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FOREIGN INVESTMENT, INTERNATIONAL MERGERS AND THE 1993 CAPITAL INCOME TAX REFORM IN FINLAND*

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Foreign direct investment in Finland and the 1993 Finnish Capital Income Tax Reform are examined in this article. Under territorial taxation, the most common form of international double taxation relief, the tax reform will encourage new capital investment. New capital investment from the US, which applies worldwide taxation, would be mildly discouraged, and FDI in the form of mergers and acquisitions largely discouraged. In the UK and Japan, the worldwide principle only covers tax rates. Thus, lower statutory taxes have a negative effect on tax expenditure leading to further discouragement. Only when international investment is subject to double taxation rather than to a bilateral double taxation treaty do lower statutory taxes encourage FDI irrespective of their form. (JEL F21, F23, H25)

1. Introduction

This paper addresses the question of how capital income tax reform in a particular country (Finland) and international double tax relief affect foreign investment in the area, whether in the form of new capital investment or takeover. Under the worldwide principle, the tax liability of a multinational enterprise (MNE) is determined in the parent country, which credits foreign taxes paid on operations abroad. As is well known, this ensures capital export neutrality in new capital investment. Under the polar opposite, territorial taxation, subsidiaries of multinational enterprises (MNEs) pay corporate tax in the host country and are exempted from taxation in the parent country.[1] The tax treatment of domestic corporations and foreign subsidiaries in the host country is the same. This relates to capital import neutrality, since the tax level does not depend on the nationality of the corporation that makes the investment. Territorial taxes are capitalised in the price of firms, and foreign MNEs planning to acquire existing firms are indifferent to them.

The focus of the paper is on new capital investment and acquisitions in Finland and the 1993 Capital Income Tax Reform. The most important effect of the reform has been the decrease in statutory tax rates, leading to an overall cut in the cost of capital (Valtiovarainministeriön työryhmämuistio 1991:28 and

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[1] *In the taxation of international portfolio investment income, the worldwide principle is referred to as the residence principle and the territorial principle as the source principle.*

Hallituksen esitys 200/1992, 203/1992). Under worldwide taxation, lower taxes on domestic firms and on subsidiaries of MNEs discourage foreign direct investment (FDI). The tax level in a host country has no tax consequences for the MNE. The increase in output level lowers the final goods price level and the profitability of FDI. Scholes and Wolfson (1991) argue that, for this reason, the Tax Reform Act of 1986 in the US which raised effective tax rates for domestic compared with foreign US investors on certain corporate assets, provided an incentive for foreign multinationals to increase their FDI in the United States. Correspondingly, the Finnish corporate tax reform, which moved in the opposite direction to promote domestic investment, discourages FDI from countries applying the worldwide principle to tax bases. Auerbach and Hasset (1993) present a critical view of the Scholes and Wolfson (1991) hypothesis. They argue that, to begin with, domestic firms were also encouraged to invest in land and structures. Second, the acquisition of existing firms is the major form of FDI and boomed after the 1986 Tax Reform Act. However, lower depreciation rates in US taxation after the tax reform increased the relative price of existing capital. The tax reform worked against acquisitions from worldwide countries.[2]

Auerbach (1989) and Auerbach and Hasset (1993) were a major source of information for this paper. Worldwide, as well as territorial taxation, affects new capital investment and acquisitions differently. This is still the case after the Finnish Tax Reform, which leaves the tax incentives given for new capital investment, i.e. depreciation rates for tax purposes, mainly intact (except in investment in structure). As shown in the study, only when international investment is subject to double taxation rather than to a bilateral double taxation treaty, do lower statutory taxes encourage FDIs irrespective of their form, but this is rare. I also consider partial worldwide principle in which tax expenditure are paid in the host country. Scholes and Wolfson hypothesis does not take into account that lower depreciation rates after the US tax reform also affects the taxation of FDI in the area, since partial rather than full worldwide taxation is common in FDI in the US. Taxable profits vary depending on the depreciation allowances and investment tax credits. The divergence in this respect is also higher than in statutory taxes among countries (see OECD, 1991, ch. 3).[3] The merger decision also raises the question of the treatment of tax losses and credits, and interest deductions (see Auerbach and Reishus, 1988, p. 160). However, these issues are not examined here. Capital gains taxation is borne by shareholders who sell the firm for the foreign MNE.[4] The assumptions regarding territorial firms differ slightly from those in Auerbach and Hasset (1993). Here, it is assumed that territorial and worldwide firms pay the same price for acquired domestic firms. Auerbach and Hasset (1993) assume that territorial firms, like domestic firms, are indifferent to making any additional acquisitions. Any change in taxes is capitalised in the price of existing firms.

Besides worldwide, partial worldwide, exemption systems and the double taxation of FDI, a deduction system in which the parent country tax base consists of after-foreign-tax net income, is examined. With the deduction system and the double taxation of FDIs, the incentive effects of the tax reform also depend on parent country taxation.

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[2] *Auerbach and Hasset (1993) also argue that it is not clear that there was a relative increase in FDIs from home countries following worldwide taxation compared with territorial taxation. They conclude that factors other than tax, such as exchange rate movements and the liberalization of capital markets, may better explain the boom in FDIs to the US.*

[3] *Even if the definitions of taxable income were the same as for domestic and foreign-source income, the actual differences in the tax expenditure in the two countries might cause deviation from capital export neutrality. Non-discrimination rules in tax treaties do not necessarily apply to tax expenditure (Surray and McDaniel, 1985, p. 170–171).*

[4] *Gardner (1992, p 52) mentions the problem in international mergers that capital gains attributable to the contributing or acquired company may be taxed at the time of the merger rather than upon realization, as is the practice for domestic mergers. Foreign shareholders may not similarly benefit from the tax advantages of later dividend distributions. For a general discussion of the taxation of share repurchases and acquisitions, see Bagwell and Shoven (1989) and Sinn (1987, ch. 6).*

Since the host countries of most foreign MNEs apply the territorial principle, the Finnish tax reform has real effects on new capital investment from abroad.[5] New investment from countries applying territorial taxation is encouraged. The tax reform will have less significance for the acquisition of existing businesses in Finland. The deduction system combined with partial exemption, as applied by Italy, has effects comparable with those of territorial taxation. The Scholes and Wolfson hypothesis is not applicable, since only minor amounts of FDI are (directly) made from countries applying worldwide taxation. However, in the few countries which extend the worldwide principle to tax bases (the US here), the tax reform does discourage FDI irrespective of the assets required or the form of direct investment. The reform works especially against acquisitions by foreign corporations. Worldwide taxation is not applied in its pure form to investments from the UK and Japan, and tax bases are subject to changes depending on the place of investment. Tax expenditure follows current Finnish legislation and, since such tax expenditure is permitted at a lower level, the overall negative effects are strengthened.

Section 2 develops the model for investment behaviour in a host country which undergoes tax reform and where FDI is made. Section 3 shows the change in FDI. Some FDI implications of the Finnish Tax Reform are given in Section 4, and brief concluding remarks are made in Section 5.

2. *The model*

Consider a tax reform in the home country, which is the host country of MNE subsidiaries. There are three kinds of firms: the subsidiaries of the MNEs in the host country, the MNE itself in its parent country and the domestic firms in the host country. Consider first the investment decision of domestic firms investing therein only. Let $F(K)$ denote the real profit gross of depreciation as a function of capital stock K. The total investment cost function at date s is $C(I_s/K_s)I_s$, where the unit investment cost function $C(I_s/K_s)$ includes the adjustment cost of investment, dependent on the rate of investment I_s/K_s. Define p_s as the price level, I_s as investment, K_s as capital stock and τ_s as the corporate tax rate at time s. The endogenous price varies inversely with the level of aggregate production, which ensures equilibrium. Corporations maximize the current value of future cash-flow, discounted at the constant nominal cost of capital r:

$$(1)\quad V_t = \int_t^{\infty} \{ p_s F(K_s) - p_s C(I_s/K_s) I_s - T_s \} e^{-r(s-t)} ds,$$

where the tax burden at date s is

$$(2)\quad T_s = \tau_s \{ p_s F(K_s) - \int_{-\infty}^{s} (p_u C(I_u/K_u) I_u \delta' e^{-\delta'(s-u)} du) \}.$$

Depreciation for tax purposes per unit of date u capital expenditure follows a declining balance, where assets are written off at a rate of δ' on a historical cost basis (which varies depending on the asset). Capital costs are part of capital expenditure for tax purposes. Investment and capital are related by

$$(3)\quad I_s = \delta K_s + \dot{K}_s,$$

where the rate of the economic depreciation of capital is δ. Assume quadratic cost function $C(I/K) = I\left(1 + \frac{1}{2}\phi\, I/K\right)$, where the adjustment cost ϕ is constant. This gives incentives for smoothing investment over time and hence makes new capital investment less sensitive to the cost of capital.[6] The main results will be rather robust regarding assumptions concerning the adjustment costs of investment. It is

[5] *The tax reform also works against local debt finance, which should encourage funding from the parent country. In data, this would show as an increase in FDIs, although not necessarily related to any change in real capital investment.*

[6] *For literature on the adjustment cost of investment, see Hayashi (1982, 1985).*

only steady-state that is of interest. The total cost function with respect to I is normalized to unity in the steady state. The focus is on the incentive effects of permanent tax changes around the original equilibrium and tax variables are referred to without time subscripts. The equilibrium Euler path is shown in the Appendix. Based on (A.2), the Euler condition for the optimal capital stock path is written as

$$(4) \quad F_K^t + \chi_t = q_t\left(\rho + \delta - \frac{\dot{q}_t}{q_t}\right)\frac{1-\Gamma}{1-\tau},$$

where q_t is the relative marginal price of a new capital good, $\rho = r - \dot{p}_t/p_t$ is the real interest rate and

$$(5) \quad \chi_t = \frac{1}{2}\phi(I_t/K_t)^2\,\frac{1-\Gamma}{1-\tau}$$

shows current adjustment costs per unit of investment. This would be absent if the adjustment costs depended only on the level of investment, rather than on the ratio of investment to capital stock. The term Γ in the expressions represents the current value of tax savings per dollar of date s investment:

$$(6) \quad \Gamma = \int_t^{\infty} e^{-r(u-t)}\,\tau\,\frac{\delta'}{r+\delta'}\,du.$$

Eqs. (4) and (5), together with the development of the relative price of capital goods $q = 1 + \phi(\dot{K}/K)$ from (A.5) in the Appendix, yield first-order nonlinear differential equations in capital stock K and the relative price of capital goods q. For analytical solutions, consider the incentive effects of (small) tax changes around the steady state, denoted by an asterisk. The changes that are implemented in the tax reform are assumed to be unanticipated and permanent. The domestic capital accumulation effects of the tax reform are again shown in the Appendix, where the following second-order differential equation in capital stock is derived: [7]

$$(7) \quad \ddot{K}_t - \rho\dot{K}_t - \frac{\varphi(\rho+\hat{\delta})}{\phi}K_t = -\frac{\varphi(\rho+\hat{\delta})}{\phi}K^*\left(1 - \frac{a+b}{\varphi}\right),$$

where

$$\hat{\delta} = \delta\left(1 - \frac{1}{2}\phi\,\delta\right),$$

$$\varphi = -\frac{F_{KK}^* K^*}{F_K^*},$$

$$q_t^K = q_t^*(1-\Gamma) = (q_t - \phi\dot{K}/K)(1-\Gamma),$$

$$a = \frac{\tau - \tau^*}{1-\tau^*} - \frac{\Gamma - \Gamma^*}{1-\Gamma^*},$$

$$b = \frac{\rho(q^K - q^{K^*})}{(\rho+\hat{\delta})q^{K^*}} - \frac{\dot{q}^K}{(\rho+\hat{\delta})q^{K^*}}.$$

Here, $\hat{\delta}$ is the rate of the economic depreciation of capital stock (of current expenditure on capital). It includes economic depreciation δ and the reduced unit price of capital induced by current expenditure. The term φ is the elasticity of F_K with respect to K, evaluated at the steady-state value K^*. It shows how capital cost changes are turned into capital stock changes. The price of existing capital acquired in a steady-state is given by $q_t^K = q_t^*(1-\Gamma)$. The price goes down due to the accelerated depreciation rates Γ given to new capital. The postponement of tax payments causes an implicit tax liability on existing capital. In other tax terms, a describes the effect of taxes on the market value of new investment (through the linearization of $F_K\,\frac{1-\tau}{1-\Gamma}$ around the steady-state). b relates to the relative valuation of existing firms. This is zero for domestic firms, since buying existing capital for q^K or new capital for q results in the same current value.

The characteristic roots of the saddlepoint equilibrium are shown in the Appendix. The solution for K_t and q_t as given by (A.14) and

[7] *The procedure closely follows Auerbach (1989, p. 942-943). He also discusses other alternative approaches to characterize and solve the problem.*

(A.15) in the Appendix gives the economic meaning of (7). A marginal decrease in the cost of capital (a goes down) will cause an increase in investment. The relative price of capital goods will initially decrease and then start to move back to its long-term value of unity.

3. *The foreign multinational*

Consider the foreign MNE and its investment in its home country. Assume first that it acquires capital in the form of firms. The price of the capital is not the new capital goods price 1, but the value of the firm. Later, an exogenous share of FDI is new capital investment at price 1 per unit of capital rather than the price of existing old capital. The analytical solution reveals the exact relationship between acquisitions and new capital investment, which would not be apparent in a phase diagram analysis. Any capital gains taxation in the acquisition is ignored. This is possible when deals are structured as acquisitions of stock to avoid corporate-level taxes.

The MNE differs from the domestic firm in the host country in that its acquisition policy has no impact on the output price p. The tax effects are dependent on the tax provisions the company faces. Denote the tax variables of the parent country by the superscript f. Equation (2), showing taxes on date s, can be rewritten for foreign firms as

$$(8)\quad T_s^F = \lambda T_s + (1-\lambda)\,\tau_s^f \left(p_s F^F(K_s^F) - \int_{-\infty}^{s} (p_u C(I_u/K_u) I_u \delta'^f e^{-\delta'^f (s-u)}\, du)\right).$$

λ is the proportion of taxes paid in the host country which is similar to those paid by domestic firms and T_s is identical to (2) except that capital stock K_s^F refers to that acquired by the foreign MNE at date s. $1-\lambda$ describes the proportion of foreign taxable profits taxed in the foreign parent country τ^f. As with the domestic firm, as shown by (A.2) in the Appendix, the current value of the future cash flow of the foreign firm can be written as

$$(9)\quad V_t^F = \int_t^\infty e^{-r^F(s-t)} p_s \Big[(1-\tau_s^F) F^F(K_s^F) - \left(1 - \frac{1}{2}\phi^F \delta + \frac{1}{2}\phi^F \frac{\dot{K}_s^F}{K_s^F}\right)\left(\delta K_s^F + \dot{K}_s^F\right)(1-\Gamma_s^F)\Big]\, ds + A_t,$$

where $\tau^F = \lambda\tau + (1-\lambda)\,\tau^f$, $\Gamma^F = \lambda\tau \dfrac{\delta'}{r+\delta'} + (1-\lambda)\,\tau^f \dfrac{\delta'^f}{r+\delta'^f}$ and

$A_t = \Gamma_s^F \int_{-\infty}^{t} \hat{\delta}\, e^{-(\delta'+\pi)(t-u)}\, du$. Past assets are written off at a rate δ' or δ'^f on a historical cost basis, and π describes the inflation rate (as in Auerbach and Hasset, 1993). This gives a solution analogous to (7), when ρ, a and b are replaced by respective foreign variables described by the superscript F. This can be written as:

$$(10)\quad \dot{K}_t^F - \rho^F K_t^F = \frac{\rho^F + \hat{\delta}}{\phi^F} K^{*F}\left(\varphi\left(\frac{K_t - K^*}{K^*}\right) + a^F + b^F\right),$$

$$a^F = \lambda\frac{\tau^F - \tau^{*F}}{1-\tau^{*F}} - \frac{\Gamma^F - \Gamma^{*F}}{1-\Gamma^{*F}},$$

$$b^F = \frac{\rho^F (q^K - q^{K^*})}{(\rho^F + \hat{\delta})\, q^{K^*}} - \frac{\dot{q}^K}{(\rho^F + \hat{\delta})\, q^{K^*}},$$

where τ^{*F} and Γ^{*F} are the steady-state values of the tax parameters. The foreign firm acquires existing firms, implying that $(K_t^F - K^{*F})/K^{*F} = (K_t - K^*)/K^*$. The term a^F is the effect of taxes on the market value of new investment. The tax rules and a^F under differing double tax relief are given by

1) the worldwide principle ($\lambda = 0$)

$$a^F = 0$$

2) the partial worldwide principle ($\lambda = 0$, $\Gamma^F = \Gamma$)

$$a^F = -\frac{\Gamma - \Gamma^*}{1-\Gamma^*}, \text{ where } \Gamma - \Gamma^*$$

$$= \tau\frac{\delta'}{r+\delta'} - \tau^*\frac{\delta^{*\prime}}{r+\delta^{*\prime}}$$

3) the exemption system ($\lambda = 1$)

$$a^F = \frac{\tau - \tau^*}{1-\tau^*} - \frac{\Gamma - \Gamma^*}{1-\Gamma^*}, \text{ where } \Gamma - \Gamma^*$$

$$= \tau\frac{\delta'}{r+\delta'} - \tau^*\frac{\delta^{*\prime}}{r+\delta^{*\prime}}$$

4) the deduction system ($\tau^F = \tau + \vartheta(1-\tau)\tau^f$, $\tau^{*F} = \tau^* + \vartheta(1-\tau^*)\tau^{*f}$)

$$a^F = \frac{\tau^F - \tau^{*F}}{1-\tau^{*F}} - \frac{\Gamma^F - \Gamma^{*F}}{1-\Gamma^{*F}}, \text{ where}$$

$$\Gamma^F - \Gamma^{*F} = (\tau + \vartheta(1-\tau)\tau^f)\frac{\delta'}{r+\delta'}$$

$$-(\tau^* + \vartheta(1-\tau^*)\tau^{*f})\frac{\delta^{*\prime}}{r+\delta^{*\prime}}$$

5) the double taxation ($\tau^F = \tau + \tau^f$, $\tau^{*F} = \tau^* + \tau^{*f}$)

$$a^F = \frac{\tau^F - \tau^{*F}}{1-\tau^{*F}} - \frac{\Gamma^F - \Gamma^{*F}}{1-\Gamma^{*F}}, \text{ where}$$

$$\Gamma^F - \Gamma^{*F} = \tau^F\frac{\delta'}{r+\delta'} - \tau^{*F}\frac{\delta^{*\prime}}{r+\delta^{*\prime}}$$

Under the worldwide principle, a^F is zero since the host country tax level has no economic significance for the MNE because taxes are credited. The partial worldwide principle differs in that full crediting is only given on dividend payments to the parent company. Under a deduction system and the double taxation of FDI, the incentive effects of the tax reform also depend on parent country taxation. Finally, term $\vartheta < 1$ shows the degree of exemption in a deduction system with partial exemption.

Term b^F is similar to the respective variable for domestic firms b, except that the foreign discount rate ρ^F replaces ρ. The foreign firm observes the equilibrium path of q, p, q^K. It is small enough to take the prices of goods p as given in this second stage. The decision of foreign firms to acquire domestic capital hence has no effect on domestic output and investment decisions. A constant elasticity demand specification for output is assumed, i.e.

$$(11) \quad \frac{p - p^*}{p^*} = -\varphi\left(\frac{K - K^*}{K^*}\right).$$

Market prices determined by the production of domestic corporations evolve according to (A.10) and (11):

$$(12) \quad \frac{p - p^*}{p^*} = a(1 - e^{\lambda_1 t}).$$

(11) implies that (10) is a first-order differential equation, where the solution at $t = 0$ is

$$(13) \quad \frac{\dot{K}_0^F}{K^{*F}} = -\frac{\rho^F + \hat{\delta}}{\phi^F}$$

$$\int_0^\infty e^{-\rho^F t}\left(a^F - \frac{p - p^*}{p^*} + b^F\right) dt.$$

It is seen that FDI of the MNE relates negatively to tax effect a^F, to lower market prices $(p-p^*)/p^*$ and to the higher price of existing capital b^F. The value of existing capital at date t around the steady state is:

$$(14) \quad q_t^K = q_t(1-\Gamma) + A = q_t(1-\Gamma)$$

$$+ \frac{\hat{\delta}}{\delta' + \pi}\Gamma.$$

where (9) is used for A. This and (A.15) imply that:

$$(15) \quad \frac{q_t^K - q_t^{K*}}{q_t^{K*}} = \frac{\lambda_1\phi}{\varphi} e^{\lambda_1 t} aB + C,$$

$$\frac{\dot{q}_t^K}{q_t^{K*}} = \lambda_1\frac{\lambda_1\phi}{\varphi} e^{\lambda_1 t} aB,$$

where $B = \dfrac{1-\Gamma}{1-\Gamma^*\left(1-\dfrac{\hat{\delta}}{\delta'+\pi}\right)}$,

$$C = -\frac{(\Gamma-\Gamma^*)\left(1-\dfrac{\hat{\delta}}{\delta'+\pi}\right)}{1-\Gamma^*\left(1-\dfrac{\hat{\delta}}{\delta'+\pi}\right)}.$$

Hence, b^F from (10) and (15) can be rewritten as

$$(16)\quad b^F = \frac{\rho^F-\lambda_1}{\rho^F+\hat{\delta}}\,\frac{\lambda_1\phi}{\varphi}\,e^{\lambda_1 t}\,aB + \frac{\rho^F}{\rho^F+\hat{\delta}}\,C.$$

A positive change in investment incentives for new capital investment $\Gamma > \Gamma^*$ lowers the relative value of existing capital (C is more negative). A higher level of capital accumulation partly mitigates the encouragement in acquisitions ($aB < 0$ and the first term is positive in 16). Substituting b^F from (16) and $(p-p^*)/p^*$ from (12) into (13) gives, after some manipulation,

$$(17)\quad \frac{\dot{K}_0^F}{K^{*F}} = -\frac{1}{\phi^F}\left\{\frac{\rho^F+\hat{\delta}}{\rho^F}\left(a^F + \frac{a\lambda_1}{\rho^F-\lambda_1}\right) + \frac{\lambda_1\phi}{\varphi}\,aB + C\right\}.$$

Auerbach and Hasset (1993, p. 35) divide acquisitions by the fraction $1-\beta$ of the new capital through the direct purchase of assets. This pays a price of 1 per unit (net of adjustment costs). The last two terms in the outer brackets of (17) are eliminated, since q^K may be replaced by q. The remaining fraction β describes existing capital purchases at price q^K and depending on the tax term b^F.[8] After this division, and upon recognition that $\lambda_1\ (\rho-\lambda_1) = -(\rho+\hat{\delta})\ \varphi/\phi$ (see A.13 in the Appendix), (17) becomes

$$(18)\quad \frac{\dot{K}_0^F}{K^{*F}} = \frac{1}{\phi^F}\left\{\frac{\lambda_1\phi}{\varphi}L\left(a^F + \frac{\lambda_1(a-a^F)}{\rho^F}\right) - \frac{\lambda_1\phi}{\varphi}\,\beta aB - \beta C\right\}.$$

$L = \dfrac{\rho-\lambda_1}{\rho^F-\lambda_1}\,\dfrac{\rho^F+\hat{\delta}}{\rho+\hat{\delta}}$ shows the negative relationship of the foreign discount rate ρ^F and capital accumulation effects. It is equal to unity if domestic ρ and foreign discount rates ρ^F are the same. The negative term $\dfrac{\lambda_1\phi}{\varphi}$ enters all terms except the last one and describes the capital accumulation effects. A high domestic adjustment cost ϕ (relative to the foreign adjustment cost ϕ^F) increases its value. In the inner brackets, the first term a^F is the tax effect. The second term $\lambda_1(a-a^F)/\rho^F$ shows the change in producer prices due to the tax reform and how this affects foreign multinationals. A relatively higher cost of capital for domestic firms, $a > a^F$, would induce a rise in prices coming from the reduction in the scale of domestic operations. Overall, FDI can be written as a function of tax parameters as follows

$$(19)\quad \frac{\dot{K}_0^F}{K^{*F}}\begin{pmatrix}(-) & (+) & (+)\,(-)\\ a^F, & a-a^F, & aB,\ C\end{pmatrix}$$

Under the worldwide principle, the total tax rate is independent of host country taxation, and the tax effect, a^F, receives the value zero. A lower statutory corporate tax rate for the domestic company, $a < 0$, would decrease the product price level ($a-a^F \downarrow$), thus discouraging new capital investment. In mergers, there is an immediate increase in the relative price of existing capital, $C > 0$, if the value of depreciation for tax purposes is lower. Acquisitions are also discouraged due to higher level of capital accumulation ($aB < 0$). When the worldwide principle is only partially applied, as is often the case in practice, a^F is positive for tax reform that lowers statutory tax rates and tax expenditure (instead of being zero). The incentive effect of goods price changes,

[8] *Hartman (1980) argues that newcomers are likely to base their investment decision more on non-tax factors. Non-tax factors may result in exogenous β and may explain why newcomers possibly give more weight to acquisitions, as suggested by Auerbach and Hasset (1993, footnote 8).*

emerging from $a-a^F = (\tau-\tau^*)/(1-\tau^*) < 0$, are also discouraging.

Under the territorial principle, $a = a^F$, and (18) can be written as

$$(20) \quad \frac{\dot{K}_0^F}{K^{*F}} = \frac{1}{\phi^F}\{a\frac{\lambda_1\phi}{\varphi}(L-\beta B) - \beta C\}$$

Auerbach and Hasset (1993) considered territorial firms to be identical to domestic firms, so that buying existing capital for q^K or new capital for q results in the same current value. This implies that $B = 1$ and $C = 0$, and (20) is equal to zero when all investment is made in the form of acquisitions ($\beta = 1$) and parent and host country discount rates are equal ($L = 1$). Here, the valuation of existing capital is similar that in worldwide firm ($B \neq 1$ and $C \neq 0$).

4. *The capital income tax reform of 1993 and foreign investment in Finland*

A unified flat capital income tax at a rate of 0.25, and the reduction of the corporate tax rate from 0.36 to the same level were the main features of the Finnish Tax Reform Act of 1993.[9] Table 1 shows the major parent countries with FDI in Finland (Suomen Pankki, 1991), and the current form of international double taxation relief.

Most of the countries apply the territorial principle, and repatriated income is exempted from taxation in the parent country. The only countries on the list applying the worldwide principle are the United States and the United Kingdom (to which Japan could be added). The fact that foreign companies often use subsidiaries sited in these countries for FDI in Finland explains the high percentages for

Table 1. Foreign Direct Investment 1985–1990 and double taxation relief

Countries	FDI	Tax relief
Sweden	59 %	Territorial
Benelux countries	12 %	Territorial
Switzerland [a]	10 %	Territorial
United States	7 %	Worldwide
Denmark	3 %	Territorial
Germany	2 %	Territorial
United Kingdom	2 %	Worldwide
Others	5 %	–

a: Under worldwide taxation, a company with a higher-than-20% share in another company is entitled to a reduction in corporate tax, which leaves the overall tax treatment of foreign source income as an exemption system.

Sweden (59 %), Switzerland (10 %) and the Benelux countries (12 %).

The estimated effects of the 1993 Capital Income Tax Reform on foreign direct investment in Finland measure the first-year change in the investment-capital ratio. The MNE finances investment from retained earnings, where the discount rate ρ is the gross nominal interest rate.[10] There are two scenarios for discount rate ρ. In the first, the real interest rate is low, and the same goes for domestic and foreign corporations ($\rho = \rho^F = 3.71$ %).[11] In the second, the real domestic interest rate is high ($\rho = 8$ %), and three percentage points above the foreign real interest rate ($\rho^F = 5$).

The value of the quadratic adjustment cost is 5. The respective calculations for an adjustment cost of 15 are given in the Appendix (values 5 and 15 are those used by Auerbach and Hasset, 1993). The foreign adjustment cost is unity (for other assumptions concerning the foreign adjustment cost, simply divide the figures by that value). For the four types of assets considered, and for each country type, the fraction of acquisitions β is evaluated from zero to one.

In the US, the calculation of profits follows US rules and the indirect tax credit method applied follows the worldwide principle. Under

[9] *The 25 % proportional tax would fall on all interest income (currently at a lower rate), on dividend income and on capital gains on nominal bases. The proportion of inventories taxed on historical cost bases is increased from 0.75 to unity. The current declining-balance depreciation rates for tax purposes for equipment is retained, while that for structure is decreased from 9 % to 7 % (in most cases). Investment reserve provisions are being largely abolished in 1994.*

[10] *All tax considerations can be ignored assuming that capital income and capital gains are taxed at the same rate.*

[11] *The values given to the variables partly follow those in Hetemäki and Kari (1991).*

Table 2. Worldwide taxation

Worldwide principle		r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$	
β	0	0.5	1	0	0.5	1
Equipment	–0.139	–0.199	–0.259	–0.022	–0.080	–0.138
Structure	–0.116	–0.168	–0.220	–0.024	–0.079	–0.133
Land	–0.112	–0.142	–0.172	–0.112	–0.152	–0.191
Inventories	–0.214	–0.184	–0.154	–0.169	–0.180	–0.191
Average	–0.145	–0.173	–0.201	–0.082	–0.123	–0.163

Table 2 gives the values for (18) under the worldwide principle, where $a^F = 0$, and under the partial worldwide principle where $a^F = -(\Gamma - \Gamma^*)/(1-\Gamma^*)$, $\pi = 0.05$, $\varphi = 1$, $\tau = 0.25$, $\tau^* = 0.36$. The estimation used for true economic depreciation is from Hulten and Wykoff (1981). For equipment $\delta = 0.1225$, $\delta' = \delta'^* = 0.3$; for structure $\delta = 0.0361$, $\delta' = 0.07$ and $\delta'^* = 0.09$; for land $\delta = \delta' = \delta'^* = 0$; for inventories $\delta = 0$, FIFO share of inventories, v, shifts from 0.25 to 0 and hypothetical values $\delta' = -0.0489$ and $\delta'^* = -0.0439$ are evaluated using King and Fullerton (1984, 2.23 p. 21)[12]. The abolition of the 25 % investment reserve provisions after 1994 is ignored.[13]

worldwide taxation, the Finnish Tax Reform affects first-year investment in four different kinds of assets, as shown in Table 2.

Consider first the low real interest rate case ρ, $\rho^F = 3.71$ and FDI ranging from new capital investment ($\beta = 0$) to pure acquisitions ($\beta = 1$). The negative sign of average investment (last row,) as well as in each type of asset, shows that the foreign direct investment level goes down under the worldwide principle. This conclusion holds irrespective of the assets required or the form of direct investment. The reform reduces the cost of capital for domestic firms and hence lowers the final goods prices and the profitability of investment. It also implies an immediate increase in the relative price of existing capital. The reason for this is that falling tax rates lower the importance of depreciation for tax purposes. The discouragement is hence the greatest for acquisitions, where the average cutdown in first-year investment is 20 %, especially in equipment where the depreciation rates for tax purposes are largest. Table 2 ignores the fact that the tax reform raises the capital gains taxation of structures. This would have lead to a greater discouragement in acquisitions of structures when capital gains taxes were not entirely born by sellers (as assumed here).[14]

Compare next the low interest case ρ, $\rho^F = 3.71$ with the high interest case $\rho = 8$, $\rho^F = 5$, where the domestic interest rate is relatively higher. Because of the higher foreign interest rate ρ^F, the MNE is less sensitive to the changes in the cost of capital in the host country. This implies a lower weight given to a decrease in the price of goods, which mitigates discouragement of FDI. A higher domestic interest rate also increases the relative investment costs of domestic firms (but also implies a more negative stable root λ_1 and lower adjustment in capital stocks and final goods prices, see A.13 in the Appendix). Finally, Table 2' in the appendix shows that the higher adjustment cost of investment for domestic firms lowers the disincentive effects, too. It seems fair to conclude, however, that the assumptions concerning this parameter value or interest rate do not alter the qualitative results.

[12] *From* $\tau v \pi = -\tau \frac{\delta'}{r+\delta'}(\rho + \hat{\delta})$, *where the l.h.s. is the extra cost of the historical basis assessment of intangibles, and the r.h.s. is the equivalent measured as a (negative) declining balance deduction of depreciation. This gives* $\delta' = -r[(1-v)\pi]/[(1-v)\pi + \rho + \hat{\delta}]$.

[13] *The tax-minimizing use of the investment reserve provisions for structures implies that the effective corporate tax rate before 1993 was* $(1-0.25)\,0.36 + 0.25\,\Gamma^* = 0.32$ *(at a nominal discount rate of* $r = 8.71$ *%) instead of a statutory tax rate of 0.36 (for the incentive effects of investment grants in Sweden, see King and Fullerton, 1984, 100-103).*

[14] *Before 1993, only 60 per cent (since 1993 100 %) of the realization revenue of structures owned for over 10 years was taxable income, but the possible undepreciated balance was a fully deductible expense up to the taxable gross gain and above the realization revenue (i.e. a deductible loss).*

Table 3. Partial worldwide taxation

Partial worldwide principle		r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$	
β	0	0.5	1	0	0.5	1
Equipment	–0.528	–0.588	–0.648	–0.416	–0.478	–0.540
Structure	–0.281	–0.333	–0.385	–0.234	–0.288	–0.342
Land	–0.112	–0.142	–0.172	–0.112	–0.152	–0.191
Inventories	–0.058	–0.028	–0.002	–0.081	–0.092	–0.103
Average	–0.245	–0.275	–0.302	–0.211	–0.252	–0.294

Table 4. Territorial taxation and a deduction system with partial exemption

Territorial principle		r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$	
β	0	0.5	1	0	0.5	1
Equipment	0.037	–0.023	–0.083	0.048	–0.014	–0.076
Structure	0.043	–0.009	–0.061	0.051	–0.003	–0.058
Land	0.060	0.030	0	0.060	0.020	–0.019
Inventories	0.114	0.144	0.174	0.091	0.080	0.069
Average	0.063	0.036	0.008	0.063	0.021	–0.021
Deduction system (Italy)		r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$	
β	0	0.5	1	0	0.5	1
Equipment	0.064	0.004	–0.056	0.059	–0.002	–0.063
Structure	0.033	–0.018	–0.070	0.034	–0.021	–0.076
Land	0.059	0.030	0	0.060	0.020	–0.019
Inventories	0.111	0.141	0.171	0.093	0.082	0.071
Average	0.067	0.039	0.011	0.061	0.020	–0.022

Table 4 records values for (18) and (20). In Italy, 0.6 is exempted and the corporate tax rate is 47.8. Other parameter values are those used in the calculations in Table 2.

Under partial worldwide taxation, tax expenditure follows Finnish legislation. Examples of this are the UK and Japan. Partial worldwide taxation implies that the cost of capital effects are non-zero and given by $a^F = \frac{\Gamma - \Gamma^*}{1 - \Gamma^*}$, where $\Gamma - \Gamma^* = \tau \frac{\delta'}{r + \delta'} - \tau^* \frac{\delta^{*\prime}}{r + \delta^{*\prime}}$.

The resulting figures are given in Table 3.

The higher cost of capital due to lower statutory taxes, and hence a lower current value of depreciation rates for tax purposes, implies additional discouragement, especially in investment in equipment and structure. The tax reform has a similar effect on land investment as pure worldwide taxation, and a minor effect on investment in inventories (the latter is because of the decrease in inflationary loss under the FIFO principle). The discouragement in investment is, on average, greater from countries applying the partial worldwide principle than from those applying the pure worldwide principle.

Table 4 shows the effects of territorial taxation and the incentive effects of a deduction system with partial exemption, as currently applied by Italy.

The countries applying the territorial principle when involved in FDI in Finland are the Nordic countries (Sweden, Norway, Denmark), the Benelux countries, Switzerland, Germany, France, Luxembourg and Canada. The positive incentive effects are prevalent in new investment, where the cost of capital is decreased (a is negative for all assets). This is

Table 5. Double taxation

Double taxation		r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$	
β	0	0.5	1	0	0.5	1
Equipment	0.764	0.705	0.645	0.604	0.546	0.488
Structure	0.459	0.407	0.356	0.376	0.321	0.267
Land	0.281	0.251	0.221	0.281	0.241	0.202
Inventories	0.335	0.365	0.395	0.312	0.301	0.290
Average	0.460	0.432	0.404	0.393	0.352	0.312

comparable to the incentive effect on domestic firms. As shown in the Appendix, with a domestic adjustment cost of 15, all foreign investment except that allocated to equipment, is relatively more encouraged. The average increase in the first-year investment rate is from 6.3 % to 8.4 %. Finally, in Italy, a deduction system with partial exemption is applied (the corporate tax rate is 47.8 and 60 % is exempted). The effective cut-down in the statutory tax rate is reduced from 11 % to 9 % (from 36 % to 25 %) , but the cost of capital effect a^F remains relatively unaffected. The territorial and deduction systems, hence, have the same kind of incentive effect.

There is no OECD country to which a (bilateral) double taxation treaty does not apply, although foreign countries adopting the territorial principle do not necessarily exempt dividend income from Finland from taxes. Double taxation is shown in table 4 for the simple case in which domestic and foreign taxation is the same to begin with.

The tax reform has the strongest positive incentive effects when lower statutory taxes reduce the double taxation of international investment. Unlike under territorial taxation, the positive incentive effects are also strongly prevalent in acquisitions and mergers.

5. *Conclusions*

Tax reform that cuts down the cost of capital encourages new foreign capital investment from countries applying territorial taxation, but is approximately neutral when the major proportion of foreign direct investment (FDI) is in the form of takeovers. This holds for the Finnish Capital Income Tax Reform of 1993, where the major change is the cut-down in statutory tax rates. The numerical estimation also shows that the deduction system with partial exemption, as currently applied in Italy, inherits similar incentive effects as territorial taxation. New capital investment from the US, which applies worldwide taxation, would be mildly discouraged, and FDI in the form of mergers and acquisitions more strongly discouraged. In the UK and Japan, the worldwide principle only covers tax rates and does not mean the unification of tax bases. Thus, lower statutory taxes have a negative effect on tax expenditure, leading to additional discouragement. Only when international investment is subject to double taxation rather than to a bilateral double taxation treaty do lower statutory taxes encourage FDI irrespective of their form.

One area for future research would be to take into account the empirically observed relationship between the real discount rate and the market value of existing firms. In conditions of relatively high real interest rates, this market value may decline, encouraging mergers and acquisitions.

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Appendix

New Capital Investment and Acquisitions

The Euler condition for the optimal capital stock path

Using (2) and (3), (1) may be written as

$$(A.1)\quad V_t = \int_t^\infty e^{-r(s-t)} p_s \Big[(1-\tau_s) F(K_s) - \Big(1 - \frac{1}{2}\phi\delta + \frac{1}{2}\phi\frac{\dot K_s}{K_s}\Big)(\delta K_s + \dot K_s)(1-\Gamma_s)\Big] ds + A_t,$$

where

$$(A.2)\quad A_t = \int_t^\infty e^{-r(s-t)} \tau_s \int_{-\infty}^{t} p_u C(I_u/K_u) I_u DEP(s, s-u)\, du\, ds$$

is the present value of tax savings due to the depreciation of investment made before date t, predetermined at date t, and $\Gamma_s = \int_s^\infty e^{-r(u-s)} \tau_u DEP(u, u-s)\, du$ represents the current value of tax savings per dollar of date s investment. The Euler condition $dV/dK - \frac{d}{dt}(dV/d\dot K) = 0$ for the optimal capital stock can be written as[16]

$$\int_t^\infty e^{-r(s-t)} p_t [(1-\tau) F_K^t + \Big(\frac{1}{2}\phi\Big(\frac{\dot K}{K}\Big)^2 + \frac{1}{2}\phi\delta^2 - \delta\Big)(1-\Gamma_t)]$$

$$(A.3)\quad = -\frac{d}{dt}\int_t^\infty e^{-r(s-t)} p_t \Big(1 + \phi\frac{\dot K}{K}\Big)(1-\Gamma_t)\, ds.$$

The model will be linearized around the steady state. Assuming the quadratic cost function, $C(I/K) = 1 + \frac{1}{2}\phi\frac{I}{K}$ shows average investment costs per unit of investment. Normalize the derivative of the total quadratic cost function $C(I/K)I$ with respect to investment I to unity in the steady state, so that Tobin's q equals one. Investment greater (less) than in the steady state implies that q is greater (less) than 1. This steady-state normalization $C(I/K) + C'(I/K)I = 1$ implies:

$$(A.4)\quad C(I/K) = 1 - \frac{1}{2}\phi\, I/K = 1 - \phi\delta + \frac{1}{2}\phi I/K,$$

where (3) is used in steady state. The relative marginal price to the corporation of new capital goods, inclusive of adjustment costs, is

[16] *For a discussion of the solution technique, see Auerbach (1983)*

$$(A.5)\quad q = \frac{pd[C(I/K)I]/dI}{p} = C(I/K) + IC'(I/K) = 1 + \phi(\dot{K}/K),$$

where (A.4) was used for $C(I/K)$ and $C'(I/K)$. Expression (A.5) can be written as

$$(A.6)\quad \frac{\dot{K}_t}{K_t} = \frac{q_t - 1}{\phi}$$

Using the fact that $\frac{I_t}{K_t} = \delta + \frac{\dot{K}_t}{K_t} = \delta + \frac{q_t - 1}{\phi}$ from (A.6), current adjustment costs per unit of investment are given by

$$(A.7)\quad \chi_t = \frac{1}{2}\phi(I_t/K_t)^2 \frac{1-\Gamma}{1-\tau} = \frac{1}{2}\phi\left(\delta + \frac{\dot{K}_t}{K_t}\right)^2 \frac{1-\Gamma}{1-\tau}.$$

Completing the derivation in the RHS of (A.3), noting $\frac{1}{2}\phi\left(\frac{\dot{K}}{K}\right)^2 + \frac{1}{2}\phi\delta^2 - \delta = \frac{1}{2}\phi\left(\delta + \frac{\dot{K}}{K}\right)^2 - \delta\left(1 + \phi\frac{\dot{K}}{K}\right)$, and using (A.5) for $1 + \phi\frac{\dot{K}}{K}$ and χ_t from (A.7) gives (4) in the text.

Domestic capital accumulation

Expressions (A.5), (4) and (5) yield a system of first-order differential equations in the relative capital goods price q_t, and in the capital stock K. With the help of (A.6), (4) may be written (dropping off the subscripts) as

$$(A.8)\quad \dot{q}_t = -F_K\frac{1-\tau}{1-\Gamma} - \frac{1}{2}\phi\left(\delta + \frac{q_t - 1}{\phi}\right)^2 + q_t(\rho + \delta)$$

Linearize (A.6) and (A.8) around the steady state ($q^* = 1$) to get

$$(A.9)\quad \frac{\dot{K}_t}{K^*} = \frac{q_t - 1}{\phi}$$

$$(A.10)\quad \dot{q}_t = -F^*_{KK}\frac{1-\tau^*}{1-\Gamma^*}(K_t - K^*) - \delta(q_t - 1) + (\rho + \delta)(q_t - 1) + \frac{F_K}{1-\Gamma^*}(\tau - \tau^*) - \frac{(1-\tau^*)F_K}{(1-\Gamma^*)^2}(\Gamma_t - \Gamma^*),$$

where the steady-state value of a variable is denoted by an asterisk *. Using the steady-state value of (A.8), which is $F^*_K = (\rho + \delta - \frac{1}{2}\phi\delta^2)(1-\Gamma^*)/(1-\tau^*)$ and definitions $\hat{\delta} = \delta\left(1 - \frac{1}{2}\phi\delta\right)$ and $\varphi = -\frac{F^*_{KK}K^*}{F^*_K}$, (A.10) gives

$$(A.11)\quad \dot{q}_t = \varphi(\rho + \hat{\delta})\frac{K_t - K^*}{K^*} + \rho(q_t - 1) + (\rho + \hat{\delta})\frac{\tau - \tau^*}{1-\tau^*} - (\rho + \hat{\delta})\frac{\Gamma - \Gamma^*}{1-\Gamma^*}.$$

The price of existing capital acquired in the steady-state is given by $q^K_t = q^*_t(1-\Gamma) = (q_t - \phi\dot{K}/K)(1-\Gamma)$. Solving this for q_t gives

$$(A.12)\quad q_t = \frac{q^K_t}{q^{K^*}} + \phi\frac{\dot{K}}{K}.$$

Substituting q_t from (A.12) (and its derivative $\dot{q}_t$) into (A.11) and dropping unnecessary subscripts gives a second-order linear equation in K shown as (7) in the text, where the characteristic roots are:

$$\text{(A.13)} \quad \lambda_1 = \frac{\rho - \sqrt{\rho^2 + \frac{4\varphi(\rho+\hat{\delta})}{\phi}}}{2}; \qquad \lambda_2 = \frac{\rho + \sqrt{\rho^2 + \frac{4\varphi(\rho+\hat{\delta})}{\phi}}}{2}$$

Assuming that the economy is in a steady state initially, and that the tax parameters shift immediately and permanently at that date, the solution for K_t and q_t is, from (7) and with the aid of the transversality condition,

$$\text{(A.14)} \quad K_t = K^*\left(1 - \frac{1}{\varphi}(1 - e^{\lambda_1 t})\, a\right)$$

$$\text{(A.15)} \quad q_t = 1 + \frac{\lambda_1 \phi}{\varphi}\, a\, e^{\lambda_1 t},$$

where λ_1 is the stable root for (7). (A.14) and (A.15) are similar to those presented in Auerbach and Hasset (1991, p. 29).

Tax Reform in Finland, $\phi = 15$

Table 2'. Worldwide taxation, when $\phi = 15$

Worldwide principle	r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$		
β	0	0.5	1	0	0.5	1
Equipment	–0.035	–0.110	–0.185	–0.006	–0.088	–0.169
Structure	–0.082	–0.147	–0.212	–0.016	–0.078	–0.141
Land	–0.083	–0.127	–0.172	–0.079	–0.136	–0.191
Inventories	–0.158	–0.152	–0.145	–0.121	–0.154	–0.186
Average	–0.090	–0.134	–0.179	–0.056	–0.114	–0.172

Table 3'. Partial worldwide taxation, when $\phi = 15$

Partial worldwide principle	r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$		
β	0	0.5	1	0	0.5	1
Equipment	–0.185	–0.260	–0.335	–0.163	–0.239	–0.316
Structure	–0.231	–0.297	–0.361	–0.187	–0.255	–0.324
Land	–0.083	–0.127	–0.172	–0.080	–0.136	–0.191
Inventories	–0.002	–0.005	–0.011	–0.033	–0.066	–0.098
Average	–0.125	–0.172	–0.220	–0.116	–0.174	–0.232

Table 4'. Territorial and deduction system, when $\phi = 15$

Territorial principle	r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$		
β	0	0.5	1	0	0.5	1
Equipment	0.033	–0.042	–0.117	0.043	–0.033	–0.109
Structure	0.062	–0.003	–0.067	0.075	0.007	–0.061
Land	0.089	0.045	0	0.092	0.036	–0.019
Inventories	0.170	0.177	0.183	0.014	0.106	0.074
Average	0.089	0.044	0	0.087	0.029	–0.028

Deduction system	r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$		
β	0	0.5	1	0	0.5	1
Equipment	0.043	–0.032	–0.107	0.043	–0.035	–0.113
Structure	0.054	–0.011	–0.076	0.055	–0.013	–0.080
Land	0.089	0.044	0	0.092	0.036	–0.019
Inventories	0.167	0.173	0.180	0.141	0.108	0.075
Average	0.088	0.044	0.001	0.085	0.024	–0.034

Table 5'. Double taxation

Double Taxation	r, $\rho^F = 3.71$			$r = 8$, $\rho^F = 5$		
β	0	0.5	1	0	0.5	1
Equipment	0.313	0.238	0.163	0.272	0.190	0.109
Structure	0.440	0.375	0.310	0.353	0.290	0.228
Land	0.310	0.266	0.221	0.313	0.257	0.202
Inventories	0.391	0.398	0.404	0.360	0.327	0.294
Average	0.364	0.319	0.275	0.324	0.266	0.208