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DOES GERMANY COLLECT REVENUE FROM TAXING CAPITAL INCOME?

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DOES GERMANY COLLECT REVENUE FROM TAXING CAPITAL INCOME?

Abstract

A widespread objection to the introduction of consumption tax systems claims that this would lead to high tax revenue losses. This paper investigates the revenue effects of a consumption tax reform in Germany. Our results suggest that the revenue losses would be surprisingly low. We find a maximum revenue loss of 1.6 percent of annual GDP. In some years, we even find a tax revenue gain. This implies that the current tax system collects little revenue from taxing the normal return to capital. Based on these results, we calculate a macroeconomic measure of the effective tax rate on capital income.

JEL Code: H25, H21.

Keywords: cash flow tax, tax revenue effects, effective taxation of capital income.

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1 Introduction

In the academic debate on the appropriate income tax base, the question of whether or not capital income should be taxed is a key issue. According to the concept of comprehensive income taxation (Schanz (1896), Haig (1921) and Simons (1938)), both capital and labour income should be part of the tax base. Advocates of consumption tax systems (see e.g. Fisher & Fisher (1942)), in contrast, argue that the normal return to investment should be exempt from tax.

Most existing tax systems are based on the principle of comprehensive income taxation. But recent tax reforms have reduced the tax burden on capital income relative to other types of income. Examples for this trend include the introduction of tax exemptions for retirement savings in the U.S. and many other countries and the move toward dual income taxation in the Scandinavian countries. As a result, existing tax systems include elements of both the traditional comprehensive income tax concept and the consumption tax approach. For many observers, though, these hybrid systems do not go far enough, and several tax reform proposals suggest the introduction of pure consumption tax systems[1].

In the literature, the advantages and disadvantages of consumption tax reforms have been discussed extensively. While advocates of consumption taxation point to the efficiency losses and adverse growth effects caused by capital income taxes, critics point out that consumption tax systems are vulnerable to income shifting, that a switch to consumption taxes would have undesirable distributional effects and that it may give rise to tax revenue losses.

Compared to the extensive theoretical debate on consumption tax reforms, relatively little empirical work has been done in this area. This paper focuses on one important empirical aspect of consumption tax reforms: the effects on tax revenue. Estimating the tax revenue difference between the existing tax system and a hypothetical consumption tax system is interesting for two reasons. Firstly, consumption tax reform proposals will be unsuccessful in the political process if the expected tax revenue losses are too high. Secondly, the tax revenue difference between the existing tax system and a hypothetical consumption tax system may be interpreted as a measure of the tax burden on the normal return to capital (Gordon, Kalambokidis & Slemrod (2004a)).

In the literature, empirical work on the tax revenue effects of consumption tax reforms mostly focuses on the United Kingdom and the United States. Meade (1978, p. 261ff.) estimates the tax revenue from different consumption based tax systems. Gordon & Slemrod (1988) compare the tax revenue generated under the existing tax system in the U.S. to the tax revenue that would be generated by an

[1] See e.g. Meade (1978), Hall & Rabushka (1995) or, for Germany, Rose (2003) or Mitschke (2004).

R-base type cash flow tax. They find that, in 1983, the US government would have increased tax revenue by implementing a cash flow tax system. Gordon, Kalambokidis & Slemrod (2004a) and Gordon, Kalambokidis, Rohaly & Slemrod (2004) replicate and extend the analysis by applying it to data for the years 1995 and 2004. It turns out that a switch to a consumption based tax systems in 1995 or 2004 would have induced a considerable loss in tax revenue. The difference in results is partly explained by business cycle effects.

This paper uses the approach introduced by Gordon & Slemrod (1988) to investigate the tax revenue effects of introducing a consumption tax system in Germany. For the time period between 1977 and 1998, we ask how tax revenue would have been affected if the tax base had been that of a consumption tax system. We extend the approach used in Gordon & Slemrod (1988) by considering an S-base type cash flow tax, next to the R-base tax.

Our analysis leads to the following results. Firstly, the revenue from taxing capital income collected by the German tax system between 1977 and 1998 is remarkably low, i.e. the revenue losses caused by switching to a consumption tax system would be low as well. For instance, in 1983 and 1986, we find that the revenue from taxing capital income in Germany was effectively close to zero. For the 1990s, this number is positive but still fairly low, with a maximum of 1,6% of GDP. Secondly, the revenue difference is quite volatile and strongly influenced by business cycle conditions. Thirdly, the volatility of the tax revenue losses or gains depends on the type of consumption tax system under consideration. Under an R-base, the tax revenue difference to the existing tax system would be much more volatile than under an S-base.

The rest of the paper is set up as follows. In the following section, we describe the theoretical basis of our approach. In section 3, we present the results of the empirical analysis. Section 4 discusses some limitations of the analysis and economic questions raised by the results. In section 5, we use our results to calculate a macroeconomic measure of the tax burden on capital income. Section 6 concludes.

2 The Theoretical Framework

In this section, we describe the theoretical basis of our empirical analysis. Our approach follows Gordon & Slemrod (1988) and extends the analysis by considering an S-base, next to the R-Base. It is helpful to discuss the firm level and the household level separately.

2.1 The firm level

Consider a firm operating in period t, which owns real assets including inventories (K_t) and financial assets (B_t). The latter yield a financial income $\rho_t B_{t-1}$, where ρ_t is the rate of return. Income from real assets is denoted as F_t. The two asset types depreciate with rates δ^K and δ^B, respectively. The firm's debt G_t gives rise to interest payments of $i_t G_{t-1}$ where i_t is the interest rate. The firm may issue new shares $N_t - N_{t-1}$, it pays dividends Ω_t, and direct taxes T_t. The firm's cash-flow equation in period t is given by:

$$F_t + \rho_t B_{t-1} + N_t - N_{t-1} + G_t - G_{t-1} = I_t^K + I_t^B + i_t G_{t-1} + \Omega_t + T_t \qquad (1)$$

where I_t^K is gross real investment and I_t^B is financial investment. Note that

$$I_t^K = K_t - K_{t-1}\left(1-\delta^K\right) \quad \text{and} \quad I_t^B = B_t - B_{t-1}\left(1-\delta^B\right) \qquad (2)$$

2.1.1 The status quo tax system

Under the current tax system, income from both real and financial assets is subject to tax whereas interest on debt and depreciation allowances may be deducted from the tax base. Tax payments under the current tax system (T_t^C) are thus given by:

$$T_t^C = u(F_t + \rho_t B_{t-1} - i_t G_{t-1} - D_t) \qquad (3)$$

where D_t stands for depreciation deductions and u is the statutory tax rate on profits (including local taxes).

2.1.2 Consumption tax systems

There are many ways of introducing consumption tax systems in practice. We consider two types of corporate income taxes which may be used to construct a consumption tax system: an R-based tax system which only taxes cash flows from real activities and an S-based system which also taxes financial cash flows. Although both systems imply intertemporal neutrality of the tax system, their effects on tax revenue may be quite different.

The R-base tax system An R-base tax system (see Meade (1978)) excludes financial income from the tax base, disallows interest deductions and replaces depreciation deductions by expensing for new investment in real assets and inventories. Denote the tax revenue in period t under a hypothetical R-based tax system by T_t^R. Tax revenue T_t^R is given by

$$T_t^R = u\left[F_t - I_t^K\right] \qquad (4)$$

The difference in tax revenue to the status quo tax system is:

$$T_t^C - T_t^R = u\left[I_t^K - D_t + \rho_t B_{t-1} - i_t G_{t-1}\right] \equiv u\left[\Delta_t^{CR}\right] \tag{5}$$

where Δ_t^{CR} denotes the tax base effect in case of an R-base tax reform.

The S-base tax system According to Meade (1978), an S-base tax system only levies tax on the cash flow related to share capital flowing from firms to firm owners, i.e. dividends net of newly issued shares.[2] Using (1) and setting $T_t = 0$, the S-base can be written as

$$\Omega_t - N_t + N_{t-1} = F_t + \rho_t B_{t-1} - I_t^K - I_t^B + G_t - G_{t-1} - i_t G_{t-1} \tag{6}$$

(6) shows that the S-base tax is equivalent to a tax base which would tax both real and financial income and any increase in debt and allow for an immediate deduction of real and financial investment. In the empirical analysis, we will calculate the right hand side of (6). The tax payment under the S-base tax can thus be expressed by:

$$T_t^S = u\left[F_t + \rho B_{t-1} - I_t^K - I_t^B + G_t - G_{t-1} - i_t G_{t-1}\right] \tag{7}$$

so that the difference in tax revenue to the current system is:

$$T_t^C - T_t^S = u\left[I_t^K + I_t^B - G_t + G_{t-1} - D_t\right] \equiv u\left[\Delta_t^{CS}\right] \tag{8}$$

The difference between the R-base and the S-base is given by

$$T_t^R - T_t^S = u\left[I_t^B - \rho B_{t-1} - G_t + (1 + i_t)\, G_{t-1}\right] \equiv u\left[\Delta_t^{RS}\right] \tag{9}$$

This difference is zero if investment in financial assets is equal to the return to these assets ($I_t^B = \rho B_{t-1}$) and debt grows at the rate of interest. These conditions may hold under the assumptions of perfect capital market and in a steady state where the growth rate of the capital stock equals the rate of interest. But, as the subsequent analysis will show, they do not hold empirically for the time span under consideration, so that the S-base differs considerably from the R-base.

2.2 The household level

So far, we have only considered taxes at the firm level. But under the current system, capital income is also taxed at the household level. The household's budget constraint can be written as

[2] The tax reform proposal for Germany made by Mitschke (2004) also uses the S-base system.

$$C_t + S_t = Y_t^L + i_t A_{t-1} + \Omega_t + M_t - T_t^h \tag{10}$$

The household spends available income on consumption C_t and savings S_t. Income consists of labour income denoted by Y_t^L, interest income $i_t A_{t-1}$, dividends from domestic firms Ω_t and other types of income which we summarize under M_t. The latter may include dividends from foreign firms, income from personally held real estate investment, from retirement benefits and more. Under the consumption tax systems discussed above, dividends as well as interest income would be exempt from personal income taxation. Under all tax systems, labour income would be subject to tax.[3] The tax treatment of the other income components in the current German tax system will be discussed further below.

3 Empirical Evidence

3.1 The data

For the analysis at the firm level, we use data from the balance sheet data pool of the German Federal Reserve Bank. For some earlier years we just have data on West Germany. Table 1 describes the data sample.

[3]Introducing a consumption tax system would also require changes in other parts of the tax system, in particular inheritance taxation. Pursuing these issues in greater detail, though, would be beyond the scope of this paper.

Table 1: Descriptive Statistic

Year	Total assets (bn DM)	of which: real assets	debt	Investment (bn DM) in: real assets	financial assets	interest rate (%)
		West Germany				
1972	1 037,5	64,1%	76,3%	111,3	47,7	8,2
1973	1 113,3	64,4%	77,0%	116,6	34,2	9,5
1974	1 162,4	64,3%	77,4%	97,5	27,7	10,6
1975	1 188,0	63,6%	77,4%	74,2	27,0	8,7
1976	1 291,6	62,9%	77,8%	129,1	56,3	8,0
1977	1 332,8	61,1%	78,0%	76,8	48,8	6,4
1978	1 419,5	61,0%	78,6%	130,8	45,6	6,1
1979	1 533,9	60,5%	79,4%	147,5	63,5	7,6
1980	1 632,4	61,3%	80,3%	164,2	36,1	8,6
1981	1 707,3	60,8%	81,3%	129,8	54,0	10,6
1982	1 720,3	60,5%	81,6%	100,5	25,5	9,1
1983	1 792,1	58,9%	81,8%	116,8	74,3	8,0
1984	1 886,3	57,3%	81,8%	135,0	83,4	7,8
1985	1 940,1	56,4%	81,8%	125,8	57,4	6,9
1986	1 982,6	55,9%	81,1%	128,8	48,0	6,0
1987	2 081,1	55,6%	80,7%	170,6	64,1	5,8
1988	2 206,7	54,8%	80,9%	185,3	84,9	6,0
1989	2 398,3	54,3%	81,6%	236,2	111,2	7,1
1990	2 596,2	53,7%	81,8%	247,4	121,9	8,9
1991	2 868,9	53,1%	82,1%	297,7	164,9	8,7
1992	2 963,8	52,0%	81,7%	198,1	98,9	8,1
1993	3 005,3	51,2%	82,4%	182,5	65,8	6,4
1994	3 054,5	49,6%	82,3%	154,7	97,8	6,7
1995	3 091,3	49,0%	81,8%	174,0	58,0	6,5
1996	3 130,9	48,3%	81,8%	162,2	67,3	5,6
1997	3 217,0	48,0%	81,4%	202,1	75,5	5,1
		Germany (West and East)				
1997	3 497,7	50,6%	82,1%	205,6	79,7	5,1
1998	3 715,0	50,0%	81,9%	293,4	158,4	4,5
1999	3 980,8	49,1%	82,0%	309,8	199,0	4,3
2000	4 214,0	47,9%	82,3%	284,2	202,9	5,4
2001	4 314,9	47,5%	81,9%	246,0	114,7	4,8

During the period covered by the data, there is a slight increase in the debt-asset ratio[4] and a significant decline in the share of real assets in overall assets. The latter is in particular due to a massive increase in financial assets held by firms. The reader should note that the data we use is based on German GAAP Balance Sheets (Handelsbilanz), not on tax return data. Under German tax law, the German GAAP accounting rules are, in principle, also binding for tax accounting ("Maßgeblichkeitsprinzip"). But there are some exceptions to this rule, so that there may be deviations between the two types of accounting.[5]

[4] A considerable part of the firms' debt takes the form of book reserves, in particular reserves for future pension obligations. Throughout this paper, we treat these book reserves as ordinary debt.

[5] Profit tax payments reported in German GAAP micro data are usually slightly lower than suggested by reported profits, which implies that taxable profits are somewhat lower than profits

In order to assess the effects on taxes levied at the household level, we use German Statistical Office income tax data. This data includes information on personal capital income, i.e. interest income and dividends as well as certain types of realized capital gains.[6]. Moreover, it includes data on personal income from real estate investment and data on tax credits for corporate taxes paid on distributed profits. Unfortunately, this data is only available for every third year and only for the period 1977-1998.

As in the preceding section, we start at the firm level and then add the effects arising at the household level. Since the tax rates on both the firm and the household level vary over time and across individuals, we first compute the effects for the *tax bases* (subsections 3.3 and 3.4) and then add the *tax rate* (subsection 3.5). Since we do not have balance sheet data from the banking sector, we have to assume that banks are taxed as in the current system and are unaffected by the tax reforms under consideration.

3.2 Tax base effects at the Firm Level

In order to compute the tax bases Δ_t^{CR} and Δ_t^{CS} as presented in equations (5) and (8), we need to define the following variables: I_t^K is investment in real assets which is computed by comparing the stocks of different capital assets in two sequential periods and adding the depreciation deductions for these assets. The same method is applied to financial assets:

$$I_t^K = K_t - K_{t-1} + D_t^K \quad \text{and} \quad I_t^B = B_t - B_{t-1} + D_t^B \tag{11}$$

The depreciation deductions D_t can be taken directly from the data. In order to calculate the revenue effects of switching to the R-base, we also need data on income from financial assets (ρB_{t-1}). In the balance sheet data, interest earnings ("Zinserträge") are reported. In the following, we will assume that these interest earnings include all income from financial assets which is taxed under the existing tax system. These interest payments are relatively low, given the stock of financial assets held by firms. This suggests that there may be returns to the firm's financial assets other than interest payments. Of course, part of the financial assets held by firms may be cash balances or loans to clients which do not produce interest income. Moreover, the income on financial assets may take the form of capital gains. If taxable income from financial assets exceeds interest earnings reported in the data, our approach underestimates the revenue losses caused by a switch to an R-base. The estimate for the S-base is not affected.

according to German GAAP. Given this, our analysis slightly overestimates the revenue losses of switching to a consumption tax system.

[6] See §20EStG (German Income Tax Law).

Figure 1 shows the tax base effects Δ_t^{CR} and Δ_t^{CS} for the years between 1972 and 2001 ("West"-Germany for 1972-1997 and "total" Germany for 1997-2001). Positive (negative) values mean that a consumption tax reform would yield a loss (gain) in the tax base.

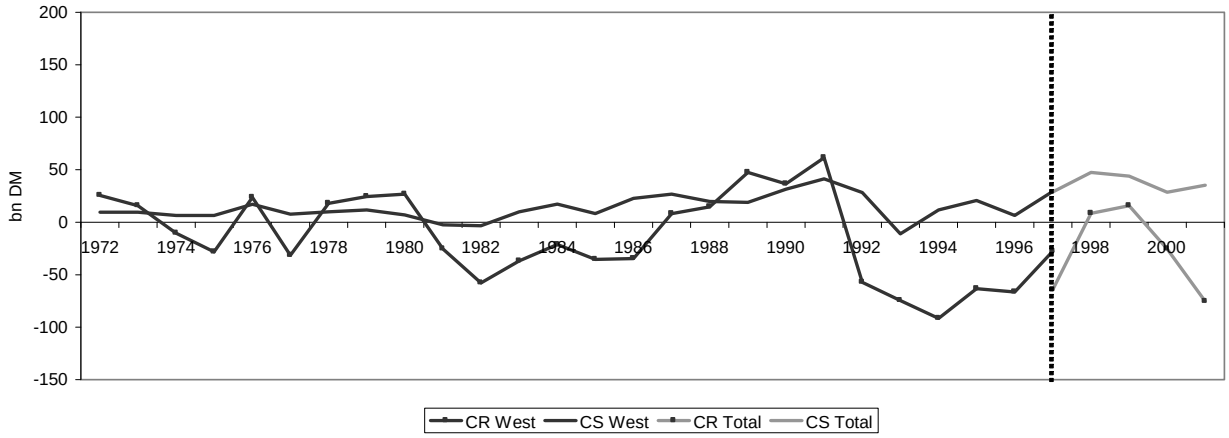

Figure 1: Δ_t^{CR} and Δ_t^{CS} for 1972-2001

Figure 1 shows that a switch to a consumption tax system would have reduced the tax base in some but not all years. This holds for the S-base and in particular for the R-base. Moreover, the tax base effects are much more volatile in the case of the R-base. This difference between the two systems will be discussed further below.

3.3 Adding the tax base effects at the household level

The German income tax law differentiates between seven types of income which are subject to tax at the household level. These include income from agriculture (E_1), non-incorporated business (E_2), self-employment (E_3), employment (E_4), financial assets (E_5), rent and leasing (E_6) and other income including certain types of retirement benefits (E_7). The taxation of business income is covered by the firm level analysis in the preceding section. Income from employment and self-employment is essentially labour income. What we have not taken into account so far is personal income from financial assets (E_5), income from rent and leasing (E_6), which is mainly generated by personally held real estate investment, and retirement benefits (E_7). We can express the household's budget constraint under the current tax system as:

$$\sum_{h=1}^{7} E_h - f^E\left(\sum_{h=1}^{7} E_h\right) + E^o = C_t + S_t \tag{12}$$

where f^E is the (non-linear) income tax function, $\sum_{h=1}^{7} E_h$ is the tax base and. E^o stands for income which is not subject to taxes (like grants etc.).

Personal income from financial assets, which essentially consists of interest income and dividends, is subject to tax under the current tax system. Under an R-based tax system, financial investment would be tax exempt. Under an S-based tax system, personally held financial investment would be taxed in the same way as financial investment at the firm level. Since we have no data on net financial investment or net withdrawals from bank accounts at the personal level, we assume (following Gordon, Kalambokidis & Slemrod (2004a)) that income from financial investment at the personal level is untaxed.

Besides, we have to take into account that, between 1977 and 2000, Germany had an imputation system for the taxation of corporate profits. Corporate taxes paid on distributed profits where credited against personal income taxes. In a consumption tax system, there would be no credits for taxes paid at the corporate level. We therefore have to take into account the revenue costs of this tax credit under the old system.

A more complex question is how we should deal with income from rent and leasing. Taxable income from rent and leasing is negative in our dataset, except for 1977 and 1980. This is because there are considerable tax incentives for investment in real estate. One example is accelerated depreciation on housing capital. These incentives are often seen as a means of compensating for rent regulation which acts as a break on real estate investment. The question is whether these tax subsidies would have to be replaced by explicit subsidies under a consumption tax system. Another difficulty is that we do not have data on tax depreciation and interest deductions for housing investment made by private households, so that we cannot calculate the tax base effects of switching to a consumption tax system for this type of income. We therefore simply assume that this income is tax exempt. We will discuss the consequences of relaxing this assumption in section 4. Finally, we also leave unchanged the treatment of income from retirement benefits (E_7). Given this, the tax base difference between the current system and the consumption tax system is simply $E_5 + E_6$.

We may now calculate the overall tax base difference by adding the tax base effects at the firm level and the household level. While our firm level data is available on a yearly basis, data for taxable income from financial assets at the household level is available only in three year intervals and only for the time period $1977 - 1995$ for West-Germany and for 1998 for Germany as a whole. Table 2 summarizes the results for the household and the firm level for these years.

Table 2: Tax base effects in billion DM at the household and the firm level

	1977 (West)	1980 (West)	1983 (West)	1986 (West)	1989 (West)	1992 (West)	1995 (West)	1998 (Total)
Income from capital (E5)	-7,90	-16,16	-19,30	-25,11	-30,57	-52,40	-31,97	-43,33
Incom from rent and leasing (E6)	-9,83	-11,88	27,67	28,02	6,88	10,00	18,62	28,24
Sum	-17,73	-28,04	8,37	2,91	-23,69	-42,40	-13,35	-15,10
CR Firm	31,44	-26,70	36,86	34,68	-47,53	57,26	63,29	-8,42
CR Sum	**13,72**	**-54,74**	**45,22**	**37,59**	**-71,22**	**14,86**	**49,94**	**-23,52**
CS Firm	-7,78	-6,89	-9,99	-22,68	-18,85	-28,35	-20,62	-47,43
CS Sum	**-25,51**	**-34,93**	**-1,62**	**-19,78**	**-42,54**	**-70,76**	**-33,97**	**-62,53**

The numbers in table 2 have to be interpreted as follows. For instance, in 1998, a consumption tax reform would have decreased the tax base by approximately 15 billion DM at the personal level. At the firm level, there is an additional tax base decrease of 8,4 billion, so that the overall increase in the tax base ("CR sum") would have been 23,5 billion DM (12 billion €). In the case of an S-base consumption tax system, in contrast, the tax base at the firm level would have been smaller and the overall tax base effect amounts to over 62 billion DM (32 billion €). Table 2 also shows that the tax base effects are very volatile. We will discuss the differences between the S-base and the R-base and the reasons for the volatility of the tax base effects in greater detail in section 4.

3.4 Total effects on tax revenue

In this section, we try to assess the revenue effects of a reform towards an R-base or an S-base. In order to calculate the revenue effects in a precise manner, we would need micro data which allows to determine marginal tax rates for every firm and every household in every period. Since we do not have this data, we simply use top marginal tax rates for firms and households. We thus overestimate the revenue gains and losses of the tax reforms under consideration. Next to the tax base effect, we also have to take into account the revenue effect of abolishing the tax credit for corporate taxes paid which existed between 1977 and 2000.

Table 3 reports the changes in tax bases, the assumed tax rates (taken from Devereux, Griffith & Klemm (2002) and Fuest & Weichenrieder (2002)), the tax credit and the revenue effects.

Table 3: Summary of the tax revenue effects in billion DM in case of a tax reform towards an R- or S-base tax system

	1983 (West)	1986 (West)	1989 (West)	1992 (West)	1995 (West)	1998 (Total)
Gain/Loss in tax base						
firm level R	36,86	34,68	-47,53	57,26	63,29	-8,42
firm level S	-9,99	-22,68	-18,85	-28,35	-20,62	-47,43
individual E5+E6	8,37	2,91	-23,69	-42,40	-13,35	-15,10
Assumed tax rates						
firm level	62,56%	62,69%	62,73%	59,40%	56,55%	56,01%
individual level	56,00%	56,00%	56,00%	54,99%	56,98%	56,98%
Abolishment of imputation of corporate taxes						
	3,37	5,38	5,72	8,11	6,08	9,60
Tax revenue gain/loss						
R-base	**31,11**	**28,74**	**-37,36**	**18,80**	**34,27**	**-3,72**
S-Base	**1,81**	**-7,22**	**-19,37**	**-32,05**	**-13,18**	**-25,57**
in % of annual GDP						
R-base	1,8%	1,5%	-1,6%	0,6%	1,0%	-0,1%
S-Base	0,1%	-0,4%	-0,8%	-1,0%	-0,4%	-0,7%

It turns out that the revenue effects of a switch to a consumption tax system are not very large. Under the R-base, the maximum revenue loss observed in the data is 1.6% of GDP (in 1989) and the largest revenue gain is 1.8% of GDP in 1983. In the case of the S-base, the revenue losses attain a maximum of 1% of annual GDP in 1992. Such a revenue loss could be compensated, for instance, by a 2.5 percentage point increase in the value added tax. In most years, the revenue losses would have been much smaller, and for 1983 we find a small revenue increase.[7] One should note that these revenue effects have been calculated on the basis of the top marginal tax rates, so that the true revenue losses (and gains) are probably significantly smaller.

4 Discussion

4.1 Behavioral response

Our analysis abstracts from taking into account behavioral adjustments which would be caused by a switch to a consumption tax system. If these behavioral adjustments are taken into account, it is likely that the tax revenue losses would be smaller as investment and economic growth are expected to increase as a reaction to consumption tax reforms. Our approach is thus likely to overestimate the

[7] In their analysis for the U.S., Gordon & Slemrod (1988) and Gordon, Kalambokidis & Slemrod (2004a) find that under a simulated R-base tax, the tax liability would have increased by $7,4 billion in 1983. In 1995, there would have been a loss in tax revenue of $108,1 billion, i.e. approximately 1.5% of GDP.

true revenue losses. A related issue is that the introduction of a consumption tax revenue may also lead to new opportunities for tax evasion through income shifting. For instance, under the R-base, there may be incentives to engage in income shifting between real and financial income flows. This may well increase the revenue losses. Investigating this in greater detail would be beyond the scope of this paper.

4.2 R-base or S-base?

From a theoretical point of view, the revenue effects of switching to an R-base should be the same as those of switching to an S-base, at least in the long term. But our results for the two tax bases are very different[8]. In particular, the revenue effects of switching to an S-base are much less volatile. Moreover, in some years, there are large differences between the revenue effects: For instance, in 1995, we find an increase in tax revenue amounting to 1% of GDP for the R-base and a decline in revenue of 0.4% of GDP for the S-base. In order to capture the differences between both systems systematically, recall equation (9). The tax base difference Δ_t^{RS} is due to deviations from the equilibrium path of investment in financial assets (first term) and that of debt financing (second term):

$$\Delta_t^{RS} = \left(I_t^B - \rho B_{t-1}\right) - \left(G_t - (1+i_t)\, G_{t-1}\right) \tag{13}$$

Figure (2) shows the effects of both terms ("investment" and "debt") and the difference Δ_t^{RS} ("DIFF").

[8] Meade (1978) also states that "cyclically the two bases have different effects", e.g. in 1974, "the S basis is very much higher than the R basis" and he concludes that "the figures for S for 1973 and 1974 seem to be 'atypical'." (p. 262).

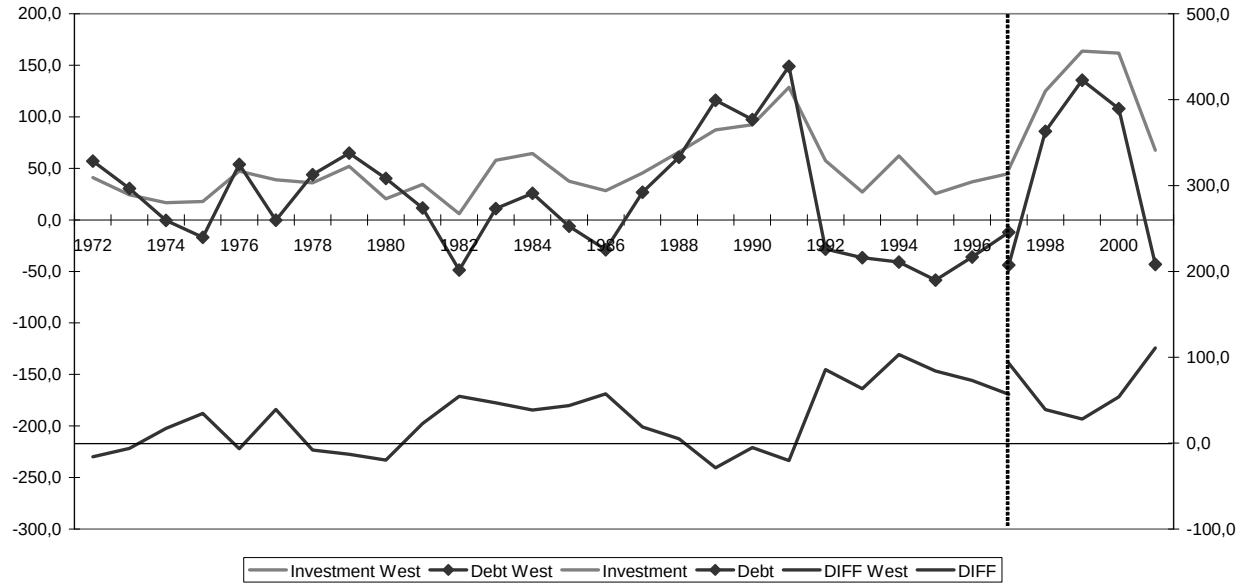

Figure 2: Differences between Δ^{CR} and Δ^{CS} due to investment in financial assets and debt differentials.

Figure 2 shows that differences between the R-base and the S-base arise in particular in years where the cash flow from financial investment was negative. This was the case, for instance, in the 1990, where net investment in financial assets at the firm level was particularly high.

In practical terms, the S-base is probably easier to handle than the R-base. One of the disadvantages of an R-based system is that it requires a sharp distinction between financial and non-financial incomes. This distinction is particularly difficult to apply to banks. Banks typically charge for their services by charging interest rates for loans which exceed those paid for deposits. Under an R-based tax system, profits generated by the provision of financial services might therefore go untaxed. The S-base avoids this difficulty by taxing real as well as financial assets.

4.3 Business cycle effects

Gordon, Kalambokidis & Slemrod (2004a) explain the difference in revenue losses between 1983 and 1995 for the U.S. by (1) the drop in interest rates, which lowers the effect of disallowing interest deductions, and (2) the different business cycle conditions. It is clear that our results are also strongly affected by the business cycle. Since investment is very volatile over the business cycle, a tax base which allows for expensing will also be affected by business cycle conditions. We could solve this problem by filtering the time series in order to control for investment

fluctuations. Unfortunately, we lack an appropriate data base since we do not have yearly data for the household level.

We therefore illustrate the business cycle effects by concentrating on the firm level. Figure 3 depicts the time series for gross business investment, Δ_t^{CR} (left scale) and Δ_t^{CS} (right scale) in billion DM. By simple graphical analysis, it becomes clear that the loss in tax base depends on the business cycle phase.

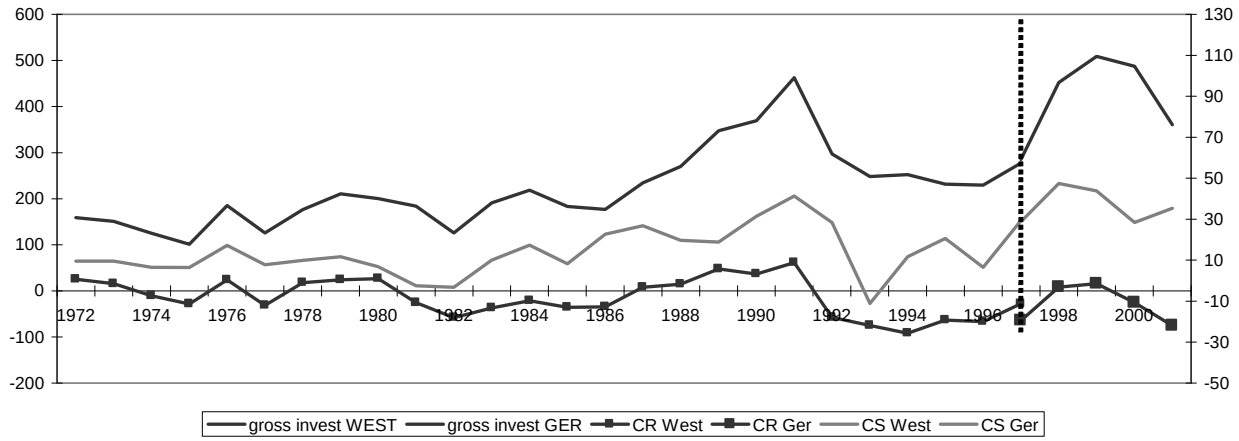

Figure 3: Gross investment, Δ_t^{CR} and Δ_t^{CS}.

The loss in tax base in 1995 is relatively low, as is investment, while the loss 1998 is relatively high, which is accompanied by high investment activity. As GKS (2004) point out, investment has a strong impact on the values of Δ_t^{CR} and Δ_t^{CS}. This implies that the revenue loss in 1998, for instance, might be higher than the average loss and has to interpreted with caution. Accordingly, revenue losses found for bust years like 1983 are likely to underestimate the average revenue losses.

4.4 Taxing income from rent and leasing

As pointed out in section 3, taxable income from rent and leasing is mostly negative under the existing German tax system. This is mainly due to generous depreciation rules which are probably meant to neutralize the negative effect of rent regulation on real estate investment. In our calculations, we have assumed that the subsidization of real investment through the tax system will simply be abolished in a consumption tax system. A possible objection to this approach would be that the subsidies implicit in the current tax system will have to be replaced by explicit subsidies of real estate investment. In this case, we would underestimate the revenue losses of switching to a consumption tax system. We therefore report the results for the case where we assume that the tax treatment of income from

rent and leasing remains as it is. The tax revenue effects are computed by multiplying the tax base effects with top marginal rates and including the imputed corporate taxes (as in table 3).

Table 4: Income from rent and leasing and the tax base effects in billion DM when income from rent and leasing is taxed as in the current system

	1983 (West)	1986 (West)	1989 (West)	1992 (West)	1995 (West)	1998 (Total)
Income from rent and leasing	-27,67	-28,02	-6,88	-10,00	-18,62	-28,24
Total effects on the tax base (in billion DM)						
R-base	17,56	9,56	-78,10	4,86	31,32	-51,76
S-base	-29,29	-47,80	-49,42	-80,75	-52,59	-90,77
Gain or loss in tax revenue (in billion DM)						
R-base	15,62	13,05	-41,21	13,31	23,66	-19,81
S-base	-13,68	-22,91	-23,22	-37,55	-23,79	-41,66

Table 4 shows that a switch to an S-base would now yield revenue losses for all years, and the overall revenue losses are higher.

5 A measure of the effective tax rate on the normal return to capital

Gordon, Kalambokidis & Slemrod (2003) use the approach presented above to develop the concept of a backward-looking measure of the effective marginal tax rate (EMTR) on investment. However, they concentrate on conceptual issues and do not apply their measure [9].

Here, we apply this method to the data presented above and extend the analysis on the individual level. Our goal is to present a simple macro-economic measure of the effective taxation of capital income, or more precisely, of the normal return to capital.

As we pointed out in the previous sections, capital taxation in Germany takes place at both the firm and the individual level. Since Germany can be considered as a small, open economy, the firm and the individual level need not be linked at all. Since measuring the tax burden on capital income in other countries than Germany is beyond the scope of this paper, we concentrate on the intersection of both sets, i.e. we analyze the taxation of capital which is owned by households in Germany and held by firms in Germany.

[9] Furthermore, they abstract from personal taxes and make some other critical assumptions. In Becker & Fuest (2004), we discuss the methodology and the effects of relaxing some of these assumptions. Then, we propose a method of computing the EMTR without relying on those assumptions and apply it to German firm level data.

The effective tax rate θ on capital income could be defined as:

$$\theta = \frac{\tilde{\varpi} - \varpi}{\tilde{\varpi}} \tag{14}$$

with $\tilde{\varpi}$ the pretax return to capital and ϖ the after-tax return. Denote the effective tax rate on capital income at the firm level by m_F and at the household level by m_H. Then, we can write:

$$(1-\theta)\,\tilde{\varpi} = (1-m_F)\,(1-m_H)\,\tilde{\varpi} = \varpi \tag{15}$$

Usually these measure combine the tax payments and a referential value like profit or income. In our case, m_F and m_H are defined as:

$$m_F = \frac{TC - TR}{\textit{income from the firms' capital}} \tag{16}$$

where TR has to be replaced by TS when the shift to a S-base tax is considered; and at the individual level:

$$m_H = \frac{f^E\left(\sum_{h=1}^{7} E_h\right) - f^E\left(\sum_{h=1}^{7} E_h - E_5 - E_6\right)}{\textit{income from the households' capital}} \tag{17}$$

Finally, we need to specify the denominators. We do not refer to taxable income reported in the household tax return data because these figures already all kinds of artificial reduction of the tax base[10]. Instead, we suppose that, in general, the capital market is in equilibrium, which means that the ex-post return to capital is equal to the short-term risk-free bond yield.

Thus, we approximate income values Θ_n from capital (see the denominators in equations (16) and (17)) by

$$\Theta_n = r\,(K^n + B^n) \;\text{ with } n = F, H \tag{18}$$

where F and H stand for firms and households, respectively. We have data on the households' financial and real wealth from the German Central Bank (see Deutsche Bundesbank (1999)). The households' net wealth grew from 8 209 bn DM in 1990 to 12 092 bn DM in 1997[11].

[10] Think for example of tax avoidance and evasion activities which are supposed to play an important role in the taxation of capital income, see e.g. Cnossen (1996).

[11] For calculating θ for the years 1992 and 1995 we need the net wealth of West German households. Unfortunately, we only know that in 1990 West German wealth presented 95% of the totality and 91% in 1997. We take the 1997 value which may lead to an overestimation of the effective capital income tax rate. The 1992 and 1995 presented in table 5 may thus be too high.

In order to compute $\theta = m_F + m_H - m_F m_H$, we further have to make assumptions on the average tax rates on corporate and individual income. We therefore report several scenarios ranging from lower values to the top marginal rate for both types of income.

Table 5 reports values of θ in different scenarios concerning the average tax rates on corporate and individual income.

Table 5: Effective tax rate on capital income with different scenarios of the average tax rates on firm-level and household-level capital income

	R-Base	firm-level				S-base	firm-level			
household. level	1992	40,0%	45,0%	50,0%	59,4%	1992	40,0%	45,0%	50,0%	59,4%
	40,0%	-6,5%	-7,6%	-8,7%	-10,8%	40,0%	6,8%	7,4%	7,9%	9,0%
	45,0%	-6,2%	-7,3%	-8,4%	-10,5%	45,0%	7,1%	7,6%	8,2%	9,2%
	50,0%	-5,9%	-7,0%	-8,1%	-10,2%	50,0%	7,4%	7,9%	8,5%	9,5%
	55,0%	-5,5%	-6,6%	-7,7%	-9,8%	55,0%	7,7%	8,2%	8,8%	9,8%
household. level	1995	40,0%	45,0%	50,0%	56,6%	1995	40,0%	45,0%	50,0%	56,6%
	40,0%	-11,4%	-12,9%	-14,5%	-16,5%	40,0%	4,8%	5,3%	5,8%	6,5%
	45,0%	-11,3%	-12,8%	-14,3%	-16,3%	45,0%	4,9%	5,4%	5,9%	6,6%
	50,0%	-11,2%	-12,7%	-14,2%	-16,2%	50,0%	5,0%	5,5%	6,0%	6,6%
	57,0%	-11,0%	-12,5%	-14,1%	-16,0%	57,0%	5,1%	5,6%	6,1%	6,8%
household. level	1998	40,0%	45,0%	50,0%	56,0%	1998	40,0%	45,0%	50,0%	56,0%
	40,0%	2,8%	3,1%	3,3%	3,6%	40,0%	11,5%	12,8%	14,1%	15,7%
	45,0%	3,0%	3,2%	3,4%	3,7%	45,0%	11,6%	12,9%	14,3%	15,8%
	50,0%	3,1%	3,3%	3,6%	3,8%	50,0%	11,7%	13,0%	14,4%	15,9%
	57,0%	3,3%	3,5%	3,7%	4,0%	57,0%	11,9%	13,2%	14,5%	16,1%

Note that the lower right values in each quadrant represent the upper bound of θ but not a realistic estimation of the true value. If one takes the 50%-assumption for both the firm and individual level, θ ranges from $-14,2\%$ in 1995 (R-base scenario) to 14.4% in 1998 (S-base scenario). As we pointed out above, 1998 is not at a very typical point in the business cycle and should therefore be considered as a relatively high value.

Furthermore, it should be noted that these results are only valid for capital income which is taxed in Germany at both levels. The low levels are not too surprising since not all types of capital income are subject to taxation.

Finally we should say that this type of effective tax rate measure is highly sensitive to business cycle effects as the broad variance of values in table 5 suggests. The reason is that the tax base of one period depends on the investment decisions of former periods since depreciation deductions always refer to past investment projects. In Becker & Fuest (2004) we construct a backward looking effective tax rate measure which is not sensitive to cyclical business investment.

6 Conclusions

In this paper, we have analyzed the revenue effects of tax reforms which would replace the existing tax system by a consumption tax system of the R-base or the S-base type. The most important result is that the revenue losses which would be caused by a consumption tax reform are surprisingly low. For some years, we even find revenue gains. These results imply that the current German tax system collects very little revenue from taxing capital income. Next to this, our analysis has shown that the revenue effects depend on the type of consumption tax system. The revenue effects of a switch to an R-base are much more volatile than those of introducing an S-base. Moreover, the yearly revenue effects are strongly influenced by business cycle conditions.

From these revenue figures, we deducted a simple backward-looking measure of the effective tax rate on capital income in Germany. Again, we find relatively low levels and, in some years, even negative values which indicates a subsidization of capital income.

These results should be interpreted in the light of several limitations of our study, which are mostly due to data problems. Firstly, we had to assume that the tax treatment of the financial sector remains unchanged. Secondly, we assumed that capital income and income from rent and leasing at the household level is untaxed under a consumption tax system. Thirdly, we have assumed that the tax treatment of pension income will not be changed by the consumption tax reform. We also had to calculate the revenue effects of the consumption tax reform on the basis of top marginal personal and corporate income tax rates, which implies that we may overestimate the magnitude of the revenue effects.

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