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Abstract

A Danish tax reform, decided in May 2009 and taking effect from the beginning of 2010, lowered the marginal tax rate on top bracket taxable income from 63% to 56%. Because contributions to pension accounts are tax deductible, the reform provided an incentive to increase pension contributions before the change in taxation. Using high frequency panel data, we document an increase in pension contributions in the second half of 2009 in response to the anticipated change in taxation, and that this led to an increase in total savings.

Keywords: Pension savings, tax incentives, high frequency individual data.
JEL classification: H3

1 Introduction

It is a long-standing topic of interest whether tax incentives effectively increase savings at the individual level, but due to a lack of high quality data on savings the economic literature has struggled to provide decisive answers (Bernheim 2002). In a recent paper, Chetty et al. (2014) use high quality annual data on savings for the Danish population to show that tax subsidies to pension contributions are ineffective at increasing savings on private pension accounts. A small minority of people shift their savings to other accounts when the tax incentives are changed, while the large majority do not respond at all. However, tax incentives may not always be ineffective. A hitherto neglected tax incentive for saving in tax deferred accounts arises in connection with the announcement of income tax reforms that change the value of future tax deductions by altering the marginal tax rate (MTR). In this paper, we use a recent tax reform in Denmark as a natural experiment and identify behavioral responses to anticipated changes in tax incentives by exploiting a new data source with information of pensions contributions at the monthly frequency.

2 The 2010 Danish Tax Reform, Data, and Method

The Danish tax system consists of proportional taxes (a regional tax, a church tax, a labor market tax, and a bottom bracket income tax) and a progressive schedule on top of that. In 2009 the proportional taxes amounted to 43.5% and the progressive schedule consisted of a middle bracket tax rate of 6% and a top bracket tax rate of 15%. The middle and top tax brackets applied to income above DKK 377.000 (one USD corresponds to around DKK 6.5) . A tax reform, passed by parliament on May

28, 2009 and taking effect from January 1, 2010, removed the middle bracket tax and increased the top-tax threshold to DKK 424.000. The tax reform thus lowered the MTR from almost 63% to 56% for people paying top taxes while leaving the marginal tax rate practically unchanged for others.[1] Because contributions to pension savings accounts are deductible the reform gave an incentive to advance pension contributions to 2009 while the tax rate was high.

The Danish pension system consists of three components that are typical of retirement savings systems in developed countries: a state-provided defined benefit (DB) plan (analogous to Social Security in the United States), employer organised defined contribution (DC) accounts (analogous to 401(k)s in the United States), and privately organised DC accounts (analogous to IRAs in the United States). 90% of all DC contributions are made to employer organised accounts. For further details, see Chetty et al. (2014). In Denmark, as in the US, there is increased reliance on DC schemes and this raises the interest in understanding the factors determining these contributions.

Our analysis is based on a new administrative register (called the *eIncome* register) with monthly information from employers about wages, salaries and contributions to employer organized pension accounts for all employees in Denmark. We have access to data covering the 48 months from January 2008 to December 2011. The *eIncome* register contains the identification number of the employee, which we use to link the data to annual records with additional information about financial wealth.

To identify the effect of the reform on pension contributions during 2009, we split the sample into taxpayers who experienced a reduction in their MTR and taxpayers

[1]See Kreiner et al. (2016) for more details about the tax system and the 2010 reform.

who did not, where people are allocated to a tax bracket based on income in 2008. The treatment group (T-group) includes employees with monthly gross earnings above DKK 35,000 in 2008, roughly the 75th percentile of the income distribution. The control group (C-group) includes individuals with a monthly income in the range DKK 30,000-35,000.

Our sample consists of all individuals who are employed in the private sector, and where we have 48 consecutive observations from January 2008 to December 2011 with positive wage income. We further limit the sample to individuals with contributions to annuity pension schemes of less than DKK 100.000 in 2008.[2] The final sample consists of 116,724 individuals in the T-group and 64,287 indivduals in the C-group.

3 Results

Figure 1, panel A displays the average monthly contribution rate—measured in proportion to total monthly gross payments to the individual—to employer organized pension accounts. The contribution rate for the C-group is more or less constant at a level of 4.5% throughout the observation period. For the T-group the level is slightly higher. More importantly, there is a spike in the contribution rate towards the end of 2009. This is consistent with the tax incentive to increase payments while the deduction rate is still at a high level.

The graph does not reveal whether the effect is driven by many individuals who change their contributions a little, or whether it is driven by a few individuals who

[2]The latter selection is imposed because the tax deductibility for contributions to annuity schemes was capped at DKK 100.000 from 2010, and we want to avoid interference from this rule change when measuring the effect of the change in the marginal tax rate on contributions in 2009.

change their contributions a lot. In order to identify individuals who made extraordinarily large pension contributions, we construct a dummy indicator that equals one for an individual if the pension contribution rate in December 2009 is 25 percentage points higher than its level in December 2008.[3] Panel B of Figure 1 is similar to panel A with the exception that the treatment group is divided into a group consisting of individuals who made extraordinarily large contributions according to the dummy indicator (T-group2) and another group consisting of individuals who did not (T-group1). 4,818 persons made extraordinary contributions according to this definition, and panel B shows that the entire increase in the average monthly rate of pension contribution from panel A is driven by the group who made extraordinary contributions.

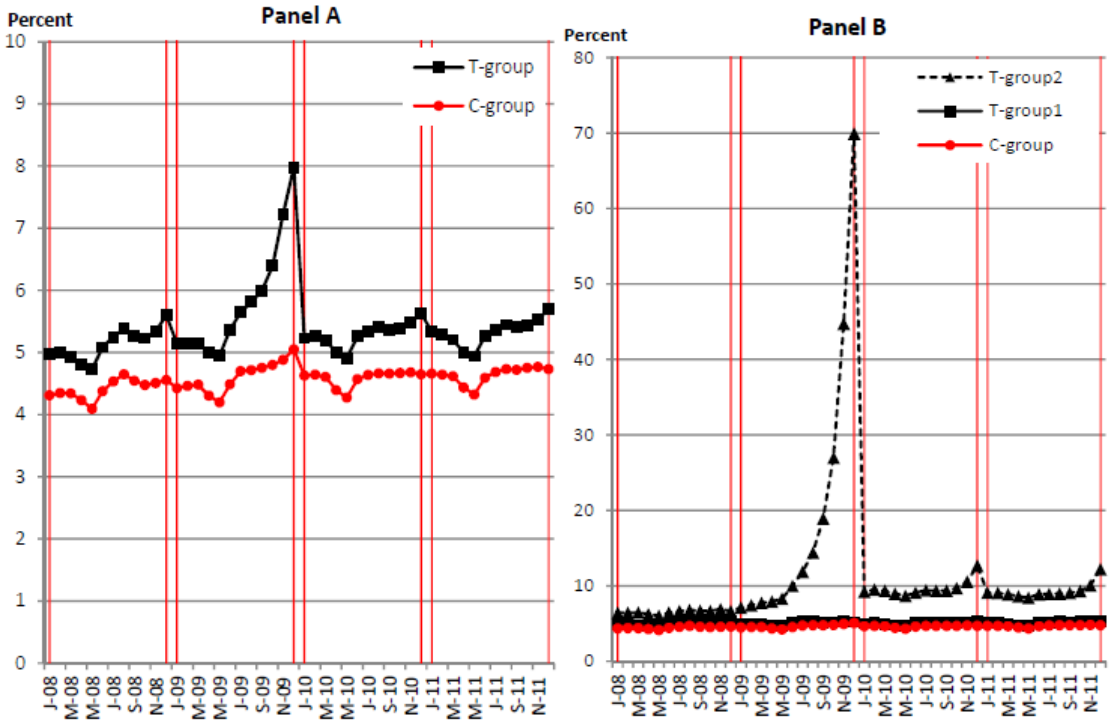
Figure 1 documents higher contributions to employer organised pension accounts, but it does not reveal whether this increase is counteracted by reduced savings in other accounts. We address this issue in Table 1, which is based on annual data from the income-tax register on savings in privately organized retirement savings accounts and in financial assets in each of the years 2006–2011. To quantify the effect of the increased contributions to employer organized accounts on savings in privately organised pension savings accounts, we estimate the following equation

$$P_{it}^{Priv} = \beta_0 + \beta_1 D_t + \beta_2 P_{it}^{Empl} + \mu_i + u_{it} \tag{1}$$

where P_{it}^{Priv} are contributions to privately organised pension savings accounts in year t measured as a fraction of total annual gross payments, D_t is a vector of year dummies, P_{it}^{Empl} are contributions to employer organised accounts measured as a fraction of total

[3]Results are very similar if we use other thresholds than 25 percentage points or use a dummy indicator that equals one if an individual has extraordinarily high contribution rates in any of the months after the reform was decided.

Figure 1: Contributions to employer organised retirement savings accounts



Notes: Panel A and B show average monthly contributions to employer organized pension accounts as a share of total gross payments for the T-group and C-group (Panel A) and T-Group1, T-group2 and the C-group (Panel B). The C-group (64,287) includes all private sector employees with average monthly wage income in the range DKK 30,000–35,000 in 2008, contributions to annuity pension schemes of less than DKK 100,000 in 2008, and (48) registered monthly wage payments from January 2008 to December 2011. The T-group (116,724) includes all private sector employees with average monthly wage income above DKK 35,000 in 2008, contributions to annuity pension schemes of less than DKK 100,000 in 2008, and (48) registered monthly wage payments from January 2008 to December 2011. T-group2 (4,818) includes all individuals from the T-group whose contribution rate in December 2009 was at least 25 percentage points higher than their contribution rate in December 2008. The T-group1 includes members of the T-group who are not included in T-group2.

annual gross payments, μ_i is an individual specific effect, which is potentially correlated with the explanatory variables, and u_{it} is an error term. The parameter of interest β_2 measures the effect of increasing contributions to employer organised accounts on contributions to privately organised accounts. We instrument P_{it}^{Empl} using the interaction $D_{2009} \times D_i^{Treat}$ where the indicator D_i^{Treat} is one for individuals belonging to the treatment group. This isolates the changes in contributions to employer organised accounts that are related to the anticipated tax change.

Columns (1) and (2) in Table 1 present the results from the estimation. Column (1) is based on the full sample. The results show that when contributions to employer organised accounts increase by one unit then contributions to privately organised accounts increase by 0.156 units. The positive coefficient means that contributions to employer accounts crowd in contributions to private accounts. Crowding in is expected since the tax incentive also applies to private accounts. In column (2) we limit the treatment group to include only the 4,818 individuals who made extraordinary contributions to their employer organised accounts. The parameter estimate from this regression based on the T-group2 and the C-group is smaller, showing that the group contributing extraordinarily to employer organised accounts is only partially overlapping with the group that contributes extra to privately organised accounts.

Finally, we estimate the effect of the total increase in contributions to tax favoured pension savings accounts, i.e. both employer organised and privately organised accounts, on savings in financial assets by running the following regression

$$S_{it} = \alpha_0 + \alpha_1 D_t + \alpha_2 P_{it}^{TotPen} + \theta_i + v_{it} \tag{2}$$

where S_{it} is savings in financial assets relative to total gross payments. The income

Table 1: Effect of tax reform on savings in privately organised retirement accounts and on savings in financial assets

	(1)		(2)		(3)	(4)
Dependent variable	P^{Priv}		P^{Priv}		S	S
P^{Empl}	0.156	***	0.050	***		
	[0.126,0.186]		[0.042,0.057]			
P^{TotPen}					-0.650	- 0.086
					[-1.362,0.063]	[-0.222,0.050]
Observations	1,069,320		408,702		1,069,320	408,702

Notes: 95% confidence intervals reported in square brackets. *** indicates that the coefficient is significant at a 0.1% level. These are based on standard errors which are clustered at the individual level. Column (1) and (2) present estimates of β_2 from equation (1) and columns (3) and (4) present estimates of α_2 from equation (2). P^{Empl} and P^{TotPen} are instrumented with $D_{i,2009} \times D_i^{Treat}$. Estimates in column (1) and (2) are based on the full sample. Estimates in columns (2) and (4) include only those individuals in the treatment group who made extraordinary contributions to employer organised retirement accounts before the reform, here defined as having a pension contribution rate measured in proportion to total gross payments in December 2009 that is 25 percentage points higher than its level in December 2008. All regressions include year dummies and control for individual fixed effects.

tax register records financial wealth at the end of the year and savings in financial wealth is then approximated by the difference between financial wealth in year t and year $t-1$. D_t is a vector of year dummies and P_{it}^{TotPen} are total contributions to tax subsidized retirement savings accounts measured as a fraction of total annual gross payments, which is instrumented using the interaction $D_{2009} \times D_i^{Treat}$. Column (3) shows estimates for the full sample and column (4) shows estimates for the sample where the treatment group only consists of the 4,818 individuals who made extraordinary contributions to their employer organised retirement savings account. In both cases the parameter is insignificant. The estimate in column (3) has a wide confidence interval, but the estimate in column (4) is more precisely estimated and the confidence interval rules out crowd-out in excess of 22 percent of the increase in contributions to pension savings accounts. This indicates that a large part of the contributions to pension savings accounts shown in Figure 1 passes through to total savings.

4 Conclusion

This is the first paper to document that an income tax reform generates increased savings through accounts where contributions are tax deductible. The results show that individuals increase deductible contributions to employer organised pension savings accounts when knowing that the future value of deductions will decrease. We find that this increase in pension contributions passes through to total savings, and that the effect is driven by a small fraction of the people affected by the reform.

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