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# Tax Treatment of Business Investments in Intellectual Assets: An International Comparison

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**STI WORKING PAPER 2006/4**

**Jacek Warda, JW Innovation Associates Inc.**

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## ABSTRACT

In a knowledge-based economy, business performance and overall levels of economic growth are increasingly dependent on the development and exploitation of intellectual assets. A number of OECD countries offer tax incentives to encourage and reward business expenditures on intellectual assets. This working paper examines the tax treatment of corporate expenditures on selected intellectual assets and develops an indicator of the relative generosity of tax systems in OECD countries to such investments. Five types of intellectual assets are considered: research and development (R&D), patents, workforce training, software and organisational change. The paper shows that although tax incentives have, to date, mainly favoured R&D expenditures, they are gradually embracing other types of intellectual assets, especially in those countries that provide more generous tax treatment of R&D. Nineteen OECD countries had specific R&D tax incentives in place in 2005, up from only 12 in 1996, and 6 offered tax incentives for corporate training. Only one country, Japan, provides a tax incentive for investments in information and communication technology, including purchased software. Many countries require software to be capitalised and provide some degree of tax relief in the form of accelerated depreciation schemes. Tax treatment of expenses related to the acquisition of patents is similar, with most countries requiring the cost of acquiring patents to be capitalised and depreciated over time. Some countries offer accelerated depreciation schemes or tax relief on revenues generated by licensing royalties to encourage further investment in patenting. Cross-country differences in corporate tax rates and in specific tax incentives lead to considerable differences in the generosity of tax regimes to expenditures on intellectual assets.



## RÉSUMÉ

Dans une économie du savoir, la performance des entreprises et les taux de croissance économique globaux dépendent de plus en plus du développement et de l'exploitation d'actifs intellectuels. Un certain nombre de pays de l'OCDE appliquent des mesures d'incitation fiscale afin d'encourager et de valoriser les dépenses des entreprises portant sur des actifs intellectuels. Ce document de travail examine le régime fiscal des dépenses des entreprises portant sur certains actifs intellectuels et définit un indicateur de la générosité relative des systèmes fiscaux des pays de l'OCDE vis-à-vis de ces investissements. Cinq catégories d'actifs intellectuels sont envisagées : recherche et développement (R-D), brevets, formation de la main-d'œuvre, logiciels et changement organisationnel. La note montre que, si les incitations fiscales ont surtout à ce jour favorisé les dépenses de R-D, elles s'appliquent aussi de plus en plus à d'autres catégories d'actifs intellectuels, surtout dans les pays qui accordent déjà un régime fiscal plus généreux à la R-D. Dix-huit pays de l'OCDE appliquaient des mesures d'incitation fiscale spécifique à la R-D en 2005, au lieu de 12 seulement en 1996, et 6 d'entre eux appliquaient des mesures d'incitation fiscale aux dépenses de formation des entreprises. Un seul pays, le Japon, accorde une incitation fiscale aux investissements dans les technologies de l'information et de la communication, y compris aux achats de logiciels. Beaucoup de pays exigent que les logiciels soient capitalisés et accordent à des degrés divers des allégements fiscaux sous forme de systèmes d'amortissement accéléré. Le régime fiscal des dépenses liées à l'acquisition de brevets est similaire, la plupart des pays exigeant que le coût de l'acquisition de brevets soit capitalisé et amorti au fil du temps. Certains pays appliquent des systèmes d'amortissement accéléré ou des allégements fiscaux sur les redevances de licences afin d'encourager les nouveaux investissements dans le brevetage. Les différences entre les pays en matière de taux d'imposition des sociétés et de mesures d'incitations fiscales spécifiques aboutissent à des différences considérables dans la générosité des régimes fiscaux applicables aux dépenses portant sur les actifs intellectuels.

## EXECUTIVE SUMMARY

A competitive and stable tax policy can be an effective tool for promoting innovation and creating an innovation-friendly business environment. An important step in designing an effective and efficient tax policy is to learn from mechanisms and experiences in other countries, particularly those that are successful in achieving high innovation outcomes.

This study examines the tax treatment of investments in selected intellectual assets in OECD countries and provides a way to compare the relative generosity of tax systems for investments in intellectual assets across countries. It examines five categories of corporate investments in intellectual assets: *i)* research and development (R&D), *ii)* patents, *iii)* worker training, *iv)* software and *v)* organisational change.

The report confirms that OECD countries continue to develop fiscal policy tools to promote investments in intellectual assets, in particular for R&D and worker training. As market-based instruments, tax incentives do not, generally, discriminate between specific projects or investments – they tend to be broadly accessible by business and available for any qualifying activity, although some countries do target tax incentives to certain types of firms (small and medium-sized firms, in particular) and certain types of behaviour (*e.g.* collaborative R&D). This approach differs from that used in most grant programmes, in which government can select specific projects for support, for example those from which it expects large spillover effects in the long term or those in particular fields of science and technology. In part, the increased use of fiscal instruments to stimulate investment in R&D and other intellectual assets reflects the desire of governments to achieve various national or supranational R&D targets. It is also a reflection of governments' need to enhance the business environment in order to attract new investment, spurred by an aggressive competition for R&D-based investment worldwide.

The following are important findings of this study:

- Spending on most intellectual assets – with the notable exception of patents – is treated as a revenue expense that can be deducted in the year incurred. While most R&D, training, software, organisational change and start-up costs can be immediately deducted in the year the expenditures are made (*i.e.* current deduction), there is no such provision available for costs associated with patents, which are treated as depreciable assets in the countries examined.
- Most OECD countries have specific tax incentives in place for R&D investments – 19 of the 27 countries examined (or 70%) in 2006. This figure compares with only 50% of OECD countries examined in 1996, highlighting the growing popularity of this policy instrument. Some tax incentives are based on the total level (or volume) of R&D expenditure; others are based on incremental increases in expenditure; and some combine volume and incremental approaches.
- Investments in patents do not benefit from any specific tax incentives, other than provisions that allow for accelerated depreciation of patent costs. But tax incentives for patents are channelled indirectly through broader schemes that encourage investments in R&D and other intangible assets. Patents can be an input to, or an output of, R&D processes, which may help to explain the relative dearth of patent-specific tax incentives. Patents may already benefit from the R&D tax incentives existing in many OECD countries. Other channels also exist for the incentive tax treatment of patents, especially the growing role of patent donations and tax reductions on royalty payments.

- Corporate training is the next most popular area – after R&D – where specific tax credits exist, appearing in five OECD countries. While these incentives are not as widespread as R&D tax credits, their emergence points to the growing emphasis governments put today on human resource development and lifelong learning.
- The main channels for the tax treatment of software are current expensing or accelerated depreciation. There is only one country – Japan – that provides a tax credit specifically for information and communication technology (ICT) investments, including purchased software. Similar to patents, however, software development expenses that constitute eligible R&D expenditures may benefit from tax incentives applicable to R&D expenditures in those countries that provide them.
- Organisational expenses benefit from no specific tax credits; however, full deductibility of organisational expenses prevails, meaning that this type of intangible expenditure is largely treated by tax authorities as current business expense.

Is there any obvious relationship among tax treatments of different intellectual assets at the country level? As Table 1 indicates, countries that provide R&D tax incentives are more likely to offer incentives for other types of intellectual assets. This likelihood does not appear to be strong enough to warrant far-reaching conclusions, as there is little evidence that selective tax incentives exist for intellectual assets such as patents, software and organisational change. There are countries in which national tax-based innovation policies seem to be more holistic, however, in particular, Austria, France, Japan, the Netherlands, Spain, and perhaps Korea.

The driving force behind this trend appears to be recognition by governments that R&D does not operate in vacuum and as such is not sufficient to bring new products or services to market and increase industrial productivity. Other key factors that shape business innovation but lie outside the realm of R&D include investments in intellectual assets such as patents and patent rights, a skilled workforce and organisational flexibility.

**Table 1. Overview of tax credits and additional allowances for intellectual assets in select OECD countries**

| Country | R&D | Acquired Patents | Training | Software | Organisational Change |
|---|---|---|---|---|---|
| **Austria** | Volume *and* incremental allowance *or* alternative tax credit | - | Additional allowance *or* alternative tax credit | | |
| **Australia** | Volume *and* incremental allowance | - | - | - | |
| **Belgium** | Investment deduction | Investment deduction | - | - | - |
| **Canada** | Tax credits at federal and province level | - | - | - | |
| **Czech Republic** | Volume- based allowance | - | - | - | - |
| **Denmark** | Additional allowance on collaborative R&D with universities | - | | - | - |
| **Finland** | - | - | | - | - |
| **France** | Volume *and* incremental tax credit | - | Incremental tax credit | - | - |
| **Germany** | - | - | | - | - |
| **Greece** | - | - | | - | |
| **Hungary** | Additional allowance | - | | - | |
| **Iceland** | - | - | | | |
| **Ireland** | Incremental tax credit | - | - | - | - |
| **Italy** | Volume-based tax credit for small firms | - | - | | - |
| **Japan** | Volume-based tax credits based on ratio of R&D to sales. | - | Volume *and* incremental tax credit | Information technology tax credit | - |
| **Korea** | Volume *or* incremental tax credit | - | Volume *or* incremental tax credit | | - |
| **Mexico** | Volume-based tax credit | - | - | - | - |
| **Netherlands** | Volume-based credit on research wages | Investment deduction | Additional allowance (until 2004) | - | - |
| **New Zealand** | - | - | | - | - |
| **Norway** | Volume-based tax credit | - | - | - | - |
| **Poland** | Tax credit (coming in 2006) | - | | - | |
| **Portugal** | Volume *and* incremental tax credit | - | | - | |
| **Slovak Republic** | | - | | | |
| **Spain** | Volume *and* incremental tax credit | Technological innovation tax credit | Volume *and* incremental tax credit | - | - |
| **Sweden** | - | - | - | - | - |
| **Switzerland** | - | - | | - | - |
| **Turkey** | | Investment allowance | | | |
| **United Kingdom** | Volume-based tax credit | - | - | - | - |
| **United States** | Incremental tax credit and state credits | - | Tax credits available at state level | - | - |

*Notes*: "-" means that the country was examined but no pertinent incentive found; "blank" space means that the country information was not available for that intellectual asset area.

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# INTRODUCTION[1]

Business innovation comprises a system of many different, overlapping and seemingly incongruent activities. They range, for example, from the organisation and strategy of a firm to the quality and skills of its human capital to technology acquisition, intellectual property, collaboration and networking, and to accessing sources of capital. If research and development (R&D) can be seen as better defined (after decades of work on *the Frascati Manual*), the opposite is true about other components of business innovation – the intellectual assets or innovation intangibles.

To date, tax treatment studies have focused on R&D, establishing a solid base for comparisons.[2] The current study extends this comparative analysis *beyond* R&D – by focusing on the tax treatment of other vital ingredients of the innovation process – intangible investments in intellectual assets.

The report reviews the status of tax treatment of investments in selected intellectual assets in OECD countries. In particular, it examines whether such investments are treated as expenditures or investments (to be depreciated) and whether special incentives or provisions exist to reduce the tax burden on firms that make the investment.

Five broad categories of business expenditures on the intellectual assets are discussed:

1. *Research and development*: The study updates and revises information on selective tax incentives for R&D and calculates their relative generosity (the B-index) in OECD countries.

2. *Patents*: The study examines the relative generosity of the tax treatment of costs associated with the acquisition and creation of patents, as well as income related to licensing revenues (royalties). It also discusses the tax treatment of patents used in R&D. It calculates a measure of relative generosity.

3. *Training of human resources*: The assessment focuses on the tax treatment of corporate expenditures on worker training. It identifies the costs that qualify for specialised tax treatment (*e.g.* training fees, supplies and wages) and the way they are treated in the tax code. A measure of the relative generosity of tax systems to investments in corporate training is developed.

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1 The author gratefully acknowledges the intellectual contribution of Jerry Sheehan, who guided this project from its inception to successful completion. Much appreciation and thanks are due to Catalina Martinez, Graham Vickery and Gregory Wurzburg of the OECD for their excellent collaboration and valuable input. The report has also benefited from keen attention and thoughtful comments of members of the OECD Working Party on Innovation and Technology Policy and Working Party No. 2 of the Committee on Fiscal Affairs of the OECD, for which the author is especially grateful. All errors and omissions remain the responsibility of the author.

2 For example, Jacek Warda, *Measuring the Value of R&D Tax Treatments in OECD Countries*, STI Review No. 27, OECD: Paris, 2001.

4. *Computer software*: The section attempts to distinguish between the tax treatment of costs associated with the internal development of software and externally purchased software, between stand-alone software and software that is bundled with hardware, and between software development and R&D. A measure of relative generosity is calculated.

5. *Organisational change*: The section discusses the tax treatment of business expenditures related to the establishment of new firms, including the costs of start-up, continuing operations and restructuring. A measure of the relative generosity of the tax system to such expenses is also calculated.

As reflected in those areas of expenditure, innovation is much harder to define than R&D. Equally difficult is the design of policies to support innovation. Indeed, each of the areas mentioned above can have its own set of policy instruments. The challenge is to design and co-ordinate these policy instruments into a coherent system that effectively and efficiently promotes business innovation. For example, little is known about the broader interactions of tax incentives with other innovation policies:

- Does implementing an R&D tax incentive scheme have implications for other areas of policy, such as education and training or the supply and demand for researchers and technicians?
- How do patents benefit from the existing tax incentives for R&D? Is there a connection between a country's patenting productivity and its R&D tax incentives?
- How does the tax treatment of corporate expenditures on R&D, software or employee training influence the pace of organisational change in the company? Does it induce decisions to proceed with corporate restructuring or organisational effectiveness investments?

The objective of the paper is not to evaluate the cost and benefits of tax incentives nor to endorse their adoption as an instrument of innovation policy, but to report on the status of tax treatment in OECD countries and provide a simple way to compare tax systems across countries. For comparative purposes, the report applies a quantitative indicator of the relative generosity of tax systems towards investments in intellectual assets. It is modelled on the B-index of R&D tax expenditures, which has been used by the OECD since 1996 to produce comparisons of the tax treatment of R&D investments.[3] The B-index measures the present value of before-tax income that a firm needs to cover the cost of investing one unit of currency (dollar, euro, yen, etc.) in an intellectual asset (*e.g.* R&D, patent, software, training, organisational change) and to pay the applicable corporate income taxes. The index considers investments at the margin, with economic rent exhausted, and ignores financing considerations, such as the cost of capital. The lower the index the greater is the incentive for a firm to invest in a given intangible.[4]

For simplicity's sake, the B-index developed in this paper is applied under a stylised scenario of maximum potential generosity. It assumes that a company has enough profit to use the full benefit of R&D tax incentives and is not limited by various caps or ceilings on the amount of credits earned, as well as carry-back or carry-forward provisions. Only corporate tax systems are considered; other tax systems

[3] Tax incentives usually take one of four forms: tax credits, allowances from taxable income, exemptions from income tax payable, and tax deferrals (depreciation allowances). Although tax credit and allowances from taxable income are an obvious type of tax incentive, depreciation allowances are a tax incentive if they are allowed at a rate that is greater than the rate of economic depreciation. A specific form of tax deferral is current deduction of the cost of an intangible asset, *i.e.* a deduction in the year the investment is made.

[4] Annex 1 presents detailed information on the calculation of the B-index, while appendices in each section of the report contain information on the specific calculation of the B-index relevant to a given type of intellectual asset.

(*e.g.* personal, value added, capital, etc.) are not included in the model. The discount rate used in the model is constant for all countries; the model abstracts from international differences in interest rates and assumes a uniform discount rate of 10% to ensure comparability over time. In addition, the model does not consider the extent to which interest costs and other financial charges may be deducted against taxable income at the corporate level (*i.e.* investment is financed only through equity). While falling short of an exhaustive financial model of the tax treatment of investments in intellectual assets, this simplified model of the B-index has many important policy uses, including measuring relative attractiveness of corporate tax systems; enabling international comparisons and benchmarking; tracking tax policy trends; and informing evaluations of policy impact.

# 1. TAX TREATMENT OF RESEARCH AND DEVELOPMENT

## Introduction

This section updates previous analysis conducted for the OECD of R&D tax treatment for manufacturing companies in OECD countries for the period 2004-2005. Twenty-seven OECD countries are included and compared, including the Czech Republic and Poland, which are recent additions to the update.[5] The analysis considers the following components of R&D tax treatment: the corporate income tax rate, R&D tax credits, special R&D allowances from taxable income and tax depreciation of capital assets (machinery and equipment, and buildings) used in R&D. The B-index methodology is used to provide a uniform approach to comparing the countries, assuming a best-case scenario in which firms are indefinitely profitable and unlimited in the amount of R&D tax incentives they can claim.[6] Thus, tax incentives can be utilised in the same period in which they are earned.

## Types of R&D tax incentives

There are two major forms of R&D tax incentives used in OECD countries: R&D tax credits and R&D allowances. Tax credits allow a deduction from the tax a corporation must pay to tax authorities. Tax allowances represent an additional deduction from the taxable income of the corporation, which indirectly lowers the amount of tax owed.

As of 2006, 12 OECD countries offer R&D tax credits. Eight countries offer credits based on the total volume or level of the firm's R&D investment. Two countries – Ireland and the United States – use purely incremental tax credits that base the amount of credit on the increase in a firm's R&D spending over some base period. Three countries – France, Portugal and Spain – use a mixed system of volume-based and incremental tax credits. Korea offers both a volume-based and an incremental tax credit, but these two credits are mutually exclusive – a firm can claim only one of these credits (see Table 1.1). Over time, there has been a shift away from incremental incentives towards volume incentives, which while increasing potential deadweight losses are often seen as simpler to implement. With the exception of Ireland, most incentives introduced since 2001 have been volume-based. In addition, Japan switched from an incremental to a volume-based system, and France also added a volume component to its incremental incentive. In several countries, more generous tax credits are offered for small firms that meet a number of criteria linked to their number of employees, annual turnover or levels of R&D spending.

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5 Tax Management Inc., *Business Operations in Foreign Countries*; International Bureau of Fiscal Documentation (IFBD), *Taxation of Companies in Europe*, Amsterdam; IFBD, *Taxation of Companies in Asia and Pacific,* Amsterdam; IFBD, Taxation of Companies in Latin America, Amsterdam.

6 Ceilings on the amount of tax credit a firm can claim, or on the amount of R&D expenditure that can qualify for a tax incentive are excluded from this comparison. Such ceilings tend to make tax incentive systems more beneficial to small firms than large firms, which is a policy objective in many countries.

**Table 1.1. R&D tax credits in OECD countries, 2004-2005**

| Country | Level of R&D | Increment of R&D | Special treatment of SMEs |
|---|---|---|---|
| **Austria*** | 8% | | |
| **Canada - federal** | 20% | | 35% of level |
| **France**** | 5% | 45% | |
| **Ireland** | | 20% | |
| **Italy** | | | 30% of level |
| **Japan** | 10-15% | | 15% of level |
| **Korea** | 15% | 50% | |
| **Mexico** | 30% | | |
| **Netherlands** | 14% | | 42% of level |
| **Norway** | 18% | | 20% of level |
| **Portugal*** | 20% | 50% | |
| **Spain*** | 30% | 50% | |
| **United States - federal** | | 20% | |

* Alternative refundable tax credit.
** Tax incentive is based on a combination of level of R&D investment and incremental increase in R&D investment.

R&D allowances are less popular than credits, with only seven OECD countries offering them. Most are volume-based, but Australia and Austria offer a combination of both level-based and incremental allowances (see Table 1.2). Denmark and Hungary offer targeted incentives (of 150% and 400%, respectively) for collaborative R&D with public research institutions only, while Belgium earmarks its incentives for capital assets engaged in R&D. The United Kingdom has a more generous allowance for SMEs.

**Table 1.2. R&D allowances from taxable income in OECD countries, 2004-2005**

| Country | Level of R&D | Increment of R&D | Special treatment of SMEs |
|---|---|---|---|
| **Australia*** | 125% | 175% | |
| **Austria*** | 125% | 135% | |
| **Belgium** | 113.5% | | |
| **Czech Republic** | 200% | | |
| **Denmark** | 150% | | |
| **Hungary** | 200-400% | | |
| **United Kingdom** | 125% | | 150% of level |

* Tax incentive is based on a combination of level of R&D investment and incremental increase in R&D.

Depreciation allowances are a third type of incentive. Generally, depreciation for tax purposes contains an incentive component if its present value of write-offs over time is accelerated or higher than the present value of depreciation write-offs used for accounting (book-keeping) purposes. The study does not attempt to isolate the value of the incentive component of tax depreciation. Instead, it uses depreciation rates which are generally accepted for fixed assets employed in R&D. These rates, which may be accelerated depreciation rates or accounting rates, are presented in Appendix 1.1.

In summary, this overview confirms the trend that OECD countries continue to invest in fiscal policy tools to promote R&D and innovation. In part, this trend reflects the desire of governments to achieve various national or supranational R&D targets, but it is also a reflection of the need by governments to enhance the business environment in order to attract new investment, spurred by an aggressive competition for R&D-based investment worldwide.

**Analytical observations**

This new update paints a picture of continued evolution in the area of R&D tax treatment. Overall, 19 of the 27 (*i.e.* 70%) surveyed countries had an R&D tax incentive in place in 2005. This compares with 17 countries (68% of the 25 countries examined) in the 2004 update and with only 12 countries (50%) found to be using R&D tax treatment in 1996. While there were no new or modified R&D tax incentives reported among the 25 countries examined in the 2004 update, Portugal reintroduced its R&D tax credit program after temporarily suspending it in 2004; Poland passed a law which will introduce an R&D tax credit in 2006; and the Czech Republic's Income Taxes Act introduced a new provision allowing taxpayers to deduct from their corporate income tax base 200% of the costs incurred in the realisation of R&D.

Instead of bringing new R&D tax incentives on stream, several countries reduced their corporate income tax rates in recent years, which influences the relative generosity of tax incentives in those countries that offer them:

- Austria witnessed a drop of 9 percentage points: from 34% to 25%.
- Finland's corporate income tax rate went down from 29% to 26%.
- Denmark's corporate tax rate declined by 2 percentage points, from 30% to 28%.
- Italy's rate fell from 37.25% to 33%.
- Mexico's corporate tax rate fell by 3 percentage points between 2004 and 2005, from 33% to 30%.[7]
- The Netherlands' rates fell by 3 percentage points to 31.5%.
- Korea's corporate tax rate also decreased by approximately 2 percentage points.

In the case of Austria, the changing corporate tax rate affected its B-index considerably, increasing it from 0.888 in 2004 to 0.928 in 2005. Thus the tax subsidy (calculated as 1- B-index) in Austria declined from 11 cents to 7 cents on the dollar. This is because the R&D tax allowance, as a deduction from taxable income, is specifically sensitive to corporate income tax rates. However, to partially mitigate this problem, Austria has introduced an alternative refundable tax credit of 8% which is open for all firms, not only SMEs. The result is a more generous value of the 2005 B-index, amounting to 0.922 (Table 1.3).

The effect of these changes on the B-index values can be seen in Table 1.3, which compares 2005 calculations with those for 2004. The arrow indicates the direction of change in the attractiveness of R&D tax treatment for the countries examined (↑ means an improvement, ↔ means no change, and ↓ means a decline in attractiveness). Double arrows identify a strong change in the attractiveness of the R&D tax treatment (see Table 1.3). For details on R&D tax incentives and major parameters included in the B-index, see Appendix 1.1 and 1.2.

7 Mexico's corporate tax rate is expected to decrease further to 28% in 2007.

**Table 1.3. R&D tax treatment B-indexes: A 2005 update**

| Country | Large company 2004 | Large company 2005 | Change | Small company 2004 | Small company 2005 | Change |
|---|---|---|---|---|---|---|
| **Australia** | 0.883 | 0.883 | ↔ | 0.883 | 0.883 | ↔ |
| **Austria** | 0.888 | 0.922 | ↓ | 0.888 | 0.922 | ↓ |
| **Belgium** | 1.009 | 1.009 | ↔ | 1.009 | 1.009 | ↔ |
| **Canada (federal)** | 0.827 | 0.827 | ↔ | 0.678 | 0.678 | ↔ |
| **Czech Republic** | - | 0.698 | | - | 0.698 | |
| **Denmark** | | | | | | |
| -150% allowance | 0.822 | 0.839 | ↓ | 0.822 | 0.839 | ↓ |
| -without allowance | 1.015 | 1.013 | ↑ | 1.015 | 1.013 | ↑ |
| **Finland** | 1.010 | 1.008 | ↑ | 1.010 | 1.008 | ↑ |
| **France** | 0.866 | 0.866 | ↔ | 0.866 | 0.866 | ↔ |
| **Germany** | 1.024 | 1.030 | ↓ | 1.024 | 1.030 | ↓ |
| **Greece** | 1.015 | 1.015 | ↔ | 1.015 | 1.015 | ↔ |
| **Hungary** | | | | | | |
| - 200% allowance | 0.838 | 0.838 | ↔ | 0.838 | 0.838 | ↔ |
| - 400% allowance | 0.495 | 0.495 | ↔ | 0.495 | 0.495 | ↔ |
| **Iceland** | 1.012 | 1.012 | ↔ | 1.012 | 1.012 | ↔ |
| **Ireland** | 0.951 | 0.951 | ↔ | 0.951 | 0.951 | ↔ |
| **Italy** | 1.027 | 1.023 | ↑ | 0.549 | 0.575 | ↓ |
| **Japan** | | | | | | |
| -R&D/sales <10% | 0.865 | 0.865 | ↔ | 0.808 | 0.808 | ↔ |
| -R&D/sales >10% | 0.831 | 0.831 | ↔ | 0.808 | 0.808 | ↔ |
| -with universities | 0.782 | 0.782 | ↔ | 0.808 | 0.808 | ↔ |
| **Korea** | 0.815 | 0.820 | ↓ | 0.839 | 0.842 | ↓ |
| **Mexico** | 0.612 | 0.627 | ↓ | 0.612 | 0.627 | ↓ |
| **Netherlands** | 0.942 | 0.934 | ↑ | 0.780 | 0.762 | ↑ |
| **New Zealand** | 1.023 | 1.023 | ↔ | 1.023 | 1.023 | ↔ |
| **Norway** | 0.794 | 0.794 | ↔ | 0.769 | 0.769 | ↔ |
| **Poland** | - | 1.011 | | - | 1.011 | |
| **Portugal** | 1.014 | 0.717 | ↑↑ | 1.014 | 0.717 | ↑↑ |
| **Spain** | 0.559 | 0.559 | ↔ | 0.559 | 0.559 | ↔ |
| **Sweden** | 1.015 | 1.015 | ↔ | 1.015 | 1.015 | ↔ |
| **Switzerland** | 1.010 | 1.010 | ↔ | 1.010 | 1.010 | ↔ |
| **United Kingdom** | 0.904 | 0.904 | ↔ | 0.894 | 0.894 | ↔ |
| **United States (fed.)** | 0.934 | 0.934 | ↔ | 0.934 | 0.934 | ↔ |

*Note*: Portugal suspended its programme in 2004 and re-introduced it in August 2005.

*Source*: JPW Innovation Associates Inc.

**Appendix 1.1. B-index and general R&D tax treatment in OECD countries: Major parameters, 2005**

| Country | B-index Large/SME | Tax subsidy (1-B-index) | CIT rate Large/SME % | Current deduction % | Depreciation ME | Depreciation B |
|---|---|---|---|---|---|---|
| **Australia** | 0.883 | 0.12 | 30 | 100 | 5 years | 40 years |
| **Austria** | 0.922 | 0.08 | 25 | 100 | 5 years | 25 years |
| **Belgium** | 1.009/1.009 | -0.01 | 33.99 | 100 | 3 years | 20 years |
| **Canada** (federal) | 0.827/0.678 | 0.17/0.32 | 32.12/23.12 | 100 | 100% | 4% |
| **Czech Republic** | 0.698 | 0.30 | 26 | 100 | 5 years | 30 years |
| **Denmark** | | | | | | |
| – without allowance | 1.013 | -0.01 | 28 | 100 | 30% | 20 years |
| – 150% allowance | 0.839 | 0.16 | | | | |
| **Finland** | 1.008 | -0.01 | 26 | 100 | 25% | 20% |
| **France** | 0.866 | 0.13 | 34.33 | 100 | 40% | 20 years |
| **Germany** | 1.030 | -0.03 | 38.70 | 100 | 20% | 33 years |
| **Greece** | 1.015 | -0.02 | 35 | 100 | 3 years | 12.5 years |
| **Hungary** | | | 16 | 100 | 3 years | 50 years |
| – 200% R&D allowance | 0.838 | 0.16 | | | | |
| – 400% allowance at universities | 0.495 | 0.50 | | | | |
| **Iceland** | 1.012 | -0.01 | 18 | 100 | 10 years | 50 years |
| **Ireland** | 0.951 | 0.05 | 12.5 | 100 | 100% | 100% |
| **Italy** | 1.023/0.575 | -0.02/0.42 | 33 | 100 | 10 years | 33 years |
| **Japan** | | | 42/32 | 100 | 50% | 50 years |
| – R&D intensity <10% | 0.865/0.808 | 0.14/0.19 | | | | |
| – R&D intensity >10% | 0.831/0.808 | 0.17/0.19 | | | | |
| – with universities and other R&D institutes | 0.782/0.808 | 0.22/0.19 | | | | |
| **Korea** | 0.820/0.842 | 0.18/0.16 | 27.5/14.5 | 100 | 5 years | 5 years |
| **Mexico**[1] | 0.627 | 0.37 | 30 | 100 | 35% | 20 years |
| **Netherlands** | 0.934/0.762 | 0.07/0.24 | 31.5/27 | 100 | 5 years | 25 years |
| **New Zealand** | 1.023 | -0.02 | 33 | 100 | 22% | 4% |
| **Norway** | 0.794/0.769 | 0.21/0.23 | 28 | 100 | 20% | 4% |
| **Poland** | 1.011 | -0.01 | 19 | 100 | 5 years | 40 years |
| **Portugal** | 0.717 | 0.28 | 27.5 | 100 | 4 years | 20 years |
| **Spain** | 0.559 | 0.44 | 35 | 100 | 100% | 33 years |
| **Sweden** | 1.015 | -0.02 | 28 | 100 | 30% | 25 years |
| **Switzerland** (Zurich) | 1.010 | -0.01 | 24.5 | 100 | 40% | 8% |
| **United Kingdom** | 0.904/0.894 | 0.10/0.11 | 30/19 | 100 | 100% | 100% |
| **United States** (federal) | 0.934 | 0.07 | 35 | 100 | 5-year MACRS property | 39-year property |

1. Mexico allows a 94% immediate deduction for machinery and a 74% immediate deduction for buildings.

**Appendix 1.2. R&D tax credits and R&D allowances in OECD countries: Major characteristics, 2005**

| Country[1] | Rate on level | Rate on incre-ment | Base for increment[2] | Expense base[3] | Deducted from TI or CIT[4] | Taxable | Separate treatment of SMEs |
|---|---|---|---|---|---|---|---|
| **Australia** | 125% | 175% | 3 yrs | C, ME | TI | Yes | |
| **Austria** | | | | | | | |
| – special allowance | 125% | 135% | 3 yrs | C | TI | Yes | |
| – capital allowance | 115% | | | ME, B | TI | Yes | |
| – alternative refundable tax credit | 8% | | | C | CIT | No | |
| **Belgium** | | | | | | | |
| – investment deduction | 113.5% | | | ME, B | TI | Yes | |
| **Canada** (federal) | 20% | | | C, ME | CIT | Yes | 35%; refund |
| **Czech Republic** | 200% | | | C | TI | Yes | |
| **Denmark** | | | | | | | |
| – collaborative R&D with universities | 150% | | | C | TI | Yes | |
| **France** | 5% | 45% | 2 yrs | C, MED, BD | CIT | No | Refund-able |
| **Hungary** | | | | | | | |
| – with/at universities | 400% | | | C | | | |
| – other R&D | 200% | | | C | | | |
| **Ireland** | | | | | | | |
| – R&D expenditure | | 20% | Single | C, ME | CIT | No | |
| – R&D buildings | 20% | | period 3 years back | B | CIT | No | |
| **Italy** | | | | | | | |
| – small companies | 30% | | | C, ME, B | CIT | No | SME only |
| **Japan** | | | | | | | |
| – large firm <10% research intensity | 10% | | | C, MED | CIT | No | 15% |
| – large firm >10% research intensity | 12% | | | C, MED | CIT | No | 15% |
| – collaboration with universities and other R&D institutes | 15% | | | C, MED | CIT | No | 15% |
| – basic technology | 5% | | | ME | CIT | No | |
| **Korea** | | | | | | | |
| – development of tech. | 15% | | | C | CIT | No | |
| – alternative | | 50% | 4 yrs | C | CIT | No | |
| – facilities | 10% | | | ME, B | CIT | No | |
| **Mexico** | 30% | | | C | CIT | No | |
| **Netherlands** | 14% | | | Research wages | TI | Yes | 42% |
| **Norway (**refundable) | 18% | | | C | CIT | No | 20% |
| **Portugal** | 20% | 50% | 2 yrs | C | CIT | No | |

**Appendix 1.2. R&D tax credits and R&D allowances in OECD countries: Major characteristics, 2005 (Cont'd)**

| Country[1] | Rate on level | Rate on increment | Base for increment[2] | Expense base[3] | Deducted from TI or CIT[4] | Taxable | Separate treatment of SMEs |
|---|---|---|---|---|---|---|---|
| **Spain** | | | | | | | |
| - Tax credit | 30% | 50% | 2 yrs | C | CIT | No | |
| - Capital R&D | 10% | | | ME | CIT | No | |
| **United Kingdom** | | | | | | | |
| – Small company | 150% | | | C | TI | Yes | Refund- |
| – Large company | 125% | | | C | TI | Yes | able |
| **United States** (federal) | | 20% | Maximum 50% of current expenses | C | CIT | Yes | |

1. Other OECD countries do not have tax credits or taxable income allowances.
2. Average over specified number of years.
3. C = current; ME = machinery; B = buildings; MED = ME depreciation; BD = B depreciation.
4. CIT = corporate income tax; TI = taxable income.

## 2. TAX TREATMENT OF PATENTS AND PATENT RIGHTS

### Introduction

This section reviews the tax treatment of costs associated with investing in patents (*i.e.* acquiring or developing them).[8] The section discusses country tax provisions and draws comparisons using the B-index model (see Appendix 2.1 for methodology and examples).[9] Table 2.1 recaps major components of the tax treatment of patents including depreciation and tax incentives. Note that these components pertain to patents as a stand-alone intangible asset – not to R&D where patents may serve as input or output (for a description of R&D tax incentives see Section 1).

The main message of this section is that there appear to be few tax incentives for patents. This is unlike the situation for investments in R&D (see Section 1), but alike other categories of intangible investments covered by the study, corporate training is the only area after R&D that enjoys relatively more generous tax incentives (see Section 3).

### Tax treatment of different types of patent investments

The tax treatment of patent expenses depends on the way the patent is acquired and exploited. Following the grant of a patent, the patent holder has a number of options for exploiting the patent. The patentee may exploit the patent by *using* the patented process themselves (*e.g.* in R&D) or by merely retaining the patent rights. Alternatively, the patentee may *sell* or assign the patent rights to a third person who plans to exploit the patent (for example, in the R&D process). Another option would be for the patentee to *license* the patent rights to a third person, permitting that person to manufacture the patented article, or use the patented process, in return for a royalty. In each case, the holder of the patent rights can exclude others from the use of the particular patented invention.[10]

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8 This section draws extensively on the findings of a research paper prepared for the European Patent Office, providing a comprehensive survey of the tax treatment of patents in OECD countries based on information collected from professional tax sources. See Jacek Warda, Taxation of Patents and Patent Rights: A Country Review, Prepared for the European Patent Office, Munich, August 2005.

9 The study's main sources of tax information include: Taxation of Companies in Europe, Taxes and Investment in Central and East European Countries, Taxation and Investment in Asia Pacific and Taxation of patent Royalties, Dividends, Interest in Europe, all publications of the International Bureau of Fiscal Documentation, Amsterdam (available in loose-leaf format or on line at www.ibfd.org); publications of Tax Management Inc., Foreign Investment Income Portfolios: Business Operations; Canadian, Australian and U.S. Master Tax Guides 2005, CCH Limited, Chicago; KPMG International, KPMG's Corporate Tax Rate Survey – January 2004; and various Doing Business publications of PriceWaterhouseCoopers for various countries.

10 Inland Revenue, *Patents* – Income *Tax Treatment: Exposure Draft*, Wellington, New Zealand, October 2004.

Following the framework above, this section analyses corporate tax treatment as it relates to three types of patent-related investments:

- Acquired patents.
- Self-developed patents.
- Licensing of patent rights.

For the first two of these, tax treatment is affected by rules regarding depreciation, as well as by applicable R&D tax incentives. Patents in all OECD countries are treated as depreciable assets, not as expenses that can be deducted in the year costs are incurred. While most software, organisational change and start-up, and training and R&D expenditures can be immediately deducted in the year the expenditures are made (*i.e.* current deduction), there is no such provision available for the acquisition of patents. As outlined below, tax incentives for R&D can accommodate some of the costs of developing or acquiring patents. For licensing costs and revenues, different rules apply, as outlined below.

***Depreciation***

Depreciation is a key component of the tax treatment of patents. Depreciation can usually be claimed when the patent or patent rights are used or available for use in deriving income. It is calculated on the cost of acquiring the patent or patent right. Depreciation rates have to be in accordance with generally accepted accounting standards or by tax authorities in the case of tax depreciation. Typically an accounting type of depreciation is applied to patents, with the period of depreciation approximating the useful or economic life of the patent.[11] Some differences must be taken into account when applying these rules to acquired (purchased) versus self-developed patents:

- *Purchased patents* are always treated as intangible fixed capital assets and have to be depreciated. Depreciation is based on the acquisition cost, which depends on the commercial value of the patent or patent rights. In most cases, the government prescribes a method of depreciation and the period over which such patents can be depreciated. Purchased patents are depreciated using the straight-line method, with the exception of Canada and Switzerland. These two countries, in addition to the straight-line method, also provide an option of using a declining balance method. The latter method is used largely for long-term patents.[12]

- *Self-developed patents* follow similar rules to purchased patents, but the cost base is different. The value of the self-developed patent for tax depreciation purposes is the cost of applying and protecting the patent – not its economic or market value. If a firm develops and patents an invention, the cost of the patent for depreciation purposes would include registration fees charged by patent authorities, patent attorney fees and other incidental expenses on application and granting. Ongoing patent maintenance fees are typically treated as revenue expenditures (*i.e.* maintaining business operations) and thus are eligible for immediate deduction. Note that the cost of the R&D that led to patenting of an invention is not included in the depreciation base for self-developed patents.

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11 Such depreciation would be used for accounting purposes but is often accepted for tax purposes as well.

12 The declining balance method involves applying the depreciation rate against the undepreciated balance, instead of spreading the cost of the asset evenly over its life as the straight-line method does. Because it produces a higher depreciation write-off earlier in an asset's lifetime, it may be a more realistic reflection of the expected benefit from the use of the asset: many assets are most useful when they are new.

Governments can be considered to provide some tax benefits for patenting if they allow more rapid depreciation of the costs of patenting for tax purposes than for accounting purposes. For patents, which can protect an invention for 20 years after the date of filing the first application, useful life may be thought of as 20 years. But for many inventions, the economic lifetime may be considerably shorter, reflecting the heterogeneous nature of patents. Many governments provide ceilings and/or floors on the depreciation period, and it is often up to the patent owner to choose the period of depreciation within the prescribed range. Almost all of the 29 countries examined in this study allow patents to be depreciated in less than 20 years, thus providing some additional incentives in tax depreciation rules (Table 2.1).[13] Allowable depreciation periods range from 5 years to 20 or even 30 years, depending on the country, with the last two being maximum periods. Most countries allow depreciation to be taken over a shorter period if the holder has the right to exploit the intangible for less than the set maximum. For example, in Belgium, the tax law requires that the depreciation of patents be taken over a minimum of 5 years using the straight-line method and, depending on their life expectancy, up to a maximum of 30 years.[14] Australia also provides a range for depreciation, depending on the nature of the patent.

Not all countries prescribe depreciation periods for patents. In such countries, the depreciation period is often broadly defined as "over the useful life." This means that the applicable depreciation rate is based on the number of years of expected economic life, which may vary depending on the nature of the patent and is largely determined by the patent holder. For example in Austria, there are no pre-set rates of depreciation given for acquired patent property; it is to be depreciated over the full or remaining useful life. In Switzerland, official guidelines for depreciation percentages are published, but they are not obligatory. In Hungary, the law does not contain an exact period of depreciation for patents and similar rights; therefore, the period of depreciation depends on the useful life of these assets.

Note that in the large majority of OECD countries, the depreciation available for patents is also applicable to a broader group of intangible assets, specifically to trademarks and know-how. A few countries such as Australia, Ireland and perhaps Japan and Korea provide specific patent depreciation rates which are not necessarily more generous than those for the broader set of intangibles.

***Investment allowances***

A handful of countries offer investment deductions on the purchase of capital assets. Acquired patents, among other capital investment assets, broadly qualify for such deductions in the following countries:

- Belgium provides a deduction of 13.5% on the cost of purchased patents. This deduction is also applicable to R&D.
- The Netherlands offers a deduction ranging from 3% to 25% of the cost of an asset depending on the size of the company.
- Turkey grants an investment allowance equal to 40% of the patent's original cost.

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13 Clear exceptions are Austria, France, Germany, Greece, New Zealand, Norway and Portugal.

14 It is worth noting that in some countries the depreciation periods exceed the nominal duration of patent protection (20 years from date of application). A case study may be in order to determine the conditions and frequency of use of such 25-30 year depreciation. It may be the case that countries count the 20 year depreciation period from the day of patent grant or first use, which is usually a few years after the date of application, or may allow patent extensions in certain situations.

These allowances decrease the cost of purchasing the patent, thus making the tax treatment of patents relatively more attractive in those countries. They represent an additional deduction on the price of the capital asset from the taxable income of the corporation. In some countries they include patents as eligible assets. This is the case of the so-called increased investment allowance in Belgium that permits an extra deduction on the acquisition price of R&D capital assets, including patents (see Table 1.2), and the allowance in the Netherlands and Turkey, which pertain to all capital investments. With the exception of the Netherlands, however, the allowances fail to move the Patent B-index below 1, meaning that they do not compensate for the fact that patent costs must be depreciated over time.

***Patents and R&D tax incentives***

Some additional tax benefits for patenting are channelled through R&D tax incentives. This can happen in two ways, with implications for both acquired and self-developed patents.

As regards *acquired patents*, some countries allow the costs associated with the purchase of patents or patent rights to be considered part of the R&D expenditure that qualifies for R&D tax incentives (tax credits or allowances). In general, this inclusion is possible provided the purchase of the patent or patent right is essential for the performance of R&D by the company. For example:[15]

- France includes two items in the base for R&D tax credit: *i)* depreciation allowances relating to patents purchased in order to undertake further R&D activities; and *ii)* the acquisition cost of patents for the purpose of adaptation to a specific application or to succeed in creating a substantial new product.

- In the base for qualifying R&D expenditures (for its R&D tax incentive) Hungary includes the cost value of purchased inventions, patents, licences and know-how.

- In Mexico, expenses related to intellectual property protection, including patents, trademarks, and copyrights of nationals and foreigners, qualify for the R&D tax incentive, as long as the latter are made through the Patent Co-operation Treaty.
- In Portugal, qualifying R&D expenditures for the purpose of a tax reserve for R&D investment include the acquisition of patents and know-how licences exclusively destined for R&D activities.
- In Spain, qualifying R&D and technology expenditure for the tax incentive includes acquisition of advanced technology in the form of patents, licences, know-how and designs.

In such scenarios, the patent or patent right acquired is considered an *input* to the R&D process and as part of the R&D expenditure may be eligible for R&D tax incentives.[16] It is believed that the tax treatment of patents or patent rights as an input (cost) to R&D encompasses a broader range of OECD countries than those specifically mentioned here.[17]

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15 Greece also defines R&D expenditure to include expenses for the licence for the exploitation of patents, which are connected with the performance of R&D, but Greece does not offer a tax concession for R&D.

16 Note that the B-indexes presented in Table 4 do not include R&D tax incentives. They present only non-R&D tax treatment of patents. For the B-indexes applicable to countries that include patents as R&D expenditure please see section 5.

17 At the present time, it is not possible to include all those countries.

As regards *self-developed patents*, the costs of R&D that contributed to the patented invention can generally qualify for available R&D tax incentives (even though the costs of R&D are not included in the depreciation value of the patent). In addition, the R&D tax incentives of some countries specifically allow patenting costs to be included as qualifying R&D expenses:

- Canada has in place a programme to encourage scientific research and experimental research and development (SR&ED) that results in some form of intellectual property. Costs to develop a patent might be SR&ED if they meet the eligibility criteria. Thus the SR&ED tax credit may be applicable to such costs.

- In the United States, the term *research or experimental expenditures* (R&E) includes the costs of obtaining a patent, such as attorneys' fees expended in making and perfecting a patent application. R&E generally includes all such costs incidental to the development or improvement of a product. The term "product" includes any pilot model, process, formula, invention, technique, *patent*, or similar property, and includes products to be used by the taxpayer in its trade or business as well as products to be held for sale, lease, or license.

***Licensing revenues***

In the countries surveyed, royalties paid for the right to use a licence are generally considered a deductible expense. Royalty revenues are generally treated as ordinary business income and taxed at the statutory corporate income tax rate. Nevertheless, selective tax incentives are offered in a small number of countries to encourage exploiting the patent.

Royalty tax incentives are given in the form of tax reductions – full or partial exemptions from corporate income tax on royalties, which is a sort of a tax holiday. Royalty tax incentives differ among countries. Three types can be distinguished:

- A full exemption from income tax: Ireland offers this incentive for companies based in the country and conducting R&D there which results in a patent that then gets licensed out.

- A partial exemption or reduction in income tax – typically 50% – is offered in Switzerland, Hungary and Korea.

- A reduction in capital gains tax – offered in France.

Consideration of the royalty revenue tax concession may affect calculations of the B-index by requiring a recalculation of the overall corporate tax rate in a way that reflects the share of firm revenues that accrue from royalties.[18] Since such information is not available at an aggregated level, such considerations are not included in the B-index calculations below.

[18] Favourable tax treatment of royalties from patents may reduce the value of the B-index. If royalties are taxed at a lower rate than the ordinary corporate income, the firm's average tax rate - a product of both the royalty income tax rate and ordinary income tax rate - will be lower than the ordinary income tax rate which will in turn reduce the value of the B-index. Example: A corporation derives 50% of its income from ordinary operations and the other 50% of income from royalties. Ordinary income and royalties are taxed at 40% and 20% respectively, yielding an average corporate tax rate of 30%. Say patents are depreciated over 10 years straight-line, yielding the present value of depreciation of 0.68. The patent B-index for that corporation in that country will be B= (1-0.676(0.30))/(1-0.30) = 1.14. If the royalties are taxed at the rate equivalent to ordinary corporate income B= (1-0.676(0.40))/(1-0.40) = 1.22.

**Tax treatment of patent donations**

The country survey has found that there are also other mechanisms at play (outside the realm of the B-index) that may affect the corporate tax treatment of patents. Donations of patents property to eligible research bodies such as universities and research institutes and tax breaks afforded by governments to donor taxpayers (corporations and individuals) appear to play a growing role in technology transfer.[19]

***United States***

The United States has been a leader in the donation scheme. US corporate deductions, for a contribution or gift to a qualified organisation, are limited to 10% of the donor's taxable income. Within this deduction, US businesses can transfer patents to research universities and other not-for-profit organisations, providing opportunities for the development of new technologies. The critical factor is valuation of the patent. The higher the value of patent donation the greater the value of tax deduction and the greater the stimulus to transfer dormant technology to the institution that may put it to productive use, eventually.

According to the Internal Revenue Service, the market values of such property transfers – the base for the income deduction – have tended to be significantly overstated. Consequently, the American Jobs Creation Act[20] curtailed the practice of donating patents valued at fair market price by establishing new more restrictive rules for charitable contributions of qualified intellectual property. The new rules permit a deduction for the value of the property as determined by the *income* generated from the property *after* the donation. The applicable proportion is 100% in the first two taxable years ending on or after the date of the contribution. The applicable proportion then drops 10 percentage points per year until it reaches 10% in the eleventh and twelfth year. No deduction is permitted for income thereafter.

***Other countries***

Based on the cursory review of the issue, it is believed that other OECD countries examined in this review allow donations of intellectual property. For example, the International Bureau of Fiscal Documentation (IBFD) points to Austria where, under the Income Tax Code, donations in cash or in kind from a business enterprise for R&D purposes that are made to a number of listed organisations and institutions can be deducted from taxable income. These institutions include universities, the Austrian Academy of science, societies operating on a non-profit basis etc. The deductible donations are limited to 10% of the income of the preceding fiscal year of the donor. In Mexico, donations from business enterprises to civil organisations, universities or R&D institutions that are included in the National Register of Scientific and Technological Institutions can be deducted from taxable income.

This section only highlights the increasing importance of donation mechanisms as a possible tax incentive for patent holders. It is believed that the practice of patent donations deserves a detailed cross-country examination of its magnitude and economic implications.

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19 Jacek Warda, *Taxation of Patents and Patent Rights: A Country Review*, Prepared for the European Patent Office, Munich, August 2005, unpublished; and IBFD, *Tax Treatment of Research & Development Expenses*, December 2004, p. 28.

20 Joint Committee on Taxation, *Options to improve tax compliance and reform tax expenditures*, January 27, 2005 pp. 295-307, http://www.house.gov/jct/s-2-05.pdf

**Calculating the Patent B-index**

Because patents are typically depreciated and few countries offer tax incentives such as tax credits or taxable income allowances, the Patent B-index tends to be considerably greater than unity implying a certain tax burden. This means that less than 100% of patent expenditure can be effectively deducted against taxable income in the acquisition year. This is because patents are depreciable assets and cannot be deducted as current expenses.[21]

Countries that have the B-indexes close to one tend to provide minor incentives through broadly-based investment allowances (Belgium, The Netherlands and Turkey) or through tax credit (Spain). These countries' B-indexes stay around 1.02-1.04 yielding what can be thought of as a small negative tax subsidy of -0.02 to -0.04. This compares with the countries which do not have tax incentives and provide depreciation allowances over the extended period of the patent's life and whose negative tax subsidies exceed the value of -0.20 in a number of cases. Note that only The Netherlands' B-index is lower than one (0.97), resulting in a positive tax subsidy of 0.03. This is in the case of small firms eligible for a 25% investment allowance.

A word of caution is due here. It is important to understand that the B-index that yields a negative tax subsidy does not constitute in itself a negative evaluation of fiscal policy towards patents or any other intangible investment thereof. (And the reverse is true as well.) It only states the fact that there are not too many tax-based incentives pertaining solely to investment in patent assets across OECD countries. It also says that the tax treatment of patents follows closely an accounting (non-incentive) approach. This may be quite appropriate from the policy perspective, as patents which are normally connected to the R&D process might have already earned the incentives through the R&D tax treatment.

**Analytical observations**

Overall, in the countries examined, there are no patent-specific tax incentives, other than provisions that allow for accelerated depreciation of patent costs. A few tax incentives for patents are channelled through broader schemes which encourage investments in R&D and other intangible assets. But the scarcity of patent-specific tax incentives should not be too surprising. This stems from the dual nature of the patent and its connection to R&D. Patents can be an input to, and output of, the R&D process which may help to explain the relative dearth of patent-specific tax incentives.

It is likely that patents may have already been covered by the tax incentives designed for R&D, many of which exist in OECD countries. Some countries include explicitly purchased patents in the base for R&D tax credits. And self-developed patents may have already benefited from the R&D tax incentives existing in many OECD countries. Finally, there may be other channels for tax treatment to provide incentives for patents, especially the growing role of patent donations.

Still the following observations remain:

- Specific tax incentives (*e.g.* credits and allowances) are seldom used for patents, although some patenting costs can be included in R&D tax incentive programmes in a number of countries.
- Accounting (ordinary or non-incentive) depreciation is the main tax treatment, with some countries allowing accelerated depreciation.

[21] Note that a capital asset, whose cost is deducted ratably through depreciation over a period of time, will always have a present value less than one provided the value of time is positive and the asset cannot be deducted in the year incurred.

- For acquired patents, depreciation is based on the cost of purchasing the patent, which should approximate market value.
- For self-developed patents, depreciation is based on the cost of applying for the patent (application fees, legal fees), not on market value.
- For licensors, royalty income tax exemptions are infrequently used.
- For licensees, there are no tax incentives that would specifically support the purchase, use and application of patents, unless they are purchased and used as part of the R&D process – then they may qualify for the R&D tax incentives available in a given tax jurisdiction.

**Table 2.1. Corporate income tax rates and tax treatment of patents and patent rights: Major parameters**

| Country | CIT rate (%) | Depreciation of patents and patent rights | Tax incentives for patents and patent rights | Patent B-index | Tax burden/ subsidy** |
|---|---|---|---|---|---|
| **Austria** | 25.0 | useful life | | 1.18 | -0.18 |
| **Australia** | 30.0 | 8 years for innovation patent<br>20 years for standard patent | | 1.11 to 1.23 | -0.19 to 0.23 |
| **Belgium** | 33.99 | 5-30 years | 13.5% investment deduction | 1.02 to 1.27 | -0.02 to -27.0 |
| **Canada (federal)** | 32.1 | 25% DB or useful life | | 1.12 | -0.12 |
| **Czech Republic** | 26.0 | 6 years or period agreed | | 1.07 | -0.07 |
| **Denmark** | 28.0 | 7 years | | 1.09 | -0.09 |
| **Finland** | 26.0 | 10 years | | 1.11 | -0.11 |
| **France** | 34.33 | useful life | Royalty capital gains tax reduction* | 1.28 | -0.28 |
| **Germany** | 38.7 | useful life | | 1.34 | -0.34 |
| **Greece** | 35.0 | 20 years | | 1.29 | -0.29 |
| **Hungary** | 16.0 | useful life | 50% royalty tax exemption* | 1.10 | -0.10 |
| **Iceland** | 18.0 | 5-7 years | | 1.04 to 1.05 | -0.04 to -0.05 |
| **Ireland** | 12.5 | 17 years | Full royalty tax exemption* | 1.07 | -0.07 |
| **Italy** | 33.0 | 3 years or useful life | | 1.04 | -0.04 |
| **Japan** | 42.0 | 8 years | | 1.19 | -0.19 |
| **Korea** | 27.5 | 10 years | 50% royalty tax exemption* | 1.12 | -0.12 |
| **Mexico** | 30.0 | 15% | | 1.10 | -0.10 |
| **Netherlands** | 27.0-31.5 | 5 years | 3-25% investment deduction | 0.97 to 1.06 | 0.03 to -0.06 |
| **New Zealand** | 33.0 | 20 years | | 1.26 | -0.26 |
| **Norway** | 28.0 | useful life | | 1.21 | -0.21 |
| **Poland** | 19.0 | 5 years | | 1.04 | -0.04 |
| **Portugal** | 27.5 | useful life | Inter-corporate royalty exempt* | 1.20 | -0.02 |
| **Slovak Republic** | 19.0 | 5 years | | 1.04 | -0.04 |
| **Spain** | 35.0 | 10 years | 10% technological innovation tax credit | 1.02 | -0.02 |
| **Sweden** | 28.0 | 5 years | | 1.06 | -0.06 |
| **Switzerland (Zurich)** | 24.5 | 40% DB or 5 years | 50-80% royalty income tax relief (negotiable)* | 1.04 or 1.05 | -0.04 or -0.05 |
| **Turkey** | 30.0 | 15 years | 40% investment allowance | 1.02 | -0.02 |
| **United Kingdom** | 30.0 | Accounts write-off to (a) 25% if preferred | | (a) 1.09 | (a) -0.09 |
| **United States (federal)** | 35.0 | 15 years | | 1.24 | -0.24 |

*Notes*:

* Not included in the calculation of the B-index.

** Negative values indicate a relative tax burden; positive values indicate a subsidy.

To help calculate the B-indexes for countries reporting the depreciation period for patents as "useful life" a 20-year depreciation period is chosen. This is based on the assumption that in most countries the legal life of a patent is 20 years.

*Source*: JPW Innovation Associates Inc. based on tax sources such as The International Bureau of Fiscal Documentation, Amsterdam and Tax Management Inc.

## APPENDIX 2.1

### About the Patent B-index

Exhibits 1 and 2 provide the formulas and examples of calculating the Patent B-index and patent tax subsidy/burden with applicability to a wide range of other intangible investments.

### Exhibit 1: Calculating the Patent B-index

***Patent B-index definition***

A minimum present value (PV) of the before-tax income that a firm needs to generate in order to cover the cost of a patent investment and to pay the corporate income taxes

***Generic formula***

**Patent B-index = (1-A)/(1-t)**

Where:

A = the net present discounted value of depreciation allowances, tax credits and other tax incentives available and the numerator (1-A) is the after-tax cost of the patent); t = corporate income tax rate

***Options***

- a) Depreciation only is claimed: B= (1 - zt)/(1-t)
- b) Depreciation and tax credit: B = (1-zt –c)/(1-t) or B = (1-zt –c(1-t))/(1-t) if credit is taxable
- c) Depreciation and investment allowance: B = (1-zt-wt)/(1-t)

Where:

z = present value of depreciation (if z=1 then current expensing)

c = tax credit; w= investment allowance/deduction; t = corporate income tax rate

***Calculating depreciation***

Unless deducted immediately, the present value of depreciation deduction z will be always less than zero because of the time value of money. For example, an asset depreciated over 10 years straight-line using assumptions of this study – a 10% discount rate and an end-of-period depreciation – will yield the present value of 0.68.

***Notes related to patents***

- The prevailing tax treatment of patents is depicted by equation (a).
- Equation (b) is not applicable since no tax credits are available for patent investment *per se*. If patents become a part of R&D expenditure then R&D tax credits may be available in some countries on the cost of patent or licence acquisition which may follow equation (b). (See section 5.)
- A few countries offer investment deductions for patents which follow equation (c).

**Exhibit 2: Calculating the patent tax subsidy/burden**

***Formula***

Values of the Patent B-index < 1 indicate that government subsidises the investment under consideration. For example if B= 0.95 the tax subsidy component is 0.05 or 5 cents on the dollar). It follows the following formula:

Tax subsidy/burden = 1 – Patent B-index

Values of the Patent B-index > 1 indicate that the before-tax income generated from the investment is not sufficient to pay for its cost and the applicable taxes. This is due to taxes that need to be paid on the income generated from the investment. In other words a negative tax subsidy becomes a measure of tax *burden* on the investment.

***Cases***

a) Tax subsidy > 0: – A case of generous tax incentives: more than 100% of expenditures can be deducted from income due to tax incentives such as tax credits and additional allowances from taxable income.

b) Tax subsidy = 0: – Expenditures are deductible in the tax year in which they are incurred.

c) Tax subsidy < 0: – A case of non-incentive tax systems: expenditures cannot be deducted immediately in the current year – the tax system typically will not provide incentives for investment or incentives are minor in value.

## 3. TAX TREATMENT OF CORPORATE TRAINING AND EDUCATION EXPENSES

### Introduction

The tax treatment of expenditure on training and education differs with the nature of the investor. There are two types of private investors in this area: corporations and individuals. While the tax treatment of individual investors in training and education is crucially important in a knowledge society, the focus of this report is on the tax treatment of *expenditure* on intellectual assets and, more specifically, the corporate side of this expenditure. This treatment may take the shape of allowance from taxable income, depreciation allowance or a tax credit against such spending.

Unlike corporations, individuals do not typically invest in intangibles such as patents, R&D or software, but individuals do invest in training and education. Personal income taxation plays a major role in channelling the incentives for training and education, which typically include tax credits to be deducted from the personal income tax payable, allowances from the personal taxable income and tax exempt reserves from employment income. Apart from tax incentives, the size of the personal income tax rate and the speed at which the personal income tax rate increases with the level of taxable income (the number of income tax brackets) are two important factors in making work-education-leisure decisions by individuals.[22] A comparative review of country tax treatment of individual investments in intangibles – embedded in the personal income tax system and related systems such as capital gains taxation – is the next logical step to expand the analysis of innovation-related intangible investment. This requires, however, a separate research undertaking.

### Approach

This section examines only *one* side of the training and education equation, namely the tax treatment of expenditures on training and education made by corporate employers.[23] This is consistent with the overall focus of the study on the corporate income tax. The purpose of this section is to identify, analyze and internationally compare the generosity of the tax treatment of corporate training. The B-index methodology is used to provide a uniform approach to comparing country policies (see Appendix 3.1 for major components of the corporate tax treatment of training tax credits).

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22 In this context (and this is beyond the scope of the paper), it is interesting to ponder whether in a knowledge society in which there is an interest in favouring investment in intangibles such as skilled human capital, progressive taxation is not a bit contradictory today. High marginal tax rates at higher income levels may discourage investment in work and lifelong education, to the benefit of leisure, thus preventing in the long term the achievement of full potential of the knowledge society. It is tempting to think otherwise, however, that with progressive taxation, there may an implicit stimulus for individuals in higher income tax brackets to invest proportionally more in education than leisure with appropriately designed tax incentives such as tax-free education plans for children. Clearly this is a topic for new research in the area of intangibles.

23 The other side – the tax treatment of *revenues* and income that education and training providers receive from those who pay for learning services – is not discussed, see *Education Policy Analysis*, OECD, Paris 2005, pp. 107-109.

Those countries are reported whose programmes have been explicitly mentioned in professional tax sources.[24] Based on the review of tax sources it is believed that other countries that are not reported here (due to the lack of relevant tax information) channel tax treatment through current deductions only. There might be however, differences among those countries as to which expenditures constitute eligible training costs that could be deducted as business expenses.

**Salient characteristics**

Three general observations can be advanced when analysing the tax treatment of corporate training expenditures. First, the main method of tax treatment is to allow full deductibility (100%) of training expenses in the year incurred. This is true in 17 out of the 18 countries examined. An exception is Ireland where training expenditure is capitalised over a three-year period. Also Finland and Canada are partial exceptions as they base their tax treatment on the timing of benefits accruing to the company. Training expenses that produce short-term benefits are typically allowed a full deduction in the current year, whereas training expenses that provide long-term benefits are treated as investment and may be amortised over the specified period of time.

Second, corporate training is the only other area (after R&D) that is targeted by credit-based fiscal incentives. Although the use of the tax credit instrument is not widespread, mechanisms similar to those used in the case of R&D tax treatment are employed. Tax credits have been in use in six countries: Japan, Korea, Austria, France, Spain and The Netherlands (until 2004). What is particularly striking is that in such a small sample of countries, tax credit designs are diverse: two countries (Austria and The Netherlands) use volume-based additional allowances from taxable income, while the remaining countries use tax credits. Those credits, however, range from volume based (Korea) to purely incremental (France) to hybrid schemes mixing the volume and incremental tax credits (Japan and Spain). Note that all these incentives are available in addition to current deduction of training expenses. In Mexico, training expenditures can qualify for the R&D tax incentive, up to certain prescribed limitations.

Third, these special incentive schemes are largely geared to enhancing the training capacity of small companies. Three of the six countries mentioned above have tax incentives that favour training expenditures by small firms. For example, France provides its incremental tax credit for small companies only. The Japanese tax credit formula is designed to particularly encourage small companies to increase and improve training. While the training tax credit is allowed against corporate income tax payable for both large and small companies, large companies are only eligible for a 25% incremental tax credit whereas small firms can claim both a volume-based and an incremental credit. The measure was introduced on a temporary basis for three years as of 1 April, 2005. Until 2004, the Netherlands offered an allowance equal to 20% of the costs of training expenses, in addition to the normal 100% deduction for these costs. The programme was focused on small companies that make relatively small expenditures on training against which, up to a defined expenditure threshold, a 40% training allowance applied. Training expenditures over a threshold, typically made by larger firms, entertained a 20% additional allowance.

Most of these incentive measures are subject to various caps defined either as the maximum amount of tax credit claimed (France), maximum amount of qualified training expenditure (The Netherlands) or a percentage of income tax payable (Japan, Spain). Only Austria and Korea have no upper limit on the use of their tax incentives. However, a notable feature of France's training tax credit is its refundability subject to the above ceiling.

[24] Main sources for this section are: *Taxation of Companies in Europe*; *Taxes and Investment in Asia and the Pacific,* International Bureau of Fiscal Documentation, Amsterdam, Tax Management Inc. publications, and various Web sites.

Finally it appears that for tax credit or additional allowance purposes, qualifying training expenses are those incurred for professional training courses, performed by an arm's length organisation. These expenses typically would cover course fees, payments for external instructors, training materials, rent for rooms (outside the company) and training equipment required.

**Summary**

Table 3.1 provides the main parameters of the tax treatment of corporate training expenditures, including current deductions, depreciation and special tax incentives available, as well as comparative values of tax subsidies/burdens provided by the countries examined. Based on this comparison, the following observations can be made:

- Overall, corporate training enjoys the second-next most attractive tax incentives after R&D. However, the use of tax incentives is concentrated in a few countries – only 6 of the 15 countries examined.
- A prevailing number of countries – 17 out of 18 – treat training expenses as currently deductible.
- The most generous tax treatment of training and education expenditures is delivered by Japan and Korea, followed by The Netherlands (until 2004). These countries provide tax subsidies for corporate training in the range of USD 0.15 to USD 0.30 per one dollar of training expenditure. Small companies are the particular focus of the training and education tax credits and allowances in those countries.
- The other three countries – Austria, France and Spain – provide a tax subsidy in the range of USD 0.05 to USD 0.10 on the dollar.
- The United States represents a special case as the tax treatment of corporate training expenditures occurs chiefly at the state level. Examples of US states using tax incentives include Alabama, Arizona, Colorado, Kentucky, Mississippi, Ohio, South Carolina and Virginia.

**Table 3.1. Corporate tax treatment of training: major parameters selected countries (2004-2005)**

| Country | Tax Treatment of Corporate Training | | | CT B-index | Tax subsidy/burden (1-B-index) |
|---|---|---|---|---|---|
| | Current deduction | Depreciation | Tax incentive | | |
| **Australia** | 100% | | | 1.0 | 0 |
| **Austria** | 100% | - | (a) 20% additional allowance or (b) 6% tax credit | (a) 0.93<br>(b) 0.92 | (a) 0.07<br>(b) 0.08 |
| **Belgium** | 100% | - | - | 1.0 | 0 |
| **Canada** | (a) 100% if short term benefit | (b) If long term benefit | | (a) 1.0<br>(b) | (a) 0<br>(b) |
| **Czech Republic** | 100% | | | 1.0 | 0 |
| **Finland** | (a) 100% if short term benefit | (b) 10 years if long-term | | (a) 1.0<br>(b) 1.11 | (a) 0<br>(b) 1.11 |
| **France**<br>• large<br>• small | <br>100%<br>100% | | <br><br>35% increment tax credit | <br>1.0<br>0.95 | <br>0<br>0.05 |
| **Italy** | 100% | | | 1.0 | 0 |
| **Ireland** | - | 3 years | | 1.01 | -0.01 |
| **Japan**<br>• large<br>• small | <br>100%<br>100% | | <br>25% increment tax credit<br>Hybrid level and increment tax credit | <br>0.94<br>0.70 | <br>0.06<br>0.30 |
| **Korea**<br>• large<br>• small | <br>100%<br>100% | - | <br>15% level tax credit | <br>0.79<br>0.82 | <br>0.21<br>0.18 |
| **Mexico** | 100% | - | Can qualify for R&D tax incentives | 1.0 | 0 |
| **Netherlands**<br>• small<br>• large | <br>100%<br>100% | | <br>40% additional allowance<br>20% additional allowance | <br>0.85<br>0.93 | <br>0.15<br>0.07 |
| **Norway** | 100% | | | 1.0 | 0 |
| **Spain** | 100% | | Hybrid 5% level and 10% increment tax credit | 0.91 | 0.09 |
| **Sweden** | 100% | | | 1.0 | 0 |
| **United Kingdom** | 100% | | | 1.0 | 0 |
| **United States**<br>• federal<br>• state | 100% | | <br>state tax credits available | 1.0 | 0 |

*Source:* JPW Innovation Associates Inc., compiled from various international sources such *as International Bureau of Fiscal Documentation* and *Tax Management Inc.*

## APPENDIX 3.1

### About the Corporate training B-index

Exhibits 1 and 2 provide the formulas and examples of calculating the Corporate training (CT) B-index and related tax subsidy/burden with applicability to a wide range of other intangible investments.

### Exhibit 1: Calculating the Corporate training (CT) B-index

#### *CT B-index definition*

A minimum present value (PV) of the before-tax income that a firm needs to generate in order to cover the cost of an investment in corporate training and to pay the corporate income taxes

#### *Generic formula*

**CT B-index = (1-A)/(1-t)**

Where:

A = the net present discounted value of depreciation allowances, tax credits and other tax incentives available and the numerator (1-A) is the after-tax cost of the corporate training); t = corp. income tax rate

#### *Options*

- *a)* Depreciation only is claimed: B= (1 - zt)/(1-t)
- *b)* Depreciation and tax credit: B = (1-zt –c)/(1-t) or B = (1-zt –c(1-t))/(1-t) if credit is taxable
- *c)* Depreciation and investment allowance: B = (1-zt-wt)/(1-t)

Where:

z = present value of depreciation (if z=1 then current expensing)

c = tax credit; w= investment allowance/deduction; t = corporate income tax rate

#### *Calculating depreciation*

Unless deducted immediately, the present value of depreciation deduction z will be always less than zero because of the time value of money. For example, an asset depreciated over 10 years straight-line using assumptions of this study – a 10% discount rate and end-of-period depreciation – will yield the present value of 0.68.

#### *Notes related to CT*

- Overall, a mix of tax incentives is available across OECD.
- The prevailing tax treatment of corporate training is current expensing. This is shown by equation (a), where z=1.
- Equation (b) is applicable to a few countries which employ tax credits: France, Japan, Korea, Spain and selected US states.

- Countries that offer investment allowances follow equation (c): Austria and The Netherlands (until 2004).

**Exhibit 2: Calculating the Corporate training tax subsidy/burden**

***Formula***

Values of the CT B-index < 1 indicate that the government subsidises the investment under consideration. For example if B= 0.95 the tax subsidy component is 0.05 or 5 cents on the dollar). It follows the following formula:

***Tax subsidy/burden = 1 – CT B-index***

Values of the CT B-index > 1 indicate that the before-tax income generated from the investment is not sufficient to pay for its cost and the applicable taxes. This is due to taxes that need to be paid on the income generated from the investment. In other words a negative tax subsidy becomes a measure of tax *burden* on the investment.

***Cases***

- *a)* Tax subsidy > 0: - A case of generous tax incentives: more than 100% of expenditures can be deducted from income due to tax incentives such as tax credits and additional allowances from taxable income.
- *b)* Tax subsidy = 0: - Expenditures are deductible in the tax year in which they are incurred.
- *c)* Tax subsidy < 0: - A case of non-incentive tax systems: expenditures cannot be deducted immediately in the current year – the tax system typically will not provide incentives for investment or incentives are minor in value.

## 4. TAX TREATMENT OF SOFTWARE

### Introduction

Compared with the tax treatment of R&D, the taxation of software expenses[25] is less consistent across countries and generally lacks clarity. There are several reasons which make comparability difficult.

First, software contains both tangible and intangible elements. In addition, software can be a tradable service or a tradable good.[26] When computer companies sell software and hardware together in a bundled package, software taxation presents little problem since hardware is considered to be a tangible good, and software is considered incidental to the hardware, so is often taxed the same way.[27] The problem arises when software is developed in-house or purchased independently of hardware as an off the shelf package or custom software. If it is part of a service, such software will likely be expensed in the current year or amortised over a number of years, often at the choice of the taxpayer. If considered a good, the software will likely be capitalised subject to the tax rules and conventions existing in the tax jurisdiction concerned. Capitalized software will show on the balance sheet of the company whereas expensed software will not.

Second, the classification of software for tax purposes is not uniform and very much depends on the unique features of national policies. Unlike R&D taxation, countries examined in the study tend to construe and classify software in the manner that is most advantageous to those countries. There is no international standard or guideline for the definition of software for tax purposes. The result is a hodgepodge of standards for tax treatment which vary between countries.

Third, there is also a disconnection between the dynamics of software technologies and the dynamics of rules and regulations reflecting changes in software. Software technologies and software development tools evolve very rapidly today – a six months' cycle is a norm – but policies and legal procedures for the tax treatment of software can take a long time to catch up. Moreover, as computer software continues to evolve, the distinction between types of software (*e.g.* such as systems software and application software) is blurring.[28]

Fourth, a further complication is that software can be delivered through numerous routes each enjoying its hard-to-figure tax rules. All this makes international comparisons complex.

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25 Main sources: *Taxation of Companies in Europe*; *Taxes and Investment in Asia and the Pacific,* International Bureau of Fiscal Documentation, Amsterdam, and various Web sites.

26 Because of the different place of supply rules, it is important whether a particular supply is characterised as being of goods or services. This is not always clear in the case of supplies of computer software. Broadly, on line supplies of software and supplies of "bespoke" software contained in a physical media, *e.g.* a disk, are supplies of services, whereas "off-the-shelf" software contained in a physical media are characterised as goods. See http://www.cla.org/eclawbook/ecl_10.htm

27 http://www.law.berkeley.edu/journals/btlj/articles/vol2/kuo.pdf

28 Jennifer J. Smith, "The Taxation of Software Payments," *Ottawa Business Journal*, February 23, 2004 http://www.ottawabusinessjournal.com/281019380517953.php

**Forms of software delivery**

- ***Internally (in-house) developed software.*** The fact whether the software was *purchased* or *internally* developed would mean the difference between capitalisation and depreciation versus expense deduction.

- ***Purchased, off-the-shelf, standard software (packaged, shrink-wrapped or click-through software).*** Most application oriented (*i.e.* word processing software but also specialised types of software such as Enterprise Resource Planning (ERP) software and Customer Relationship Management (CRM)[29] software when not delivered with computer hardware) and systems software (operational system software for the computer to run) will be included in this category.

- ***Embedded (bundled) in durable equipment categorised as an investment.*** If the software is bundled with the hardware, as is the case with most retail computer purchases (for which there is no separately stated price), then the software cost can receive the same tax treatment as the computer hardware. In that case, the price of the computer includes payment for the software as well as the hardware. Since the full price is included in producers' purchases of durable equipment, such software is implicitly treated as an investment good. The bundling can also include other services, such as installation, maintenance, training and development. This might be the likely case of ERP and CRM type software as these types tend to be delivered in turnkey fashion.

- ***Custom software,*** software that is prepared for a specific customer with its own unique source code. Custom software is typically defined as computer software that requires the end-user to enter into a specific licensing agreement with the licensor concerning the use of the software.

- ***Leased software*** offers favourable tax treatment as payments are fully deductible as a business expense. It also offers technological benefits (quicker access to productive assets and less risk of obsolescence and option to upgrade).

**Approach**

As the tax treatment of software operates within different national contexts, this causes variations in cross-country comparability on a wider scale than comparability of the taxation of R&D for which internationally accepted definitions and standards are available (*e.g.* the *Frascati Manual*). Therefore, this section presents a generic and highly stylised look at the tax treatment of software to make the cross-country comparability useful. It largely abstracts from the types of software and from their methods of delivery as discussed above – issues which complicate the comparability of tax systems – and which may warrant a separate research based on an in-depth survey of jurisdictions concerned. Instead the section focuses on comparing two generic types of software – the acquired software and the in-house developed software. It gathers and analyses relevant tax treatment information which later feeds into the calculation of the Software B-index for each country concerned (See Appendix 4.1).

[29] Enterprise resource planning systems (ERP) are management information systems that integrate and automate many of the business practices associated with the operations or production aspects of a company. See en.wikipedia.org/wiki/ERP_software. The generally accepted purpose of Customer Relationship Management (CRM) is to enable organisations to better serve their customers through the introduction of reliable processes and procedures for interacting with those customers. See en.wikipedia.org/wiki/CRM_software.

The descriptions of the rules provided in tax sources on which this section is based tend to be general. Tax policies that pertain to software expenses are reported country by country. For a tax treatment summary and individual country B-indexes, see Table 4.1.

**Purchased software**

There are some commonalities in the tax rules of national jurisdictions. Purchased software will almost always be capitalised and depreciated. The rate at which the software can be written off for tax purposes depends on the *type* of software and *how* the software is used. If the useful life of purchased software is less than a year, the cost of acquisition may be fully deductible in the year of acquisition. Similarly if the purchase price of software is below a certain price floor, the cost of such software can be deducted in full. Overall, the concept of useful life of an asset plays a role in defining the length of depreciation of software but the distinction is not that pronounced as in the case of patents.

Two observations come to mind when analysing the tax treatment of software. The first is that the main – if not sole – tax incentive is accelerated depreciation. This is largely represented by 100% write off of software expenses. A 100% write-off is offered in 9 of the 23 countries examined – Australia, Canada, Denmark, Finland, France, Greece, Mexico, United Kingdom and the United States – but not always on all types of software. This applies mainly to applications or off-the-shelf software whose useful life is relatively short *e.g.* in the United Kingdom defined as less than 2 years.

Other countries, too, offer low periods of depreciation ranging from two to five years on a straight-line basis. In Ireland, however, business software is deemed as plant and typically depreciated over a quite lengthy period of 8 years straight-line. Those countries that offer declining balance depreciation for software also provide relatively generous write-off rates. For example, Switzerland allows a write-off of 40% of the price of the asset per year, while Canada grants a 45% depreciation on systems software and Norway has a 30% rate of depreciation in effect. It is interesting to note that the United Kingdom treats business software of long-term use as plant, depreciating it at 25% declining balance per annum.

The second point is there are no tax credits or allowances from taxable income available for purchased software. This is except for Japan, which provides a temporary volume-based 10% tax credit for ICT investment, including purchased software, (due to expire as of 31 March, 2006).

**In-house developed software**

There is no specific rule for expensing or depreciating in-house software. This type of software can be fully deductible as current expense (especially if it is developed for sale or licence *e.g.* New Zealand) or depreciated. For example in Australia, in-house software is written off over 3 years. In New Zealand, development must be capitalised whereas pre-development expenses can be deducted as incurred. In the United States, in-house software development will likely be amortised over 15 years as an intangible.

An important point, however, is that often software development represents part of a company's R&D effort. Business software development expenses which constitute eligible R&D expenditure will earn tax incentives applicable to R&D expenditures in those countries that provide them (See Section 1 on Tax treatment of R&D.) However, eligible software projects must be characterised by technological advance and technological uncertainty, and undertaken on a systematic basis.

**Summary**

Overall, the tax treatment of software by the selected OECD countries is not excessively generous. The only tax credit applicable to purchased software, other than R&D-type software, can be found in Japan. Thus it is only Japan which shows the positive software tax subsidy of 0.05. Other countries that rely on depreciation instruments show B-indexes greater than unity yielding a relative tax burden. At best, these countries can provide a neutral tax treatment to certain types of software.

**Table 4.1. Corporate tax treatment of software: major parameters**

| Country | Tax treatment of software | | | |
|---|---|---|---|---|
| | Purchased | In-house developed | B-index | Tax subsidy/ burden* |
| Australia | (a) 100% | (b) In-house software development pool: 40%-40%-20% over 3 years – no deduction allowed in first year<br><br>Software R&D can qualify for 125% R&D tax allowance | (a) 1.0<br>(b) 1.07 | (a) 0<br>(b) -0.07 |
| Belgium | (a) 3 years SL | | (a) 1.05 | (a) -0.05 |
| Canada | (a) 45% (systems) DB to (b) 100% (applications) | Software development can qualify for R&D tax credit | (a) 1.07<br>(b) 1.03 | (a) -0.07<br>(b) -0.03 |
| Czech Rep. | (a) 3 years SL or period agreed | | (a) 1.05 | (a) -0.05 |
| Denmark | (a) 100% | | (a) 1.0 | (a) 0 |
| Finland | (a) 100% | | (a) 1.0 | (a) 0 |
| France | (a) 100% (exceptional depreciation of 12 months) | Software development can qualify for R&D tax credit | (a) 1.0 | (a) 0 |
| Germany | (a) Determined by company circumstances - SL | (b) 100% deductible | (a)<br>(b) 1.0 | (a)<br>(b) 0 |
| Greece | (a) 100% or (b) depreciated at up to 30% DB | | (a) 1.0<br>(b) 1.07 | (a) 0<br>(b) -0.07 |
| Hungary | (a) 50% SI | | (a) 1.01 | (a) -0.01 |
| Ireland | (a) Deemed as plant – 8 years SL | Software development can qualify for R&D tax credit | (a) 1.04 | (a) -0.04 |
| Japan | (a) 5 years SL plus tax credit of 10% | (b) In-house developed software – 5 years SL | (a) 0.95<br>(b) 1.12 | (a) 0.05<br>(b) -0.12 |
| Mexico | (a) Software as part of computer system – 30 % SL<br>(b) Other acquired software – 100% deduction | Software development can qualify for the R&D tax credit | (a) 1.04<br>(b) 1.0 | (a) -0.04<br>(b) 0 |
| New Zealand | Capitalised - at (a) 48% DB or (b) 36% SL | Software developed in-house for use in business – (c) pre-development expenses deductible 100%; (d) development expenses must be capitalised until the project is completed and depreciated<br><br>(e) Software developed for sale or licence – 100% | (a) 1.04<br>(b) 1.04<br>(c) 1.0<br>(d) ?<br><br>(e) 1.0 | (a) -0.04<br>(b) -0.04<br>(c) 0<br>(d) ?<br><br>(e) 0 |
| Netherlands | (a) Determined by company circumstances – SL | Software development can qualify as R&D | (a) ? | (a) ? |
| Norway | (a) 30% DB | | (a) 1.07 | (a) -0.07 |
| Poland | (a) 2 years SL | | (a) 1.01 | (a) -0.01 |
| Portugal | (a) 3 years SL | | (a) 1.05 | (a) -0.05 |

**Table 4.1. Corporate tax treatment of software: Major parameters (Cont'd)**

| Country | Tax treatment of software | | | |
|---|---|---|---|---|
| | **Purchased** | **In-house developed** | **B-index** | **Tax subsidy/ burden*** |
| Spain | 3 or 6 years, but typically (a) 3 years SL | | (a) 1.05 | (a) -0.05 |
| Sweden | (a) 4 years SL | (b) 100% | (a) 1.05<br>(b) 1.0 | (a) -0.05<br>(b) 0 |
| Switzerland | (a) 40% DB | | (a) 1.02 | (a) -0.02 |
| United Kingdom | If long useful life (a) 25% to accounts write-off if preferred<br>(b) 100% if useful life < 2 years | Same rules as for purchased apply<br>Software R&D can qualify for R&D tax credit | (a) 1.09<br>(b) 1.0 | (a) -0.09<br>(b) 0 |
| United States | (a) Off-the-shelf and short lived – 100% expensing<br>(b) Other acquired computer software – 3 years SL | (c) Amortised over 15 years SL as intangible<br>Software R&D can qualify for a tax credit | (a) 1.0<br>(b) 1.05<br>(c) 1.24 | (a) 0<br>(b) -0.05<br>(c) -0.24 |

*Notes*: SL= straight-line depreciation method; DB= declining balance depreciation method; *= 1-B-index.

*Source*: JPW Innovation Associates Inc., compiled from various international sources as quoted above.

## APPENDIX 4.1

### About the Software B-index

Exhibits 1 and 2 provide the formulas and examples of calculating the Corporate Training (CT) B-index and related tax subsidy/burden with applicability to a wide range of other intangible investments.

### Exhibit 1: Calculating the Software B-index

#### *Software B-index definition*

A minimum present value (PV) of the before-tax income that a firm needs to generate in order to cover the cost of an investment in software and to pay the corporate income taxes

#### *Generic formula*

**Software B-index = (1-A)/(1-t)**

Where:

A = the net present discounted value of depreciation allowances, tax credits and other tax incentives available and the numerator (1-A) is the after-tax cost of the corporate training); t = corporate income tax rate

#### *Options*

- a) Depreciation only is claimed: B = (1 - zt)/(1-t)
- b) Depreciation and tax credit: B = (1-zt –c)/(1-t) or B = (1-zt –c(1-t))/(1-t) if credit is taxable
- c) Depreciation and investment allowance: B = (1-zt-wt)/(1-t)

Where:

z = present value of depreciation (if z = 1 then current expensing)

c = tax credit; w = investment allowance/deduction; t = corporate income tax rate

#### *Calculating depreciation*

Unless deducted immediately, the present value of depreciation deduction *z* will be always less than zero because of the time value of money. For example, an asset depreciated over 10 years straight-line using assumptions of this study – a 10% discount rate and end-of-period depreciation – will yield the present value of 0.68.

***Notes related to software***

- The prevailing tax treatment of corporate software is current expensing or depreciating. This is shown by equation (a).
- Equation (b) – a tax credit - is applicable only to Japan.
- No countries offer additional allowances from taxable income for software (equation (c))

**Exhibit 2: Calculating the Software tax subsidy/burden**

***Formula***

Values of the Software B-index < 1 indicate that the government subsidises the investment under consideration. For example if B = 0.95 the tax subsidy component is 0.05 or 5 cents on the dollar. It follows the following formula:

***Tax subsidy/burden = 1 – Software B-index***

Values of the Software B-index > 1 indicate that the before-tax income generated from the investment is not sufficient to pay for its cost and the applicable taxes. This is due to taxes that need to be paid on the income generated from the investment. In other words a negative tax subsidy becomes a measure of tax *burden* on the investment.

***Cases***

- (a) Tax subsidy > 0: – A case of generous tax incentives: more than 100% of expenditures can be deducted from income due to tax incentives such as tax credits and additional allowances from taxable income.
- (b) Tax subsidy = 0: – Expenditures are deductible in the tax year in which they are incurred.
- (c) Tax subsidy < 0: – A case of non-incentive tax systems: expenditures cannot be deducted immediately in the current year – the tax system typically will not provide incentives for investment or incentives are minor in value.

## 5. TAX TREATMENT OF ORGANISATION & START-UP EXPENSES

### Introduction

In accounting terms, organisational expenses of any corporation may include various categories of expenses incurred in either establishing a new entity or acquiring an existing one. They are treated differently by tax authorities and often become a subject of a court tax ruling. In general, one can identify the following organisational expenses as applicable:

- ***Organisational costs***. Organisation costs include the legal and accounting costs necessary to organize, facilitate the filing of the necessary legal documents, and other regulatory paperwork required at the state and national levels, cost of temporary directors, cost of organisational meetings and incorporation fees.

- ***Start-up expenses***. Start-up expenses and pre-opening expenses include costs incurred after a decision has been made to acquire or enter into a business. These would include salaries and wages for training employees and fees for executives and consultants or for similar professional services, travel for obtaining prospective distributors, suppliers, or customers, analysis or survey of potential markets, products, labour supply, transportation facilities, advertisements for the opening of the business. Start-up costs are the costs for creating an active trade or business or investigating the creation or acquisition of an active trade or business. Start-up costs include any amounts paid or incurred in connection with any activity engaged in for profit or for the production of income before the trade or business begins, in anticipation of the activity becoming an active trade or business.[30] Start-up expenses may also include reorganisation costs provided such reorganisation results in a new or improved business.

### Approach

As is the case of intangibles generally (see software and patent sections), it is difficult to come up with an unequivocal definition and categorisation of organisational expenses. The concept of organisational expense is fluid as it depends on different company contexts and legal interpretations. Depending on the company circumstances, organisational costs may also include items such as computer software, employee training, and patent rights – topics discussed in separate sections of this paper which have different tax treatments. Thus the accounting – generic and narrow – definition of organisational expenses (OE) is probably the only approach that can be taken in this research. Tax policies that pertain to organisation and start-up costs are reported country by country. Note that source materials upon which this section is built are not very specific with regard to the types of organisational expenses or start-up expenses under consideration. Many country descriptions treat OE as *generic* and such is the approach that this paper has taken in identifying and calculating the relative attractiveness of the tax treatment of OE (the OE B-index). More detailed research into accounting, legal, and tax practices existing in the specific countries is required. However, it is believed that these expenses are typical and in each country will be defined by the activities described above.

30 http://www.irs.gov/businesses/partnerships/article/0,,id=134690,00.html

For a summary of the OE tax treatment and generic OE B-indexes, see Table 5.1. For information on the calculation of the OE B-indexes see Appendix 5.1.

**Salient characteristics**

Full deductibility of organisational expenses is the main tax treatment in the sample of 19 countries examined. Nine countries consider these costs as deductible business expenses in the year incurred, irrespectively of the nature of the expense: in other words, both capital and non-capital expenses are included. In addition to allowing full deductibility, countries such as France and Japan provide an option to capitalise such expenses if required by the company.

The remaining countries – Korea, Spain, Switzerland and the United States – require capitalisation of OE. In addition, Denmark requires organisational expenses which are part of a plant to be capitalised. The rates of amortisation are typically straight-line, based on the period of five years. However, in the United States, organisational expenses fall under Section 197 Intangibles, which broadly covers the tax treatment of self-developed intellectual property such as patents and software. The US tax treatment was relaxed to some extent recently. For expenses paid or incurred after October 22, 2004, a company can elect to deduct immediately a limited amount (up to USD 5 000) of start-up and organisational costs. The costs that are not deducted currently can be amortised ratably (straight-line) over a 15-year period. The deduction of the first USD 5 000 appears to be particularly relevant for early start-up companies.

It is interesting to note that three countries in the sample provide limited or no deductibility for organisational expenses connected to the formation of company. In this group of countries, the best treatment can be found in Italy, which allows one-half of the organisational expenses to be deducted in any one year within five years of company formation.

In general, there is no allowance for the amortisation of organisational expenses in Ireland. An exception is the cost of recruiting and training staff which may be amortised over three years. Formation expenses incurred up to three years prior to the start-up of business are deductible provided they would have been deductible had the company been trading. And organisational expenses – incurred in connection with establishing a Swedish corporation or increasing the corporate capital – are generally *not* deductible.

Finally, note that there is *no* selective tax incentive (*e.g.* a tax credit or additional allowance from taxable income) available for organisational expenses in any of the countries examined. This is unlike the areas of R&D and training but similar to other categories of intellectual assets discussed above.

**Summary**

In analysing the OE tax treatment the following points can be made:

- Full deductibility of OE prevails, meaning that, in the absence of selective tax incentives, the most the company can get from the tax authorities is neutral tax treatment of OE (no tax subsidy) – in these cases the OE B-index equals 1.0.

- In a few countries, OE needs to be capitalised – in these cases the OE B-index is greater than 1.0 meaning that there might be a tax burden involved in organising or starting up a new company (*i.e.* the tax subsidy is negative).
- Some countries give the taxpayer a flexibility to immediately deduct a full organisational expense in the year incurred or amortise it in the future years.

**Table 5.1. Tax treatment of organisational expenses: Major parameters**

| Country | Organisational expenses | | | |
|---|---|---|---|---|
| | Current deduction | Depreciation | OE B-index | Tax subsidy/ burden* |
| Belgium | 100% | | 1.0 | 0 |
| Czech Rep. | | 5 years SL | 1.06 | -0.06 |
| Denmark | 100% | Capitalised if plant | 1.0 | 0 |
| Finland | 100% | | 1.0 | 0 |
| France | 100% | Or amortised over 5 yrs SL | 1.0/1.06 | 0/-0.06 |
| Germany | 100% | | 1.0 | 0 |
| Ireland | 100% on pre-trading expenses | | 1.0 | 0 |
| Italy | 50% may be deductible | | 1.25 | -0.25 |
| Japan | 100% | Or capitalised over 5 yrs SL | 1.0/1.06 | 0/-0.06 |
| Korea | | Amortised over 5 years SL | 1.06 | -0.06 |
| Mexico | 100% | | 1.0 | 0 |
| Netherlands | 100% | | 1.0 | 0 |
| New Zealand | 100% if of non-capital nature | | 1.0 | 0 |
| Norway | 100% | | 1.0 | 0 |
| Spain | | Amortised over 5 years SL | 1.06 | -0.06 |
| Sweden | Not deductible | | - | - |
| Switzerland | | Amortised over 5 years SL | 1.06 | -0.06 |
| United Kingdom | 100% | | 1.0 | 0 |
| United States | First USD 5 000 | Rest is amortised over 15 years SL | 0/1.24 | 0/-0.24 |

*Notes*: SL= straight-line depreciation method; DB = declining balance depreciation method; *= 1-B-index.

*Source*: JPW Innovation Associates Inc., compiled from various international sources as quoted above.

## APPENDIX 5.1

### About the Organisational expenditure B-index

Exhibits 1 and 2 provide the formulas and examples of calculating the Organisational expenditure (OE) B-index and related tax subsidy/burden with applicability to a wide range of other intangible investments.

### Exhibit 1: Calculating the organisational expenditure (OE) B-index

***OE B-index definition***

A minimum present value (PV) of the before-tax income that a firm needs to generate in order to cover the cost of an organisational investment and to pay the corporate income taxes

***Generic formula***

**OE B-index = (1-A)/(1-t)**

Where:

A = the net present discounted value of depreciation allowances, tax credits and other tax incentives available and the numerator (1-A) is the after-tax cost of OE; t = corporate income tax rate

***Options***

- a) Depreciation only is claimed: B = (1 - zt)/(1-t)
- b) Depreciation and tax credit: B = (1-zt –c)/(1-t) or B = (1-zt –c(1-t))/(1-t) if credit is taxable
- c) Depreciation and investment allowance: B = (1-zt-wt)/(1-t)

Where:

z = present value of depreciation (if z=1 then current expensing)

c = tax credit; w = investment allowance/deduction; t = corporate income tax rate

***Calculating depreciation***

Unless deducted immediately, the present value of depreciation deduction z will be always less than zero because of the time value of money. For example, an asset depreciated over 10 years straight-line using assumptions of this study – a 10% discount rate and end-of-period depreciation – will yield the present value of 0.68.

***Notes related to OE***

- The prevailing tax treatment of OE is current expensing. This is shown by equation (a), where z=1.
- Equation (b) and equation (c) – depicting tax credits and additional allowances from taxable income, respectively – are not applicable.

**Exhibit 2: Calculating the OE tax subsidy/burden**

***Formula***

Values of the OE B-index < 1 indicate that government subsidises the investment under consideration. For example if B = 0.95 the tax subsidy component is 0.05 or 5 cents on the dollar. It follows the following formula:

***Tax subsidy/burden = 1 – OE B-index***

Values of the OE B-index > 1 indicate that the before-tax income generated from the organisational investment is not sufficient to pay for its cost and the applicable taxes. This is due to taxes that need to be paid on the income generated from the investment. In other words a negative tax subsidy becomes a measure of tax *burden* on the investment.

***Cases***

- (a) Tax subsidy > 0: – A case of generous tax incentives: more than 100% of expenditures can be deducted from income due to tax incentives such as tax credits and additional allowances from taxable income.
- (b) Tax subsidy = 0: – Expenditures can be fully deducted from income.
- (c) Tax subsidy < 0: – A case of non-incentive tax systems: expenditures cannot be deducted immediately in the current year – the tax system typically will not provide incentives for investment or incentives are minor in value.

## ANNEX 1

## MEASURING THE TAX TREATMENT OF INNOVATION INTANGIBLES

### What is the B-index?

The B-index measures the minimum present value[31] of before-tax income that a firm needs to generate in order to cover the cost of the intangible (*e.g.* R&D, patent, software, training etc.) investment and to pay the applicable corporate income taxes. *The lower the index the greater is the incentive for a firm to invest in a given intangible.* In particular, the index considers an investment of one currency unit, measuring the present value of pre-tax income on a one currency unit investment at the margin, with economic rent exhausted, that a firm needs to earn to cover the after-tax cost of acquiring the asset, and pay corporate tax on the income, ignoring financing considerations.

Exhibit 1 specifies important limitations of the model. Exhibits 2 and 3 below show the formulas, and Exhibit 4 presents examples of calculating the B-index and tax subsidy with applicability to a wide range of intangible investments. Finally, Exhibit 5 discusses tax parameters that enter the B-index calculation.

### Exhibit 1: Important elements not included in the B-index model

A key element not accounted for in the B-index is the cost of finance,[32] which is assumed to be the same for all countries. In addition, international differences are not considered in the B-index for the following elements:

- The extent to which interest costs and other financial charges may be deducted against taxable income at the corporate level (*i.e.* investment is financed only through equity).
- The ability to finance by means of flow-through shares or other similar mechanisms.
- The tax treatment of dividends and capital gains.
- Personal income tax rates; commodity taxes, property taxes, payroll taxes and taxes on capital.
- Credit refundability, caps or ceilings on the amount of credits earned and carry back or carry forward provisions.

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31 The discount rate used in the calculations is 10%.

32 The only element pertaining to the cost of finance that is introduced in the model is the nominal discount rate. The discount rate is used to calculate the present values of a project-related income and its cost. To isolate the tax effect for the analysis, the discount rate of 10% will be applied uniformly to all tax jurisdictions.

**Exhibit 2: Calculating the B-index for intellectual assets: R&D, patents, training software, organisational expenditure**

***B-index definition***

A minimum present value (PV) of the before-tax income that a firm needs to generate in order to cover the cost of an intangible investment and to pay the corporate income taxes

***Generic formula***

$$\textbf{B-index} = (1-A)/(1-t)$$

Where:

A = the net present discounted value of depreciation allowances, tax credits and other tax incentives available and the numerator (1-A) is the after-tax cost of the patent); t = corporate income tax rate

***Options***

- a) Depreciation only is claimed: $B = (1 - zt)/(1-t)$
- b) Depreciation and tax credit: $B = (1-zt -c)/(1-t)$ or $B = (1-zt -c(1-t))/(1-t)$ if credit is taxable
- c) Depreciation and investment allowance: $B = (1-zt-wt)/(1-t)$

Where:

z = present value of depreciation (if z=1 then current expensing)

c = tax credit; w= investment allowance; t = corporate income tax rate

***Calculating depreciation***

Unless deducted immediately, the present value of depreciation deduction *z* will be always less then one because of the time value of money. For example, an asset depreciated over 10 years straight-line using assumptions of this study – a 10% discount rate and end-of-period depreciation – will yield the present value of 0.68.

**Exhibit 3: Calculating a tax subsidy/burden**

Values of the B-index < 1 indicate that government subsidises the investment under consideration. For example if B = 0.95 the tax subsidy component is 0.05 or 5 cents on the dollar. It follows the following formula:

$$\textbf{Tax subsidy/burden} = 1 - \textbf{B-index}$$

Values of the B-index > 1 indicate that the before-tax income generated from the investment is not sufficient to pay for its cost and the applicable taxes. This is due to taxes that need to be paid on the income generated from the investment. In other words a negative tax subsidy becomes a measure of tax *burden* on the investment.

***Cases***

- (a) Tax subsidy > 0: A case of generous tax incentives: more than 100% of expenditures can be deducted from income due to tax incentives such as tax credits and additional allowances from taxable income.
- (b) Tax subsidy = 0: Expenditures are deductible in the tax year in which they are incurred.
- (c) Tax subsidy < 0: A case of non-incentive tax systems: expenditures cannot be deducted immediately in the current year – the tax system typically will not provide incentives for investment or incentives are minor in value.

**Exhibit 4: Country examples**

| **Canada** | **Germany** |
|---|---|
| B=(1 - xt - yzt - c(1-t))/(1-t) | B=(1-xt - yzt)/(1-t) |
| **United Kingdom** | **Netherlands** |
| B=(1 - xwt - yzt )/(1-t) | B=(1-xt - yzt– uc(1-t))/(1-t) |

**Where:**

x = proportion of current R&D expense
y = proportion of capital R&D expense
u = proportion of R&D wages and salaries

z = present value of depreciation; c = tax credit; t = tax rate; w= rate of additional deduction or allowance

**Exhibit 5: Types of tax incentives entering the B-index**

Tax incentives usually take three forms: tax credits, allowances from taxable income and tax deferrals such as current deduction and depreciation allowances:

- Tax credits.
- Amounts deducted from the tax liability.
- Additional allowances.
- Extra amounts over current business expenses deducted from gross income to arrive at taxable income.

***Current deduction***

- A full deduction of business expenses of a given kind in the year incurred.

***Depreciation***

- An estimate of the decrease in the value of an asset, caused by "wear and tear" or obsolescence. It represents the amount of a certain investment that is consumed each year and appears on the profit and loss statements (balance sheet) of an organisation.[33] The most common methods of calculating depreciation include straight line and declining balance.

[33] Anders Hintze and Katharina Andersson, Statistics Sweden, *The dilemma of quantifying IT expenditures in organizations*, Voorburg Group on Services Statistics, Örebro September 17-21, 2001, p.3.

- Straight-line depreciation rates are computed by dividing the cost by the estimated useful life as determined in accordance with accepted business practice.
- The declining balance method involves applying the depreciation rate against the undepreciated balance. Instead of spreading the cost of the asset evenly over its life, this system expenses the asset at a constant rate, which results in declining depreciation charges each successive year.
- Depreciation contains an incentive if it is allowed for tax purposes at a rate greater than the rate of economic depreciation. In Australia, Canada, Ireland and the United Kingdom, depreciation allowances for tax purposes are known as *capital cost allowances*.