JULIAN S. ALWORTH*

Tax Factors and the Financing of Multinational Companies

Introduction

Multinational corporations have become the norm rather than the exception in the world economy and even the activities of many medium-sized companies often span several countries. Furthermore, firms operating production units in only one country can establish special foreign finance subsidiaries as vehicles through which to source capital markets in different countries. In this international environment it is often difficult for companies to evaluate the merits of alternative financing strategies, to determine capital costs for budgeting purposes, and to exploit fully the opportunities for minimising capital costs resulting from the possibility of tapping different financial markets.

Three aspects of international finance complicate the capital budgeting decision of multinationals. Firstly, multinationals can choose from a wider set of financial policies than those available to a firm operating only domestically (Table 1). In particular, multinationals can exploit or 'internalise' market imperfections, transactions costs or differences in risk across countries[1]. For example, companies may shift their worldwide funding from one centre to another depending on different assessments of their creditworthiness by investors in different markets. Secondly, multinationals operate in more than one tax jurisdiction. This implies varying national treatments of company income and in some cases discrimination for and against foreign investments. It also means that affiliates located in different countries may follow different financial policies on account of tax considerations alone. Finally, the multinational dimension entails foreign exchange and political risks not generally associated with operating in a single country.

Table 1: Financial policies of multinational firms*

Autonomous financial policies of affiliate

1. Borrow
   a) In the host country (currency)
   b) In the home country (not from the parent) or in the international financial market
2. Retain earnings
3. Issue shares to non-majority shareholders (i.e. not to parent)

Parent-dependent financial policies of affiliate

1. Borrow from parent
   source of parent funds:
   a) The parent issues shares
   b) The parent borrows
   c) The parent retains earnings
2. Issues shares to parents
   source of parent funds:
   a) The parent issues shares
   b) The parent borrows
   c) The parent retains earnings

** Only downstream financing from the parent to the affiliate is considered in the table. In addition to these possibilities, multinational companies have the option of raising finance in different currencies.*

Much has been written about the benefits from portfolio diversification[2] through multinationals and the best ways to manage foreign exchange risks[3]. However, little consideration has been given to the way tax factors should be incorporated into the determination of worldwide capital costs. This paper addresses in a very general manner the issue of how taxation, exchange risks, and capital market differences interact with one another and can be exploited

* The views expressed in this paper are my own and not necessarily those of the Bank of International Settlements.

to minimise capital costs in an international environment. Section 1 discusses the valuation of income streams accruing from foreign investments in the absence of foreign exchange movements. In this section the parent company is treated as a pure holding company whose sole purpose is to channel funds to and from a foreign affiliate to final shareholders. Section 2 examines how taxes affect the valuation of overseas investments in this simplified framework. Section 3 illustrates alternative financial strategies which might be followed by firms in the presence of taxes. Section 4 allows for intra-company financial relationships between the parent company and its foreign subsidiary. Some of the consequences resulting from the tax treatment of foreign exchange gains and losses are examined in section 5. The concluding section discusses some further applications of the framework discussed in the paper. In order to concentrate attention on the impact of taxation several important considerations relating to the risk factors specific to the international dimension of the foreign investment decision (e.g. political risks) are neglected.

1. Financial structure and capital market equilibrium

The main concepts which are necessary to analyse the investment decision in the domestic context can be easily extended to the international dimension. For this purpose, the head office of a multinational is best visualised as a holding company which channels funds to its affiliate which undertakes investments abroad. As for any other investment the valuation of returns received through the holding company should be based on maximising the present value of the cash flow of returns over time discounted at the opportunity cost of shareholder's funds. This approach focuses the attention on how the firm's shareholders value foreign investment and avoids complications which might arise from interactions between the production activities of the parent and affiliate.

The value maximising objective of the shareholders of the holding company can be summarised mathematically as

$$V_0 = \text{Max} \int_0^\infty D_t e^{-\varrho t} \qquad (1)$$

where V_0 is the value of foreign investments in the affiliate (which for simplicity is assumed to be for a very long time horizon), D_t are the net dividends received by ultimate shareholders at time t from the foreign affiliate and ϱ is the constant discount factor applied to this stream of future returns. Assuming for simplicity that the foreign affiliate is 100 per cent owned by the parent and momentarily that there are no taxes, the residual value of the cash flows received by the parent can be derived from the accounting identity equating the sources and uses of funds of the affiliate. This identity states that

PROFITS + NEW BOND ISSUES + NEW SHARE ISSUES
=
CASH FLOWS TO THE PARENT (DIVIDENDS) + INVESTMENTS + INTEREST PAYMENTS

In mathematical terms this expression can be written as

$$\pi_t + (B_{t+1} - B_t) + (S_{t+1} - S_t) = D_t + INV_t + rB_t \qquad (2)$$

where, in addition to dividends, the variables included are defined as

- π_t earnings (value added net of labour costs and depreciation);
- B_t outstanding bond issues at time t;
- S_t outstanding shares at time t;
- rB_t interest payments on outstanding borrowings; and
- INV_t investment expenditures.

Rearranging terms, we can see from this expression that

$$\pi_t - INV_t = \text{Total Net Financing Flows}$$

In other words, in the absence of taxes the total net financial flows from the affiliate are determined by real values alone and do not depend on the financial structure. This result is the basis for the extension of the MODIGLIANI-MILLER[4] propositions of financial irrelevance amongst alternative sources of finance to the multinational company. Indeed since it is realistic to assume that in most instances the foreign affiliate will not go bankrupt independently of the parent, the MODIGLIANI-MILLER propositions are stronger in the case examined here than for purely domestic companies. This indifference proposition also extends to the composition of financial flows between the parent and the affiliate.

2. Taxation of foreign source income

Taxation affects the MODIGLIANI-MILLER propositions in several ways. Firstly, in the presence of personal taxes (m) or other forms of withholding taxes on capital income the discount factor for foreign investments is net of tax. Secondly, capital gains accruing from an appreciation of the value of the foreign investment ($V_{t+1} - V_t$) are taxed at an effective rate z.

Thirdly, and most importantly, earnings net of interest payments ($\pi_t - rB_t$) are taxed at an effective rate τ. The actual value taken by τ depends in a complicated fashion on the interaction between the tax system at home and in the country in which the foreign affiliate is located. Earning income in one tax jurisdiction and enjoying the proceeds in another implies that two different tiers of taxes may be applied to the same stream of profits. Profits are taxed at a rate τ_a in the host country where the affiliate is located and at a rate τ_h in the home country where the parent company receives its dividends. In addition, dividend payments to the parent are subject to a withholding tax (w_s) in the host country and dividends paid out to final shareholders are taxed at a marginal personal tax rate of m.

In order to avoid double taxation, relief for the taxes borne abroad is generally given in the home country although the specific form of the relief is often negotiated with the host country tax authorities and is the object of treaties between countries. There are many systems of double taxation relief, but in practice relief for earnings received from foreign branches and subsidiaries is provided either through a credit against foreign taxes or by exempting all foreign earnings from taxes.

The credit system exists in several major countries such as Germany, the United Kingdom and the United States. In the case of income received from foreign branches – entities which are not separately incorporated from the parent – this results in taxes being levied in the home country at a rate which is equal to the difference between the home and foreign tax rates ($\tau_h - \tau_a$). However, in the case of earnings of subsidiaries – entities which are separately incorporated from the parent company – both taxation and the relief via a tax credit are limited to the underlying taxes which are deemed to have been paid on the dividends distributed to the parent. As a result foreign income is not taxed by the parent country authorities when the income accrues. Indeed if interpreted appropriately this provision means that only dividends received from abroad are subject to tax whilst there are no taxes on retained earnings. Hence every unit of dividends distributed by the affiliate and received by ultimate shareholders in these circumstances will be subject to a 'tax cost' (θ) given by

$$\theta = \frac{(1 - m)(1 - \tau_h)}{(1 - w_s)(1 - \tau_a)}$$

where the denominator in this expression allows for the fact that dividends are grossed-up for the underlying tax paid.

Under the exemption system, such as that which in most circumstances applies to earnings from foreign affiliates of Swiss companies, profits are taxed only in the host country (τ_a) and the price of distributing income (θ) is equal to $(1 - m)/(1 - w_s)$ since the parent company is not taxed on the repatriated earnings[5].

The effect of these provisions is that the tax treatment of dividends differs markedly according to the type of double taxation relief and to the interaction between the home and host countries' tax systems[6]. If we let τ be the total tax burden on profits in the home and host country and let θ be the tax cost of distributing a unit of net dividends from the affiliate to the parent company, the various systems of double taxation relief can be summarised as shown in Table 2. The value of $\theta(1 - \tau)$ indicates the total after tax return available to the shareholder after payment of all taxes.

Table 2: Effective tax on foreign income under different systems of double tax relief

	τ	θ
Credit no deferral	τ_h	$1 - m$
Credit with deferral	τ_a	$\frac{(1 - m)(1 - \tau_h)}{(1 - w_s)(1 - \tau_a)}$
Exemption	τ_a	$(1 - m)(1 - w_s)$

3. Taxation and alternative financing strategies

The appendix to this paper discusses the optimisation problem involved in deriving the cost of capital from the maximisation of V given the 'sources and uses' of funds in expression (2)

amended for the presence of taxes. The values for the cost of capital in the case of debt finance, retained earnings and new share issues by the affiliate derived from this optimisation problem are reported in Table 3. In order to focus attention on the choice amongst alternative financial policies it is useful to make pairwise comparisons between the various costs of capital.

Table 3: Cost of capital for different financial policies under various methods of double taxation relief

	Debt	Retentions	New share issues
Credit no deferral	$r(1-\tau_h)$	$\frac{\varrho}{1-z}$	$\frac{\varrho}{1-m}$
Credit with deferral	$r(1-\tau_a)$	$\frac{\varrho}{1-z}$	$\varrho\frac{(1-w_s)(1-\tau_a)}{(1-m)(1-\tau_h)}$
Exemption	$r(1-\tau_a)$	$\frac{\varrho}{1-z}$	$\frac{\varrho}{(1-m)(1-w_s)}$

3.1 Debt and retained earnings

The first such comparison is between debt and retained earnings which are the most common financial policies followed by the affiliates of multinational firms. If we assume that the discount rate $\varrho = r(1-m)$, i.e. shareholders discount dividends at the net of tax borrowing cost to the firm, it is possible to carry out the comparisons in term of the tax parameters alone. As can be seen from Table 3, with the credit system with no deferral the financial policy of the binational company is the same as that followed by any company operating only in the home country jurisdiction because home country tax parameters alone apply to foreign source income[7]. If $(1-m) > (1-z)(1-\tau_h)$ the optimal policy is to borrow as much as possible, not only to finance investment but also to increase dividends and make capital repayments. Legal restrictions for example with respect to 'thin capitalisation'[8] often imply that such extreme corner solutions are in practice not feasible since many countries do not allow dividend distributions to exceed accumulated earnings.

On the other hand, if $(1-m) < (1-z)(1-\tau_h)$, the optimal policy is to finance investment from retained earnings and use any excess retentions to accumulate financial assets. Again it is likely that if this policy is pursued beyond a certain degree, the home country authorities will deem the affiliate to be a 'tax avoidance scheme'. The conclusion drawn from this exercise is that branches which are taxed like domestic companies should follow financial policies analogous to those of the parent company. In essence for both of these financial policies there is no difference between the parent and the affiliate. In practice the existence of other taxes on capital income, such as local taxes on income earned in the home country, may bring about divergences between the financial policies of the parent and the affiliate.

The 'deferral' and 'exemption' cases are similar in that the foreign tax system determines the company tax liability on the foreign project. If $(1-m) < (1-z)(1-\tau_a)$, firms will accumulate earnings abroad seeking, possibly, to do so in countries with very low tax rates. This is the common tax avoidance scheme associated with 'tax havens'. In a number of countries the advantages associated with tax havens have been decreased by provisions which eliminate deferral if a subsidiary is believed to have accumulated earnings abroad for the sole purpose of avoiding tax.

Another finding is that with deferral, foreign and domestic projects may be financed differently if the tax rates diverge sufficiently in the two countries. If $\tau_h > (m-z)/(1-z) > \tau_a$, domestic projects will be financed by borrowing and foreign projects by retained earnings. The critical values of the personal tax rate above which retentions are preferred to debt will differ in this case according to whether the project is undertaken at home or abroad.

The value for which retentions are preferred to debt depends crucially on the interaction between z and the tax rate on profits. The higher the value of the latter, the higher the marginal income tax rate for which retentions are preferred to debt. Hence, in the home country, if τ_h is high, only shareholders with high marginal tax rates prefer retained earnings to debt. However, in 'tax havens' with low τ_a retentions are also preferred by shareholders with very low marginal tax rates (m). Thus, even if only 50% of capital gains are deferred, shareholders facing at least a 33% marginal tax rate will prefer firms to retain earnings abroad if $\tau_a = 0.2$.

3.2 Retentions and new share issues

The second pairwise comparison is between alternative forms of equity finance. By analogy

with our previous comparison, from Tables 2 and 3 we can see that the general condition for issuing new shares is that

$$\theta > (1 - z)$$

i.e. the capital gains tax charged on retaining a unit of foreign profits abroad is less than the additional taxation incurred by paying that unit out as dividends and financing new investments from the home country. While this condition is reminiscent of the similar choice facing domestic investments, there is an important distinction to be made. θ represents the opportunity cost of distributing a dividend from the affiliate to the parent and to the home country shareholder. The value of θ varies markedly according to the alternative double tax relief systems. Under a double tax system based on a credit with no deferral, new share issues will be preferred to retained earnings if $z > m$. It also follows that if there is no discrimination against foreign source income under the personal tax system in the home country, domestic firms and foreign affiliates will follow the same financial policies. In the case of the credit system with deferral shareholders will prefer to receive income in the form of retained earnings rather than dividends if

$$(1 - z)(1 - \tau_a) > (1 - \tau_h)(1 - m)/(1 - w_s)$$

Indeed if possible it would be optimal for the firm to use surplus retained earnings not used for the purpose of investing in order to repurchase shares. This would amount in effect to an operation whereby firms would recapitalise in a 'tax haven'. Finally, in the case of the exemption system the choice amongst various sources of finance will depend on whether $(1 - z)$ is greater or less than $(1 - w_s)$.

4. Using the intra-company account

Up to this point, the only differences between the financial policies of a company operating in only one jurisdiction and the case of the multinational result from dissimilar tax rates. By construction we have not allowed the parent and the affiliate to exploit the tax system by undertaking arbitrages with one another. In order to do so we must allow the parent company itself to undertake different types of financing relationships with its affiliate. One way in which this can take place is by allowing for the company to borrow and lend to the affiliate as well as to undertake share and dividend transactions. This would entail similar arbitrages to those we described in the previous section.

Intra-company transactions, however, are distinguished by the fact that they can take place at non-market prices determined by the firm. In essence the firm can arbitrarily raise or lower the nominal interest rate charged on its intra-company transactions (r') and choose whether to repatriate earnings in the form of dividends or interest payments. If the scope for pursuing such policies is sufficiently wide the cost of capital for the multinational firms becomes undefined in relation to market interest rates[9].

The value taken by r' depends on the parent company's distribution of profits from the affiliate as dividends is more expensive than a receipt in the form of interest income. As we saw in the previous section, the price of receiving profits as dividends is equal to $\theta(1 - \tau)$. The cost of receiving profits as interest payments depends on the level of withholding taxes on interest income (w_b) in the country of the affiliate, the tax treatment of interest receipts by the parent, and the system of double taxation relief. Since interest payments cannot be deferred there are only two systems of double taxation relief for foreign withholding taxes that need to be considered. With the credit system, foreign withholding taxes are credited against taxes in the parent country so that the shareholder receives $(1 - m)(1 - \tau_h)$. On the other hand with the exemption system the shareholder receives $(1 - m)(1 - w_b)$. If we let α be the proportion of the foreign withholding tax which is credited, the tax incentive for taking profits in the form of dividends or interest given by M can be summarised as follows:

$$M = \theta(1 - \tau) - (1 - m)[1 - w_b(1 - \alpha) - \alpha\tau_h] \quad (3)$$

From expression (3) we can see that if $M > 0$, the firm will choose the lowest possible value of r' and repatriate earnings through dividend distributions. Conversely, if $M < 0$, the firm chooses the highest value of r' and repatriates earnings on the intra-company account.

Table 4 presents the two possible values of M for different forms of double taxation relief on interest under the simplifying assumptions that $m = 0$. Since there is no deferral of taxes on

Table 4: Tax incentives for discretionary pricing under different forms of double taxation relief

System of double taxation relief	Value of M
Credit without deferral	0
Credit with deferral	0
Exemption	$(1 - m)[(1 - \tau_a) - (1 - w_a)]$

interest payments the incentives to alter intra-company prices under the deferral and non-deferral credit system of double tax relief are alike. Indeed, as can be seen from the table under the credit system there is no incentive to alter interest rates. This is because under the credit system the same tax treatment applies to all types of income received from abroad by the parent company. This symmetrical treatment does not occur under either the exemption system because the tax differentials in the host country on interest and dividend payments are not washed out upon repatriation. The value of M will depend on whether $(1 - w_b)$ exceeds $(1 - w_s)$. This condition can be easily interpreted as follows. If a unit of after-tax profits distributed as dividends is greater than a unit of interest payments net of foreign withholding taxes, it is better to lend to the affiliate at as low a possible value of r'. If on the other hand the opposite is true, the highest possible value of r' should be chosen. Indeed the firm could still profitably arbitrage between the domestic and foreign tax systems without recourse to changing the value of r' by varying the composition of its funding.

The existence of 'thin capitalisation' regulations on foreign subsidiaries as well as the application of 'arm's length pricing rules' to intra-company loans reflects the awareness by the tax authorities of many countries of these tax incentives. Naturally, in a fully specified model it would be possible to take account of the various constraints which the tax authorities impose on the behaviour of individual firms and to derive the appropriate 'shadow prices' for diverging from these values.

5. Taxation and foreign exchange

Companies operating internationally generally assume exposures in different currencies. Some of these exposures will be connected with the day-to-day invoicing of exports and imports; others will be longer-term, relating to capital expenditures or financial investments of both head offices and overseas affiliates. The high variability of exchange rates during the 1970s and 1980s has underscored the importance of managing carefully these exposures and drawn attention to the resulting potential tax consequences.

The fiscal treatment of gains and losses arising from assets and liabilities denominated in currencies other than those of the tax jurisdiction is complex and differs markedly from country to country. Furthermore, existing practices in some major countries such as the United States and the United Kingdom are based largely on case law, which is often difficult to interpret and to generalise. The evolution of the law has often been unpredictable, elusive and lacking overall guidance. In other countries legislation is often silent with respect to currency fluctuations and the practice is to apply rules concerning similar transactions.

Apart from the problems of interpretation of existing tax provisions, two sets of issues arise with respect to the tax treatment of foreign exchange gains and losses. The first are analogous to those which exist for any form of tax on capital gains when there is no indexation for changes in the underlying rate of inflation. Indeed, if purchasing power parity held at every moment in time so that exchange rate changes reflected divergences in relative inflation rates across countries there would be no difference between nominal gains due to inflation at home or abroad. Under these circumstances all nominal gains whether resulting from the appreciation of domestic or foreign assets and liabilities would reflect domestic inflation only, and if no adjustment were made for nominal gains resulting from changes in the general price level the final shareholder would be burdened by a much higher effective rate of tax. Accordingly the cost of capital would have to be adjusted to reflect the higher taxes on capital gains. However, purchasing power parity and relative interest rates across countries do not provide good guidance to exchange rate changes particularly over short time horizons. In terms of the determination of the cost of capital this means that an adjustment factor needs to be attached to the cost of capital to account for the risk associated with the tax implications of possible

deviations from purchasing power parity over the life of the project. Alternatively adjustments could be made to cash flows, for example, by weighting funds received from the affiliate by the probability of deviations from purchasing power parity.

The second set of tax problems arising from the treatment of foreign exchange result from asymmetries or 'fragmentation' in the treatment of economically similar transactions. Firms that hedge their foreign exchange exposures by taking offsetting forward positions and thereby do not have any effective gain or loss may still end up paying taxes or receiving tax subsidies. Numerous 'tax traps' for the unwary and arbitrage opportunities for the more adept arise from the following distortions[10]:

1. Fluctuations in the domestic currency value of assets and liabilities may be treated differently even if the transactions are closely related to one another. This has been a major problem in the United Kingdom and despite numerous court cases remains unsolved.
2. Some exchange rate gains and losses are taxed or relieved as ordinary income whilst others come under capital gains tax rules. This may affect the structure of borrowing and lending.
3. There may be differences in the treatment of accruals and realisations of gains and losses. This raises the issue of when a gain or loss should be taken.
4. The manner in which the income of foreign affiliates is translated for purposes of consolidation with that of the parent company may affect the tax jurisdiction in which a company books its borrowing and lending in foreign currency.

In addition to these general questions, currency fluctuations raise a number of specific issues in different countries. For example, in the United States 'source' questions need to be addressed with regard to whether gains and losses should be allocated to domestic or foreign source income. Another such example concerns the timing of transactions accepted by the tax authorities. In the United Kingdom capital gains and losses are computed as the difference between the sterling value of the proceeds from disposal of an asset, measured at the time of disposal, and the sterling value of acquisition costs at the time of acquisition.

6. Conclusions

The purpose of this paper has been to illustrate the manner in which companies operating in different countries should go about their financing decisions in the presence of various tiers of taxes. Unfortunately there is little evidence with regard to how far current practices of multinationals deviate from the capital budgeting decisions which have been described above[11]. The 'tax haven' phenomenon and 'tax transfer pricing' illustrate that fiscal considerations matter considerably in the decisions taken by multinationals.

The practical implementation of the decision model discussed in this paper often may require several elaborations. Firstly, the tax parameters may need to be extended to allow for the existence of tax integration between the company and personal tax systems in the host and home country. This may alter some of the tax incentives regarding the location of financing vehicles. For example, both Germany and the United Kingdom have adopted a system of company taxation that allows for shareholders to receive a tax credit for taxes paid at the corporate level. In these countries the financing of both inward and outward investments would need to take account of these provisions particularly in the case of closely held firms where there is less likely to be tax conflicts amongst major shareholders. Secondly we have not considered in any detail the branch versus subsidiary decision. Branch taxes in certain countries and provisions regarding dividend distributions may affect the decision of whether to set up initially a separate entity or whether to operate under the same name. The model could also be extended to examine the opportunities derived from differential tax treatments for cross-border mergers and acquisitions. Thirdly, laws such as the anti-tax haven regulations contained in the so-called Sub-part F provisions of the U.S. tax code and constraints affecting financial policies such as 'thin capitalisation rules' may affect the aggressive use of tax minimising strategies. Furthermore, provisions concerning transfer pricing may affect the extent to which other financial flows may be substituted for dividends. The constraints imposed by these provisions should be included in any further elaboration of the model. Fourthly, we have not considered the ingenious use of double taxa-

tion agreements which can lead to shifting of funds through long chains of affiliates in order to minimise taxes. For example, the wide network of double taxation agreements entered by the United Kingdom and special provisions made in some of the treaties with developing countries which allow for a lengthy deferral of tax ('tax sparing') in these countries make subsidiaries incorporated in the UK a convenient vehicle through which to channel funds to these countries. Fifthly, the model can be used to incorporate other tax related provisions such as depreciation allowances and subsidised loans which have not been included in this narrow examination of the financial policies of firms. Finally, the analysis carried out in this paper may be extended to examine how tax-related considerations may lead to cross-border mergers.

Appendix

The value maximisation problem for the firm in expression (1) can be rewritten in a continuous twice formulation as the capital market equilibrium condition

$$\varrho V_s = D_s + (1-z)\,\dot{V}_s \qquad \text{(A.1)}$$

where $\dot{V}_s = \partial V_s / \partial t$ is the instantaneous capital gain at time s (the time subscript is deleted in what follows). From the sources and uses account of the firm, we know that dividends are by identity a residual of the real and financial policies of the firm. Hence, net dividends received by the individual shareholder in the home country, under the assumption that the firm either borrows or retains earnings to finance its investments, equal

$$D = \theta\,[x - r\,(1-\tau)\,B + \dot{B}] \qquad \text{(A.2)}$$

In addition to the tax parameters τ and θ the remaining variables in expression (A.2) relate to profits and financial flows: x are cash flows net of investment expenditures and of tax shields for depreciation[12], B is the stock of outstanding external borrowings of the affiliate, and $\dot{B}$ is the instantaneous change in the stock of external borrowings. In order to avoid complexities arising from tax shields relating to depreciation allowances, for the remainder of this chapter the investments undertaken by the firm are assumed to be infinitely durable. By rearranging terms expression (A.2) can also be written as the cash flow identity: receipts = disbursements.

$$x + \dot{B} = D + r\,(1-\tau)\,B \qquad \text{(A.3)}$$

Substituting (A.2) into (A.1) we obtain expression (A.4):

$$\varrho V + \theta r\,(1-\tau)\,B = \theta\,(x + \dot{B}) + (1-z)\,\dot{V} \qquad \text{(A.4)}$$

This is a modified capital market condition relating post-tax financial charges (on the left) to post-tax earnings (on the right). If we let $b = B/(B+V)$ be the gearing ratio, (A.4) can be written more simply as,

$$N\,(B+V) = \Omega x + (\dot{B} + \dot{V}) \qquad \text{(A.5)}$$

where N, the financial cost of the firm, given by

$$N = [\varrho\,(1-b) + \theta r\,(1-\tau)\,b]/[(1-b)\,(1-z) + b\theta] \qquad \text{(A.6)}$$

and Ω is equal to

$$\Omega = \theta/[(1-b)\,(1-z) + b] \qquad \text{(A.7)}$$

The differential equation (A.5) can be resolved so as to yield the value maximising objective of the firm as (A.8)

$$B + V = \Omega \int_0^\infty e^{-Nt} \times dt \qquad \text{(A.8)}$$

As is readily seen from this expression the firm maximises its value (B + V) by discounting its cash flow x at a cost of capital N. Thus, expression (A.8) is analogous to the valuation formula for domestic projects[13]. The financial cost of capital for new share issues and other types of finance can be derived in a similar fashion (see ALWORTH, 1987).

Footnotes

[1] The market for longer-term interest and currency swaps are an attempt to securitise and trade in the differences in risk and transactions costs across jurisdictions through mechanisms analogous to those which can be exploited by multinationals.

[2] See AGMON and LESSARD (1977) and JACQUILLAT and SOLNIK (1978).

[3] See EITEMANN and STONEHILL (1986), part III.

[4] See MILLER (1986) for an up-to-date, non-technical survey of the MODIGLIANI-MILLER approach to financial policy.

[5] In most countries the tax credit is limited to the value of the tax rate in the home country. If foreign taxes are higher, there are 'excess credits' and the credit system operates like an exemption system.

[6] We omit discussion of the effects of various forms of corporate shareholder tax integration systems. See ALWORTH (1987) for a discussion of more complex financial strategies in these circumstances.

[7] Assuming τ_h equals the tax rate on domestic investments.

[8] 'Thin capitalisation' rules define measures of borrowing that are considered excessive in relation to outstanding equity.

[9] We have expressly not referred to minimisation or maximisation since there may be no minimum or maximum in the absence of any government control. Governments will generally impose severe constraints on the values of r'.

[10] See KAY and KING (1985).

[11] See SHAPIRO (1986) and LESSARD (1979b) for some case studies concerning the financial decisions of multinationals.

[12] $x = \pi - q\,I - \tau\,[p_a\,f\,(K) - DEP]$
where q I are investment expenditures and DEP are depreciation allowances for tax purposes.

[13] The actual maximisation assumes the existence of non-negativity constraints on dividends and that the transversality conditions with respect to interest rates are satisfied.

References

ADLER, M. (1979): 'U.S. Taxation of U.S. Multinational Corporations: A Manual of Computation Techniques and Managerial Decision Rules.' In *International Finance and Trade* (M. SARNAT and G. SZEGO, eds.), Cambridge, Mass.: Ballinger.

ADLER, M., and DUMAS, B. (1983): 'International portfolio choice and corporation finance: a synthesis.' *Journal of Finance,* 37, pp. 925–984.

AGMON, T., and LESSARD, D. (1977): 'Investor recognition of corporate international diversification.' *Journal of Finance,* 32 (September), pp. 1049–1055.

ALWORTH, J.S. (1987): *Finance and Investment Decisions of Multinational Companies: The Tax Aspects.* Oxford: Basil Blackwell.

EITEMANN and STONEHILL (1986): *Multinational Business Finance.* Reading: Addison-Wesley, 4th ed.

JACQUILLAT, B., and SOLNIK, B. (1978): 'Multinationals are poor tools for diversification', *Journal of Portfolio Management* (Winter), pp. 8–12.

KAY, J., and KING, J. (1985): *Taxing Currency Fluctuations?* London: Institute for Fiscal Studies.

LESSARD, D.R. (1979a): 'Transfer prices, taxes and financial markets: implications of internal financial transfers with the multinational corporation.' In HAWKINS, R.G., ed.: *The Economic Effects of Multinational Corporations.* Greenwich, Conn.: JAI Press.

LESSARD, D.R., ed. (1979b): *International Financial Management: Theory and Application.* Boston: Warren, Gorham and Lamont.

MILLER, M. (1977): 'Debt and taxes.' *Journal of Finance,* vol. 32, pp. 261–275.

MILLER, M. (1986): 'The academic field of finance: some observations on its history and prospects.' *Tijdschrift voor Economie en Management,* 31, pp. 395–408.

SHAPIRO, A.C. (1986): *Multinational Financial Management.* Boston: Allyn and Bacon.