipment would not be eligible for partial tax credits. Equipment which is used during the SR&ED phase of the assembly, construction or commissioning of a project, but which is intended to be used in the resulting commercial, manufacturing or processing facility, plant or line, would not be eligible for partial ITCs. Although this limitation would apply to capital expenditures, current expenditures associated with the SR&ED phases would continue to qualify as SR&ED expenditures.

This limitation on commercial equipment is important because it preserves the focus of the tax credit on scientific research and experimental development and denies it for capital expenditures made with a subsequent direct commercial application in mind. Allowing the latter type of capital expenditure to become eligible would significantly expand the scope and cost of the existing program.

C. Definition of SR&ED

During the past decade much progress has been made in the complex exercise of defining the range of activities qualifying as SR&ED. In 1986, as a result of extensive consultations with the SR&ED community, Revenue Canada Taxation (“RCT”) issued an Information Circular which brought greater certainty to the meaning of SR&ED.

Nevertheless, consultations revealed that two further clarifications
would be helpful. The first proposed change clarifies the meaning of experimental development. Specifically, it clarifies that work performed with the intent of achieving a technological advancement, including incremental improvements, for the purpose of creating new, or improving existing materials, devices, products or processes would qualify as experimental development.

The second proposed change confirms that specific types of work, such as data collection or testing, which are directly in support of basic or applied research and experimental development would also qualify as SR&ED expenditures.

While these changes do not broaden the definition of SR&ED, they provide greater certainty as to what constitutes a SR&ED activity.

VI. SUMMARY

Innovation is an important factor for the prosperity and growth of an economy. The tax system can affect the environment for innovation in a number of ways — at a general level through its effect on deficits and macroeconomic variables and by specific incentives designed to encourage particular activities. While tax incentives can be useful in certain circumstances they also have drawbacks and can, in some cases, be inefficient ways of encouraging activity.

One important component of innovation is the development of innovative products or processes. The benefits of R&D extend beyond the direct benefits to the performer and include important spillover benefits to other firms as the R&D knowledge disseminates into the economy. These external benefits provide an economic rationale for government policies, such as tax incentives, to encourage R&D. Indeed, many development countries do provide incentives to encourage R&D.

Canada provides substantial income tax incentives, at both the federal and provincial level, to promote research and development — indeed, these incentives deliver over one billion dollars of assistance annually and are among the most attractive in the world. These incentives have evolved considerably since their inception in response to changes in the importance of R&D and changes in the way R&D is carried out. Recent changes to the system of R&D tax incentives did not alter the basic structure of the system, but were designed to make the system more effective, simplify the determination of eligible credit, and reduce uncertainty for taxpayers about their entitlement.
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ANNEX A

History of Tax Incentives for R&D in Canada
(1960 - 1992)

Pre-1961
- Current expenditures on R&D fully deductible in the year incurred.
- Capital expenditures on R&D deductible at the rate of 33 percent per annum.

1961
- Capital expenditures made fully deductible in the year incurred.

1962-66
- Incremental incentive introduced — tax deduction of 50 percent of current and capital expenditures in excess of the base levels prevailing in 1961.

1966-75
- Incremental 50 percent tax deduction replaced by (non-taxable) grants under IRDIA (Industrial Research and Development Incentives Act) of:
  - 25 percent of capital expenditures
  - 25 percent of current expenditures in excess of the average level over the previous five years.

1977-78
- Investment tax credit of 5 to 10 percent, depending upon region, introduced for both current and capital expenditures.

1978
- Incremental allowance introduced — tax allowance of 50 percent of current and capital expenditures in excess of the average level over the previous three years.
- General investment tax credit rate increased to 10 percent, 20 percent in Atlantic Canada and Gaspé region, and 25 percent for small businesses.

1983
- Incremental allowance eliminated.
- Tax credit rates for R&D increased by ten percentage points to 20 percent for general R&D expenditures, 30 percent for Atlantic Canada and 35 percent for expenditures made by small businesses.
- Partial refundability (20 percent-40 percent) of unused investment tax credits introduced for expenditures made before May 1986.
- 3-year carry-back of ITCs introduced, carry-forward extended to seven years.
- Limits on deductibility of ITCs eliminated.
• Scientific Research Tax Credit flow-out mechanism introduced.

1984
• 35 percent credit limited to first $2 million of R&D expenditures per year.
• SRTC issues constrained to equity shares.

1985
• SRTC mechanism eliminated.
• 100 percent refundability of 35 percent credit earned on current R&D expenditures introduced.
• “Wholly attributable to R&D” requirement modified to “all or substantially all attributable”.
• R&D credit extended to expenditures of a current nature “directly attributable” to R&D.
• R&D re-cast as Scientific Research and Experimental Development (SR&ED).
• Change of control rules introduced for ITCs and SR&ED deductions.
• ITC base computed net of assistance.

1986
• SR&ED incentives extended to payments made to federal granting councils.
• 20 percent and 40 percent refundability of unused ITCs extended to credits on expenditures made before 1989.

1987
• Buildings excluded from SR&ED incentives.
• Restriction introduced on amount of ITCs claimable in a year.
• Carry-forward period for ITCs extended from 7 years to 10 years.
• Requirement that expenses be “related to the business” strengthened, partnership rules introduced.
• 20 percent refundability of unused investment tax credits eliminated for expenditures made before 1988.
• 40 percent refundability of unused investment tax credits extended indefinitely.

1988
• “Fast-track” introduced for partial SR&ED investment tax credit refunds before notice of assessment.
1992

- Optional proxy method for determining SR&Ed overhead expenditures proposed.
- Partial tax credit for equipment that used primarily but not all or substantially all for SR&ED proposed.