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 2 to 3 percent of GDP in the long run, depending on the specific scenario. Given the slow nature of capital accumulation, it also imposes considerable costs in the short run. We also consider a tax smoothing scenario to offset the intergenerationally redistributive effects.

JEL Code: D58, D92, E62, G32, H25.

Keywords: tax reform, investment, financial structure, growth.

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1 Introduction

The high international mobility of portfolio capital and multinational investments has rendered the taxation of capital income increasingly difficult. In an open economy, personal taxes on interest and dividend income not only reduce the volume of savings but also drive out portfolio capital to other countries. High corporate taxes suppress investments by domestically owned firms and deter international direct investments, since multinational companies face an incentive to locate production in low tax countries. International direct investment seems to respond more sensitively to taxes than investment of small and medium sized domestic firms,[1] tempting countries to attract such investment with favorable tax conditions. 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 which erode the domestic tax base (see Hines, 1999 and Gordon and Hines, 2002 for empirical evidence). Probably for these reasons, international tax competition has led to a pronounced trend towards lower corporate tax rates as documented by Devereux, Griffith, and Klemm (2002).

The taxation of capital income can 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. Due to the government's limited information on foreign activities of domestic tax payers, income on

[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.

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 the surveys by Bernheim (2002), Poterba and Samwick (2002) and Poterba (2002) suggest.

Apart from its effect on the level of domestic and inbound foreign investment, the system of company taxation interferes with an efficient allocation of capital on several margins. The differential tax treatment of corporate and non-corporate firms distorts the choice of organizational form (MacKie-Mason and Gordon, 1997). Given that the opportunity cost of equity is not deductible, corporate taxes favor debt over equity and change the firms' capital structure. This tax preference for debt is partly offset by personal taxes where the investor's interest income is subject to normal personal income tax while capital gains are favored by the realization principle or by an explicit tax preference (Miller, 1977). Next, dividends are often taxed more heavily than capital gains which prevents payouts (Poterba, 2004). This favors investment by mature firms and stands in the way of reallocating capital towards young, fast growing companies in need for external equity capital. Auerbach and Hassett (2003) emphasize this heterogeneity among small and large firms and find that the dividend tax mostly harms smaller, capital constrained companies. Finally, the relative taxation of capital and labor income can importantly affect the rate of business 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.

Most countries formally adhere to, but violate in practice, the concept of comprehensive income taxation. A number of countries have switched to taxing parts of personal capital income separately from other income with a low, flat rate and have partly moved towards a form of dual income tax. The proponents of a dual income tax have listed a number of reasons for differential taxation of labor and capital income both

on equity and efficiency grounds.[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. In principle, this double taxation of savings calls for a tax on personal consumption, for example by setting the capital income tax to zero. 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 of households. A moderate capital income tax could be justified if inheritance or wealth transfer taxes are incomplete for other reasons. 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 to attract mobile firms and reduce personal taxes to prevent the flight of portfolio capital. In separating labor and capital income taxation, the dual income tax is thus better suited to adjust to international tax competition. 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.[3] For the sake of a short name, we will henceforth call it SDIT as an acronym for Swiss Dual Income Tax. The reform combines an allowance for corporate equity (ACE) with

[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.

[3]The reform proposal was developed in Keuschnigg (2004a).

a dual income tax of the Nordic type. The paper demonstrates 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 2.5 to 3.5 percent of GDP in the long-run, depending on the specific scenario. Given the slow nature of capital accumulation, it also imposes considerable costs in the short-run as 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 that endogenously uses 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. It captures the differential effects of tax reform on four types of firms: domestically owned corporate and non-corporate firms, as well as domestic subsidiaries of home and foreign based multinational firms that are listed on international stock markets. Further, the model also endogenizes debt equity choice and dividend payout behavior of corporations which are prime margins affected by most business tax reforms. The European Commission (2001) provides an extensive compilation of marginal effective tax rates in member countries, differentiated across types of firms and sources of finance. Our model not only implements these effective rates in about the same detail, but also allows to quantify the behavioral responses in general equilibrium when a reform changes tax 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.[4] A

[4]Assets are imperfect substitutes and allow for small return differentials that guide the portfolio composition of households, reflecting in part the well documented home bias in international portfolio diversification, see French and Poterba (1991) and Gordon and Gaspar (2001). The average portfolio

detailed model of household behavior is necessary for at least three reasons: First, the tax reform proposal shifts taxes from capital to labor and thereby affects work incentives. Second, the reduction of the personal tax on capital income strengthens savings incentives. Further, a low tax on personal capital income is motivated in part to prevent capital flight in an open economy making the portfolio allocation of assets a central topic. Last, certain capital income taxes affect only part of the business sector rather than the total economy, as is often assumed in more aggregate studies.

We believe that the present exercise in business tax reform is of interest much beyond the Swiss case. The overall reform scenario also connects to the US debate on the economic effects of the recent dividend tax relief of the Bush administration, see Carroll, Hassett, and Mackie III (2003) and Gravelle (2003). More importantly, given the extra detail of our quantitative model and our separate evaluation of the various steps towards a dual income tax, the paper should be informative in considering the impact of a dual income tax reform as implemented in the Nordic countries. Cnossen (1999) discusses the dual income tax as a potential model for the European Union. Variants of a dual income tax were recently suggested for Germany, independently by the council of economic advisors (Sachverständigenrat (2003)) and by Sinn (2003). A quantitative evaluation of these proposals that would consider the differential impact on domestically owned versus internationally operating firms is not yet available. Although the proposed tax reform is different in some important aspects, the insights of this study should be relevant for these countries as well.

The paper proceeds in section 2 by presenting a precise statement of the main tax reform proposal and by justifying its structure in the light of the literature on optimal taxation. Section 3 provides an assessment of the reform proposal for the Swiss case. We start with a short discussion of the current state of capital income taxation in

return, in contrast, determines the overall level of savings.

Switzerland and then present an analytical perspective on the economic impact of the reform, derived from a stylized version of the simulation model. In the following, we summarize the additional transmission channels present in the simulation model and present the long-run impact followed by the transitional effects of the reform. A final subsection discusses sensitivity analysis with respect to the strength of the key behavioral margins. The paper concludes with section 4.

2 A Growth Oriented Dual Income Tax

2.1 The Proposal

To eliminate the present tax distortions in the business sector and to remove the tax obstacles to growth, a specific version of a dual income tax is proposed. The SDIT system (Swiss Dual Income Tax) combines the Nordic type of dual income taxation with an allowance for corporate equity (ACE). The key thrust of SDIT is to tax capital income once with a moderate flat rate at the personal level while profits resulting from a normal return on capital are tax exempt at the company level. Only supernormal returns such as rents or monopolistic profits are subject to the tax. The proposal is described and analyzed in full detail in Keuschnigg (2004a). Specifically, the SDIT reform rests on five pillars:

1. Progressive wage taxation as in the status quo (with a top marginal tax rate of $t^L = 37\%$).

2. Proportional profit taxation at a flat tax rate (equal to the current average rate of $t^U = 23.2\%$). In contrast to the current state, the tax applies uniformly to all firms, corporate and non-corporate.

3. Deduction 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 compensate for the interest gains due to tax deferral leading to an accruals equivalent rate equal to t^S. The rate satisfies the restriction $(1-t^U)\left(1-t^S\right) = 1-t^L$ to avoid tax arbitrage by misdeclaration of owners' wages (and, thus, becomes $t^S = 18.3\%$). 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.

Allowance for corporate equity (ACE) As a third pillar, SDIT introduces an allowance for corporate equity (ACE) which is the single most important measure to remove the tax obstacles for growth and provides a widespread stimulus to domestic and multinational direct investment at home. It decisively strengthens the country's attractiveness for international direct investment and strengthens its position in international tax competition. The pillar sets the effective marginal tax rate (EMTR) on investment to zero and reduces the effective average tax rate (EATR) to a major extent.

The ACE system was developed and shown to be neutral with respect to investment by Boadway and Bruce (1984), was popularized by the Institute for Fiscal Studies (1991) and discussed in the light of uncertainty by Bond and Devereux (1995). The basic idea is to extend the tax deductibility of interest on business debt to a normal return on equity as well. Bond and Devereux (1995) find that no more than a risk free normal return equal to the net of tax return on government debt is called for. In allowing for

tax deduction of *all* costs of finance, the ACE system makes the profit tax neutral with respect to investment and also avoids the tax distortion in favor of debt finance. Under an ACE system, the profit tax exempts a normal return on capital but continues to tax in a non-distortive way a supernormal return on capital. Apart from the tax neutrality with respect to investment and debt equity choice, the allowance substantially reduces the average tax rate on profits. The lower tax burden is the mirror image of the revenue losses incurred by the government.

We believe that the recent literature on international taxation provides a good theoretical rationale for the structure of the SDIT system. Most importantly, the optimal taxation analysis of 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. This does not at all imply that the corporate tax should be eliminated. Haufler and Schjelderup (2000) show that the same 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 under the SDIT scheme is an alternative way to set the EMTR to zero and achieves the same. The role of the statutory tax rate is to tax rents and supernormal profits. Huizinga and Nielsen (1997) have emphasized that a positive rate also helps to tax 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 SDIT system, a positive tax rate is also needed to prevent income shifting from labor to capital income. The size of the tax rate at the firm level is further constrained by the fact that a too high rate relative to the statutory tax rates in other countries might induce profit shifting by multinational firms.

Another important aspect of the ACE allowance is that it also 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, as Devereux and Griffith (1998) have shown, the ACE system should help to attract inward foreign direct investment (FDI) and also reduce outward FDI by domestic multinationals. It is sometimes objected that the ACE allowance leaves normal returns tax free but imposes a positive EATR on projects with supernormal returns. It thus discriminates against the most profitable investments, often implemented by technologically advanced multinational corporations. However, the reduction of the EATR is also a major benefit to the most profitable firms relative to the status quo. Furthermore, the same objection applies to any other tax scheme that is neutral with respect to marginal investments such as the cash-flow tax. Finally, a country's ability in using tax incentives to target the most profitable firms compared to less profitable ones is rather limited. As Keen (2001) and Devereux, Griffith, and Klemm (2002) argue, special tax regimes are probably the only possibility to specifically target the more profitable, internationally mobile firms. If this is not possible, the only way to attract them is to keep the EATR and, thus, the statutory rate low.

Dual Income Taxation By implication of the first and fourth pillar, SDIT combines progressive wage taxation with a flat tax rate on capital income. Thereby, the shareholder tax is defined as a moderate but comprehensive flat tax on all types of 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 SDIT proposal for other reasons. It serves at least five important functions. First, the rate t^S of the shareholder tax is chosen to satisfy the restriction $(1 - t^U)\left(1 - t^S\right) = 1 - t^L$ and thus eliminates the incentives for tax arbitrage by misdeclaration of owners' wages as capital income. This is considered as the Achilles heel of the Nordic dual income tax[5] which

[5]See Sørensen (2003). Fjærli and Lund (2001) provide empirical evidence. Lindhe, Södersten, and Öberg (2004) analyze the implications for different organizational forms.

necessitates complicated and administratively expensive schemes to avoid it.When an entrepreneur appropriately declares her personal contribution to the firm's earnings as a wage, no profit tax applies to this income but the owner must pay the top wage tax at a rate t^L, leaving him with net earnings $1 - t^L$. If she pays no wage, her contribution to the firm's earnings inflates profits. Since these profits result from the entrepreneur's labor input, no cost of equity can be deducted. Hence, they show up as a supernormal return on equity capital and get taxed at the company level at a rate t^U, and subsequently at the personal level at a rate t^S. When this supernormal return eventually accrues either as dividends or as capital gains, the cumulative tax burden leaves a net income $(1 - t^U)\left(1 - t^S\right)$ which is equal to what the entrepreneur would receive if she had declared a wage.[6] Consequently, SDIT avoids the opportunity for tax arbitrage by misdeclaration of owners' wages.

Second, SDIT ensures a low tax burden on all forms of savings. It substantially reduces the double taxation of savings inherent in the current income tax and thus represents an important step towards a consumption oriented tax system. At the personal level, 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). Given the fact that a large part of labor supply is rather inelastic, this argument calls for a lower personal tax rate on capital income. The choice of tax rates, however, is further constrained by the need to prevent income shifting from labor to capital income. Depending on the chosen tax rate at the company level, the personal tax rate cannot be too low. Third, 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

[6] 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 on profits.

under the residence principle.

Fourth, and more importantly, the comprehensive and uniform flat tax rate ensures tax neutrality at the personal level with respect to firms' financing decisions. Similar to Auerbach (1991), the shareholder tax contains a surcharge to correct 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.[7] This feature roughly assures holding period neutrality and allows for efficient risk diversification of portfolio investors. Apart from this, it equates the effective tax rates on dividends and capital gains, thereby eliminates the tax bias against profit distributions and equates the costs of capital from retained earnings and new equity. It is often argued that tax neutrality towards payout behavior contributes to improved capital market efficiency. The tax thus encourages firms to pay out profits and to compete with other firms on the capital market for new equity. This should help to improve the efficiency of the capital market in allocating scarce capital towards the most productive investments. Furthermore, given a uniform tax rate on interest and the return to equity, SDIT also ensures tax neutrality at the personal level with respect to firms' debt equity choice. Since all types of firms are treated uniformly on both the company and personal level, the SDIT system is by construction neutral with respect to choice of organizational form. Finally, SDIT ensures full loss offset and thereby encourages risk taking on account of the Domar Musgrave effect. According to Gordon (1998), Cullen and Gordon (2002) and Sørensen (2003), 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.

[7] See Keuschnigg (2004a) for an administratively simple approach and detailed calculations.

Value added tax The SDIT proposal will lose tax revenue. The most important reasons are that it exempts a normal return on equity from the profits tax and roughly halves the current tax rates on interest and dividend income in Switzerland. 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. SDIT clearly shifts the tax burden from capital towards labor. In eroding the real wage, the economic costs will show up in an added labor supply distortion. As an alternative scenario, we will also consider cuts in lump-sum transfers to the private sector (subsidies to agriculture and industry, social transfers etc.) 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 also motivated by the fact that the value added tax with a normal rate of 7.6% is far below the European average, leading to a much lower share of indirect taxes in Switzerland compared to other countries. Further, the size of the government sector and, in particular, social transfers have grown much more than average in the last decade. As a matter of fact, the growth of the government sector in Switzerland was among the highest of all OECD countries. Many economists and policy makers call for a reversal of the trend.

3 Quantitative Assessment

3.1 The Need for Tax Reform and the Current Tax System

Switzerland is among the richest countries in the world. However, over the past 30 years, it has lost much of its lead position. While per capita income in 1970 was 74% higher than the OECD average, the differential shrinked to only 16% in 2002. It is only

marginally ahead of its neighboring countries Austria, France, Germany, and Italy. No other OECD country experiences net outflows of foreign direct investment as high as Switzerland (OECD (2004)). While the country has traditionally applied moderate taxes on the personal and corporate level, it did not react to the trend towards lower tax rates abroad, see Devereux, Griffith, and Klemm (2002). Currently, a rather limited reform proposal that intends to reduce the double taxation of dividends and to achieve a more effective taxation of capital gains on company shares is discussed in the political process.

Table 1 reports the current structure of Swiss tax rates.[8] 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. The rate of 37.3% represents the upper end of the progressive tax schedule. 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. We assume that about 20% of capital gains are subject to the income tax and that tax deferral under the realization principle reduces the effective tax rate to .58 of the statutory rate, see OECD (1991). Thus, the effective capital gains tax rate for corporate shares is $.2 \times .373 \times .58 = 4.3\%$. In contrast, capital gains realized upon selling or transferring noncorporate firms are fully taxed. Average holding periods are much longer, resulting in a reduction factor of .41 on account of larger interest gains. Noncorporate firms thus face a much higher effective tax rate of $.373 \times .41 = 15.3\%$ on realized capital gains. However, since retained earnings of noncorporate firms are zero by definition, capital gains taxes are less important for these firms.

[8]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 form an average of the top tax rates on personal and corporate income and weigh them together using cantonal GDP.

Tax on	Status Quo		SDIT	
	DC	NC	DC	NC
Profits	23.2%	37.3%	23.2%	23.2%
Allowance for equity	no	no	yes	yes
Capital gains	4.3%	15.3%	18.4%	18.4%
Dividends	37.3%	—	18.4%	18.4%
Interest	37.3%	37.3%	18.4%	18.4%
Wages	37.3%	37.3%	37.3%	37.3%
Value added	7.6%	7.6%	—	—
Property	0.7%	0.7%	0.7%	0.7%

Note: DC: Domestic Corporations. NC: Noncorporate Firms.

Table 1: Tax rates in Switzerland: Status Quo vs. Swiss Dual Income Tax (SDIT)

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 the firm's pretax rate of return and the net of tax return of an investor in percent of the pretax return. They aggregate the impact of all firm level and personal taxes as well as tax depreciation rules. A higher tax wedge indicates a higher distortion against savings and investment.

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 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.

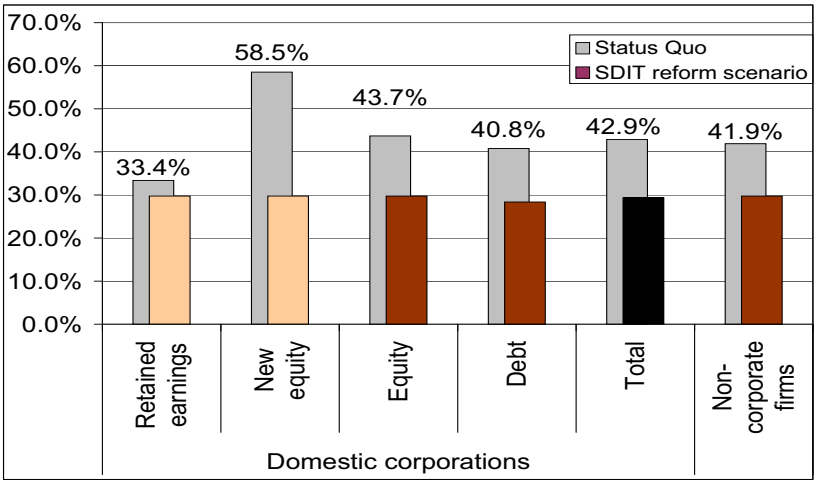

Figure 1: Effective marginal tax rates on investment: Status Quo versus SDIT

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 serves as weight for the impact of the dividend tax. Taking a payout ratio of .4, the average tax on equity on the the personal level is $.4 \times .373 + .6 \times .043 = 17.5\%$, see Table 1, and determines the EMTR for equity in the back row of Figure 1. In the literature, there is no consensus upon the role of dividend taxes. Under the new view of dividend taxation, firms finance marginal investment with retained earnings so that the double taxation of dividends becomes irrelevant for capital accumulation, see Auerbach (2002) for a summary of the literature. 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 the further development by Dietz (2003). Both ideas imply that the

dividend tax distorts capital accumulation.

Looking at the three sources of finance separately, the Swiss tax system is seen to induce the familiar hierarchy of finance or pecking order of financial sources. Comparing the cost of debt with the weighted cost of equity, Figure 1 indicates a moderate tax bias of about two percentage points in favor of debt financed investments. However, this non-neutrality is the net effect of two larger distortions on the company and personal level, see Miller (1977). Interest on business debt is deductible from the corporate tax basis while the opportunity cost of equity is not. This asymmetric tax treatment creates a strong incentive for debt usage on the corporate level. Since long, corporate finance experts have identified the tax deductibility of interest payments as a major advantage of debt over equity. Although the relationship was never denied, empirical studies have for a long time failed to prove the relationship. Taking account of the identity of the marginal investor and the corporate tax status to calculate firm specific marginal tax rates, recent empirical research has confirmed the effect of taxes on debt usage.[9]

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. Putting corporate and personal taxes together, equity pays the full corporate tax and a reduced tax on the personal level. Interest income, in contrast, escapes the corporate tax on account of tax deductibility but is fully taxed on the personal level. For non-corporate 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 tax and interest tax coincide, see Table 1, there is no distortion between debt and equity.

The investment incentives by personal and corporate firms determine the sectoral

[9]MacKie-Mason (1990) and Graham (1996) find that firms adjust leverage towards higher debt usage in response to increases in the corporate tax rate. Graham, Lemmon, and Schallheim (1998) identify a relation between the *level of corporate debt* and their simulated tax rates. Gordon and Lee (2001) provide additional evidence. Graham (2003) summarizes the empirical strategy and discusses further literature.

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 $.72 \times .437 + .28 \times .408 = 41.3\%$. Comparing this to the EMTR of 41.8% for noncorporate firms indicates that, on average, the Swiss tax system is largely neutral with respect to organizational form. Note, however, that 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 start becoming 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 calculation may understate the distortion of organizational choice.

The front row of Figure 1 plots the marginal effective tax rates on investment that result from implementing the SDIT proposal. Quite obviously, the SDIT 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 are uniformly reduced on account of the investment neutrality on the firm level. The remaining tax wedge and size of EMTRs are due to moderate taxation at the personal level, consisting of the shareholder tax under SDIT and the wealth tax.

3.2 Analytical Arguments

We start with a core version of our numerical model to highlight the main transmission channels and to build intuition for the most important economic impact deriving from introducing SDIT. The next subsection presents numerical results.

The Investor's Perspective: Savings can either flow into equity or into interest bearing assets such as business and government debt. Suppose that debt pays a fixed market rate of interest i. Denoting the interest tax by t^B, the net return amounts to $i^n = (1 - t^B)\, i$. When assets are perfect substitutes, arbitrage behavior equates net of tax returns:

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

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 on outstanding shares are equal to the total increase $\dot{V}$ in firm value less new share issues VN. The right hand side of (1) is the net of tax return on the firm value.

Corporate Firms: By the cash flow identity (2), inflows consisting of profits π, new equity VN, and new debt $N = \dot{B}$, must equal outflows in the form of dividends and investment spending $I = \dot{K}$. For simplicity, this section ignores depreciation of the capital stock K. Adhering to the old view of dividend taxation we assume in (3) that dividends are chosen as a fixed fraction θ of the total return to investors.[10]

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

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

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

[10]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.

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.[11]

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

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

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

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

where $f(K) \equiv \max_L F(K, L) - wL$ denotes maximized revenues net of wages resulting from optimal employment L that is hired at a wage w. 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 tax liability resulting from 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.[12]

Excessive debt leverage comes at a cost. Several theories have rationalized why firms use only limited amounts of debt despite of its tax advantage. Since firm owners are protected by limited liability, they will find it optimal to declare bankruptcy of the

[11] See equations (2.5) and (2.11) in Auerbach (2002) who discusses the implications of the new and old views of dividend taxation for the cost of equity. In our simulation model, we assume 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 payout ratio θ needed to match the model with aggregate dividend payments. This reduces the weigth 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.

[12] Following Hayashi (1982), it can be shown that $V + B = K$. Thus, total firm value K is equal to the value of equity V and debt B.

firm more often if the debt load is higher. Consequently, bankruptcy costs have to be paid more frequently.[13] For the same reason, owners of highly leveraged firms might prefer to engage in higher risk, see Jensen and Meckling (1976) and Myers (1977). In addition, collateral of firms might be sufficient to satisfy debt owners for low leverage of a firm and make firm bonds almost riskless. Increasing the debt load will then stretch collateral over a growing amount of debt making it more and more risky. Last, in a pecking order model of firm's financial policy, debt issues signal bad quality compared to internal financing of investments, see Myers and Majluf (1984). When debt investors anticipate these problems, they request a premium m that increases with leverage as measured by 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 Hamiltonean is $\mathcal{H} = (1-\tau)\left[f(K) - (i+m)B\right] + \tau\mu(K-B) - I + N + qI + \lambda N$. 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 costate equations thus yield conditions

[13] See e.g. Bond and Meghir (1994) or Auerbach (2002).

for optimal levels of capital and debt,

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

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

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

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

If debt and equity are treated equally on the personal level, then the pretax returns must also be identical, $r = i$. Interest deductibility at the company level, however, creates a positive preference for debt equal to $\nabla = \tau i/(1-\tau)$. Firms could save on financing costs and thereby 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 for debt 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 that the user cost of capital is an average of the tax adjusted costs of equity and debt which are weighted by the debt asset ratio,

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

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 costs of equity and debt.[14]

[14]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.

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, $t^D = 0$. As Table 1 indicates, the SDIT 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.[15] With all profits being private income, retained earnings are zero by definition. Investment is thus financed by new equity and debt. Hence, $VN = I - N$ and $D = \pi$ in (2). Inserting in the no-arbitrage condition (1), one obtains $rV = \frac{1-t^D}{1-t^G}\pi + N - I + \dot{V}$ with $r = \frac{1-t^B}{1-t^G}i$. Consequently, the Hamiltonean turns out as $\mathcal{H} = \frac{1-t^D}{1-t^G}\pi + N - I + qI + \lambda N$. After a number of now familiar steps, the solution of the optimization problem eventually results in

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

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

Neutrality of SDIT: The shareholder tax as part of SDIT is levied at a uniform, flat rate t^S on all types of capital income at the personal level, $t^D = t^G$. Since SDIT 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, SDIT is neutral with respect to the dividend payout policy of firms and treats retained earnings and new equity on an equal footing.

In addition, SDIT also equates the tax rates on interest and equity income, $t^E = t^B$,

[15] Technically, the status quo is represented by τ equal to the personal income tax rate and $t^D = 0$. Under SDIT, τ is reduced to the general profits tax while t^D is set equal to the share holder tax t^S.

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 market rate of interest, $\mu = r = i$, which is fixed by the residence principle of interest taxation to the world interest rate. Substituting into (10) shows that SDIT 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 financial neutrality of SDIT is reflected in Figure 1 by the equal heights of the EMTRs.[16]

The most important advantage of SDIT 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 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, SDIT 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 SDIT 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 consumed 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 $\nabla \equiv \frac{r - \tau\mu}{1-\tau} - i$. Taking account of

[16]The small differences are due to the differences in the risk premia on equity and debt.

the allowance for equity at a rate $\mu = r$ shows that SDIT 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. SDIT 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, $f'\left(K^{NC}\right) = i = f'\left(K^{DC}\right)$.

Moving from the Status Quo to SDIT: With our simple partial equilibrium approach that takes the market interest i as given, we can already indicate some key adjustments following the implementation of the SDIT reform. First, the reform completely removes the initial tax bias $t^D > t^G$ against corporate distributions. Since the shareholder tax equates the effective tax rates, the dividend payout ratio significantly increases.

We can anticipate the effects of SDIT on debt asset ratios by considering the debt preference ∇ in (10). Figure 1 indicates a small debt preference of corporations 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 SDIT will tend to strengthen the equity base of companies.

We have argued earlier that 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) and the tax rates listed in Table 1. On the other hand, 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, making the EMTRs fall significantly in Figure 1. SDIT substantially reduces the user costs of capital and thereby promotes investment.[17]

[17]By the envelope theorem, the effect of the tax reform on the optimally chosen debt asset ratio does

3.3 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.[18]

Savings: Household decisions are based on an overlapping generations model in the tradition of Blanchard (1985) with the level of savings following from the intertemporal consumption choice of individual households. The model is extended to allow for 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[19]

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

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

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

not influence investment. The differential of (11) yields $f''dK = \left[i + m + bm' - \frac{r-\tau\mu}{1-\tau}\right] \cdot db + (1-b) \cdot d\frac{r-\tau\mu}{1-\tau}$. The square bracket disappears when the debt asset ratio is optimally chosen as in (10). The formula also shows, however, that allowing for debt finance is very important for a meaningful quatitative analysis since the impact of profit taxation is scaled down by the size of the debt asset ratio: $f''dK = (1-b) \cdot d\frac{r-\tau\mu}{1-\tau}$.

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

[19] 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 $\varphi(l)$ is a convex increasing effort cost function. 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, $\bar{r}^n$ 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.

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. Savings can be invested in domestic and foreign government debt, domestic and foreign business bonds, equity of domestic corporate and noncorporate firms, and in internationally traded shares of domestic and foreign multinational firms. The composition of savings follows from endogenous portfolio choice that reflects among other aspects the typical home bias in international portfolio investments. Similar to Sørensen (2001), we postulate a portfolio preference $A\left[\left(1+i^{n,i}\right)A^i, i=1,\ldots,I\right]$ over the end of period wealth derived from investing in alternative assets. Portfolio preference is maximized by asset choice subject to the budget condition $\bar{A}=\sum_i A^i$. Preferences are of the linear homogeneous CES type and introduce a portfolio diversification motive using a constant elasticity of asset substitution σ^A. The solution yields asset demand functions that are proportional to overall portfolio wealth. Further, when the net of tax return of asset A^i increases relative to a "rate of return index" of other assets, agents demand more of this type. Having solved for the optimal portfolio composition, the average portfolio return $\bar{\imath}^n$ which guides the households' intertemporal decisions, follows by definition of

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

Domestic savings flow into home and foreign assets and foreign investors demand home issued assets which leads to international cross ownership of assets.[20] Invoking the 'small' open economy assumption, foreign rates of return and the overall level of foreign savings are beyond the influence of Swiss investors and therefore exogenous. Thus, foreign demand for domestically issued assets reflects only a substitution effect

[20]This connects to recent contributions on international taxation emphasizing the implications of crossownership, see Devereux (2004), Huizinga and Nielsen (1997), Keen and Ligthart (2005) and Slemrod, Hansen, and Procter (1997), among others.

when interest rates change at home. Domestic rates of returns 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. Similarly, i^G denotes the market clearing interest rate on domestically issued government debt. 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 are 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 which is thus exogenous from the home country's viewpoint. 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). Multinational firms are influenced only by a change in the domestic corporate or profit tax, see Figure 2.[21]

Multinational Investment: Our model is unique in representing the large heterogeneity of firms. Different firms respond rather differently to business taxes which is mostly overlooked in existing quantitative studies of tax reform. We distinguish four types of firms: domestically owned corporate and non-corporate firms and domestic subsidiaries of home and foreign based multinational companies. Asymmetric effects enter on account of our assumption that the return to equity gross of personal taxes is endogenous for domestically owned firms (with non-traded equity) but is exogenous for internationally traded shares of multinationals. The marginal investor of a multinational firm is assumed to be tax exempt or not subject to domestic income taxes.

[21] In Figure 3, u^c (u^m) are user costs of domestic (mutlinational) corporations while $r^{e,c}$ ($r^{e,m}$) refer to the cost of equity gross of personal taxes. Further, $t^{e,i}$ and $t^{e,s}$ denote the *effective* tax rates at the firm and personal level and refer to the investment and savings wedges.

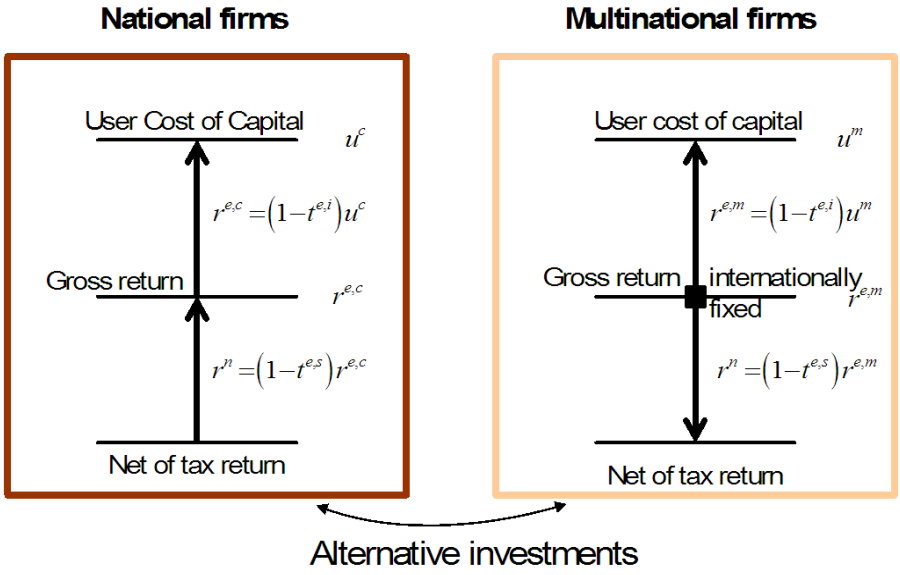

Figure 2: Tax wedges on savings and investment

Tax changes at the personal level affect the user costs of domestic firms but have no influence on multinationals. A reduction in corporate taxes stimulates investment by all firms and, in particular, multinational investment, see Figure 2. In addition, our model allows for profit shifting through transfer pricing of multinationals. It includes a fixed factor for each sector, thereby giving rise to limited rents and supernormal profits that continue to be taxed with the profits tax despite of the deduction of a normal return on account of the tax allowance for equity. Finally, the four 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. If an investment stimulating policy benefits multinational firms relatively more than domestic ones, their extra labor demand might crowd out employment by domestic firms.

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.

Parameters: Model calibration starts by calculating 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. We set the international interest rate to $i = 4\%$, the inflation rate to 1%, the growth rate of technology to 1.8% and the rate of capital depreciation to 10%. The computational model embeds a variety of behavioral margins that are parameterized to reflect the econometric evidence. In particular, we are careful to model the financial decisions. In calibrating the debt equity choice, we follow Gordon and Lee (2001) who estimate that a decrease in the corporate tax by 10% points which reduces the tax advantage of debt will reduce the debt asset ratio by three to four percent. We model an explicit payout policy along the lines of Poterba and Summers (1985) and Poterba (2004). They estimate the likely response of the payout ratio to a change in the relative tax treatment of dividends and capital gains. We further use the results of Grullon, Michaely, and Swaminathan (2002) to calibrate the response of the equity premium to a (tax induced) change in the payout ratio.

Labor supply responds to changes in real wages with an elasticity of $\epsilon_L = .5$ which reflects the consensus of the current doctrine, see Fuchs, Krueger, and Poterba (1998), and is confirmed for Switzerland by Leu and Kugler (1986). The intertemporal elasticity of substitution in consumption is set to $\sigma = .5$, see Kydland and Prescott (1982) or Hansen and Singleton (1983). Microeconometric results of Hall (1988) indicate lower values which, however, might stem from hidden heterogeneity, see Vissing-Jørgensen (2002). The survival probability of the Blanchard model is $\beta = .95$. We use a constant elasticity of substitution (CES) production function with an elasticity of capital demand with respect to the cost of capital approximately equal to unity. Again this seems to be

a consensus value, see Fuchs, Krueger, and Poterba (1998), and is supported by recent empirical evidence surveilled in Hassett and Hubbard (2002). We provide a sensitivity analysis to check the robustness of results with respect to key behavioral parameters.

3.4 Long-run Effects

Table 2 reports the long-run effects of a stepwise cumulative introduction of the SDIT reform. The first lines document the tax parameters that identify the type of scenario. The different columns are "BCase" for the initial steady state prior to reform and "STAX" for the shareholder tax, a dual income tax which eliminates distortionary taxation on the personal level between dividends and capital gains and personal and corporate sector. "INT" extends the shareholder tax to interest income and "SDIT" reports the results of the complete SDIT scenario by additionally introducing the ACE allowance for the opportunity cost of equity.

In all three scenarios, we keep a constant GDP share of government spending and a constant ratio of government debt to capital. The budget is balanced by adjusting the value added tax. Government debt thus increases along with capital accumulation. This shifts the tax burden, to some extent, to future generations which tend to gain the most from any growth enhancing policy. The last column "SDIT^{LS}" sets back the indirect tax to the base case value and finances with a cut in lump-sum transfers. This scenario helps to gauge the extra labor supply distortion that is introduced by shifting the tax burden from capital to labor by means of an increase in the value added tax.

STAX: 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

	Variable	BCase	STAX	INT	SDIT	SDIT^{LS}
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	9.24	10.42	11.70	7.60
b	Av. debt ratio	30.61	31.52	33.25	29.45	29.20
θ^c	Payout ratio, dom.corp.	40.00	55.00	55.00	55.00	55.00
u^c	User cost, dom.corp.	9.60	10.28	10.00	8.52	8.75
r^c	Cost of equity, dom.corp.	8.68	9.22	9.00	9.60	9.84
i^{BH}	Interest on bus. debt	9.83	9.72	8.74	7.98	8.24
$\bar{\imath}$	Av. portfolio return	5.26	5.42	5.73	5.80	5.93
w	Market Wages	%)	-0.53	0.58	3.68	2.94
w^h	Net Wages	%)	-2.02	-1.99	-0.13	2.94
L^s	Employment	%)	-1.02	-1.00	-0.06	1.46
K	Aggregate Capital	%)	-2.51	-0.07	8.18	8.62
GDP	Gross Dom.Product	%)	-1.39	-0.72	2.34	3.42
C	Priv. Consumption	%)	-0.96	1.63	3.53	4.13
A	Total Assets/GDP	4.10	4.30	4.65	4.68	4.53
NFA	Net For. Assets/GDP	0.65	0.70	0.97	0.94	0.84

Note: %) Percentage changes. Other values are absolute. BCase: Base Case. STAX: Dual Income Tax sets $t^D = t^G$ equal to $t^S = .184$ for corporations and introduces the profit tax combined with the shareholder tax t^S for non-corporate firms. INT: Reduction interest tax. SDIT: Allowance for Corporate Equity. Residual public finance with VAT, lump-sum only in scenario SDIT^{LS}.

Table 2: Long-run Effects

are set equal to the rate of the shareholder tax satisfying $(1 - t^U)\left(1 - t^S\right) = 1 - t^L$. Double taxation of dividends is thus eliminated while capital gains get more effectively taxed at the accruals equivalent rate equal to t^S. The negative effects mainly originate from the more effective taxation of capital gains. Up to now, capital gains on shares are very much tax favored, see Table 1. Given the payout ratio of $\theta = .4$, equation (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 STAX 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. Thus, entrepreneurial firms benefit moderately in this scenario. Investment incentives of multinational firms are not directly affected by the shareholder tax, see Figure 2. Since their marginal investor is assumed to be not subject to domestic taxes, the gross return on equity is internationally fixed. A change in personal taxes will only affect the savings 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 cannot make up for the losses. The value added tax must be accordingly raised 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 3. The average net of tax portfolio return increases from 5.26 to 5.42% and induces a 3.4% increase in financial wealth.[22] As the dividend tax cut substantially raises corporate firm values, investors must allocate a larger share of their savings to these assets. The value of equity holdings in domestically owned corporations increases by 8.14%. To induce these extra asset demand, investors must be offered a higher net return which increases significantly from 2.46 to 3.08%. 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 2, rising from 8.68 to 9.22%, and ultimately ends up in the user cost of capital rising substantially

[22] In Table 3, 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.

to 10.28%. Now, the macroeconomic effects are straightforward. Higher user costs of domestic corporations discourage investment, thereby reducing capital intensity by $\hat{K} - \hat{L} = -2.51 + 1.02 = -1.5\%$ and market wages by $-.53\%$.[23] Since the value added tax must be raised by more than 1.6 percentage points, the net of tax real wage declines much more sharply by -2%. Labor supply and employment shrink by 1% which magnifies the negative effect on capital accumulation (-2.5%). GDP and consumption must fall as well. Reflecting the net effect of a higher portfolio returns and reduced net wages, the induces 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 (including the risk premium on debt) slightly declines. Debt becomes relatively more attractive, see (10).

INT: Column "INT" extends 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 returns to interest bearing assets specifically and the average portfolio return in general. This boosts savings and adds a 12.55% increase to household financial wealth, see Table 3. The expansion of savings raises demand for all assets, but mostly flows into interest bearing assets. For example, the demand for domestic and foreign issued business debt expands significantly more than the level of overall savings. The same holds for domestic demand of foreign government debt which can be bought at a constant

[23]The hat notation refers to a percentage change, i.e. $\hat{K} \equiv dK/K$.

Ass.	BCase		STAX		INT		SDIT		SDIT^{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	3.39	5.42	12.55	5.73	16.90	5.80	14.18	5.93
A^{VC}	17.58	2.46	8.13	3.08	12.27	2.90	21.24	3.39	19.10	3.58
A^{VN}	22.42	2.46	2.98	2.58	6.50	2.36	9.06	2.30	6.88	2.47
A^{mH}	8.27	2.46	9.78	3.24	16.01	3.24	19.46	3.24	15.17	3.24
A^{mF}	2.00	2.46	8.14	3.08	14.27	3.08	17.67	3.08	13.45	3.08
A^{BH}	7.54	2.46	1.11	2.39	18.25	3.43	14.67	2.81	12.85	3.03
A^{BF}	20.52	2.46	1.79	2.46	22.04	3.76	25.67	3.76	21.16	3.76
A^{GH}	12.70	2.46	-2.30	2.04	0.89	1.80	9.31	2.32	9.54	2.72
A^{GF}	8.97	2.46	1.79	2.46	14.62	3.11	18.03	3.11	13.79	3.11

Note: Net asset rates of return $i^{n,j}$ (net of all taxes and net of equity premium) are absolute, and net of the wealth tax at rate t^W: $i^{VC} = r^{VC} - t^W$ or $i^{GH} = (1 - t^B)i^{GH} - t^W$. Column BCase 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 government debt (A^{GH} and A^{GF}).

Table 3: Portfolio Structure

foreign interest rate. Since the supply of domestically issued public debt is tied to capital accumulation by assumption, and 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 0.9%. Halving the interest tax wedge allows for a higher net return to savers (with the exception of government debt) and simultaneously a lower gross interest rate to firms.

To sum up, the required net return on equity tends to fall and that on debt tends to rise as investors reallocate their portfolio towards interest bearing assets. For both reasons, we find in Table 2 a lower cost of equity and a lower interest cost of debt, declining to 9 and 8.74%, respectively. As equation (11) demonstrates, both effects strengthen investment incentives for 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 .58%. 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 remains constant despite of the higher gross wage and employment is still smaller by one percent compared to the base case which again leads to a significant loss of GDP by −0.72%. Aggregate consumption, however, expands by a remarkable 1.6% in the long-run which results from larger financial income out of a higher level of savings that also earns a higher average 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.

Note finally that the cut in the interest tax is required for a neutral treatment of debt and equity at the personal level. Viewed in isolation, it induces more debt leverage of firms. Equations (10) and (5) show that 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 the asset market adjustment which reduces the gross interest on business debt by a full percentage point while the cost of equity falls only be a relatively minor extent.

SDIT: The effects of the complete scenario are reported in column "SDIT". Viewed in isolation, the last step introduces a tax allowance equal to the opportunity cost of equity. In the simplest case portrayed in equations (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 the neutrality discussion in section 3.1 shows, the tax

allowance serves two important functions. First, it eliminates the investment wedge for all types of firms and, second, it extends the equal treatment of debt and equity at the personal level to the company level. In making both financing costs tax deductible, SDIT is now fully neutral with respect to debt equity choice. Compared to the preceding scenario, the average debt asset ratio thus falls by 4 percentage points to 29.45%, and still declines by 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 full 4 percentage points, up from 7.6 to 11.7%.

Introducing ACE substantially cuts the average tax burden and raises firm values by 20% for domestic corporations and 9% for non-corporate firms. To induce the required portfolio reallocation, investors must be offered a higher net return on domestic corporate equity, see Table 3, which, in turn, raises the cost of equity. The elimination of the investment wedge allows at the same time a remarkable decline in the user cost, falling from 9.6 to 8.5% compared to the status quo. 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. Private consumption increases by a full 3.5%.

Table 4 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-

	DC		NC		Mh		Mfh	
	SQ	SDIT	SQ	SDIT	SQ	SDIT	SQ	SDIT
Labor share	48.00		30.00		15.70		6.30	
EMTR Total	43.71		47.84		51.77		46.96	
		28.64		30.03		29.41		25.28
EMTR Saving	28.93		17.63		39.12		33.05	
		28.64		30.03		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		26.91		26.91
User cost of capital	9.60		10.36		10.00		10.00	
		8.52		7.50		7.92		7.92
Cost of equity	8.68		7.63		9.00		9.00	
		9.60		8.57		9.00		9.00
Labor demand %		−4.07		−2.64		12.21		12.15
Capital stock %		2.18		7.09		22.57		22.50
Production %		−1.77		−0.31		14.90		14.84

Note: %) Percentage changes. Other values are absolute. DC: Domestic Corporations. NC: Noncorporate Firms. Mh: Domestic multinationals at home. Mfh: Foreign Multinationals at home. SQ: Status Quo. SDIT: Full dual income tax scenario SDIT.

Table 4: Results by Sector

corporate firms employ 48% and 30% of total labor, respectively. The table reveals that the aggregate results of Table 2 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 SDIT reform. The numbers for the debt ratio and user costs of capital are found again in Table 2 for domestic corporations, the cost of equity links to Figure 2.

The cost of equity for multinationals are determined on international stock markets and are thus beyond the influence of domestic tax policy. 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 these assets where pretax

returns are internationally fixed, see Figure 2. By a similar effect, the dividend payout ratio of the very large multinational firms tends to be higher than with domestic firms. The dividend tax cut is thus weighed more heavily than the capital gains tax increase. 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 4 verifies by the reduction in the EMTR on savings. With a high degree of asset substitutability, the net return on domestic equity must again increase. Without any compensating shrinking 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 firms rather than with the domestic sector. Since all firms compete in the same labor market, an above average expansion of one type of firms must come at the expense of other firms. The table shows that 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 2: $-4.07 \times .48 - 2.64 \times .3 + 12.21 \times .157 + 12.15 \times .063 = -.06\%$.

SDIT^{LS}: The last scenario recomputes the effects of the complete SDIT 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 income at the margin becomes independent from hours worked. Gross and net real wages thus increase by the same percentage, i.e. 2.94%. This stimulates additional labor supply and expands employment by 1.46% in the long-run and facilitates the macroeconomic expansion.

Second, lump-sum financing reduces disposable income. Aggregate savings grows by less and 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 remaining 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 only half a percentage point more than in the main SDIT scenario. The capital intensity thus falls relative to SDIT, explaining the smaller increase in the gross wage. The extra employment and the moderately stronger capital accumulation result in a substantially more vigorous expansion of GDP. Aggregate consumption swells by no less than 4 percent relative to the status quo. Finally, the smaller savings response also translates into a more moderate increase in the net foreign asset position.

3.5 Transitional Effects

The SDIT 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 income 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 17.4% which is more than double the initial value of 7.6%. Figure 3 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 contraction of GDP before the investment led expansion takes hold. As Figure 4 illustrates, GDP first falls by 2% before it starts to grow at rapid rates in the early adjustment period. The gains from capital accumulation thus arrive with a significant lag 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

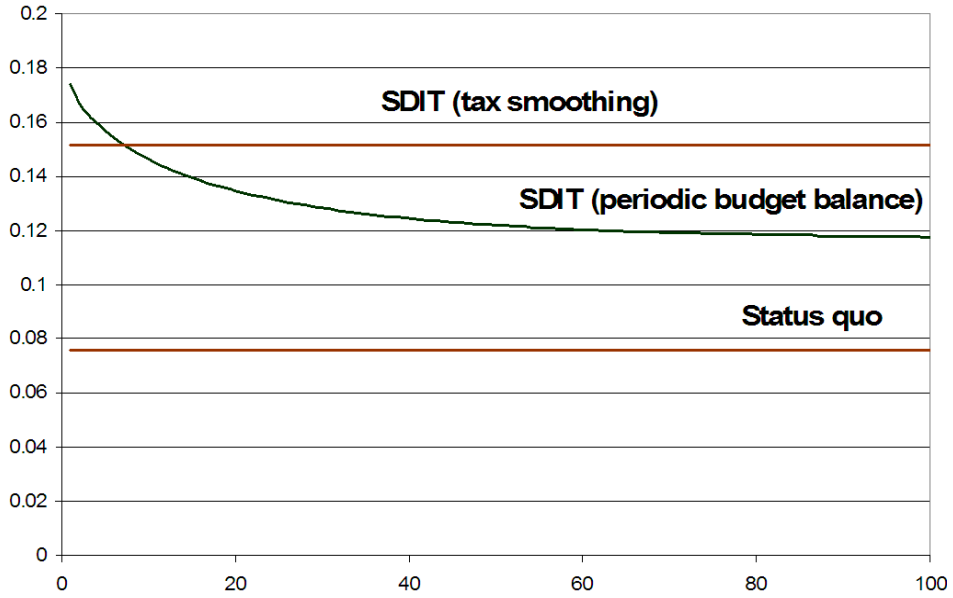

Figure 3: Value Added Tax: Periodic Budget Balancing Versus Tax Smoothing.

accumulation proceeds, the short-run loss is turned into a GDP gain only after more than a decade and eventually results in an increase of 2.34% as reported in Table 2. 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 11.7% which is 5.7 percentage points lower than the short-run value reported in Figure 3. Together with 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.[24] The gains to labor in terms of employment prospects and higher wages arrive only with a considerable delay while the gains to capital are felt immediately. Tax capitalization and the higher returns to capital in the transitional period lead to instantaneous increases in asset prices and windfall profits benefiting the owners of old capital in place. With SDIT, these capital gains get

[24]Keuschnigg (1994) discusses intergenerational reditribution effects resulting from these adjustments.

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 reform naturally call for some strategy to smooth the gains and costs of tax reform 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" in reference to the real business cycle literature, see Lucas, Jr. and Stokey (1983). The tax rate must be endogenously computed and turns out to be 15.1% which is lower than the short-run but higher than the long-run rate under periodic budget balancing, see Figure 3. Reflecting the implications of the VAT for labor supply, the tax smoothing scenario significantly dampens the short-run employment and GDP losses. As Figure 4 shows, GDP falls by only 1.6%, instead of 2% under periodic budget balancing. The mirror image of the short-run effects is that the tax smoothing scenario also dampens the long-run gains of the reform since the VAT rate must be higher to serve the public debt accumulated in the early adjustment period. GDP grows by only 1.47% instead of 2.34%.

To isolate the extra distortion that is introduced by the higher VAT rate, we run an alternative scenario of cutting lump-sum transfers. In Switzerland, the size of the public sector has grown considerably over the last decades, and social transfers have been the most rapidly growing expenditure category. The key implications of cutting (lump-sum) transfers are that it reduces disposable private income and the scope for savings but also avoids the labor supply distortion of the VAT. Social transfers do not affect the returns on an extra hour of work at the margin. In reality, a reduction in

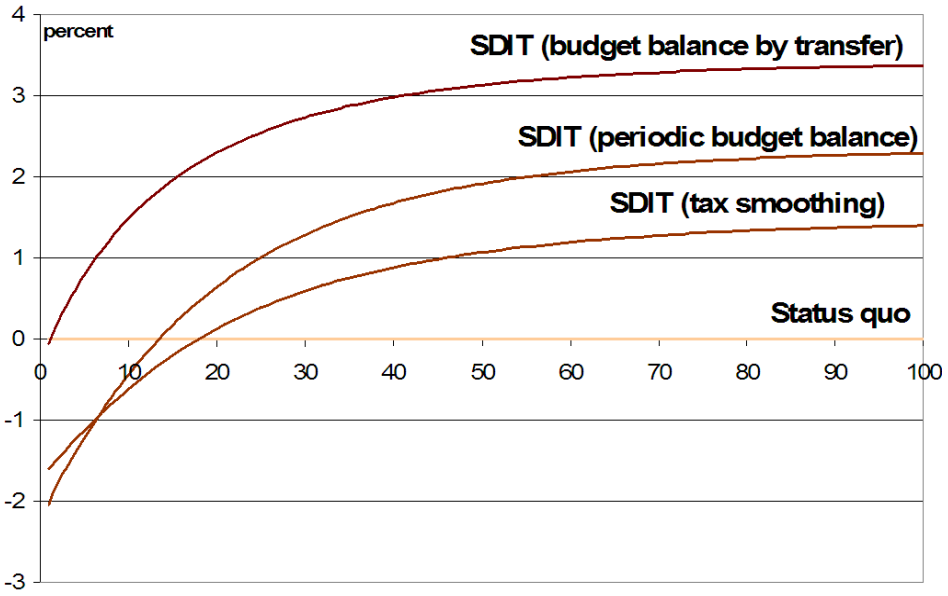

Figure 4: GDP Under Alternative Budget Financing Strategies.

social transfers might even have favorable effects on labor market participation since it widens the income differential between work versus non-work and, thus, sharpens the 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 model 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 and employment which, in turn, magnifies the investment induced expansion of GDP. Figure 4 illustrates.

3.6 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 to tax changes. Our base case parameters reflect consensus

estimates of the empirical literature. Quite often, however, these parameters are estimated rather imprecisely in the econometric literature, leaving a substantial range of equally credible values. The key behavioral parameters used are discussed in the last paragraphs of section 3.2. Table 5 summarizes the results of a sensitivity analysis. Column "SDIT" reproduces the results of the main scenario in Table 2. 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 6.2% instead of 8.18% in the base case, and the gains of the tax reform in terms of long-run GDP and consumption are somewhat smaller. The next column recomputes the main SDIT scenario with a low elasticity of labor supply, using a value of 0.25 instead of 0.5. The results are almost identical to the standard case. The reason is that the SDIT reform results only in a small variation of the net wage of -0.13% which cannot give rise to a larger labor supply effect, irrespective of the magnitude of the elasticity. However, a lower wage elasticity of labor supply would dampen the labor supply response of a lower value of σ_C as in the next column. It would also significantly dampen the short-run decline in GDP reported in Figure 4 which mainly results from the reduction in labor supply in response to the initial increase in the value added tax. The reform would be less costly in the short-run in this case.

Given that SDIT substantially strengthens savings incentives, the intertemporal substitution elasticity becomes a prime candidate for a sensitivity check. It turns out to be the most important parameter in determining the magnitude of the results. The empirical estimates support both higher and lower values than our base case value of .5. Using a higher elasticity value of $\sigma_C = 0.65$ 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,

	Variable		SDIT	ϵ_K	ϵ_L	σ_C	σ_C	μ
ϵ_K	Elasticity capital demand		1.00	**0.75**	1.00	1.00	1.00	1.00
ϵ_L	Elasticity labor supply		0.50	0.50	**0.25**	0.50	0.50	0.50
σ_C	Intertemp. subst. elast.		0.50	0.50	0.50	**0.35**	0.65	0.50
σ_C	Intertemp. subst. elast.		0.50	0.50	0.50	0.50	**0.65**	0.50
μ	Asset subst. elasticity		10.00	10.00	10.00	10.00	10.00	**5.00**
u^c	User cost, dom.corp.	%)	8.52	8.52	7.48	8.73	8.37	8.66
i^{BH}	Interest on bus. debt	%)	7.98	7.88	7.96	8.21	7.82	7.84
$\bar{r}$	Av. portfolio return	%)	5.80	5.78	5.79	5.93	5.72	5.74
t^i	Rate of indirect tax	%)	11.70	11.62	11.59	13.16	10.71	11.64
w	Market Wages	%)	3.68	3.71	3.71	3.34	3.92	3.62
w^h	Net Wages	%)	-0.13	-0.03	0.00	-1.74	1.00	-0.13
L^s	Employment	%)	-0.06	-0.01	0.00	-0.87	0.50	-0.06
K	Aggregate Capital	%)	8.18	6.20	8.33	6.25	9.54	8.06
GDP	Gross dom.prod.	%)	2.34	1.80	2.42	1.29	3.07	2.29
C	Priv. Consumption	%)	3.53	3.44	3.68	1.54	4.92	2.85
Y^C	Output Corporate Sec.	%)	-1.77	-1.10	-1.57	-4.37	0.03	-2.83
Y^N	Output Noncorporate Sec.	%)	-0.31	-0.22	-0.30	-0.54	-0.16	0.16
Y^h	Output home multis	%)	14.90	10.83	14.81	16.11	14.08	16.41
Y^{fh}	Output foreign multis	%)	14.84	10.79	14.75	16.01	14.05	16.32

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.

Table 5: Sensitivity analysis

the SDIT 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 almost, 5% instead of 3.5% in the base case parameterization. Note further, that only domestically owned firms can benefit from lower equity costs since the cost of equity of multinationals is fixed on international stock markets. 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 from the reform.

Last, we cut the elasticity of portfolio substitution μ in half, making asset demand

less sensitive to interest rate differentials and increasing the home bias.[25] Households shift less to foreign assets if the return at home declines. Consequently, domestic interest rates can fluctuate to a larger extent in response to a given shock. For example, the interest on domestically issued business debt declines by more than in the base case scenario. 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. Consequently, 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 5 shows, multinationals expand even more while domestic corporate firms, the largest sector of the Swiss economy, gets 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 very limited, however.

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 system). The proposed system eliminates the investment 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

[25] Gordon and Bovenberg (1996) explain the home bias effect by asymmetric information about foreign investment opportunities. They argue that the elasticity of substitution between home and foreign assets should be high in capital exporting countries such as Switzerland, see our base case calibration, and lower in capital importing countries.

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 also 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 tax rates on interest and dividend income but also implies a more effective taxation of capital gains. This low tax rate 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 GDP between 2.3 and 3.5 percent. However, the need to finance the revenue losses with an increase in the value added tax imposes considerable short-run costs on account of an increased labor market distortion. The detrimental labor market effect could be avoided though 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. A strategy of intergenerational income shifting by using public debt to smooth the required value added tax rates over time could reduce the short-run costs of the reform but would also significantly reduce the long-run gains.

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