

Taxes and life cycle capital gains realizations*

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Abstract

This paper analyzes heterogeneity in capital gains tax elasticities across individuals. Using panel data of over 260,000 individuals, I find that the sensitivity of capital gains to taxes is decreasing over the individual life cycle. Younger individuals respond more strongly to changes in capital gains taxes than older individuals. An increase in age of 18 years decreases the lock-in effect of capital gains taxes by approximately 10%.

Keywords: capital gains tax, lock-in effect, income taxes, life cycle

JEL Classification: H24, D14, D91

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I Introduction

There is consensus in the literature on the existence of differences in portfolio decisions across age groups. Younger individuals trade more frequently, make riskier investments, and have different savings behavior than older individuals (see, for example, Calvet, Campbell, and Sodini, 2009; Graham, Harvey, and Huang, 2009). Further, despite general agreement that taxes affect individual trading decisions (Ivković, Poterba, and Weisbenner, 2005), little is known about differences in capital gains tax sensitivity across age groups. Using a large administrative panel data set of over 260,000 individuals in Sweden with compelling cross-sectional and time-series variation in tax rates over the period 1983–1996, I find evidence that younger individuals show greater tax sensitivity than older individuals. A one-standard-deviation increase in age (about 18 years) decreases the effective coefficient of the marginal tax rate by 0.376, or 9.5% of the baseline estimate. This result is not driven by a step-up in the capital gains basis at death. This finding suggests that the lock-in effect of capital gains taxes is decreasing in age.

II Research Hypotheses

Capital gains are taxed when they are realized and not when they accrue. Individuals can thus reduce their tax burden by postponing capital gains realizations. This lock-in effect of capital gains taxes is well documented in the literature (e.g. Klein, 1999; Auerbach, Burman, and Siegel, 2000; Ivković, Poterba, and Weisbenner, 2005; Jacob, 2012). Yet, very little is known whether the effect of capital gains taxes differs across individuals. For example, in the presence of an inheritance tax, older individuals as opposed to younger individuals put more weight on bequest taxes than on income taxes. Older individuals could also consider an intergenerational tax deferral. They bequeath capital gains assets to their children which benefit of income shifting over time. In this case, they would be less sensitive to their own individual income tax rate even in absence of inheritance taxes. In con-

trast, younger individuals focus more on capital gains taxes than on other taxes when deciding on capital gains realizations as their bequest motive is weak. Therefore, I expect the lock-in effect of capital gains taxes to differ across age groups. Younger individuals are expected to be more tax sensitive than older individuals. That is, the lock-in effect of capital gains taxes decreases over the life-cycle. Thus, I formulate two hypotheses. The first hypotheses compromises the well-known lock-in effect. The second hypothesis relates to cross-sectional differences in the lock-in effect.

Hypothesis 1: The propensity to realize capital gains decreases in the capital gains tax rate (lock-in effect).

Hypothesis 2: The lock-in effect of capital gains taxes is stronger for younger individuals as opposed to older individuals.

III Tax Rules and Associated Data

III.1 Data

This study is based on a comprehensive panel (Longitudinal INdividual DATA – LINDA) that covers the period 1983–1996. This unique data set is a representative panel of 3.35% of the Swedish population. It contains information on income and other socioeconomic characteristics. I restrict my analysis to individuals with information for at least five consecutive years. I exclude all observations where the individual’s age is below 18 and those that are not within the 0.01st and the 99.99th percentiles of the income distribution. The final sample consists of 260,263 individuals and 2,692,385 observations. Table 1 presents summary statistics and variable definitions of the main variables.

III.2 Capital Gains Taxes in Sweden

In 1991, Sweden abandoned its global income system and introduced a dual income tax (see Agell, Englund, and Södersten, 1998; Jacob, 2012). The former taxes

Table 1: Summary Statistics and Variable Definitions

Name	Description	Mean	Std. Dev.
CG	Dummy equal to 100 if Capital Gain Realized	7.667	26.607
Age	Age	49.796	18.436
MTR	Marginal Tax Rate in %	36.351	13.835
Income	Income before Capital Gain	152.678	104.753
Wealth	Taxable Wealth	217.407	2955.001
Town	Dummy equal to 100 if resident of small town	11.735	32.184
City	Dummy equal to 100 if resident of capital	73.520	44.122
Capital	Dummy equal to 100 if resident of county capital	35.615	47.886
Move	Dummy equal to 100 if resident of town	2.994	17.042
Female	Dummy equal to 100 if female	51.049	49.989
Married	Dummy equal to 100 if married	51.091	49.988
Self-employed	Dummy equal to 100 if self-employed	5.041	21.878
Pension	Dummy equal to 100 if pensioner	35.670	47.902
HouseSize	Household Size	2.033	1.176

income from all income sources at the progressive income tax rate. The latter system taxes earned income such as labor income separately from capital income. This regime is still in effect. Importantly for life cycle capital gains decisions, there is no step-up in the capital gains tax base when shares are inherited; this has not changed during the sample period.

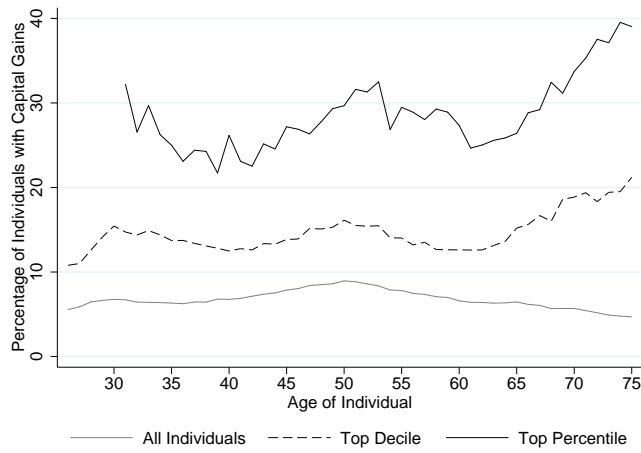
Prior to the reform, individuals were allowed to exclude 60% (50% in 1990) of long-term capital gains (holding period above two years) from their taxable income. In 1991, all nominal capital gains were taxed at a flat tax rate of 30%. In 1992, the capital gains tax rate was further lowered to 25% for fiscal years 1992/1993 and to 12.5% for 1994. In 1994, The newly elected government decided to increase the capital gains tax rate back to the 1991 level of 30% as of 1995. Therefore, there is considerable tax rate variation, ranging from 12.5% to 87%.

IV Empirical Results

Figure 1 plots the propensity to realize capital gains over the life cycle for the top percentile and the top decile of the income distribution, and all individuals. Capital gains realizations are hump-shaped for the full sample. First, young individuals buffer stock. That is, the fraction of young individuals with capital gains

is relatively low. Some young individuals, in particular those in the top percentile, already dissave to some extent (Carroll, 1997). Second, individuals between 30 and 60 years of age have an almost constant likelihood to realize capital gains, with a peak around 50 years. Finally, capital gains realizations significantly increase toward and during retirement for high-income individuals. In contrast, capital gains realizations decrease during retirement for the remaining population.

Figure 1: Capital Gains Realizations, Income, and Age Cohorts—1983-1996



I present empirical results on my research hypothesis on the tax sensitivity in two steps. First, I use simple tests around the 1991 reform using the sample of high-income individuals. Second, I exploit the entire cross-sectional variation in marginal tax rates in the data using OLS regressions.

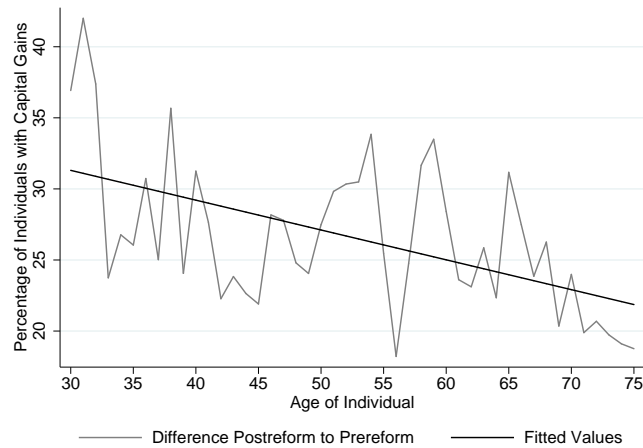
IV.1 Nonparametric Results for High-Income Individuals

First, I exploit the heterogeneity in the response to the introduction of a proportional tax rate across tax-sensitive individuals in the top percentile of the income distribution around the 1991 tax reform. As all individuals in this percentile belong to the group of top incomes, there is very little variation in marginal tax rates pre-reform. Post-reform capital gains are taxed at a fixed proportional rate and there is no life cycle-related cross-sectional variation in tax rates. Therefore,

differences in reaction largely stem from differences in tax sensitivity but not from differences in the tax cut.

All age cohorts positively respond to the 1991 tax reform and realize increasing capital gains (Figure 2). Yet the difference between post- and pre-reform realization activity decreases in age. A linear regression of the difference between pre- and post-reform capital gains realizations on age yields a point estimate of -0.21 (t-stat. 4.12).

Figure 2: Difference in Capital Gains Realizations across Age Groups around the 1991 Tax Reform



To address concerns that this result is influenced by other confounding factors, Table 2 presents results of detailed analyses of capital gains realizations before (Column 1) and after (Column 2) reform. Column 4 (3) presents estimates for differences between post- and pre-reform realization activity with (without) control variables for four age groups. The set of control variables includes demographic variables from Table 1 and three lags of income and wealth.

Some 25% of all individuals aged 60 to 70 realize capital gains. This proportion is 6.7 percentage points lower among 30-to-40-year-olds. After reform, the difference between the oldest and youngest age cohorts decreases. The difference between post- and pre-reform realization activity for 30-to-40-year-olds amounts to 30.8 percentage points—8.2 percentage points higher than the increase for 60-

to-70-year-olds. It thus appears that the proportional capital gains tax encourages younger individuals to realize capital gains more often.

Table 2: Capital Gains Realizations, before and after the 1991 Reform, in the Top Percentile – Breakdown by Age Groups

	Pre-reform 1985-1990 (1)	Post-reform 1991-1996 (2)	Difference w/o controls (3)	Difference with controls (4)
Age 30-40y	18.199	47.393	29.194*** (2.256)	30.795*** (2.585)
Age 40-50y	19.171	44.018	24.847*** (1.201)	22.668*** (1.334)
Age 50-60y	20.969	49.493	28.524*** (1.309)	28.179*** (1.393)
Age 60-70y	24.913	49.564	24.651*** (1.780)	22.531*** (1.854)

Standard errors (reported in parentheses) allow for heteroskedasticity and are clustered at the individual level. ***, **, * indicate statistical significance of the difference at the 1%, 5%, and 10% levels, respectively.

IV.2 OLS Regression Results

The question remains whether this result also holds for all individuals. To test the prediction that younger individuals show greater capital gains tax sensitivity than older individuals, I run the following regression using the panel of over 260,000 individuals:

$$CG_{i,t} = \alpha_i + \beta_1 \cdot MTR_{i,t} + \beta_2 \cdot MTR_{i,t} \cdot Age_{i,t} + \beta_3 \cdot Age_{i,t} + \chi \cdot X_{i,t-1} + \alpha_c + \alpha_t + \epsilon_{i,t} \quad (1)$$

where CG is the dependent variable, and CG is a dummy equal to 100 if an individual realized a capital gain in year t . I include the (first-dollar) capital gains tax rate ($MTR_{i,t}$) to test Hypothesis 1, its interaction with age ($MTR_{i,t} \cdot Age_{i,t}$) to test Hypothesis 2, and age. I expect β_1 to be negative: High taxes lock-in capital gains (Hypothesis 1). If tax sensitivity is decreasing in age, β_2 is expected to be positive (Hypothesis 2). I use three different tax rate measures, $MTR_{i,t}$ (Columns 1 and 2), lagged tax rate $MTR_{i,t-1}$ (Columns 3 and 4), and an instrumented

$MTR_{i,t}$ (Columns 5 and 6). The latter two address concerns about endogeneity of MTR . I use two lags of the marginal tax rate as additional instruments for the current tax rate. I normalize MTR and Age to have a mean of 0 and a standard deviation of 1. This simplifies interpretation of the coefficients.

The vector of control variables contains three lags of income and wealth as well as demographic controls (see Table 1). All regressions include county and year-fixed effects. The latter ensures that the identification of the tax sensitivity stems from cross-sectional differences in tax sensitivity. Standard errors allow for heteroskedasticity and are clustered at the individual level. Columns 2, 4, and 6 include individual fixed effects.

Table 3: Age and Tax Sensitivity of Capital Gains Realizations

Model	OLS (1)	OLS (2)	OLS (3)	OLS (4)	2SLS (5)	2SLS (6)
Tax_t	-3.547*** (0.069)	-3.960*** (0.053)			-3.883*** (0.099)	-4.390*** (0.076)
$Tax_t * Age$	0.223*** (0.026)	0.376*** (0.029)			0.224*** (0.025)	0.375*** (0.028)
Tax_{t-1}			-2.573*** (0.064)	-2.807*** (0.050)		
$Tax_{t-1} * Age$			0.261*** (0.028)	0.300*** (0.029)		
Age	-0.465*** (0.043)		-0.494*** (0.043)		-0.490*** (0.043)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	No	Yes	No	Yes	No	Yes
Observations	2,692,385	2,692,385	2,692,385	2,692,385	2,692,385	2,692,385
R-squared	0.083	0.293	0.082	0.292	0.082	0.292

Standard errors (reported in parentheses) allow for heteroskedasticity and are clustered at the individual level. ***, **, * indicate statistical significance of the difference at the 1%, 5%, and 10% levels, respectively.

Table 3 presents regression results. I find support for both hypotheses. In line with the lock-in effect, β_1 is negative. A one-standard-deviation increase in MTR (13.8%) decreases the likelihood of realizing capital gains by approximately 4 percentage points, approximately 52% of the unconditional mean. The effect of age (not identified in the fixed-effect model) is negative. That is, after controlling for income and wealth, younger individuals realize capital gains more frequently

(Graham, Harvey, and Huang, 2009). The interaction between age and MTR (β_2) is positive and statistically as well as economically significant. A one-standard-deviation increase in age (18 years) decreases the effective MTR coefficient by 0.376, or 9.5% of the baseline estimate. This confirms the result that the tax sensitivity of capital gains realizations decreases over the life cycle. The results indicate that capital gains taxes are another source of heterogeneity in portfolio decisions across age groups (see Calvet, Campbell, and Sodini, 2009).

V Conclusion

This paper shows that taxation affects capital gains realization behavior differently over the individual life cycle. Younger individuals exhibit greater tax sensitivity than older individuals. The results also have broader implications for our understanding of capital gains taxes. Following a reduction in capital gains tax rates, younger individuals respond more strongly than older individuals. As increased trading activity of individual investors can lead to lower returns of individual portfolios (Odean, 1999), a low capital gains tax rate can negatively affect capital formation of young individuals due to tax-induced trading activity. Studying the effect of capital gains taxes, in particular in the presence of bequest taxes, on capital formation and savings patterns is a natural issue for future investigation.

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