Volume Title: Canada-U.S. Tax Comparisons

Volume Author/Editor: John B. Shoven and John Whalley, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-75483-9

Volume URL: http://www.nber.org/books/shov92-1

Conference Date: July 26-27, 1990

Publication Date: January 1992

Chapter Title: The Cost of Capital in Canada, the United States, and Japan

Chapter Author: John B. Shoven, Michael Topper

Chapter URL: http://www.nber.org/chapters/c7483

Chapter pages in book: (p. 217 - 236)

6 The Cost of Capital in Canada, the United States, and Japan

John B. Shoven and Michael Topper

6.1 Introduction

The cost of capital in a country is a key variable determining that country's ability to compete for internationally mobile capital. It sets the level of investment in the economy and is thus a central factor in the determination of real wages and economic growth. In the United States, at least, the allegedly high cost of capital is often blamed for the slow rate of growth of productivity and the perceived loss of international competitiveness. The same concerns are expressed in Canada, along with a host of additional factors. Among them are that tax changes in the U.S., if not matched by changes in Canada, can have adverse impacts on the Canadian economy. For instance, when the U.S. lowered its basic federal corporate tax rate from 46 to 34 percent in 1986, concern was expressed that this might lead to large amounts of new debt financing by Canadian affiliates of U.S. corporations, and thereby erode the tax base of the Canadian corporate income tax.

It is probably accurate to portray the U.S. and Canada as sharing a common capital or financial market. Because the U.S. economy is so large, it is likely that policies to encourage saving in the U.S. have significant impact on interest rates and other terms in world capital markets, whereas the effects of Canadian saving policies on capital market terms are probably much less pronounced. It is probably reasonable to model Canada as a small open economy facing an exogenous rate of return on financial capital. Whether that capital market is best characterized as a world capital market or one for North America is open to question.

A comparison of the cost of capital in the two countries is interesting for

John B. Shoven is professor of economics at Stanford University and a research associate of the National Bureau of Economic Research. Michael Topper is assistant professor of economics at the College of William and Mary.

both policy makers and economists. One aspect of the question is whether the recent Canadian tax reforms have effectively alleviated the problem of erosion of the corporate tax base because of international financial shuffling.

Both Canada and the U.S. are concerned not only with their relative costs of capital, but also with their collective competitiveness with respect to the rest of the world. To gauge this relative position, we include in the paper some previous calculations from Bernheim and Shoven (1989) on the cost of capital in Japan. Japan is of interest because it is the world's largest capital market participant (aggregate investment and savings in Japan exceed the corresponding aggregates for the U.S.) and an important trading partner for both Canada and the U.S.

The methodology of this paper and the Bernheim-Shoven paper is fairly traditional and comparable in many respects to the detailed analyses of Boadway, Bruce, and Mintz (1987) of taxes on capital income in Canada. Their work, in turn, is related to the King-Fullerton (1984) study. Relative to this earlier work, however, the methodology of this paper emphasizes the role of risk premia in determining the cost of capital and the interaction of risk and tax considerations. The cost-of-capital concept computed in this paper is exactly the same one that business people refer to as the "hurdle rate" for new investments. That is, it is the expected net rate of return before corporate taxes that is required in order for an incremental real investment to be in the interest of the owners of the firm. Unlike the procedure in most previous studies, the cost of capital is not presented as a single number, but rather as a schedule of figures for projects involving different amounts of risk.

The plan of this paper is to discuss the cost-of-capital concept in section 6.2. Section 6.3 deals with empirical difficulties in measuring the cost of capital and describes the measurement approach taken in this paper. Section 6.4 lays out the analytics for determining the cost of capital, given the terms in financial markets. That is, given the real interest rate and the expected return and riskiness of equity portfolios, the cost of capital is derived for debt- and equity-financed projects. Section 6.5 briefly contrasts the tax systems of Canada, Japan, and the U.S., and includes a table of parameter values for capital market terms and tax regimes used in the cost of capital calculations. Section 6.6 presents and interprets the results.

6.2 Defining the Cost of Capital

Although the cost of capital is a central concept in determining investment and economic growth, relatively little empirical work has been done in actually calculating its cost. Further, the work that has been done often uses inconsistent and misleading definitions of the cost of capital. Three common measures that appear in the literature are the real interest rate, the Hall-Jorgenson (1967) tax-adjusted real interest rate, and the weighted-average cost of capital (see for example, Copeland and Weston 1979, pp. 272–298). All three have major flaws as measures of the cost of capital. The real interest rate ignores all tax and risk factors and is thus only appropriate as a hurdle rate for safe investments taxed exactly like Treasury bills. The Hall-Jorgenson approach adds detailed (corporate and personal) tax factors, but it still ignores all risk considerations.

The weighted-average cost of capital is the before-tax return necessary to offer competitive rates of return on all of the claims out against a firm, and is the correct cost-of-capital measure for the firm's existing assets. However, it is inappropriate to use this measure as the hurdle rate for new investments, unless the new investments have exactly the same risk and return characteristics as the firm's existing assets. For instance, General Motors can undertake a relatively risky project to develop improved solar cells and finance the undertaking with quite safe debt. To act in the interest of the shareholders, the appropriate hurdle rate should be tied to the riskiness of the incremental real investment, rather than to the relative safety of the debt.

Corporate investment decisions should take into account the opportunity cost of the money. The fact that the corporation is making decisions about real investments (plant expansion, a truck, or a new computer network, for example) is immaterial. In order to be in a stockholder's interest, risky real investments at the corporate level have to be competitive with equally risky financial investments available in retail financial markets.

Since observed risk premia in retail financial markets are quite large, the appropriate hurdle rate for risky real investments is much higher than for safe investments. The simplest illustration of the risk premia is a comparison of long-run average real rates of return on a diversified portfolio of common stocks with the average real returns on safe, short-term investments such as Treasury bills. In the U.S., the arithmetic-average real rate of return on the Standard and Poor's 500 between 1926 and 1989 was 8.8%, whereas the average real return on U.S. Treasury bills was 0.5% (Ibbotson Associates 1990). In Canada, there was a similar gap between average equity and Treasury bill yields. Between 1950 and 1987, the average real rate of return of the Toronto Stock Exchange composite 300 was 7.5%, whereas the average real yield on Canadian Treasury bills was 1.2% (Hatch and White 1988).

In this paper, we define the cost of capital as the expected rate of return (or hurdle rate) necessary to satisfy both financiers and tax authorities. This measure includes an interest factor, a risk premium, and a number of tax factors.

The first component in this calculation is the capital market line of the familiar capital-asset pricing model (CAPM), which summarizes the financial market's required expected returns on securities of different riskiness (see, e.g., Sharpe 1970). In figure 6.1, the intercept, R_T, represents the real return on completely safe assets, whereas the point m represents the expected return and riskiness of a market portfolio or a standardized diversified portfolio of securities, such as the S&P 500. The riskiness of other investments is determined as the systematic or nondiversifiable risk of the asset with respect to the

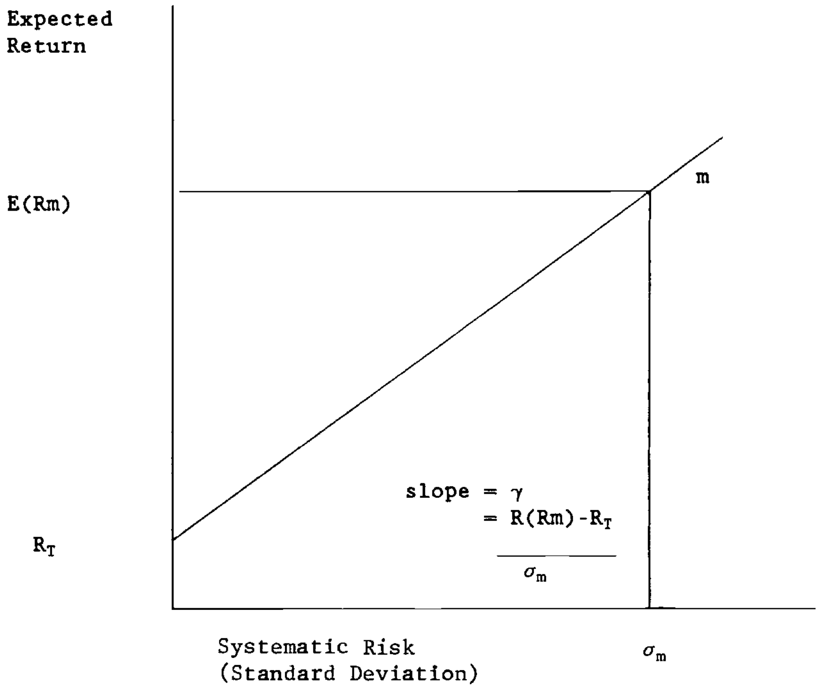

Fig. 6.1 The capital market line

market portfolio. Under the conventional assumptions of the CAPM model (perfect securities markets, no restrictions on short selling or borrowing, etc.), all investments must offer returns on the capital market line in order to be viable in the market.

The second step is to calculate the necessary expected rate of return on real investments before corporate and personal taxes. The relationship between the cost-of-capital line, capital market line, and the post-tax return the investor ultimately realizes after the payment of all corporate and personal taxes is illustrated in figure 6.2.[1]

6.3 Measuring the Capital Market Line

In principle the capital market line can be simply constructed by observing two points on the line: the return on a zero-risk safe asset and the return on a market portfolio of given riskiness. In practice, this is no easy task. For short-term safe assets it is reasonable to assume that the expected return is the contractual return (e.g., Treasury bills). Of course, the capital market line is ex-

1. For readers familiar with the King-Fullerton framework (which did not include risk), these three schedules correspond to their variables p, s, and r.

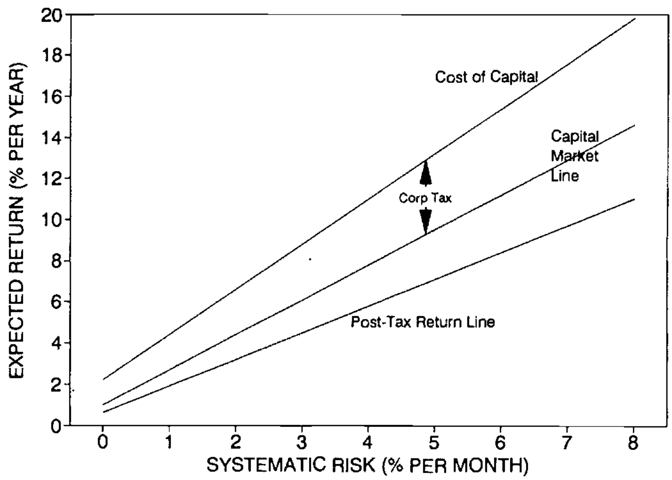

Fig. 6.2 Relationships between risk and return

pressed in real terms rather than in the nominal terms of the contracts. Also, Treasury bill yields are not perfectly safe in real terms. We follow the usual procedure of ignoring this and assume that Treasury bill yields are safe and that the expected real return is equal to the contractual rate less the average rate of inflation over the past six or twelve months.

The major problem is determining the expected return and standard deviation of the market portfolio, since there are no contracts to refer to and the expected return is unobservable. If the monthly or annual real total (dividends plus real capital gains) rates of return on the market were independently drawn from an identical distribution, then the average of a large number of realizations would give an accurate measure of the expected future returns. Similarly, the standard deviation of realizations would give an accurate guide to the standard deviation of the constant underlying real-rate-of-return distribution. Real returns in U.S. and Canadian equity markets do not seem to conform to the independent draws from an identical distribution model, however. The long-term average realization is very sensitive to the precise period covered. An example of this instability of average returns is shown in figure 6.3; while the ten-year average of annual real returns on the Toronto Stock Exchange was 8.33% between 1963 and 1972, it was only 0.10% between 1965 and 1974. This instability makes the past-realization approach unfeasible. The problem with using averages of past realizations as proxies for expected future rates of return on the market portfolio is that nonrecurring events (e.g., the formation of OPEC) may greatly affect past realizations.

The earnings-price ratio serves as a second possible proxy for the expected return on the market portfolio. Earnings are meant to reflect the amount of money a firm has left over after setting aside enough income to keep its capital

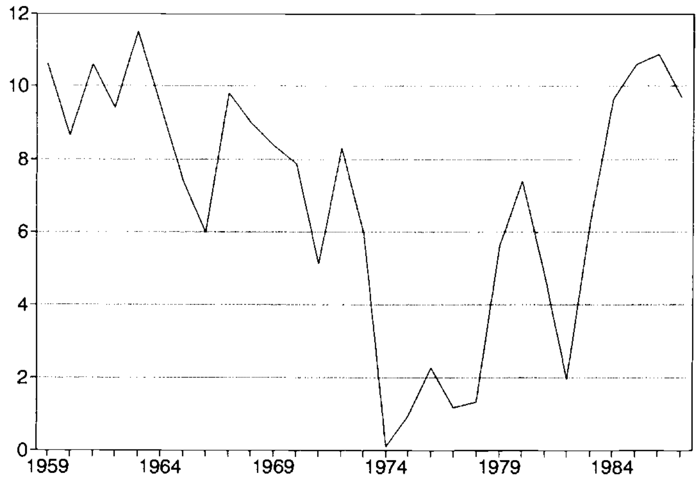

Fig. 6.3 Ten-year average real rate of return on the market portfolio in Canada

intact. If earnings were paid out to shareholders, then the shareholders would maintain a claim on a constant amount of capital. The only way that their total return could differ from the amount of earnings would be if the relative value of that constant amount of capital were to change. If one expects the relative prices of the firm's constant stock of assets to remain unchanged, then the expected total return would equal earnings, and the expected rate of return would be the earnings-price ratio. Although several accounting problems arise in measuring earnings, we adopt the annual average of monthly earnings-price ratios as our proxy for the expected return on the market portfolio. Boadway, Bruce, and Mintz use a similar procedure with an additional adjustment for inflation. In our base year of 1988, capital market lines based on E-P ratios are almost identical in the U.S. and Canada.

The 1988 E-P figure for Canada is 8.33%, while for the U.S. it is 8.55%. The 1988 real Treasury bill rate for Canada is 4.02%; it is 3.91% for the U.S. The riskiness of the market portfolio (measured as the standard deviation in monthly returns) is 4.77% for the U.S. and 5.44% for Canada. These figures are the realized standard deviation in returns for the ten-year period 1979–88.

Japanese equity markets featured very high rates of return in the 1980s and sharply increasing price-earnings ratios. Price-earnings ratios in Japan were lower than in the U.S. and Canada in 1970, but were almost 55 (or four times the levels in North America) by 1988. Even after adjusting Japanese earnings for U.S. accounting practices and Japanese cross-ownership to make them comparable, the P-E ratio in Japan exceeded 30 in 1988,[2] with a correspond-

2. See French and Poterba (1989) for details.

ing E-P ratio of 3.1%. According to the E-P approach, the Japanese capital market line is much lower than the Canadian or the U.S. capital market line, with higher equity prices effectively lowering the Japanese cost of capital. Thus, the 1988 figures suggest an integrated North American financial market segmented from the Japanese market.

6.4 An Analytical Calculation of the Cost of Capital

In this section we derive the before-tax cost of capital faced by the firm as a function of the interest rate, the risk aversion shown in the capital market line, and the design of the tax system. Consider a hypothetical investment project costing one dollar. Initially, consider a simple world without uncertainty or taxes. If $f'(k)$ is the cash flow generated by the investment and $\check{S}$ is the depreciation rate, then the project should be undertaken when the net-of-depreciation cash flow exceeds the real interest rate i − Ð, where i is the nominal interest rate on Treasury bills and Ð is the inflation rate. The cost of capital, P, is the net cash flow that just satisfies this hurdle rate:

$$P \equiv f'(k) - \delta = i - \pi. \tag{1}$$

In this certain world without taxes, the relevant opportunity cost is the real rate of return on a safe financial asset.

Now consider a world with uncertainty about both the cash flow generated by the project (income risk) and the depreciation of the investment (capital risk). The net-of-depreciation cash flow for a single period is then:

$$f'(k)\,(1 + \varepsilon_f) - k(\delta - \varepsilon_\delta), \tag{2}$$

where $\ddot{Y}_f$ and $\ddot{Y}_{\check{S}}$ are random variables capturing the uncertainty in income and capital risk, respectively. When $\ddot{Y}_{\check{S}}$ is high, depreciation is low, so that net income is high. Thus, positive values of $\ddot{Y}_f$ and $\ddot{Y}_{\check{S}}$ both correspond to favorable returns for investors.

Without loss of generality, assume that $E(\ddot{Y}_j) = 0$ for $j = f,\check{S}$. For simplicity, suppose that the $\ddot{Y}_j$ are distributed independently across periods. Since investors are risk-averse, a claim on $\ddot{Y}_j$ has negative value. Let $V(x)$ denote the certainty-equivalent value of the random variable x. Then

$$V(\varepsilon_j) = -\lambda_j, \tag{3}$$

for $j = f,\check{S}$. One can also think of λ_j as the risk premium that one must pay to an investor in order to induce him to hold the claim $\ddot{Y}_j$. In practice, the value of λ_j will depend upon investors' risk aversion, and upon the level of nondiversifiable risk subsumed in $\ddot{Y}_j$. In certainty-equivalent terms, the total single period return is:

$$f'(k)\,(1 - \lambda_f) - (\delta + \lambda_\delta). \tag{4}$$

Now the proper hurdle rate is to accept all projects whose certainty-equivalent yield exceeds the real interest rate. If one equates the above equation to $i -$ Đ and solves for the cost of capital, the result is

$$P = f'(k) - \delta = (1 - \lambda_f)^{-1}(i - \pi + \delta + \lambda_\delta) - \delta, \tag{5}$$

with both types of risk premia (λ_f and λ_δ) increasing the cost of capital.

The next step is to add tax considerations to this framework. Since equity and debt finance are taxed differently, the cost of capital will vary with the source of finance. In this section, we outline the derivation of the cost of capital for equity-financed investment.[3]

The role of taxes will depend on just which stockholders the investment-decision maker takes into account. Are they domestic owners or foreign owners? What tax brackets are domestic owners in? What taxes do foreigners pay on dividends, interest, and capital gains? This will be discussed again in the next two sections. For now, the results will be derived for a relatively high-income domestic stockholder's tax situation.

The new notation that needs to be introduced is:

- τ the corporate tax rate;
- m the average marginal rate of taxation for personal income in the form of interest;
- d the average marginal rate of taxation for personal income in the form of dividends;
- z the average rate of taxation for personal income induced (either through future realized capital gains or future dividends) by real retained earnings;
- z_n the average rate of taxation for personal income induced by nominal capital gains on the stock of corporate capital (see below for further discussion);
- A the present discounted tax value of depreciation allowances and tax credits associated with a unit of capital;
- $\acute{A}$ the marginal propensity to pay dividends out of permanent changes in the level of earnings;
- $\acute{A}_\gamma$ the marginal propensity to pay dividends out of transitory changes in the level of earnings; and
- q marginal Tobin's q (the ratio of the marginal value of installed capital to the replacement cost of capital).

It will simplify the equations to follow if we let

$$T = 1 - \alpha d - (1 - \alpha) z \tag{6}$$

3. A more detailed analysis of the equity-finance case, as well as the corresponding analytics for debt finance, can be found in Bernheim and Shoven (1989).

and

$$(7) \qquad T_\varepsilon = 1 - \alpha_\varepsilon d - (1 - \alpha_\varepsilon) z.$$

T and $T_{\ddot{Y}}$ represent the fractions of one dollar of permanent and transitory earnings, respectively, that are available for consumption by shareholders.

Note that the government effectively pays A for a unit of investment, while the net cost to the investor is $1 - A$. The total random return on one dollar invested by a shareholder is

$$(8) \qquad (1 - A)^{-1} \{T[f'(k)(1 - \tau) - \delta(1 - A)] - z_n \pi q + T_\varepsilon[\varepsilon_f f'(k)(1 - \tau) + \varepsilon_\delta(1 - A)]\},$$

where $\ddot{Y}_f$ and $\ddot{Y}_\delta$ are realized randomly in each year.

The above equation includes the term $-z_n Ḋ_q$. When the corporation installs an additional unit of capital and finances this acquisition through equity, its value rises by \$$q$. If it subsequently maintains higher capital stock by undertaking all necessary replacement investment, then in each period investors will accrue a nominal capital gain (in real dollars) of $Ḋ_q$. It seems likely that most corporations would not raise dividends in a subsequent period after accruing nominal gains on installed capital. In contrast, they might well subsequently raise dividends in response to an increase in real retained earnings. Likewise, investors may have different patterns of realization for nominal and real gains. Accordingly, we have allowed for the possibility that z_n (the average marginal rate of taxation on personal income induced by nominal gains on corporate capital) may differ from z (the average marginal rate of taxation on personal income induced by real retained corporate earnings).

The three appearances of $(1 - A)$ in the equation may also require explanation. The first simply reflects the fact that one dollar buys $(1 - A)^{-1}$ units of incremental capital. The remaining two appearances reflect the effect of depreciation by replacement capital costing $(1 - A)$ per unit.

If the corporation chooses the level of equity-financed investment to maximize its value, then it must be indifferent about raising an additional dollar of capital. If an investor contributes an additional dollar to the firm, its value rises by $(1 - A)^{-1}q$. Indifference therefore implies that $(1 - A)^{-1}q = 1$, or $q = (1 - A)$. Making this substitution into the above equation and converting to certainty equivalents, by applying the function $V(\cdot)$, one obtains

$$(9) \qquad (1 - A)^{-1} \{T[f'(k)(1 - \tau) - \delta(1 - A)] - T_\varepsilon[\lambda_f f'(k)(1 - \tau) + \lambda_\delta(1 - A)]\} - z_n \pi.$$

As in the case without taxes, the certainty equivalent of net income in any year must equal the real riskless after-tax rate of return. Since personal income taxes are levied on nominal interest payments, this return is $i(1 - m) - Ḋ$. Setting these quantities equal and solving for $f'(k) - \check{S}$, one obtains

$$p^e = \left(1 - \frac{T_\varepsilon}{T}\lambda_f\right)^{-1}\left(\frac{1-A}{1-\tau}\right)\left(i\left(\frac{1-m}{T}\right) - \pi\left(\frac{1-z_n}{T}\right) + \delta + \left(\frac{T_\varepsilon}{T}\right)\lambda_\delta\right) - \delta, \tag{10}$$

where p^e is the cost of equity-financed capital.

The above equation is the basic formula for the cost of equity-financed capital. Note that the corporate tax enters the cost of capital only in the single term

$$\frac{1-A}{1-\tau} \tag{11}$$

which multiplies both the real interest terms and the risk premia. If A were equal to τ, as with expensing (where investors are allowed to deduct immediately the full cost of their investments, presuming that they have taxable income to offset), then the corporate tax would not affect the cost of equity-financed capital at all. In that case, the government would effectively pay a fraction of the cost of the investment (τ) and would receive the same fraction of the cash generated by the project. Effectively, the government would be a proportional partner in the cost, return, and riskiness of the investment. With expensing, any investment undertaken in the absence of the corporate tax would still be undertaken with the corporate tax. The same is true if the present value of the sum of the tax savings from depreciation deductions and investment tax credits equals τ. For some investments (particularly equipment), this was the case after the U.S. 1981 tax reform.

Since A is expressed in present-value terms that depend on the nominal rate of interest, which in turn depends on the inflation rate, the effect of the corporate tax on the cost of capital and investment depends crucially on this rate of interest. This helps to reconcile the various contradictory claims about the Japanese tax system. On the one hand, a number of studies have found Japan to have one of the world's highest corporate tax rates. On the other hand, despite Japan's having depreciation schedules similar to those of the U.S. and Canada, other studies have found the Japanese corporate tax system to be relatively nondistortionary. The explanation is that the tax system is less distortionary because of the low Japanese nominal interest rates. One can see this most clearly by noting that at $i = 0$, $A = \tau$, and the corporate tax is nondistortionary regardless of the tax rate and the depreciation schedule.

The λ_f and λ_δ risk premia terms in the main formula are determined from the observed equity premium on the capital market line. In order to identify them with the available data, one has to assume that the fractions of the total premium are attributable to income and depreciation risk. Following Bulow and Summers (1984), we assume that 90 percent of the total risk is due to depreciation risk.

The cost-of-capital formula for debt finance corresponding to the formula for equity finance is:

$$(12)\quad p^d = \left(1 - \frac{T_\varepsilon}{T}\lambda_f\right)^{-1}\left(\frac{1-A}{1-\tau}\right)\left((1-\tau)\,i - \pi + \delta + \frac{T_\varepsilon}{T}\lambda_\delta\right) - \delta.$$

Note that the only difference between the equity and debt cases are in the terms multiplying i and $\bar{D}$. These differences arise because corporate interest payments are deductible against the corporate income tax, whereas equity earnings are obviously not. Further, corporate interest income is taxed like Treasury bill interest at the personal level, while equity earnings are treated differently.

6.5 Corporate and Personal Income Taxes in Canada, the U.S., and Japan

Corporate tax systems in Canada, the U.S., and Japan share many features (Shoven 1989; Whalley 1990). Representative tax and market parameters for 1988 are shown in table 6.1.[4] Although the tax code in each country contains special provisions for different industries, regions, and activities, these parameters capture the main features of each tax code in stylized form.

Comprehensive tax reforms in Canada and the U.S. during the 1980s were motivated in part by the perception that uneven tax treatment of different assets and industries was leading to costly misallocations of capital. In both countries, there was movement towards "leveling the playing field" by eliminating the investment tax credit, decelerating depreciation deductions, and bringing depreciation schedules into closer alignment with economic depreciation.[5] In 1988 the Canadian and U.S. systems had very similar tax rates and depreciation schedules, reflecting concern with the mobility of capital and tax liabilities across the countries.

The countries differ much more in their personal tax systems. Unlike the U.S., Canada attempts to offset double taxation of dividends partially by providing a dividend tax credit against "grossed up" dividends at the personal level. This effectively reduces the total taxation faced by dividend payments. The Japanese have a somewhat similar dividend tax credit that allows dividends and interest to be taxed separately from other income, generally at lower rates.

With respect to capital gains, the U.S. has moved to full taxation at the time of realization. Canada has a lifetime capital gains exclusion of $100,000 Canadian dollars (on nonhousing capital gains; housing is treated separately). After using up the exclusion, three-quarters (two-thirds in 1988 and 1989) of realized capital gains are taxed at ordinary rates. Until the recent reform, cap-

4. Tax figures include state/provincial taxes as well as federal taxes.
5. In addition, Canada reduced special tax advantages for the Atlantic provinces.

Table 6.1 **Parameter Values Used in the Calculation of the Cost of Capital in 1988**

	United States	Canada	Japan
Corporate Tax Rate (τ)	.380	.400	.499
Average Marginal Personal Tax Rate on Interest (m)	.300	.450	.200
Average Marginal Personal Tax Rate on Dividends (d)	.300	.312	.250
Effective Average Marginal Personal Tax Rate on Retained Earnings (z)	.21	.169	.08
Effective Average Marginal Tax Rate on Purely Nominal Capital Gains (z_n)	.13	.10	.02
Fraction of Long-term Earnings Paid as Dividends (α)	.5	.5	.33
Fraction of Transitory Earnings Paid as Dividends (α_ε)	.02	.02	.02
Fraction of Total Risk Attributable to Capital Risk (η)	.9	.9	.9
Short-term Nominal Interest Rate (i)	.0809	.0817	.04092
Expected Rate of Inflation (π)	.0418	.0415	.011904
Exponential Rate of Depreciation for Autos & Plants (δ)	1/7, 1/31.5	1/7, 1/31.5	1/7, 1/31.5
Tax Depreciation Lifetimes for Autos & Plants (L)	5/31.5	(3.33/25)[a]	4/26
Present Value of Tax Value of Depreciation Deductions & Tax Credits for Autos & Plants (A)	.3325 .1418	.325 .129	.473 .344
Expected Real Rate of Return on Market Portfolio from Adjusted Earnings-Price Ratio (r_2^ϵ)	.0855	.0832	.0312

[a]Actual Canadian depreciation is exponential at rates 30% for cars and 4% for buildings.

ital gains on securities were not taxed at all in Japan. Even now, taxpayers are given the option of paying a tax equal to 1 percent of the value of the stock transaction or paying a separate tax on the actual gain, at a rate of 20 percent. The 1-percent option would be chosen for all significant gain situations. Its availability means that capital gains remain extremely lightly taxed in Japan.

A further difference is that Canadian interest is taxed more heavily than dividends (unlike interest in the U.S.), and the effective rate of tax on capital gains is lower in Canada. The latter fact is due to the three-quarters inclusion rate (in contrast to full inclusion in the U.S.). We have assumed that the representative Canadian stockholder exhausts the $100,000 lifetime exclusion.

6.6 Cross-Country Cost-of-Capital Comparisons

Cost-of-capital schedules for plants and cars in Canada, the U.S., and Japan are shown in figures 6.4*a–d* and 6.5*a, b.* In all cases, the cost-of-capital lines are steeper than the capital market lines, reflecting a greater price of risk at the corporate level than at the investor level. Each of the tax systems discriminates against riskier investments, primarily because the present value of the tax benefits of the depreciation deduction, A, fall short of the corporate tax rate. This bias is strongest in Canada and weakest in Japan and is more severe for the relatively long-lived plant.

In all cases, the cost of capital with debt finance is less than with equity finance, reflecting the deductibility of interest payments from the corporate income tax. This difference is much smaller in Canada than in the U.S. because of the dividend tax credit system, lower effective capital gains rates, and higher personal taxes on interest income in Canada. In Canada, the advantage of debt at the corporate level is almost completely offset by its disadvantage at the personal level. Despite these differences between the Canadian and U.S. schedules, the cost of capital is close enough in the two countries that differences in hurdle rates are unlikely to be a key factor in investment location decisions.

In both countries, however, risk premia are large and the cost of capital for even moderately risky undertakings can be substantial compared to real interest rates. In Canada, the cost of capital for an investment with a standardized riskiness of 5 percent per month is about 13 percent for plant and 11 percent for autos for both debt and equity financing. The U.S. numbers are slightly higher than the Canadian ones for equity-financed capital and somewhat lower for debt-financed investments.

The cost of capital in Japan is substantially lower than in North America, primarily because of cheaper equity finance. The tax system plays a relatively minor direct role in determining the low cost of capital in Japan. The cost of capital for investments of the riskiness discussed above is roughly 5 percent in Japan. The evidence points to an integrated U.S.-Canada capital market, with a segmented one in Japan offering far better terms for new investments.

The results reported above are based on the decisions of managers acting on behalf of relatively high-income domestic owners. If, on the other hand, the ownership of a company is internationally diversified, a manager may conclude that the interests of the owners are best served by making sure all investments offer certainty-equivalent yields at least as great as Treasury bills, taking only corporate taxes into account. The representative owner, in effect, is treated as tax-free. The cost of capital for Canada and the U.S. under these assumptions is shown in figure 6.6*a–d.* The gap between the cost of equity- and debt-financed capital widens considerably in Canada because the relative tax preference for equity income for Canadian stockholders is no longer rele-

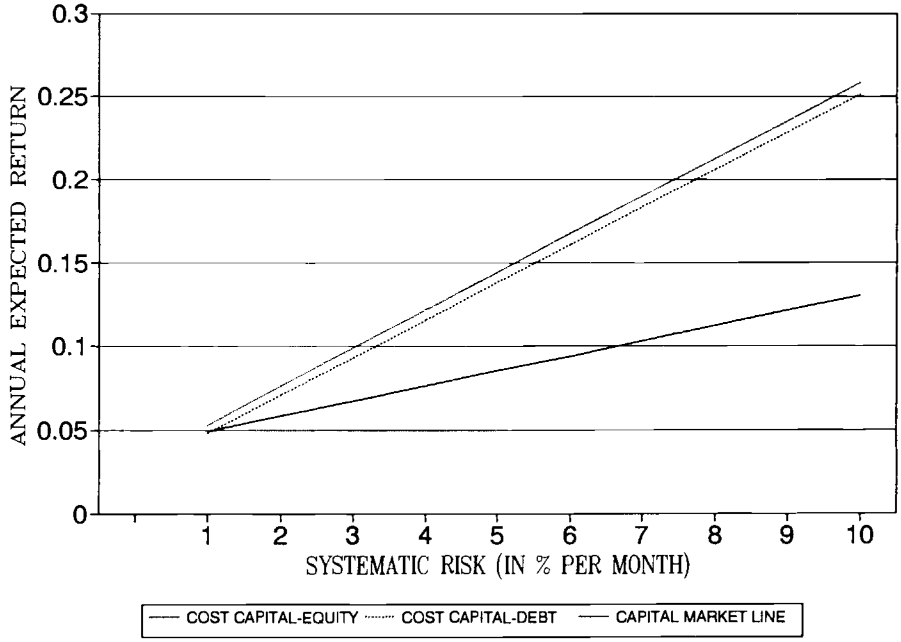

Fig. 6.4*a* Cost of capital in Canada in 1988 for equity- and debt-financed plant

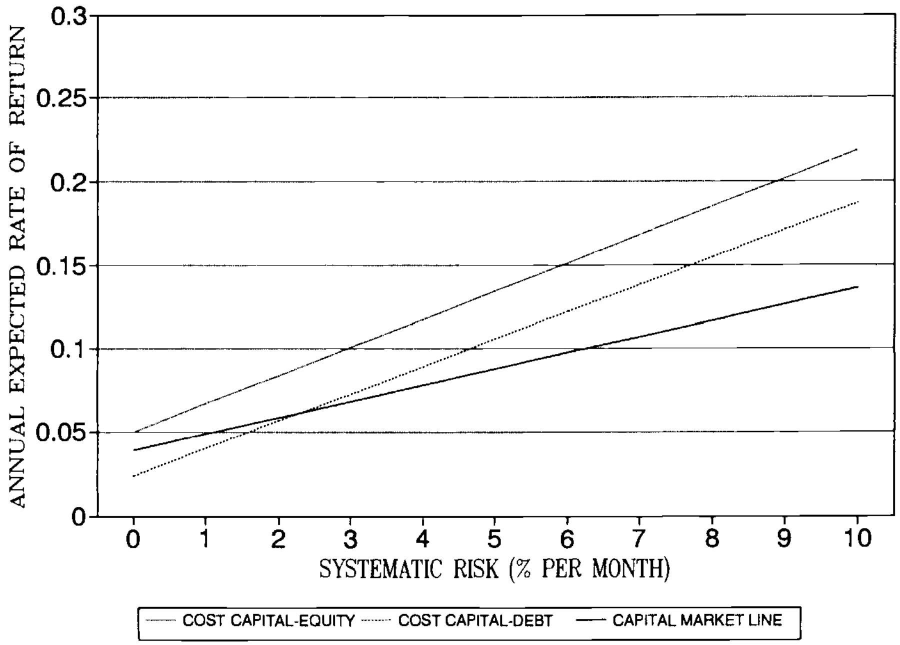

Fig. 6.4*b* Cost of capital in U.S. in 1988 for equity- and debt-financed plant

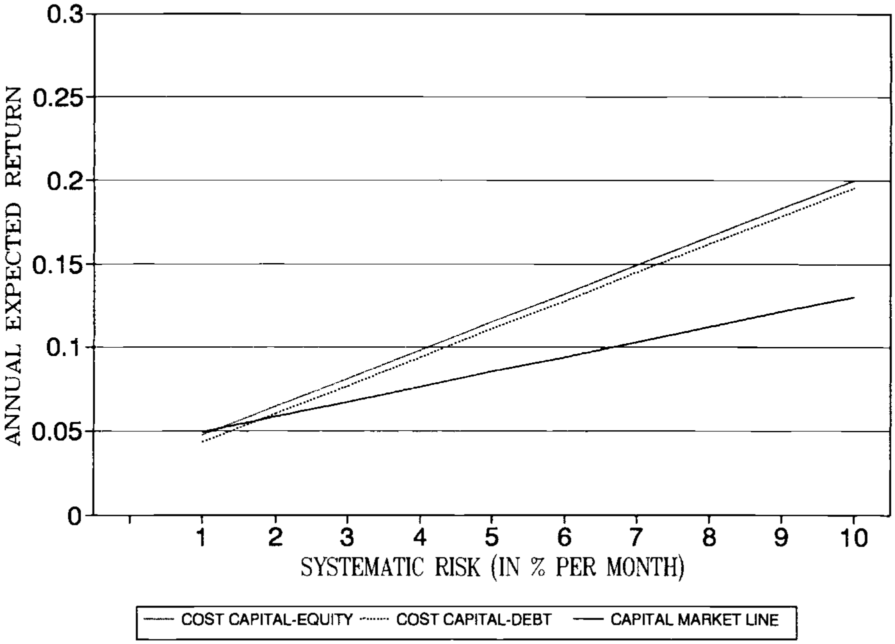

Fig. 6.4*c*   Cost of capital in Canada in 1988 for equity- and debt-financed cars

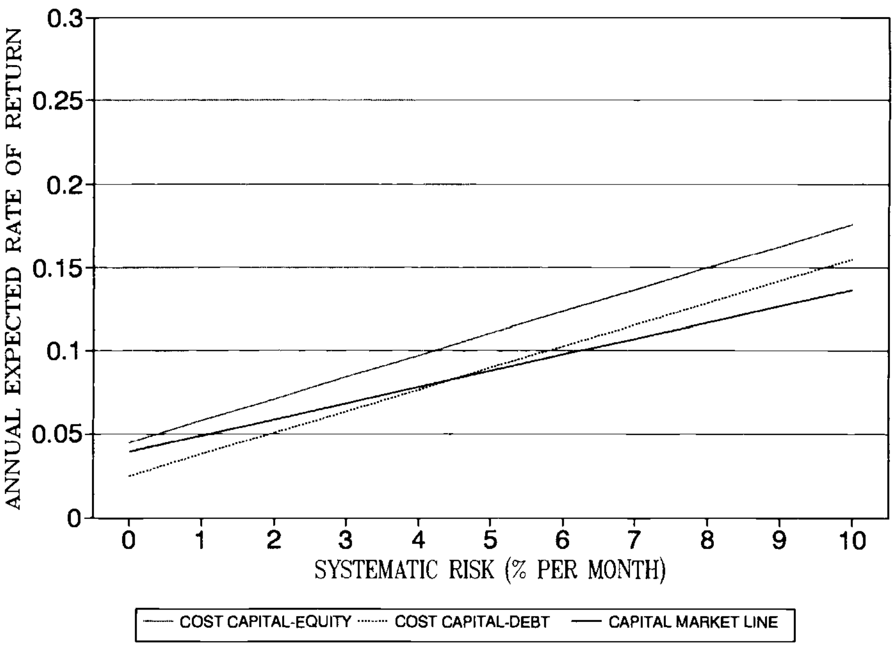

Fig. 6.4*d*   Cost of capital in U.S. in 1988 for equity- and debt-financed cars

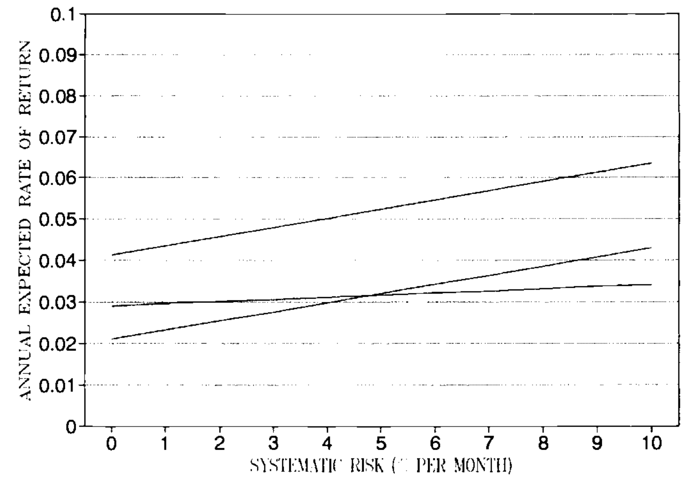

Fig. 6.5*a* Cost of capital in Japan in 1988 for equity- and debt-financed plant

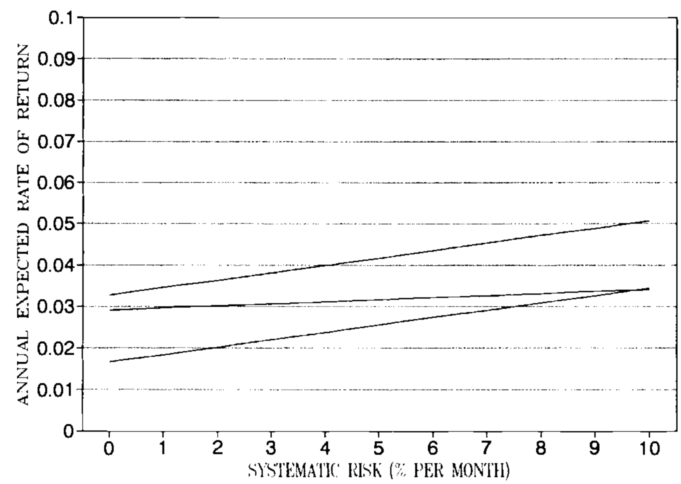

Fig. 6.5*b* Cost of capital in Japan in 1988 for equity- and debt-financed cars

vant. The basic conclusion, however, remains that the Canadian and American cost-of-capital figures are very comparable.

6.7 Concluding Remarks

This paper has calculated the cost of capital in Canada, the U.S., and Japan in 1988, using a framework that accounts for both risk and tax considerations and financial market and tax data from each country. Several findings are of

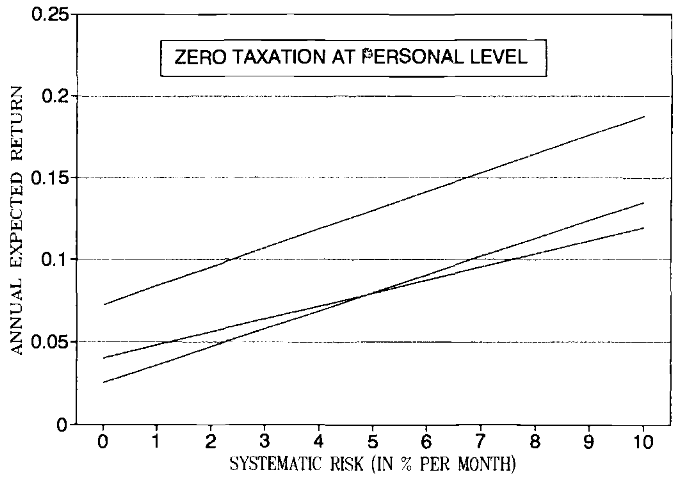

Fig. 6.6*a* Cost of capital in Canada in 1988 for equity- and debt-financed plant

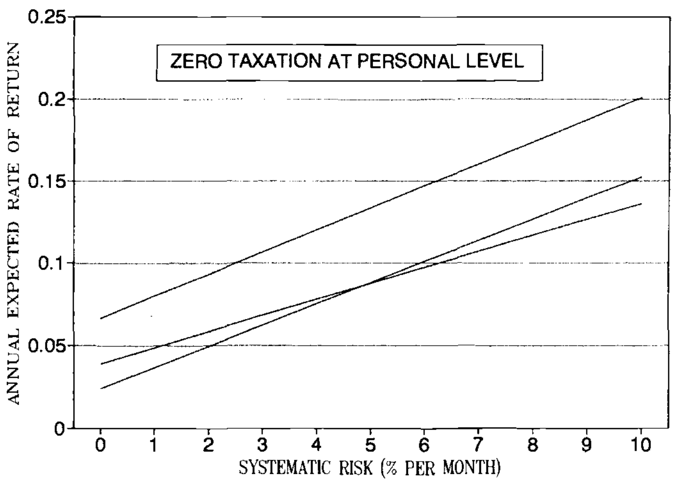

Fig. 6.6*b* Cost of capital in U.S. in 1988 for equity- and debt-financed plant

interest in the policy debate about recent Canadian and U.S. tax reforms and the international competitiveness of North American firms.

First, risk premia are extremely important components of the cost of capital. In all three countries, the corporate and personal tax systems magnify risk premia; that is, the extra return required of risky real investments at the corporate level exceeds the premium apparent in financial markets.

Second, Canada and the U.S. have a common financial market and have

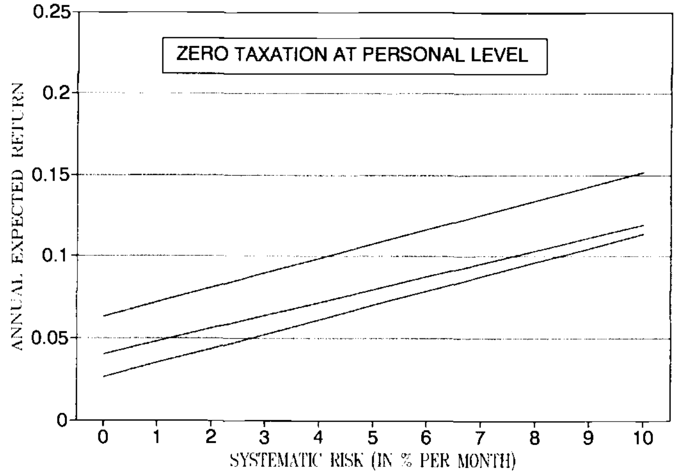

Fig. 6.6*c* Cost of capital in Canada in 1988 for equity- and debt-financed cars

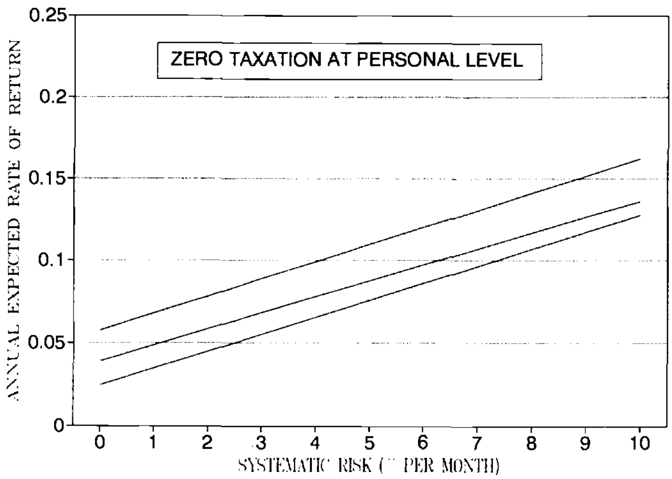

Fig. 6.6*d* Cost of capital in U.S. in 1988 for equity- and debt-financed cars

adopted tax systems that give similar treatment to risky investments. The result is that for a particular investment the cost of capital is similar in Canada and the U.S. This suggests that investment location decisions will be driven by productivity factors, and not distorted by tax and financial market concerns.

Finally, the Japanese have a large cost-of-capital advantage relative to both Canada and the U.S. This differential stems from high Japanese equity prices and the correspondingly low cost of risk capital, with tax factors playing a relatively minor role. Thus, the evidence suggests that Japanese and North American financial markets are currently segmented, although the increased globalization of financial markets will tend to equalize this differential over time.

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