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POLICY WATCH

A growth oriented dual income tax

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Abstract This paper proposes a growth oriented dual income tax by combining an allowance for corporate equity with a broadly defined flat tax on personal capital income. Revenue losses are compensated by an increase in the value added tax. The paper demonstrates the neutrality properties of the reform with respect to investment, firm financial decisions and organizational choice. Tax rates are chosen to prevent income shifting from labor to capital income. The reform decisively strengthens investment of domestically owned firms as well as home and foreign based multinationals and boosts savings. Simulations with a calibrated growth model for Switzerland indicate that the reform could add between 4 to 5 percent of GNP in the long-run, depending on the specific scenario. Given the slow nature of capital accumulation, it imposes considerable costs in the short-run. We consider a tax smoothing scenario to offset the intergenerationally redistributive effects.

Keywords Tax reform · Investment · Financial structure · Growth

JEL Classification: D58, D92, E62, G32, H25

1 Introduction

The high international mobility of portfolio capital and multinational investments has rendered the taxation of capital income increasingly difficult. Personal taxes on interest and dividend income not only reduce the volume of savings but also drive out portfolio

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capital to other countries. High corporate taxes suppress investments by domestically owned firms and deter international direct investments.[1] Multinational firms might also shift profits towards subsidiaries in low tax countries by manipulating transfer prices and engaging in other activities of international tax arbitrage (see Gordon and Hines (2002)).

The taxation of capital income not only discourages the level of savings and investment, but also the allocation of capital towards different types of investments and of savings towards different types of assets. Reflecting imperfect integration of corporate and personal income taxes and given special tax preferences, taxation of income from interest bearing assets, dividends and capital gains is far from uniform. Further deviations from comprehensive income taxation are found in the tax treatment of owner occupied housing and of savings for old age insurance. Income on portfolio capital invested abroad may escape domestic residence based personal taxes to a considerable extent. In consequence, the distortions in household portfolio composition might be as severe as the tax distortion of the level of savings, as Bernheim (2002) and Poterba (2002) argue.

Apart from its effect on the level of domestic and foreign direct investment, the system of company taxation interferes with an efficient allocation of capital by distorting the choice of organizational form (MacKie-Mason and Gordon, 1997), influencing the debt-equity choice (Miller, 1977), favoring profit retentions and reducing payouts (Poterba, 2004), and discouraging new firm creation (see Cullen and Gordon (2002)). To sum up, a more neutral system of capital income taxation may yield efficiency gains by eliminating distortions both in the level and allocation of capital.

A number of countries have switched to taxing parts of personal capital income with a separate low and flat rate and have partly moved towards a form of dual income tax.[2] From an equity perspective, personal capital income taxation leads to a higher tax on future relative to present consumption and thereby discriminates against savers. Under this view, the distributional objective is already achieved with a progressive labor income tax plus a progressive tax on inheritances and wealth transfers which give rise to exogenously received asset wealth. A moderate capital income tax could be justified if the collection of these taxes is incomplete for other reasons. Erosa and Gervais (2002) argue that a modest tax on capital income also shifts the tax burden from the young towards the old and fosters taxation according to the individual ability to pay. A dual income tax is thus a compromise that helps to limit the double taxation of capital income on account of simultaneous wealth, capital income and inflation taxation in a non-indexed tax system. A flat rate on comprehensively defined capital income also fosters horizontal equity in the taxation of different types of capital income. On grounds of economic efficiency, capital income should be taxed less heavily if the tax base is more sensitive than in the case of labor income. To withstand the pressures from international tax competition, an open economy should reduce company taxes

[1] Some highly selective references to the empirical literature are Hines (1999), Devereux and Griffith (1998) and de Mooij and Ederveen (2003) on international investment, and Hassett and Hubbard (2002), Auerbach and Hassett (2003), on domestic investment.

[2] The concept of the Nordic dual income tax was suggested by Sørensen (1994) and further developed by Nielsen and Sørensen (1997) and Sørensen (1998). Gordon (2000) and Boadway (2004) review the general issues related to differential taxation of capital and labor income.

to attract mobile firms and reduce personal taxes to prevent the flight of portfolio capital. A flat tax on comprehensively defined personal capital income limits costly tax arbitrage activities and thereby reduces the distortions in the allocation of savings and investments across different types of assets.

In this paper, we propose a novel variant of a growth oriented dual income tax. It combines an allowance for corporate equity (ACE) with a dual income tax of the Nordic type and is called ADIT for short. We demonstrate the neutrality properties of the system with respect to investment, firm financial decisions and organizational choice. The reform strengthens savings and domestic investment of home and foreign based multinationals. Simulations with a calibrated growth model for Switzerland indicate that the reform could add between 4 to 5 percent of GNP in the long-run. Given the slow nature of capital accumulation, it also imposes considerable costs in the short-run. The revenue shortfalls and the need to finance them with other distortionary taxes materialize much faster than the long-run benefits from induced growth. To offset the intergenerationally redistributive effects, we compute a tax smoothing scenario using government debt to distribute the tax burden evenly among present and future generations.

Our model features a rare degree of detail to allow a more informative quantitative evaluation than is available in other studies. We distinguish domestically owned corporate and non-corporate firms, as well as domestic subsidiaries of home and foreign based multinational firms. Such disaggregation is essential since tax reform often affects different types of firms quite differentially or is relevant only for part of the business sector rather than the total economy as is regularly assumed in more aggregate studies. Further, our model endogenizes debt equity choice and dividend payout behavior of corporations which are prime margins affected by most business tax reforms. We are able to compile effective marginal tax rates (EMTR) in the same detail as e.g. the European Commission (2001). In addition, we quantify the general equilibrium impact when a reform changes these effective rates. Finally, household decisions derive from an overlapping generations model with endogenous labor supply and an endogenous determination of the level and portfolio composition of savings. A detailed model of household behavior is necessary to estimate the reform's impact on work and savings incentives as well as international portfolio allocation.

We believe that the present exercise in business tax reform is of interest much beyond the Swiss case. The reform scenario connects to the US debate on the dividend tax relief of the Bush administration, see Carroll, Hassett and Mackie (2003) and Gravelle (2003), and to the Growth and Investment Tax Plan of the President's Advisory Panel on Federal Tax Reform (2005). The latter plan combines a cash-flow tax on corporate income with a dual income tax on the personal level. Our numerical analysis introduces the components of ADIT step by step. Since the first parts coincide with the panel's proposal, our results might be of interest to the US audience as well.[3] The paper should as well be informative about the potential impact of a dual income tax reform as implemented in the Nordic countries and proposed for other European countries, see Cnossen (1999); Sachverständigenrat (2003) or Sinn (2003). A thorough quantitative

[3] The proposal is supported by a static analysis of the reform. Occasionally, the results of a basic dynamic analysis are reported.

evaluation of these proposals is not yet available, at least at the level of detail offered by our quantitative model.

The paper presents in Section 2 the main tax reform proposal and demonstrates important neutrality properties. Section 3 provides a numerical evaluation for the Swiss case. We evaluate the long-run impact as well as the short-run and transitional effects and check for sensitivity. Section 4 concludes.

2 A growth oriented dual income tax

2.1 The ADIT system

The ADIT proposal combines the Nordic type of dual income taxation with an allowance for corporate equity (ACE). The proposal is described and analyzed in much detail in Keuschnigg (2004a) and rests on five pillars:

1. Progressive wage taxation with a top rate of t^L.
2. Proportional profit taxation at a flat tax rate t^U. The tax applies uniformly to all firms, corporate and non-corporate.
3. Deduction from the profit tax t^U of a normal rate of return on equity, equal to a long-run average of the risk free return on government bonds.
4. A proportional "shareholder" tax t^S at the personal level on all types of capital income (interest, dividends, and realized capital gains). A surcharge on realized capital gains is charged to offset the interest gains due to tax deferral leading to an accruals equivalent rate equal to t^S. The rate satisfies the restriction $\left(1-t^U\right)\left(1-t^S\right)=1-t^L$ to avoid tax arbitrage by misdeclaration of owners' wages. The shareholder tax allows full loss offset. Losses may be carried forward over unlimited periods and carried backwards over a limited time span.
5. Adjustment of the value added tax to balance the government budget.

2.1.1 Allowance for corporate equity (ACE)

The allowance for corporate equity is the single most important measure to stimulate investment and growth. The basic idea is to extend the tax deductibility of interest on business debt to a normal return on equity as well, see Boadway and Bruce (1984) and the Institute for Fiscal Studies (1991). Bond and Devereux (2003) find that no more than a risk free normal return equal to the net of tax return on government debt is called for, provided that full loss offset is guaranteed which also requires an indefinite carry-forward of losses with interest. Given tax deduction of *all* costs of finance, the ACE system makes the profit tax neutral with respect to investment and avoids the tax distortion in favor of debt finance. The profit tax continues to tax in a non-distortive way a supernormal return on capital. The reduction in the average tax rate on profits is the mirror image of the revenue losses incurred by the government.

The recent literature on international taxation, see Gordon (1986) and Razin and Sadka (1991), implies that a country should optimally set its source taxes to zero if it can use other taxes to finance a given expenditure. Haufler and Schjelderup (2000) show that this can be achieved by using a cash-flow tax which sets the EMTR at the

firm level to zero but retains a positive statutory tax rate that allows to tax economic rents. The ACE allowance is an alternative way to set the EMTR to zero. The role of the statutory tax rate is to tax rents and supernormal profits. According to Huizinga and Nielsen (1997), a positive rate also taxes domestically generated rents that accrue to foreigners under foreign ownership of domestically operating firms and thereby helps to shift income from foreigners to domestic citizens. Under the ADIT system, a positive tax rate is also needed to prevent income shifting from labor to capital income.

The ACE allowance sets the EATR on investments with a normal return to zero and much reduces it for projects with a supernormal return. Since the discrete location decisions of multinational firms are dominated by the average tax burden, see Devereux and Griffith (1998), the ACE system should attract inward foreign direct investment (FDI) and reduce outward FDI by domestic multinationals. It is sometimes objected that the ACE allowance discriminates against the most profitable investments, often implemented by technologically advanced multinationals. However, the reduction of the EATR is also a major benefit to these firms relative to the status quo. A country's ability in using tax incentives to target the most profitable, internationally mobile firms is rather limited. As Keen (2001) and Devereux, Griffith and Klemm (2002) argue, special tax regimes are probably the only possibility. If this is not possible, the only way to attract them is to keep the EATR and, thus, the statutory rate low.

2.1.2 Dual income taxation

ADIT combines progressive wage taxation with a shareholder tax which is a flat and modest, but comprehensive tax on capital income. Apart from being administratively simple and avoiding a lot of problems in corporate personal tax integration, the shareholder tax is central to the ADIT proposal for other reasons. First, its rate t^S is chosen to satisfy the restriction $\left(1-t^U\right)\left(1-t^S\right)=1-t^L$. This eliminates the incentives for tax arbitrage by misdeclaration of owners' wages as capital income which usually necessitates complicated and administratively expensive schemes.[4] Consider an entrepreneur in the top tax bracket: Reporting additional income as wage, she pays the top wage tax at a rate t^L, leaving her with net earnings $1-t^L$. Alternatively, her contribution to the firm's earnings inflates profits and shows up as a supernormal return. Since it results from the entrepreneur's personal effort it will not qualify for an ACE deduction. Consequently, earnings from the entrepreneur's labor input get double taxed, first at the company level at a rate t^U and at the personal level at a rate t^S. By definition, the cumulative tax burden is the same as the wage tax.[5]

Second, ADIT substantially reduces the double taxation of savings inherent in the current income tax. The optimal tax literature suggests that the relative size of labor and capital income tax rates should reflect the tax sensitivity of savings and labor income (see Huizinga (1995) for a simple statement). Since a large part of labor supply is rather inelastic, this argument calls for a lower personal tax rate on capital income. Third,

[4] Sørensen (2005) calls this the Achilles heel of the Nordic dual income tax, see also Fjærli and Lund (2001) and Lindhe, Södersten and Öberg (2004).

[5] If the entrepreneur's personal tax rate is smaller, she can always obtain the firm's income in terms of a wage and thereby avoid a too high tax burden on profits.

given unchanged taxation abroad, the low rate on personal capital income reduces the incentives for outward portfolio investments and helps to contain capital flight. At least part of these foreign portfolio investments will escape domestic taxation of foreign source income under the residence principle.

Fourth, the uniform flat tax rate approximately ensures tax neutrality at the personal level with respect to financing decisions. A surcharge corrects for the compound interest gains as a result of tax deferral under the realization principle and leads to an accruals equivalent capital gains tax rate equal to the dividend tax rate. The tax rate on realized gains increases with the length of the holding period to offset the benefit from deferral. To keep the tax administratively simple, it is assumed that capital gains are evenly distributed over the holding period.[6] The proposed calculation of capital gains roughly, although not exactly, assures holding period neutrality and allows for a more efficient risk diversification of portfolio investors. The equal effective tax rates on dividends and capital gains equate the costs of capital from retained earnings and new equity. The tax thus encourages firms to pay out profits and to raise new equity on the capital market. This should improve the market's efficiency in allocating scarce capital towards the most productive investments. Furthermore, ADIT also ensures tax neutrality at the personal level with respect to firms' debt equity choice. Since all types of firms are treated uniformly, the ADIT system is also neutral with respect to the choice of organizational form. Finally, ADIT ensures full loss offset and thereby encourages risk taking on account of the Domar Musgrave effect. According to Cullen and Gordon (2002) and Sørensen (2005), this insurance effect of a proportional tax with full loss offset should favor small domestic firms where entrepreneurs are exposed to substantial undiversified risk, and thus should reduce the risk premium and encourage growth. Although not accounted for in our quantitative model, this advantage must not be neglected for an overall evaluation of the reform proposal.

2.1.3 Value added tax

The ADIT proposal will lose tax revenue. It exempts a normal return on equity from the profit tax and roughly halves the current tax rates on interest and dividend income. The more effective capital gains taxation will not generate much revenue since the tax base is very narrow. We consider two alternative scenarios to finance the revenue losses. One is to raise the value added tax to balance the revenue losses. Shifting the tax burden towards labor and eroding the real wage, the economic costs will show up in an added labor supply distortion. Alternatively, we cut lump-sum transfers to see how much the efficiency gains from the increased neutrality of capital income taxation are offset by the extra labor market distortion. In the Swiss context, the two scenarios are motivated by the value added tax rate of 7.6% which is very low by European standards. Further, the size of the government sector and, in particular, social transfers had growth rates among the highest of all OECD countries.

[6] The assumption should hold on average but will clearly not be satisfied in each individual case. The scheme proposed in Auerbach (1991) achieves holding period neutrality in all cases, not only on average. It would be administratively more difficult, however.

2.1.4 Relation to other tax reform concepts

The ADIT system shares some interesting similarities with the Growth and Investment Tax Plan proposed for the U.S. by the President's Advisory Panel on Federal Tax Reform (2005). The panel proposed to combine a progressive tax on labor income, with rates ranging from 15 to 30%, and a flat tax rate of 15% on interest, dividends, and capital gains with a single-rate tax of 30% on business cash flow. The cash flow tax allows immediate expensing of new investment but firms would not receive deductions for interest paid on business debt. In the Swiss context, the ADIT system would also feature a progressive wage tax schedule with a top rate of 37%, see Section 3.2 below, and a flat tax rate on personal capital income of about 18%. The key difference to the U.S. Tax Panel's proposal is with the business tax where the ADIT system proposes, instead of a cash-flow tax, an allowance for the cost of equity together with interest deductions to achieve investment neutrality at the firm level. Since the cash-flow tax extends the tax preference only to new investments, it should raise more revenue than a business tax with an ACE allowance but still attain the desired investment neutrality. It was felt, however, that the need to continue interest deductions on old debt and disallowing deductions for new debt would create formidable transitional problems. More importantly, a small country faces the risk that the cash-flow tax might not be eligible for foreign tax credits in the United States, or other foreign countries, see McLure and Zodrow (1998) for an extensive discussion. This would create a formidable disincentive for incoming FDI in Switzerland. The case for a cash-flow tax would presumably become much stronger if the U.S. itself would follow the Panel's proposal. Introducing a cash-flow tax, however, would require an alternative solution to the income shifting problem of a dual income tax, possibly along the lines of Sørensen (2005).

2.2 Analytical arguments

We start with a stylized analytical model to highlight the main transmission channels and to build intuition for the most important impact from introducing ADIT. The next section presents quantitative results from a much more detailed numerical model.

2.2.1 The investor's perspective

Assume debt yields interest i before taxes and $i^n = (1 - t^B)i$ after interest taxation at rate t^B. When assets are perfect substitutes, arbitrage behavior equates net of tax returns of debt and equity:

$$i^n V = (1 - t^D)D + (1 - t^G)[\dot{V} - VN], \quad i^n = (1 - t^B)i. \tag{1}$$

An equity investment V yields dividends D subject to dividend taxation at rate t^D, and capital gains $\dot{V} - VN$ net of capital gains taxes at an effective rate of t^G. Capital gains of current shareholders are changes in firm value $\dot{V}$ less new share issues VN.

2.2.2 *Corporate firms*

The cash flow identity (2) equates the inflows (profits π, new equity VN, and new debt $N = \dot{B}$) to the outflows (dividends and investment $I = \dot{K}$). For simplicity, we ignore depreciation of capital. Adhering to the old view of dividend taxation, dividends in (3) are chosen as a fixed fraction θ of the total return.[7]

$$D + I = \pi + VN + N, \tag{2}$$

$$D = \theta \cdot (D + \dot{V} - VN). \tag{3}$$

Using (3), one can integrate the no arbitrage condition (1) subject to a transversality constraint. Firm value equals the present value of future net dividends $D - VN$, see (4). The net dividend flow is discounted using the cost of equity which is the required gross return r prior to the personal tax t^E on equity income. The cost of equity r is endogenously determined to assure that equity and debt yield identical net of tax returns, $(1 - t^E)r = (1 - t^B)i$. The personal tax on equity is an average of the dividend and effective capital gains tax rates. The dividend payout ratio θ serves as a weight.[8]

$$V_t = \int_t^\infty (D_s - VN_s) \exp(-r \cdot (s - t))\, ds, \tag{4}$$

$$r = \frac{1 - t^B}{1 - t^E} i, \quad t^E = \theta t^D + (1 - \theta) t^G. \tag{5}$$

The capacity to pay dividends depends on profits net of the profit tax at rate τ,

$$\pi = f(K) - (i + m)B - \tau[f(K) - (i + m)B - \mu \cdot (K - B)], \tag{6}$$

where $f(K) \equiv \max_L F(K, L) - wL$ denotes maximized revenues net of wages. Profits are further reduced by the interest cost on outstanding debt B, consisting of an 'agency cost of debt' m and interest payments to investors at rate i, and by the profits tax. Interest payments are tax deductible. The tax base would be further reduced if firms were allowed to deduct an imputed cost of equity at rate μ on the value of equity.

[7] The simulation model includes an equity premium that declines with a higher payout ratio θ as in Poterba and Summers (1985). Dietz and Keuschnigg (2004) analyze formally how payout policy responds to taxation. This paper focuses on the debt-equity choice, instead.

[8] See Eqs. (2.5) and (2.11) in Auerbach (2002). The simulation model assumes that total dividends $D = \bar{D} + D^R$ decompose into an exogenous distribution $\bar{D}$ plus a variable dividend D^R that is linked to total returns as in (3) by an endogenously determined payout ratio θ. The constant part $\bar{D}$ implies that total dividends are rather stable, reflecting the empirical result ever since Lintner (1956) that firms adjust dividends slowly to new information. Maybe more importantly, the basic dividend reduces the variable part D^R which lowers the value of the "marginal" payout ratio θ needed to match the model with aggregate dividend payments. This reduces the weight of the dividend tax in the cost of equity and allows us to control for the importance of the new view versus the old view in our simulation analysis.

Excessive debt leverage comes at a cost. Available collateral of firms is stretched over a growing amount of debt making it more and more risky. The additional costs of high debt usage might come as bankruptcy costs (Bond and Meghir, 1994 or Auerbach, 2002) or moral hazard leading to risky strategies (Jensen and Meckling, 1976; Myers, 1977). When debt investors anticipate these problems, they request a premium m that increases with the debt asset ratio $b = B/K$ such that their return i net of bankruptcy costs remains constant. On the other side, a limited debt load might be beneficial to corporate governance since the fixed repayment tends to discipline managers, see Jensen (1986). To sum up, firms pay interest $i + m$ while investors only receive i. We assume that the agency costs of debt financing depend on the debt ratio, are globally convex and minimized for some natural debt ratio b^*. Formally,

$$m(b^*) = 0, \quad m'(b^*) = 0, \quad m''(b) > 0, \quad b \equiv B/K. \tag{7}$$

Investment and financial policies follow from value maximization subject to (2), (6) and (7). The Hamiltonian is $\mathcal{H} = (1-\tau)[f(K) - (i+m)B] + \tau\mu(K - B) - I + N + qI + \lambda N$. Given shadow prices of capital and debt, q and λ, the optimality conditions for investment I and new debt N are $q = 1$ and $\lambda = -1$. In the absence of adjustment costs relating to changes in capital or debt, the shadow prices immediately jump to their steady state values, implying $\dot{q} = \dot{\lambda} = 0$. The conditions for optimal levels of capital and debt are

$$K: \quad r = (1-\tau)\left[f'(K) + b^2 m'\right] + \tau\mu, \tag{8}$$

$$B: \quad r = (1-\tau)\left[m + bm'\right] + \tau\mu + (1-\tau)i. \tag{9}$$

For easier interpretation, we rewrite (9) and define a 'tax preference for debt' ∇:

$$\nabla \equiv \frac{r - \tau\mu - (1-\tau)i}{1-\tau} = m + bm'. \tag{10}$$

If debt and equity are treated equally on the personal level, the pretax returns are identical, $r = i$, see (5). Interest deductibility at the company level, however, creates a positive preference for debt equal to $\nabla = \tau i/(1-\tau)$. Firms could raise firm value by substituting expensive equity by cheap debt. However, more debt adds agency costs of $d(mB)/dB = m + bm'$. The optimal debt asset ratio is found when the tax preference is offset by the extra agency costs. In the absence of taxes, or with full financial neutrality of taxes, the debt preference is eliminated, implying a natural debt asset ratio b^* on account of (7). Using (9) to replace bm' in (8), we find the user cost of capital

$$f'(K) = b \cdot [i + m] + (1-b) \cdot \frac{r - \tau\mu}{1-\tau}. \tag{11}$$

The firm equates the marginal product of capital to its user cost. In a steady state, a fraction b of the capital stock is financed with debt and the remaining share $1 - b$ with equity. The user cost weighs together the relevant tax adjusted costs of equity and debt.[9]

[9] For a similar result, see Fuest, Huber and Nielsen (2003). In their work, a fraction b of firms is debt financed and a fraction $1 - b$ is equity financed. Here, financing shares reflect a representative firm.

2.2.3 Non-corporate firms

With non-corporate firms, all profits are considered as part of the entrepreneur's income which is subject to the income tax once. Under current tax law, the tax rate τ must be interpreted as the entrepreneur's income tax, without any further dividend tax, $t^D = 0$. However, when the firm is sold, she gets taxed on the capital gains equal to the difference between the sales value and the book value of the firm's assets at a rate equal to her personal income tax rate τ. Due to the interest gains during the holding period under the realization principle, the accruals equivalent rate is lower, $t^G < \tau$. The ADIT system instead taxes profits at the company level by the general profit (corporate) tax at rate τ and again at the personal level at the uniform rate t^S such that the cumulative tax burden of (supernormal) profits is equal to the top wage tax rate.[10] All profits are taxed on a current basis as part of private income, regardless of whether they are retained or distributed. Investment is thus financed by new equity and debt. Hence, $VN = I - N$ and $D = \pi$ in (2). Inserting into the no-arbitrage condition (1), one obtains $rV = \frac{1-t^D}{1-t^G}\pi + N - I + \dot{V}$ with $r = \frac{1-t^B}{1-t^G}i$. The Hamiltonian is $\mathcal{H} = \frac{1-t^D}{1-t^G}\pi + N - I + qI + \lambda N$. After a number of now familiar steps, the solution emerges as

$$\nabla \equiv \frac{\frac{1-t^G}{1-t^D}r - \tau\mu}{1-\tau} - i = m + bm', \quad r = \frac{1-t^B}{1-t^G}i, \tag{12}$$

$$f'(K) = b \cdot [i + m] + (1-b) \cdot \frac{\frac{1-t^G}{1-t^D}r - \tau\mu}{1-\tau}. \tag{13}$$

2.2.4 Neutrality of ADIT

The shareholder tax as part of ADIT is levied at a uniform, flat rate t^S on all types of capital income at the personal level, $t^D = t^G$. Since ADIT includes a surcharge to compensate for the interest gains from tax deferral under the realization principle, it equates the dividend tax rate with the *accruals equivalent* capital gains tax rate. The tax rate on equity as listed in (5) thus becomes independent of the dividend payout ratio θ. In other words, ADIT is neutral with respect to the dividend payout policy of firms and treats retained earnings and new equity on an equal footing.

In addition, ADIT also equates the tax rates on interest and equity income, $t^E = t^B$, and therefore treats equity and debt fully neutral at the personal level. Consequently, the cost of equity becomes equal to the market rate of interest, $r = i$, as is evident from (5). To achieve neutrality, the equal treatment of equity and debt must also be extended to the company level which is achieved by allowing tax deductibility of the imputed cost of equity. Setting the cost of equity equal to the market rate of interest (on safe bonds) on account of the uniform shareholder tax, the appropriate allowance is equal to the interest rate, $\mu = r = i$, which is fixed by the residence principle of

[10] Technically, the status quo is represented by τ equal to the personal income tax rate and $t^D = 0$ while the (accruals equivalent) rate $t^G > 0$ is levied on the capital gains realized by a change in ownership. Under SDIT, τ is reduced to the general profits tax while both distributed profits and capital gains arising from retained profits get uniformly taxed at the uniform (accruals equivalent) rate $t^D = t^G = t^S$.

interest taxation to the world interest rate. Substituting into (10) shows that ADIT entirely eliminates the distortion in the debt asset ratio, $\nabla = 0$. Firms will accordingly choose the natural leverage b^* as in the absence of taxation which minimizes total agency costs $bm(b)$.

The most important advantage of ADIT is its investment neutrality. Since the ACE system allows for a tax deduction of all costs of finance, including both debt and an imputed cost of equity, it entirely eliminates the investment tax wedge. With $\mu = r$, the profit tax disappears from the user cost of capital in (11), $f'(K) = b^* \cdot [i + m] + (1 - b^*) \cdot r$. Noting $r = i$ by uniform taxation at the personal level, and $m(b^*) = 0$ on account of neutrality towards financial decisions, ADIT is seen to be fully neutral with respect to investment. The user cost of capital is equal to the world rate of interest, $f'(K) = i$.

The ADIT tax system is also neutral with respect to financing and investment of non-corporate firms since these firms are treated exactly the same as corporations. The entrepreneur's income tax τ is now set equal to the general profits tax while returns in terms of distributed profits and realized capital gains are taxed at the uniform (accruals equivalent) rate of the shareholder tax, $t^D = t^G = t^S$, which also applies to interest income, $t^B = t^S$. Therefore, (12) implies $r = i$ and $\nabla \equiv \frac{r - \tau\mu}{1-\tau} - i$. Noting the allowance for the cost of equity at a rate $\mu = r$ shows that ADIT is neutral with respect to the entrepreneur's debt equity choice, $\nabla = 0$. The same substitutions in (13) yield $f'(K) = i$ if the agency cost is zero at the optimally chosen debt asset ratio. ADIT is thus neutral with respect to investment and, by implication, also with respect to the allocation of capital between the non-corporate and domestic corporate sectors, $f'(K^{NC}) = i = f'(K^{DC})$.

2.2.5 Moving from the status quo to ADIT

With this stylized model, we can already indicate some key adjustments following an implementation of the ADIT reform. First, the reform completely removes an initial tax bias $t^D > t^G$ against corporate distributions. The dividend payout ratio will increase significantly. Current taxation implies a preference for debt, corresponding to $\nabla > 0$ in (10), which is the net result of equity being favored on the personal level and debt being favored on the company level. Removing the tax distortion should reduce the debt asset ratio slightly. Moving to ADIT will tend to strengthen the equity base of companies.

Interest on debt is taxed more heavily at the personal level than the average return to equity. Since all assets must yield the same net return, the personal tax preference for equity implies a cost of equity smaller than the cost of debt, $r < i$, see (5). The introduction of ACE removes the tax wedge on investment at the company level which reduces the user cost of capital. The second effect is much more important. ADIT substantially reduces the user costs of capital and thereby promotes investment.[11]

[11] By the envelope theorem, the effect of the tax reform on the optimally chosen debt asset ratio does not influence investment. The differential of (11) yields $f'' dK = [i + m + bm' - \frac{r - \tau\mu}{1-\tau}] \cdot db + (1 - b) \cdot d\frac{r - \tau\mu}{1-\tau}$. The square bracket disappears when the debt asset ratio is optimally chosen as in (10). The formula also

3 Quantitative assessment

3.1 The simulation model

Assessing the quantitative effects of a far reaching tax reform obviously requires a general equilibrium model of the economy. The stylized analysis of the preceding subsection reflects only the bare bones of the rich economic structure of our computational model. We briefly state the most important additional model features.[12]

3.1.1 Savings

Household decisions are based on an overlapping generations model in the tradition of Blanchard (1985). The level of savings follows from the intertemporal consumption choice of individual households. The model is extended to endogenous labor supply and portfolio composition of savings. Household sector decisions follow, after aggregation, from the maximization of life-time utility $(\bar{U}_t)^\mu = \sum_{s=t}^{\infty}(\beta\rho)^{s-t}[C_s - \varphi(l_s)]^\mu$ subject to a budget constraint[13]

$$G\Pi\bar{A}_{t+1} = \left(1+\bar{\imath}_t^n\right)\bar{A}_t + T_t^H + (1-t^L)w_t l_t - (1+t^I)C_t. \tag{14}$$

Our assumption that within period preferences $C - \varphi(l)$ are additively separable excludes intertemporal substitution in labor supply and eliminates income effects. Consequently, labor supply exclusively depends on the current real wage,

$$\varphi'(l_t) = \frac{1-t^L}{1+t^I}w_t. \tag{15}$$

3.1.2 Portfolio composition

The long-run level of accumulated savings $\bar{A}$ is mainly driven by the average net of tax portfolio return $\bar{\imath}^n$ and disposable labor income. The simulation model realistically allows for small return differentials among imperfectly substitutable assets, reflecting in part the well documented home bias in international portfolio diversification, see French and Poterba (1991) and Gordon and Bovenberg (1996). Savings can be invested in domestic and foreign government debt and business bonds, equity of domestic corporate and noncorporate firms, and in shares of domestic and foreign multinational

shows that allowing for debt finance is very important for quantitative analysis since the impact of profit taxation is scaled down by the size of the debt asset ratio: $f''dK = (1-b)\cdot d\frac{r-\tau\mu}{1-\tau}$.

[12] A complete documentation of the model (Keuschnigg, 2004b) is available upon request.

[13] The notation refers to $\sigma^C = 1/(1-\mu)$ intertemporal elasticity of substitution, C consumption, l labor supply, ρ subjective discount factor, β survival probability, and $\varphi(l)$ convex increasing effort cost. The model includes exogenous productivity and inflation trends but is presented in detrended form where G is one plus the rate of productivity growth and Π is one plus the inflation rate. In the budget, $\bar{A}$ is accumulated savings, $\bar{\imath}^n$ net of tax portfolio return, w wage rate, T^H lump-sum transfers, t^L and t^I are the rates of wage and indirect taxes.

firms. The simulation model, however, does not allow for owner-occupied housing and tax favored institutional investors such as pension funds. It thus cannot capture the potential efficiency gains of a more neutral allocation of savings and investment when the personal tax rate on non-favored financial assets is reduced.[14] The composition of savings follows from portfolio choice using preferences $A[(1+i^{n,i})A^i, i=1,\ldots,I]$ over end of period wealth, similar to Sørensen (2001). The maximization is subject to the budget $\bar{A}=\sum_i A^i$. Preferences are of the linear homogeneous CES type with an asset substitution elasticity σ^A. The solution yields asset demand functions that are proportional to overall portfolio wealth and increase in the net of tax return of asset A^i relative to a "rate of return index". The average portfolio return $\bar{\imath}^n$ for intertemporal decisions follows from

$$(1+\bar{\imath}^n)\bar{A}=\sum_i (1+i^{n,i})A^i. \tag{16}$$

Domestic savings flow into home and foreign assets and foreign investors demand home issued assets which leads to international cross ownership of assets.[15] Invoking the 'small' open economy assumption, foreign rates of return and the overall level of foreign savings are exogenous to Swiss investors. Domestic rates of return must adjust to clear the relevant asset markets. For example, domestic business debt is issued by domestic corporate and non-corporate firms as well as the domestic subsidiaries of home and foreign based multinationals. The interest rate i^B must adjust to equate the supply of business debt with demand by home and foreign investors. The market clearing interest on domestically issued public debt is i^G. Equity of domestically owned corporate and non-corporate firms is non-traded and similarly yields a market clearing rate of return. Finally, equity of multinational firms is traded on international stock markets where a perfectly elastic foreign demand fixes the gross rate of return. In this case, domestic personal taxes cannot influence the gross return. An increase in domestic dividend and capital gains taxes will only reduce the net returns and thereby depress domestic demand for these shares, see Devereux (2000).

3.1.3 Multinational investment

In- and out-going FDI stems from home and foreign based multinationals.[16] These firms are listed on international stock markets where the marginal investor is most likely

[14] Swiss taxpayers must add imputed rent on owner occupied housing to taxable income but can also deduct interest on mortgages. The tax distortion is probably smaller than in other countries.

[15] See Devereux (2004), Huizinga and Nielsen (1997), Keen and Ligthart (2006) and Slemrod, Hansen and Procter (1997), among others.

[16] A home based multinational faces an exogenous gross return on equity r^m and maximizes total value $r^m V_t^H = D_t^{HH} + D_t^{HF} + G\Pi V_{t+1}^H - V_t^H$. Given r^m, we calculate net of tax returns for its domestic investors. The firm generates dividends from domestic and foreign subsidiaries, $D^{HH}=\pi^H + BN^H - (I^H - \delta K^H)$, where BN^H is new debt issued at home and π^H is domestic profits net of corporate tax. D^{HF} is similarly defined. The foreign subsidiary's net profit is $\pi^{HF}=Y^{HF}-p^{QH}Q^H - w^F L^{HF} - (m^{HF}+i^{BF})B^{HF} - \delta K^{HF} - \tau^{HF}\tilde{\pi}^{HF}$. The term $p^{QH}Q^H$ is the cost of services and goods supplied by the domestic parent company, evaluated at a transfer price p^{QH}, creating net revenues $(p^{QH}-1-c^H)Q^H$ for the parent company. The tax manipulation cost c^H progressively rises when the transfer price deviates

Table 1 Parameter values

Parameter	Value	Parameter	Value
Interest rate	$i = 4\%$	Labor supply elasticity *	$\epsilon_L = .2$
Inflation rate	$\pi = 1\%$	Intertemporal substit. elast.**	$\sigma_C = .5$
Technology growth	$g = 1.8\%$	Elasticity of capital demand***	$\epsilon_K = 1$
Capital depreciation	$\delta = 10\%$	Blanchard survival probability	$\beta = .95$

Note: *See Blundell and MaCurdy (1999). **See Kydland and Prescott (1982) and Hansen and Singleton (1983). ***See Fuchs, Krueger and Poterba (1998) and Hassett and Hubbard (2002).

a foreign or tax exempt institutional investor not subject to domestic personal taxes. Therefore, the return to equity of multinational firms is fixed internationally while personal taxes can affect the cost of equity of domestically owned firms. This different response to domestic personal taxes is mostly overlooked in existing quantitative studies. On the other hand, a reduction in corporate taxes stimulates investment by all firms and, in particular, multinational investment. In addition, our model allows for profit shifting through transfer pricing. It includes a fixed factor for each sector, thereby giving rise to limited rents and supernormal profits that continue to be taxed with the profit tax despite of the ACE deduction. Finally, all types of firms compete on a common domestic labor market and pay the same wage. For this reason, tax policy may lead to crowding out among firms.

3.1.4 Net foreign wealth

Given the investment and consumption choices of intertemporally optimizing agents with perfect foresight, the home economy's current account reflects the differential trends in savings and investment at home and eventually results in an endogenously adjusted net asset position.

3.1.5 Parameters

We start from long run averages of the required data series of the Swiss economy. The model is then calibrated to replicate these averages as a stationary equilibrium. In particular, we are careful to parameterize the important behavioral margins, including financial decisions of firms. Table 1 shows the most important parameter values. In calibrating debt equity choice, we follow Gordon and Lee (2001) who estimate that a decrease in the corporate tax by 10% points reduces the debt asset ratio by three to four percent. We model payout policy along the lines of Poterba and Summers (1985) and

more from the marginal cost of 1. The term $\tau^{HF}\tilde{\pi}^{HF}$ is the total tax paid on foreign subsidiaries where $\tilde{\pi}^{HF}$ is the tax base and $\tau^{HF} = \tau^{F}$ is the effective tax rate under the exemption method which is mostly applied by Switzerland. The deduction or partial credit methods could also be supported. With optimal investment allocation to home and foreign subsidiaries, pretax marginal products of capital must yield a common gross return on equity after corporate taxes, $(1-\tau^{e,H})Y_K^H = r^m = (1-\tau^{e,HF})Y_K^{HF}$, where $\tau^{e,H}$ is the EMTR on domestic investment and $\tau^{e,HF}$ on outbound FDI. Foreign based multinationals are modeled symmetrically. The contribution of multinationals to domestic GDP thus stems from domestic subsidiaries of home and foreign based subsidiaries as listed in Tables 5.

Table 2 Tax rates in Switzerland: Status Quo vs. ADIT

		Status Quo		ADIT	
Tax on		DC	NC	DC	NC
Profits	t^U	23.2%	37.3%	23.2%	23.2%
Allowance for equity	μ	no	no	yes	yes
Capital gains	t^G	4.3%	15.3%	18.4%	18.4%
Dividends	t^D	37.3%	–	18.4%	18.4%
Interest	t^B	37.3%	37.3%	18.4%	18.4%
Wages	t^L	37.3%	37.3%	37.3%	37.3%
Value added	t^I	7.6%	7.6%	–	–
Property	t^W	0.7%	0.7%	0.7%	0.7%

Note: DC: Domestic Corporations. NC: Noncorporate Firms. ADIT: Dual Income Tax with Allowance for Cost of Equity.

Poterba (2004) who estimate the impact on the payout ratio of a change in the relative tax treatment of dividends and capital gains. Grullon, Michaely and Swaminathan (2002) estimate the response of the equity premium to a (tax induced) change in the payout ratio. We will provide a series of sensitivity tests to check the robustness of results with respect to key behavioral parameters.

3.2 The current tax system

Table 2 reports the current structure of Swiss tax rates.[17] In the status quo, wages, interest payments, dividends, and profits of noncorporate firms are all subject to the personal income tax at the same rate. Capital gains on movable private property including shares in corporate firms are, in principle, tax exempt. An exception to this rule are, for example, individuals classified as professional traders who must declare realized capital gains as part of their taxable income. In contrast, capital gains realized upon selling or transferring noncorporate firms are fully taxed. Since the profits of noncorporate firms are taxed on a current basis and are independent of the payout decision, capital gains taxes are less important for these firms.

Figure 1 shows effective marginal tax rates (EMTR) on investment by source of finance, and separately for domestic corporate and non-corporate firms. EMTRs measure the size of the overall tax wedge between a firm's pretax return and an investor's net of tax return in percent of the pretax return, taking account of all taxes at the firm and personal level.

The Swiss tax system distorts on several important margins. Corporate taxation in Switzerland follows the classical system where profits are first taxed at the corporate level and, if distributed, are taxed again as dividends. This double taxation contrasts with the effective tax exemption on capital gains. Since the return on internally financed investments consists of lightly taxed capital gains, it bears a very low EMTR of 33.4%. Alternatively, corporations may pay out profits and finance investment externally with

[17] Cantons and municipalities of the Swiss federation autonomously choose tax rates on personal and corporate income, resulting in pronounced tax differentials across regions. Focusing on the structure of the tax system, we average the top tax rates on personal and corporate income and using cantonal GDP.

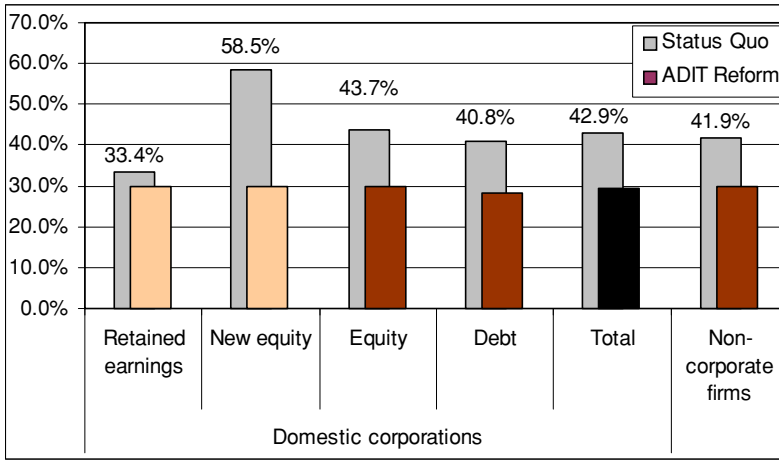

Fig. 1 Effective marginal tax rates on investment: Status quo versus ADIT

new equity. Using this strategy, the return on investment financed with new equity consists of dividends which are subject to double taxation. For this reason, the EMTR on new equity is much higher, equal to 58.5%. The strong tax bias against dividends and external risk capital has left its mark on the typical financial structure of Swiss corporations. Most firms retain their earnings in order to save the dividend tax and create lightly taxed capital gains. Many firms do not pay dividends at all.

In defining the macroeconomic impact of the dividend tax, our model adheres to the old view of dividend taxation and assumes that the cost of equity financing is a weighted average of the dividend and capital gains tax rates. The dividend payout ratio, taken to be .4, serves as weight for the impact of the dividend tax. Using the tax rates of Table 2, the average tax on equity on the personal level is $.4 \times .373 + .6 \times .043 = 17.5\%$ which determines, together with the wealth or property tax and the profit tax, the EMTR on equity in Fig. 1. Under the new view of dividend taxation, firms finance marginal investment with retained earnings so that the dividend tax becomes irrelevant for capital accumulation, see Auerbach (2002). Recently, Chetty and Saez (2005) emphasized the interaction of agency problems and dividend payments. They argue that higher dividend taxes induce big firms to keep excessive amounts of capital. In addition, new firms facing start-up costs and having to make an initial capital infusion will have to raise new equity initially and thus anticipate future dividend taxes, see Sinn (1991) and Dietz (2003). Both ideas imply that the dividend tax distorts capital accumulation.

Looking at the three sources of finance separately, the Swiss tax system induces the familiar hierarchy of finance or pecking order of financial sources. Comparing the cost of debt with the weighted cost of equity indicates a moderate tax bias of about two percentage points in favor of debt finance. However, this non-neutrality is the net effect of two larger distortions on the company and personal level, see Miller (1977). The personal tax rate on equity is an average of dividend and capital gains tax rates. Since capital gains are largely untaxed in Switzerland, the weighted tax rate on equity falls short of the interest tax. Interest on business debt is deductible from the corporate

tax basis which strongly favors debt on the corporate level.[18] Putting corporate and personal taxes together results in a moderate preference for debt finance. For noncorporate firms, profits are taxed only once so that there is no double taxation. As before, interest on debt is subject to the interest tax. Since profit and interest taxes coincide, see Table 2, there is no distortion between debt and equity.

The investment incentives by personal and corporate firms determine the sectoral allocation of capital. Weighing together the EMTRs for debt and equity financed investments by the average ratio of debt to total capital, we obtain the EMTR of total investment with mixed financing. Taking a debt asset ratio of roughly .28 for corporations, their total EMTR amounts to $.72 \times .437 + .28 \times .408 = 42.9\%$. Comparing this to the EMTR of 41.9% for noncorporate firms indicates that, on average, the Swiss tax system is largely neutral with respect to organizational form. However, the average numbers tend to mask a considerable heterogeneity across firm sizes. In reality, firms tend to switch from personal to corporate status when they become bigger. These firms must rely much more on external risk capital, i.e. new equity which bears a much higher tax load under corporate form. Our average calculations may understate the distortion of organizational choice.

The front row of Fig. 1 plots the EMTRs on investment that would result from implementing the ADIT proposal. Quite obviously, the ADIT reform entirely eliminates the tax distortions by source of finance or by choice of legal form. The small visible differences stem from the different size of the equity premium (four percent) and the intermediation margin on business debt (three percent). More importantly, the size of the EMTRs is uniformly reduced due to the investment neutrality on the firm level. The remaining tax wedge and size of EMTRs reflect moderate taxation at the personal level, consisting of the wealth tax and the shareholder tax as part of ADIT. The substantial reduction of the EMTRs and of the user cost of capital is key to promoting growth.

3.3 Long-run effects

Table 3 reports the long-run effects of a stepwise cumulative introduction of the ADIT reform. The first lines document the tax parameters that identify the type of scenario. Column "Base Case" refers to the initial steady state prior to reform. "Shareholder Tax" means a dual income tax which eliminates distortionary taxation between dividends and capital gains and treats personal and corporate sectors equally. "Reduced Interest Tax" extends the shareholder tax to interest income. Column ADIT reports the results of the complete scenario by additionally introducing the ACE allowance for the opportunity cost of equity. In all three columns, the budget is balanced by adjusting the value added tax. The last column "ADIT w/ lump sum" finances instead by lowering lump-sum transfers. We keep a constant GDP share of government spending and a constant ratio of government debt to capital. This shifts the tax burden, to some extent, to future generations which tend to gain the most from any growth enhancing policy.

[18] See MacKie-Mason (1990), Graham (1996) and Graham, Lemmon and Schallheim (1998) for empirical evidence. Graham (2003) summarizes the empirical strategy and discusses further literature.

Table 3 Long-run effects

	Variable	Base case	Shareh. tax	Reduced Int. Tax	ADIT	ADIT w/ lump sum
μ	Allowance for equity	no	no	no	yes	yes
t^U	Profit tax	23.22	23.22	23.22	23.22	23.22
t^S	Shareholder tax	37.32	18.36	18.36	18.36	18.36
t^B	Interest tax	37.32	37.32	18.36	18.36	18.36
t^I	Indirect tax	7.60	8.91	10.05	11.57	7.60
b	Av. debt ratio	30.61	31.48	33.23	29.47	29.28
θ^c	Payout ratio, dom.corp.	40.00	55.00	55.00	55.00	55.00
u^c	User cost, dom.corp.	9.60	10.30	10.01	8.50	8.69
r^c	Cost of equity, dom.corp.	8.68	9.24	9.01	9.58	9.77
i^{BH}	Interest on bus. debt	9.83	9.74	8.75	7.96	8.17
$\bar{\imath}$	Av. portfolio return	5.26	5.42	5.73	5.79	5.90
w	Market wages	%)	−0.67	0.47	3.72	3.21
w^h	Net wages	%)	−1.86	−1.76	0.03	3.21
L^s	Employment	%)	−0.37	−0.36	0.01	0.63
K	Aggregate capital	%)	−1.96	0.55	8.36	8.06
Y	Gross dom.product	%)	−0.84	−0.14	2.43	2.74
Y^*	Gross nat.product	%)	−0.41	2.53	4.77	4.33
C	Priv. consumption	%)	−0.31	2.35	3.71	3.49
A	Total assets/GDP	4.10	4.30	4.65	4.70	4.56
A^F	Net For. assets/GDP	0.65	0.70	0.98	0.95	0.86

Note: %) Percentage changes. Other values are absolute. Columns introduce ADIT step by step. 'Shareholder Tax' sets $t^D = t^G = t^S$ for corporations and introduces the profit tax combined with the shareholder tax t^S for non-corporate firms. Next column reduces interest tax to $t^B = t^S$. ADIT completes the reform by adding an Allowance for Corporate Equity. The reform is financed with VAT, lump-sum only in the last column.

3.3.1 Shareholder tax

The first step extends the corporate tax to non-corporate firms and at the same time replaces existing taxation of equity returns on the personal level by a flat uniform tax at a reduced rate. For corporations, dividend and effective capital gains tax rates are set equal to the rate of the shareholder tax satisfying $(1 - t^U)(1 - t^S) = 1 - t^L$. The negative effects mainly originate from the more effective taxation of capital gains which is also a step towards a more equitable taxation. Up to now, capital gains on shares are much tax favored. With $\theta = .4$, Eq. (5) yields a weighted tax rate on corporate equity of $t^E = .4 \times .373 + .6 \times .043$ equal to 17.5% which now rises to 18.4%, the rate of the shareholder tax. Consequently, the savings tax wedge increases and eventually results in a slightly higher overall EMTR and higher user costs of capital. Non-corporate firms are not much affected. The shareholder tax scenario essentially replaces the entrepreneurs' income tax by separate profit and shareholder taxation with an overall tax burden equal to the top personal income tax rate. In fact, this scenario also eliminates a small surcharge to the income tax of about two percentage points that stems from unfavorable treatment of entrepreneurs in the pension system which should not be part of a system of capital income taxation. Investment incentives of multinational firms are not directly affected by the shareholder tax. Since their gross

Table 4 Portfolio structure

Ass.	Base Case		Shareh.Tax		Int.Tax		ADIT		ADIT^{LS}	
	$A^j/\bar{A}$	$i^{n,j}$	$\hat{A}^j$	$i^{n,j}$	$\hat{A}^j$	$i^{n,j}$	$\hat{A}^j$	$i^{n,j}$	$\hat{A}^j$	$i^{n,j}$
$\bar{A}$	100.00	5.26	3.89	5.42	13.32	5.73	17.43	5.79	14.34	5.90
A^{VC}	17.58	2.46	8.75	3.09	13.12	2.90	21.75	3.37	19.03	3.53
A^{VN}	22.42	2.46	3.41	2.58	7.13	2.34	9.48	2.28	7.01	2.43
A^{mH}	8.27	2.46	10.26	3.24	16.83	3.24	20.16	3.24	15.70	3.24
A^{mF}	2.00	2.46	8.61	3.08	15.08	3.08	18.36	3.08	13.97	3.08
A^{BH}	7.54	2.46	1.70	2.40	19.15	3.44	15.13	2.80	12.74	2.97
A^{BF}	20.52	2.46	2.24	2.46	22.90	3.76	26.40	3.76	21.72	3.76
A^{GH}	12.70	2.46	−1.74	2.05	1.55	1.80	9.52	2.28	9.01	2.62
A^{GF}	8.97	2.46	2.24	2.46	15.43	3.11	18.72	3.11	14.32	3.11

Note: Net returns $i^{n,j}$ (net of taxes and net of equity premium) are absolute, i.e. $i^{VC} = r^{VC} - t^W$ or $i^{GH} = (1 - t^B)i^{GH} - t^W$. Column Base Case reports asset shares in total portfolio wealth $\bar{A}$, the other columns give percentage changes of demand for types of assets. Asset demand is for equity of domestic corporate and non-corporate firms (A^{VC} and A^{VN}), equity of home and foreign based multinationals (A^{mH} and A^{mF}), home and foreign issued business debt (A^{BH} and A^{BF}), and home and foreign issued public debt (A^{GH} and A^{GF}).

return on equity is internationally fixed, a change in personal taxes will only affect the savings tax wedge and thus influence domestic demand for shares of multinationals. Finally, the scenario loses considerable tax revenue on account of roughly halving the dividend tax while the capital gains tax increase is narrowly based and thus cannot make up for the losses. The value added tax must be raised accordingly which erodes the real wage and discourages labor supply.

Clearly, the first scenario encourages savings, although selectively, since it favors investments in equity over interest bearing assets and therefore triggers portfolio adjustments, see Table 4. The average net of tax portfolio return increases from 5.26 to 5.42% and induces a 3.9% increase in financial wealth.[19] As the dividend tax cut substantially raises corporate firm values, investors allocate a larger share of their savings to these assets. The value of equity holdings in domestically owned corporations increases by 8.75% which induces a higher net return of 3.09% up from 2.46. Even though the tax rate t^E on corporate equity increases only to a minor extent, the increase in the required net return to investors inflates the cost of equity listed in Table 3, rising from 8.68 to 9.24%, and ultimately ends up in the user cost of capital rising substantially to 10.3%. Now, the macroeconomic effects are straightforward. Higher user costs of domestic corporations discourage investment, thereby reducing capital intensity by $dK/K - dL/L \equiv \hat{K} - \hat{L} = -1.96 + .37 = -1.6\%$ and market wages by $-.67\%$. Since the value added tax must be raised by 1.3 percentage points, the net of tax real wage declines considerably by -1.9%. Labor supply and employment shrink by .4% which magnifies the negative effect on capital accumulation (-2%). GDP and consumption must fall as well. Reflecting the net effect of a higher portfolio return

[19] In Table 4, the average net of tax portfolio return $\bar{\imath}$ includes the exogenous "risk premia" on equity and debt, equal to 4 and 3 percent. The net return $i^{n,j}$ for each asset states the net, "certainty equivalent" return without premium. These are equal to 2.46% across assets in the initial equilibrium while the average portfolio return is higher, indicating that the premium also gives rise to extra asset income.

and reduced net wages, the induced savings lead to a minor increase in net foreign assets. The scenario also changes the financial behavior in the business sector. Since the shareholder tax, including an accruals equivalent capital gains taxation, entirely eliminates the tax bias against dividends, the payout ratio rises from 40% initially to the 'natural' rate of 55% that is chosen in the absence of any tax distortion. On average, firms prefer to rely more on new debt as a source of investment financing. The average debt asset ratio increases by almost one percentage point. The reason is that the cost of equity for domestic corporations increases while the market rate of interest slightly declines.

3.3.2 Reduced interest tax

Next, we extend the shareholder tax rate of 18.36% to interest income which is approximately half of the initial rate of 37.32%. The tax cut increases net returns to interest bearing assets specifically and the average portfolio return in general. This boosts savings and adds a 13.3% increase to household financial wealth, see Table 4. The expansion of savings increases demand for all assets, but mostly flows into interest bearing assets. Domestic and foreign issued business debt as well as foreign government debt expand significantly more than the level of overall savings. Since demand tends to increase in line with the growth of overall portfolio wealth, the market rate of interest on public debt must fall to ration demand. The declining domestic interest induces foreigners to shift away from this asset, leaving domestic demand to increase by 1.55%. Halving the interest tax wedge allows for a higher net return to savers (with the exception of public debt) and simultaneously a lower gross interest rate to firms.

The strong increase in the volume of savings leads to lower rates of return on all assets. Since households shift out of equity into interest bearing assets, domestic interest rates fall much more than equity returns. The net effect is a minor reduction of the gross return on equity to 9% and a large fall in the market rate of interest to 8.75% in Table 3. As equation (11) demonstrates, both effects strengthen investment incentives of domestic firms, corporate and non-corporate. Multinationals benefit only from the lower interest on the domestic cost of debt since the cost of equity is fixed on international stock markets. Now, the economy's average capital intensity increases rather than declines as in the preceding scenario, and the market wage goes up by .47%. Since the interest tax cut again loses revenue, indirect taxes have to be increased further by more than one percentage point. The net of tax real wage therefore falls almost as much as before and employment still declines by .36% compared to the base case which again leads to a minor loss of GDP by −.14%. Aggregate consumption, however, expands by a remarkable 2.35% which results from larger financial income out of a higher level of savings that also earns a higher portfolio return. A considerable part of the extra savings is invested internationally and thereby results in a net asset position of almost hundred percent of GDP. The extra net foreign capital income substantially adds to national income and leads to an increase in GNP, equal to GDP plus net foreign capital income, of 2.5%.

The cut in the interest tax is needed for neutral treatment of debt and equity at the personal level. Viewed in isolation, it induces more debt leverage. By (10) and (5), a cut in the interest tax raises the net interest and, along with it, the opportunity

cost of equity. As it makes debt more attractive on the personal level, the interest tax cut raises the debt preference of firms. Consequently, the debt asset ratio must increase, compared to the preceding scenario. The tendency for increased leverage is reinforced by asset market adjustment which reduces gross interest on business debt by a full percentage point while the cost of equity falls only by a relatively minor extent.

3.3.3 ADIT

The effects of the complete scenario are reported in column "ADIT" . Viewed in isolation, the last step introduces a tax allowance equal to the opportunity cost of equity. In the simplest case of Eqs. (10) and (11), the imputed cost of equity is equal to the market rate of interest on debt ($\mu = r = i$) and must, in general, be endogenously determined. As discussed in Section 2.2, the tax allowance eliminates the investment tax wedge for all types of firms and extends the equal treatment of debt and equity to the company level. In making both financing costs tax deductible, ADIT is fully neutral with respect to debt equity choice. Compared to the preceding scenario, the average debt asset ratio thus falls by roughly 4 percentage points to 29.47%, and declines by more than 1 percentage point if compared to the status quo. The cost of this initiative is that it reduces the profit tax liability to zero for firms that earn no more than a normal rate of return and thereby again loses considerable tax revenue which requires a further increase in indirect taxes. In long-run equilibrium, the value added tax rate would have to increase by a 4 percentage points, up from 7.6 to 11.6%.

Introducing ACE substantially cuts the average tax burden and raises firm values by 22% for domestic corporations and 9.5% for non-corporate firms. To induce the required portfolio reallocation, investors must be offered a higher net return on domestic corporate equity, see Table 4, which, in turn, raises the cost of equity. The elimination of the investment tax wedge allows at the same time a remarkable decline in the user cost, falling to 8.5% from the initial 9.6. User costs fall for all types of firms, yielding an economy wide investment boom. In the long-run, the capital stock is up by more than 8%. The higher capital intensity pushes up the market wage by 3.7% and eliminates the decline in the net real wage caused by the preceding steps. The decline in labor supply is reversed and employment is roughly the same as under the status quo. Since the labor force no longer shrinks, capital accumulation is much more effective in raising GDP. Reflecting the savings response and the increased net foreign asset position, GNP increases substantially by 4.8%.

Table 5 shows the differential impact of the full tax reform on domestic and multinational firms. The first line documents the sectoral employment shares in the domestic labor force. Switzerland is home to quite a number of world renowned multinational firms employing a remarkable 22% of the labor force. Domestic corporations and non-corporate firms employ 48% and 30% of total labor, respectively. The table reveals that the aggregate results of Table 3 mask a considerable heterogeneity in the response of the business sector. For variables that are stated in absolute values, the upper left number is the rate in the status quo and the lower right number reports the same figure after the ADIT reform. The numbers for user cost of capital and cost of equity are found again in Table 3 for domestic corporations.

Table 5 Results by sector

	DC		NC		Mh		Mfh	
	SQ	ADIT	SQ	ADIT	SQ	ADIT	SQ	ADIT
Labor share	48.00		30.00		15.70		6.30	
EMTR Total	43.71		47.84		51.77		46.96	
		28.66		30.07		29.41		25.28
EMTR Saving	28.93		17.63		39.12		33.05	
		28.66		30.07		29.41		25.28
EMTR Investment	20.79		36.68		20.78		20.78	
		0.00		0.00		0.00		0.00
Debt ratio	28.04		39.86		29.06		29.06	
		28.39		35.98		26.97		26.97
User cost of capital	9.60		10.36		10.00		10.00	
		8.50		7.48		7.92		7.92
Cost of equity	8.68		7.63		9.00		9.00	
		9.58		8.55		9.00		9.00
Labor demand %		−3.85		−2.65		12.06		12.01
Capital stock %		2.51		7.20		22.46		22.40
Produktion %		−1.53		−0.29		14.77		14.71

Note: %) Percentage changes. Other values are absolute. DC: Domestic Corporations. NC: Noncorporate Firms. Mh: Multinationals at home. Mfh: Foreign Multinationals. SQ: Status Quo. ADIT: Dual Income Tax with Allowance for Equity.

The cost of equity for multinationals are determined on international stock markets and thus remain constant. The cost of equity for domestic firms increases quite significantly. The reduced personal taxation of foreign source interest income results in higher net of tax returns on foreign assets whereas pretax returns are internationally fixed. With multinational firms, the dividend tax cut weighs more heavily than the capital gains tax increase since the dividend payout ratio of the very large multinational firms tends to be higher than with domestic firms. Consequently, the tax reform reduces the effective personal tax $t^E = \theta t^D + (1-\theta)t^G$ on returns to multinational shares and thereby boosts the net return quite significantly as Table 5 verifies by the reduction in the EMTR on savings.[20] With a high degree of asset substitutability, the net return on domestic equity must increase when net returns on other assets rise. Without any compensating reduction of the tax rate t^E for home corporations (which slightly increases, in fact), the cost of equity is pushed up as well. For this reason, the investment stimulus is concentrated more with multinational rather than domestic firms. Since all firms compete in the same labor market, multinational firms end up crowding out employment by domestic firms quite considerably. Weighing together the sectoral percentage changes in employment with the sectoral employment shares yields the macroeconomic employment effect in Table 3: $-3.85 \times .48 - 2.65 \times .3 + 12.06 \times .157 + 12.01 \times .063 = +.01\%$.

[20] If $u = Y_K - \delta$ is the user cost, r^e the gross return on equity and $r^n = i^{n,V} + p$ is the net of tax return including the equity premium (note that Table 4 reports the net return exclusive of the premium), the EMTR on investment is given by $\tau^{e,i} = (u - r^e)/u$ and the EMTR on savings by $\tau^{e,s} = (r^e - r^n)/r^e$, see Table 5. The overall tax wedge thus amounts to $r^n = (1-\tau^{e,s})(1-\tau^{e,i})u$.

3.3.4 ADIT w/ lump sum

The last scenario recomputes the effects of the complete ADIT proposal, but adjusts lump-sum taxes on households instead of the value added tax to make up for the lost tax revenue. This yields two main consequences. First, it avoids the extra distortion against labor supply since the marginal tax on labor income remains unchanged. Gross and net real wages thus increase by the same percentage, i.e. 3.21%. This stimulates additional labor supply which expands employment by .63% in the long-run and facilitates the macroeconomic expansion.

Second, a higher lump-sum tax on labor and a higher VAT both reduce real value of disposable wage income. A higher VAT, however, also erodes the real value of pre-existing wealth and thereby induces more savings than the lump-sum tax. With aggregate savings lower in the lump-sum scenario, the net portfolio return must increase by more in order to elicit the necessary savings. Since foreign rates of interest are fixed and capital income tax rates remain unchanged, higher net returns translate into higher market rates of interest on domestic business debt and a higher cost of equity. The user costs of capital rise and thereby retard investment to a moderate extent. Despite of the extra employment, the capital stock grows by a somewhat smaller amount compared to the main ADIT scenario. The capital intensity thus falls relative to ADIT, explaining the smaller increase in the gross wage. Despite of a slightly reduced capital stock, the extra employment results in an even more vigorous expansion of GDP. Aggregate consumption swells by 3.5% relative to the status quo. Finally, the smaller savings response also translates into a more moderate increase in the net foreign asset position and a somewhat smaller increase in GNP of 4.3%.

3.4 Transitional effects

The ADIT proposal shifts the tax burden from capital to labor income. The growth effects from eliminating the tax wedge on investment and reducing it on savings yield substantial long-run gains while the increase in the value added tax (VAT) needed to make up for the revenue losses dominates the short-run picture. Instantaneous budget balancing would dictate an immediate increase in the VAT rate to 16.5% which is more than double the initial value of 7.6%. Figure 2 plots the time path of the required VAT rates. Higher indirect taxes erode the real wage and rather immediately impair employment. Since capital is predetermined in the short-run, the unfavorable employment response leads first to a moderate contraction of GDP before the investment led expansion takes hold. As Fig. 3 illustrates, GDP instantaneously falls by .9% in the first period before it starts to grow at rapid rates. The gains from capital accumulation thus arrive with a significant delay of several years. Typically, empirical studies find that it takes about eight years to achieve half of the long-run effects. As the induced capital accumulation proceeds, the short-run loss is turned into a GDP gain after about five years and eventually results in an increase of 2.43% as reported in Table 3. GDP growth swells the tax bases and generates extra revenue so that an ever lower VAT rate suffices to assure periodic budget balance. The long-run VAT rate is 11.6% which is 5 percentage points lower than the short-run value reported in Fig. 2. Together with

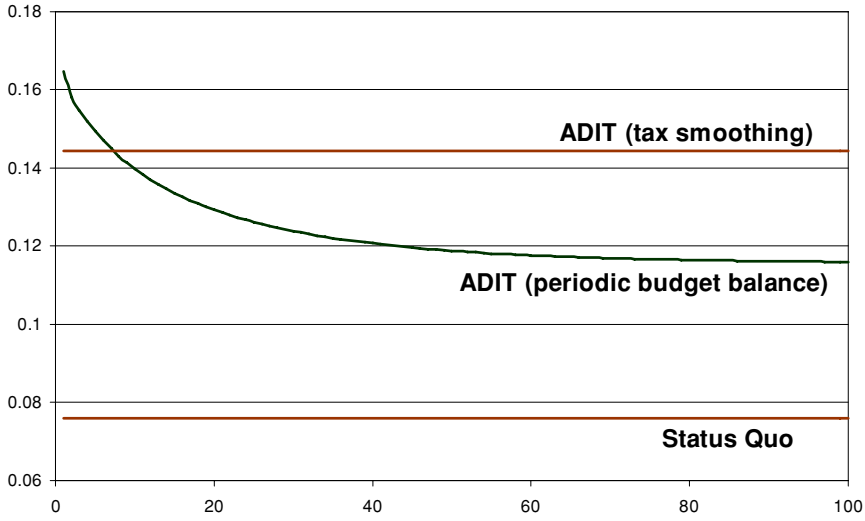

Fig. 2 Value added tax: Periodic budget balancing versus tax smoothing

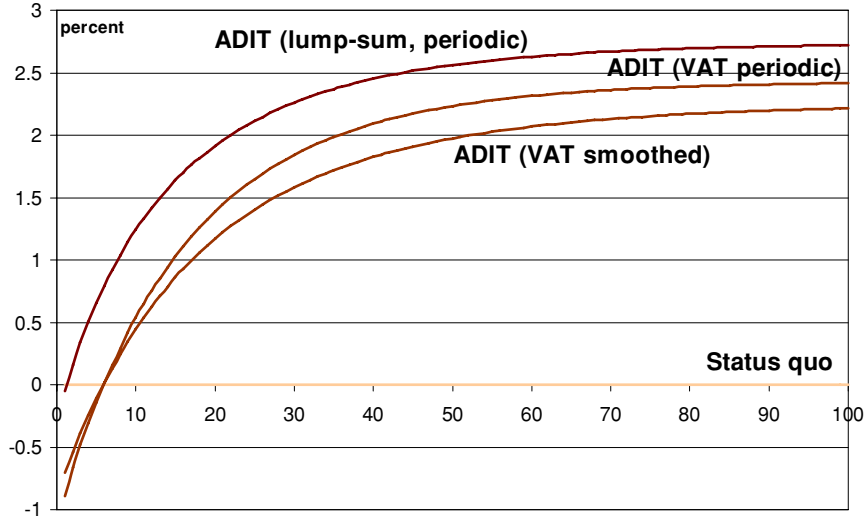

Fig. 3 GDP under alternative budget financing strategies

the increase in gross wages, the lower VAT rates essentially eliminate the short-run employment losses.

The distributional implications of this adjustment pattern are obvious and largely apply to any growth oriented tax reform.[21] The gains to labor in terms of employment prospects and higher wages arrive only with a delay while the gains to capital are felt immediately. Tax capitalization and the higher returns to capital in the transitional

[21] Keuschnigg (1994) discusses intergenerational redistribution effects resulting from these adjustments.

period lead to instantaneous increases in asset prices and windfall profits benefiting the owners of old capital in place. With ADIT, these capital gains get effectively taxed once they are realized, with a surcharge on the interest gains from tax deferral until realization. It must be emphasized that these windfall gains are not to be avoided because they are a reflection of the investment incentives needed to promote growth. Nonetheless, the unfavorable short-run GDP and employment losses of the tax reform naturally call for some strategy to smooth the gains and costs intertemporally and across generations.

An alternative to periodic budget balance is to balance the budget intertemporally, allowing deficits early on and running surpluses in the future such that a constant value added tax rate is sustained. This scenario thus accumulates substantial government debt and is called "tax smoothing" . The tax rate must be endogenously computed and turns out to be 14.4% which is lower than the short-run but higher than the long-run rate under periodic budget balancing, see Fig. 2. Reflecting the implications of the VAT for labor supply, the tax smoothing scenario dampens the short-run employment and GDP losses. As Fig. 3 shows, GDP falls by only .7%, instead of .9% under periodic budget balancing. The mirror image of the short-run effects is that tax smoothing also dampens the long-run gains since the VAT rate must be higher to serve the public debt accumulated in the early adjustment period. GDP grows by only 2.25% instead of 2.43%. Reflecting the rather inelastic labor supply response, smoothing the VAT rate is not very effective in smoothing GDP adjustment.

To isolate the extra distortion introduced by the higher VAT, we run an alternative scenario of cutting lump-sum transfers. This reduces disposable income and the scope for savings but also avoids the labor supply distortion of the VAT. In reality, a reduction in social transfers might even have favorable effects on labor market participation since it widens the income differential between work versus non-work and thereby sharpens incentives for job search. Our model neither captures these work incentives nor is it able to appropriately take account of the unfavorable redistribution within generations. Our framework thus implies that lump-sum transfer cuts avoid the short-run reduction in employment and GDP. Furthermore, the gross wage gains resulting from capital accumulation boost labor supply which magnifies the investment induced expansion of GDP, although not by a very large amount. Figure 3 illustrates.

3.5 Sensitivity analysis

While important qualitative insights can be derived from theory, the magnitudes are always sensitive and depend on key elasticities that determine the behavioral responses of individuals and firms. Quite often, parameters are estimated rather imprecisely in the econometric literature, leaving a substantial range of equally credible values. Table 6 summarizes the results of sensitivity analysis. Column "ADIT" reproduces the results of the main scenario in Table 3. We first consider the elasticity of capital demand with respect to the user cost of capital which is equal to 1 in the main case. A lower value of $\epsilon_K = 0.75$ naturally reduces the impact of a tax reform that reduces the cost of capital. The capital stock increases only by 6.3% instead of 8.4% in the base case, and the gains of the tax reform in terms of long-run GNP and consumption are somewhat smaller.

Table 6 Sensitivity analysis

	Variable		ADIT	ϵ_K	ϵ_L	σ_C	μ	s_{rep}
ϵ_K	Elast. capital demand		1.00	**0.75**	1.00	1.00	1.00	1.00
ϵ_L	Elast. labor supply		0.20	0.20	**0.50**	0.20	0.20	0.20
σ_C	Intertemp. subst. elast.		0.50	0.50	0.50	**0.65**	0.50	0.50
μ	Asset subst. elasticity		10.00	10.00	10.00	10.00	**5.00**	10.00
s_{rep}	Reported share		0.80	0.80	0.80	0.80	0.80	**0.50**
u^c	User cost, dom.corp.		8.50	8.50	8.52	8.35	8.65	8.58
i^{BH}	Interest on bus. debt		7.96	7.85	7.98	7.78	7.82	8.06
$\bar{\imath}$	Av. portfolio return		5.79	5.77	5.80	5.70	5.72	5.69
t^I	Rate of indirect tax		11.57	11.50	11.70	10.75	11.51	11.65
w	Market Wages	%)	3.72	3.75	3.68	4.03	3.65	3.53
w^h	Net Wages	%)	0.03	0.12	−0.13	1.07	0.02	−0.23
L^s	Employment	%)	0.01	0.02	−0.06	0.21	0.00	−0.05
K	Aggregate Capital	%)	8.36	6.33	8.18	9.38	8.22	7.85
Y	Gross dom.prod.	%)	2.43	1.86	2.34	2.85	2.38	2.26
Y^*	Gross nat.prod.	%)	4.77	4.36	4.58	5.86	4.03	3.47
C	Priv. Consumption	%)	3.71	3.58	3.53	4.74	3.00	2.36
A	Total Assets	%)	17.43	16.83	16.90	21.04	15.33	13.63
Y^C	Output Corporate Sec.	%)	−1.53	−0.92	−1.77	−0.07	−2.62	−2.29
Y^N	Output Noncorp. Sec.	%)	−0.29	−0.22	−0.31	−0.28	0.18	−0.28
Y^h	Output home multis	%)	14.77	10.71	14.90	13.43	16.31	15.63
Y^{fh}	Output foreign multis	%)	14.71	10.67	14.84	13.41	16.23	15.56

Note: %) Percentage changes. Other values are absolute. Residual budget financing with VAT. ϵ_K elasticity of capital demand, ϵ_L elasticity of labor supply, σ_C intertemporal elasticity of substitution, μ elasticity of portfolio substitution, s_{rep} share of foreign asset income reported.

The next column recomputes the main ADIT scenario with a higher elasticity of labor supply, using a value of .5 instead of .2. The long-run results are not much different. The reason is that the ADIT reform results only in a negligible variation of the net wage of .03% which cannot give rise to a larger labor supply effect, irrespective of the magnitude of the elasticity. However, a higher wage elasticity of labor supply would magnify the short-run decline in GDP reported in Fig. 3 which mainly results from the reduction in labor supply in response to the initial increase in the value added tax. The reform would be more costly in the short-run in this case. A higher wage elasticity would also importantly magnify the long-run gains of the lump-sum financing scenario in Table 3 which stimulates labor supply on account of higher wages.

Given that ADIT substantially strengthens savings incentives, the intertemporal substitution elasticity becomes a prime candidate for a sensitivity check. The empirical estimates support both higher and lower values than our base case value of .5. A higher value of $\sigma_C = .65$ strongly magnifies the long-run effects of the reform. When the savings response is more elastic, a smaller increase in the average portfolio return already suffices to elicit the required asset accumulation. Consequently, the ADIT scenario leads to smaller interest rates and returns to equity for domestically issued assets which leads to smaller user costs, larger investment, higher wages and larger employment. Aggregate private consumption increases by 4.7%. Note further that only

domestically owned firms will benefit from the lower cost of equity. Consequently, this scenario reduces the crowding out effects on the labor market and shifts the macroeconomic expansion away from the multinational towards the domestic sector. Obviously, a lower elasticity generates the opposite effects and much reduces the gains of tax reform.

Next, we cut the elasticity of portfolio substitution μ in half, making asset demand less sensitive to return differentials. Households shift less to foreign assets if the return at home declines and domestic interest rates can fluctuate to a larger extent in response to a given shock. However, domestic investors are also less willing to shift their portfolio demand towards equity of home firms where the tax cuts raise firm values the most. The return to domestic equity rises considerably in order to induce the required change in portfolio composition. Cheaper debt encourages investment, especially by multinationals, while a higher cost of equity, only for domestic firms, retards investment. As Table 6 shows, multinationals expand even more while domestic corporate firms get crowded out to an extent that results in a smaller increase of the macroeconomic capital stock. Except for the decline of private consumption, the macroeconomic impact is rather limited though.

The last exercises address the effectiveness of the residence principle in international capital income taxation. In the base case, we assume that only 80% of foreign source asset income are reported at home. Underreporting relates to interest on bonds, dividends and capital gains on multinational shares and the wealth tax on foreign invested assets.[22] The last column reports the results when only 50% of foreign source asset income is reported. Consequently, the tax cut as part of the ADIT scenario applies only to a smaller fraction of asset income, and the average net of tax portfolio return increases to a smaller degree (i.e. by 6.69 instead of 5.79%). Savings is reduced which pushes up domestic interest rates and equity returns, raises the cost of capital and therefore reduces the expansionary effects. The VAT rate must be raised even more to finance the public budget. However, one expects that lower domestic taxes will induce investors to report a larger share of foreign source asset income. In a separate calculation not shown in Table 6, we have thus assumed that the share of foreign source income reported at home increases from 50 to 70% as part of the scenario. This behavioral response, however, raises the effective tax rate for any given statutory rate as a larger share of asset income becomes subject to the tax. The net of tax portfolio return and therefore savings are reduced. Domestic interest rates must rise and the investment driven expansion is further reduced. The only difference is that the extra revenue from increased reporting allows for a smaller VAT rate which stimulates labor supply to a minor extent but doesn't much change the macroeconomic impact.

4 Conclusions

This paper has laid out a proposal for fundamental capital income tax reform that eliminates much of the investment and savings distortion. The reform combines a specific version of the Nordic dual income tax with an allowance for corporate equity (ACE

[22] The degree of underreporting is uncertain. The Swiss tax administration considers this a realistic number as professional and institutional investors who keep book records find it difficult to underreport.

system). The proposed system eliminates the investment tax wedge at the company level since all costs of finance for both debt and equity are tax deductible from the profits tax. A normal rate of return is tax exempt but the profits tax continues to tax an excess return to capital such as monopolistic profits or rents. The proposed system not only eliminates the marginal effective tax rate on investment, but also substantially reduces the average tax burden. Firms that earn no more than a normal return on capital, do not pay any profit taxes at all. Since the average tax rate is more important for the location decision of multinational firms, the reform is a decisive step to increase the attractiveness of Switzerland as a location of multinational investment.

At the personal level, a comprehensive, flat tax on all forms of capital income at a moderate rate is suggested. The rate is chosen to avoid misdeclaration of entrepreneurial wage income as low taxed capital income which is a common problem of the dual income tax. The low tax rate roughly halves the existing rates on interest and dividend income but also implies a more effective taxation of capital gains. It introduces a powerful savings incentive. The system was shown to be neutral with respect to investment, finance, and organizational choice and much reduces the savings distortion. It was suggested that revenue losses are financed with a value added tax, or a reduction in transfer spending.

A quantitative evaluation based on a detailed computational growth model of the Swiss economy with domestically owned corporate and non-corporate firms and domestic production of home and foreign based multinationals has shown substantial long-run gains, amounting to a permanent increase of GNP between 4 and 5 percent. However, the need to finance the revenue losses with an increase in the value added tax imposes some short-run costs on account of an increased labor market distortion. The detrimental labor market effect could be avoided to some extent if the reform were financed by a cut in transfer expenditure. The dynamic simulations have also reminded of the long time span needed until the larger part of the income gains become effective.

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