Tax Incentives and Borrowing[*]

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Abstract

We estimate the effect of a Danish 1987 tax reform, which reduced the tax rate applied to interest deductions from 73% to 50% for households with high incomes, but less for households with middle or low incomes. Using high quality panel data we find that households responded to the reduced tax subsidy by lowering interest payments and we find that the responsiveness to the tax subsidy varies by the initial level of interest payments.

Keywords: Interest rate deduction, tax reform, micro data.
JEL Codes: H24, H31

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1   Introduction

In many OECD countries households have the opportunity to reduce their taxable income by the amount of interest paid on their loans. Theoretically, the decision to borrow and the amount of debt carried forward from one period to the next is influenced by the after-tax interest rate, which usually depends on the tax payer's marginal tax rate (MTR)[1]. Despite the obvious policy relevance, the empirical evidence about the extent to which households adjust their total interest payments when the tax subsidy changes is limited and conclusions are mixed.[2]

Martins and Villanueva (2006) examine the effect of a Portuguese reform of an interest subsidy scheme that introduced a ceiling on the size of the subsidized loan. They find that the reform reduced the propensity to take up mortgage loans. Jappelli and Pistaferri (2007) examine the effect of a reform that changed after-tax interest rates by partially phasing out the interest deductibility of mortgage debt. They use a data set composed of repeated cross sections from the Italian SHIW and find that the level of mortgage debt is not affected by the reform.

We estimate the effect of a Danish 1987 tax reform, which reduced the tax rate applied to interest deductions on all loans from 73% to 50% for households with high incomes, but less for households with middle or low incomes. The reform gave high income households a strong incentive to lower their debt burden. The incentive was smaller in the middle tax bracket, and people in the lowest tax bracket experienced virtually no change in the tax value of interest deductions. We use high quality panel data tracking a random sample of Danish households from 1984 to 1990. The data are collected from the tax authorities and contain information about households' total interest payments.

This paper differs in several ways from the earlier studies. First, our data allow us to observe total interest payments, which is attractive because it is the relevant variable for tax purposes. Second, the after-tax interest rate is a function of MTR which is in turn a function of income, implying that estimates based on cross sectional comparisons are likely to be biased. Moreover, individuals may adjust earned income to accommodate the effects of the changes in the tax incentives, and this may shift some individuals into different tax brackets. We calculate MTRs based on the income in 1984, the year

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[1]Throughout, MTR will denote the marginal tax rate.

[2]Such tax provisions predominantly target mortgage loans. Maki (2001), Skinner and Feenberg (1990) provide evidence on household debt re-allocation in response to changes in relative after-tax price of mortgage and non-mortgage debt.

before the reform was announced, and the MTRs that we apply in our analysis were therefore not affected by the reform. This design can only be implemented with panel data.

2 The 1987 Danish Tax Reform

The Danish income tax system is built around a proportional local government tax and a progressive tax collected by the central government, which is the same for everyone. The local government tax rates vary across municipalities. In 1986, the highest local government tax rate was 31% and a high-income person living in that municipality would face a MTR of 75.95%. A tax ceiling ensured, however, that the MTR could not exceed 73%. Earned income, transfer income and capital income were taxed according to the same schedule.

The tax reform, announced in 1985 and implemented in 1987, broke the link between the MTR on earnings/transfer income and capital income. The reform reduced the tax value of negative capital income, i.e. the tax value of interest deductions, to 50% across all levels of income. The tax reform thereby decreased the tax value of interest deductions from 73% to 50% for the top tax bracket. The tax reform also reduced the tax rate applied to positive capital income to 56% and lowered the tax ceiling applied to earned income to 68% in the highest bracket and 56% in the middle bracket. The MTRs across tax brackets before and after the reform are summarized in Table 1.

For a high-income person the MTR on negative capital income fell by 23%-points and for a person in the middle bracket it fell by some 12%-points. Individuals in the lowest tax bracket were hardly affected. The MTR on earned income was reduced by 5%-points for persons in the top bracket and by 6%-points in the middle bracket. All types of interest payments are deductible both before and after the reform.

3 Data

We analyze income tax return data for a 10% random sample from the Danish population where we can track individuals and households longitudinally from 1984 to 1990. The data contains information about total interest payments and other types of income. Based on this we are able to calculate the MTRs. We group people at the household level and calculate the MTR facing the male. Information about demographic variables

Table 1: **MTRs before and after implementation of the 1987 tax reform**

Before Reform		After Reform			
Tax bracket	Earnings & cap. inc.	Tax bracket	Earnings	Net cap. inc <0	Net cap inc.>0[1]
$0-113$	$M+19.9$	$0-130$	$M+22.0$	$M+22.0$	$M+22.0$
$113-186$	$M+34.3$	$130-200$	$M+28.0$	$M+22.0$	$M+28.0$
$186-$	$M+45.1$	$200-$	$M+40.0$	$M+22.0$	$M+28.0$
Tax ceiling	73.0		68.0/56.0[2]		56.0[2]

Note: M is the local government tax rate. In 1987 the average municipal tax rate was 29. Threshold values for the tax brackets are given in 1000 DKK. Thresholds are adjusted yearly. Threshold values used in the table are for 1986 (before the reform) and 1987 (after the reform). The MTRs refer to personal income (as opposed to household income). (1) The tax brackets for positive net capital income refer to the sum of earnings and positive net capital income. After the reform positive capital income is taxed progressively up to the first threshold, 130,000 DKK. For a married couple the progression threshold is 260,000 based on the sum of their joint positive net capital income and earnings. (2) The 56% tax ceiling applies only to the middle bracket

Figure 1: Interest Payments by Tax Bracket
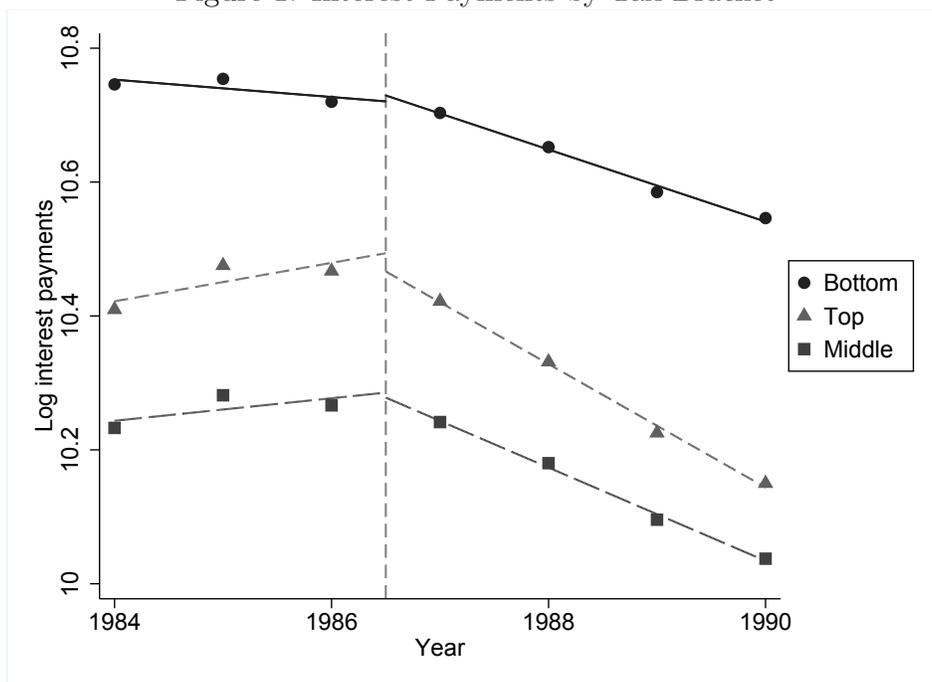
Note: The dots indicate means within year and 1984 tax bracket group. The lines are regression lines made over pre- and post reform years for each tax bracket

is collected and merged from different public administrative registers.

We start out with 74,194 household units. We include only stable household units and drop individuals living in common households, i.e. more than one family sharing residence, or individuals that live with their parents. Furthermore, we exclude households who made no interest payments (non-borrowers) during the period we examine, since we are interested in the effect of an increase in after-tax interest rates on debt. We include households where the male is aged between 20 and 60 in 1984. Finally, we drop observations for which we do not have enough information to calculate MTRs leaving a sample consisting of 45,332 household units. The data set is constructed from administrative registers, and therefore there is no attrition issue due to non-response. The only type of attrition is due to death and migration leaving us with seven observations for almost all household units.

Figure 1 shows the average of the log of total household interest payments across tax brackets together with regression lines made over pre- and post reform periods separately. Consistent with the structure of the tax incentives the slope changes the most in the top tax bracket followed by the middle bracket. The slope changes the least in the bottom bracket.

4 Methodology

In order to quantify the elasticity of interest payments wrt. the MTR on negative capital income we estimate the following regression for household i in year t:

$$\ln R_{it} = \alpha_0 + \alpha_1 \ln\left(1 - \tau_{it}\right) + \alpha_2 \ln y_{it} + \delta_t + \xi_i + u_{it}, \tag{1}$$

where R_{it} is total interest payments, τ_{it} is the MTR on negative capital income, y_{it} is the after-tax income. δ_t is a year dummy, ξ_i is an individual specific effect that is potentially correlated with the regressors, and u_{it} is an error term. The parameter of interest is α_1, which is the elasticity of interest payments wrt. the marginal net-of-tax rate on negative capital income. This specification is inspired by the literature estimating the elasticity of taxable income, e.g. Kleven and Schultz (2014).

The tax system is nonlinear, and this means that the the MTR is endogenous to the choice of income, i.e. $\ln\left(1 - \tau_{it}\right)$ and $\ln y_{it}$ are potentially correlated with u_{it} in (1). Intuitively, this happens because people potentially choose the level of interest payments to obtain a particular tax rate. For example, if a higher tax rate generates higher deductions, and if that creates a behavioral response which increases interest payments then the bias is likely to be positive.[3] To address the potential endogeneity we instrument $\ln\left(1 - \tau_{it}\right)$ with $\ln(1-\tau_{it}^{84})$, where τ_{it}^{84} is the tax rate calculated based on 1984 tax return information but using year t tax rules. Similarly, $\ln y_{it}$ is instrumented using $\ln y_{it}^{84}$ where y_{it}^{84} is after-tax income calculated using year t tax rules and 1984 income.

5 Results

Results from estimating equation (1) are reported in Table 2. Column (1) presents fixed effects (FE) estimates where the potential endogeneity of τ_{it} is not addressed. We find a negative elasticity as expected. In column (2) we instrument $\ln\left(1 - \tau_{it}\right)$ and $\ln y_{it}$ following the strategy outlined above and control for individual fixed effects. This is our preferred specification, and we find an elasticity of –7.01%.[4] This means that the tax subsidy for interest payments on debt has a causal impact on the level of interest

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[3]However, many things can influence the direction of the bias (Saez et al., 2012) and it is generally not possible to sign the bias.

[4]This is consistent with the findings of Kleven and Schultz (2014) investigating responsiveness of negative capital income with respect to the MTR.

Table 2: Main Results

	(1) FE	(2) FEIV	(3) Owners	(4) High R_{i84}	(5) Low R_{i84}
$\ln(1 - \tau_{it})$	-0.0177*	-0.0701***	-0.0666***	-0.0427***	-0.164***
	(0.00726)	(0.0103)	(0.00859)	(0.00652)	(0.0319)
$\ln y_{it}$	1.088***	0.468**	0.0952	-0.0854	1.134
	(0.0191)	(0.162)	(0.128)	(0.129)	(0.595)
Year FE	Yes	Yes	Yes	Yes	Yes
Changes	Yes	Yes	Yes	Yes	Yes
N	267419	263209	231511	131602	131600

Changes: year-to-year differences in the number of adults and children respectively.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

payments on debt.

The responsiveness to tax incentives might be sensitive to the type of debt and to the size of debt. In column (3) we present estimates for home owners for whom mortgage payments constitute the majority of interest payments. The estimated elasticity is not far from that for the overall sample. In column (4) and (5) we split the sample according to the size of interest payments in 1984. Specifically, we split the sample at the median level of interest payments in 1984 (44,353 1990-DKK) and estimate the preferred specification separately on the two sub-samples. We find an elasticity for the low interest payment group of –16.4% and an elasticity for the high interest payment group of –4.3%, and these are statistically different from each other. The latter result shows that responses are heterogenous and depend on the initial level of debt.

6 Conclusion

We estimate the effect of a Danish 1987 tax reform which reduced the tax rate applied to interest deductions from 73% to 50% for households with high incomes, but less for households with middle or low incomes. Using high quality panel data we find that tax subsidies for interest payments on debt impact interest payments. The estimate overall elasticity to be –7.01%. We also find that the responsiveness varies with the initial level of interest payments. This points towards the importance of further exploring heterogenous responses to tax subsidies on interest payments in future studies.

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