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Tax Regimes and Capital Gains Realizations

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TAX REGIMES AND CAPITAL GAINS REALIZATIONS

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Abstract

This paper analyzes the effects of different tax regimes on individual capital gains realization behavior. Using a comprehensive panel of over 335,000 individuals in Sweden over the period 1971–2005, this paper shows that after the introduction of a proportional tax replacing progressive capital gains taxes, individual investors realize capital gains more frequently. This response is concentrated within the group of high-income individuals, and the introduction of a proportional tax has permanent effects. Under progressive (proportional) taxation, investors with liquidity constraints are more (less) likely to realize capital gains and realize higher (lower) capital gains than individuals with excess income.

Keywords: Capital Gains Tax, Proportional Tax, Progressive Tax, Top Incomes, Household Finance, Liquidity Constraints

JEL Classification: H20, H24, D14, D31

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1 Introduction

Taxation of capital gains is a central feature of income tax systems around the world. It is one important potential channel affecting individual portfolio choices, the realization of capital gains, and savings patterns over an individual's life cycle. Tax authorities adopt a wide variety of capital gains tax rules and tax capital gains either at the progressive marginal income tax rate (for example, in Canada, Australia, and short-term gains in the U.S.) or at a fixed proportional tax rate (Finland, Japan, and Sweden).¹ As capital gains are taxed upon realization, individuals are able to lower their effective tax burden by postponing realization. This "lock-in effect" and the effect on trading decisions and asset prices has been addressed in theoretical² as well as empirical studies³.

Despite general agreement that taxes affect individual portfolio decisions (see, for example, Bergstresser and Poterba, 2002; Barber and Odean, 2004; Ivković, Poterba, and Weisbenner, 2005), very little is known about the impact of different tax regimes on individual capital gains realization. Specifically, in this study, I am interested in comparing the effects of progressive versus proportional taxation of capital gains. Under progressive taxation, the marginal capital gains tax rate increases in overall income. Therefore, temporarily lower income reduces the marginal capital gains tax rate of an individual investor. This creates a temporary tax incentive to realize capital gains and to rebalance the individual portfolio. In contrast, individuals with temporary excess income can be additionally locked-in if they move into a higher tax bracket. Under a proportional capital gains tax, which taxes capital gains of all individuals at one fixed rate, these temporary tax incentives become obsolete and there is no cross-sectional variation in the lock-in effect. It is an empirical question whether capital gains realizations are driven more by tax incentives or by compensating temporary liquidity constraints. This paper aims to test the extent to which capital gains taxes matter in the presence of liquidity constraints.

¹Capital gains tax rules additionally vary between countries with respect to the holding period (for example, Australia, Denmark, and the U.S.) and share in equity (Austria, Germany, and Italy). That is, capital gains are taxed at higher rates if they are short-term and/or if they arise from disposal of substantial shareholdings.

²See, for example, Constantinides (1983); Auerbach (1991); Klein (1999); Dammon, Spatt, and Zhang (2001); Poterba (2002); Shackelford and Verrecchia (2002).

³See, for example, Dyl (1977); Reese (1998); Poterba and Weisbenner (2001); Starks, Yong, and Zheng (2006); Dai, Maydew, Shackelford, and Zhang (2008); Sialm (2009).

The empirical relevance of progressive and proportional capital gains taxation has not been well tested because of the lack of compelling tax regime variation and the lack of individual data. Most empirical studies focus on changes in marginal tax rates (U.S. tax reforms of 1987, 1997, and 2003) using firm-data or aggregated time-series data, without information on individual characteristics such as income, wealth, or demographic factors of individual investors.⁴

This paper addresses these challenges and uses the 1991 tax reform in Sweden to analyze the effect of progressive and proportional taxation on individual capital gains realization behavior. The choice of Sweden and the 1991 tax reform offers a unique setting for two reasons: First, this tax reform introduced a separate tax schedule for capital income with a proportional tax rate similar for all individual investors. Before the reform, capital gains were taxed at the marginal progressive income tax rate, ranging from 30% to 80% (12% to 32%) for short-term gains (long-term gains) in the 1980s. After the reform, interest, dividends, and capital gains are taxed at a flat rate of 30%, irrespective of overall income and holding period.

Second, this study uses a comprehensive micro panel data set of over 335,000 individuals over the 1971-2005 period. The LINDA database (Longitudinal INdividual DAta) is a representative panel with individual information on taxable income, wealth, and demographic characteristics for 3.35% of the Swedish population. This data set allows analysis of how individuals react to this fundamental change in capital gains taxation, and how progressive as opposed to proportional capital gains taxation affects the timing of capital gains. Using large administrative panel data has the advantage that net capital gains realized in one year can be observed directly at the individual level. The data also allow for more detailed control of individual characteristics and income.

The first part of this study analyzes the effects of the transition from a progressive to a proportional tax regime on capital gains realizations. Aggregated results show that the sum of realized capital gains and the percentage of individuals realizing capital gains from 1974 to

⁴There are some studies based on micro data. For example, Ivković, Poterba, and Weisbenner (2005) use data on individual investments provided by a large discount brokerage house to analyze tax-motivated trading decisions and the “lock-in effect”; their data set does not include information on individual income or demographic factors. Daunfeldt, Praski-Ståhlgren, and Rudholm (2010) use a comprehensive micro data set but lack identifying cross-sectional variation in capital gains tax rates across individuals during their sample period.

2005 are highly correlated with stock market performance. After reform and, in particular, in 1991, the share of individuals realizing capital gains increased significantly. At the same time, average capital gains decreased post-reform. To control for the economic situation in Sweden in the early 1990s, I exploit the cross-sectional variation in the tax rate cut around the reform. I separately estimate reform effects for 100 percentiles of the income distribution. As expected, the effect of the reform is increasing in the income percentile.⁵ The introduction of the flat tax on capital gains has had a substantial and permanent impact on the distribution of realized capital gains across individuals. In the 1970s and 1980s, the top decile of the income distribution realized about one-third of all realized capital gains, without a significant time trend. In 1991, the share of capital gains realized by the top decile increased by 37 percentage points to reach a constant level of about two-thirds under proportional taxation. Hence, the concentration of realized capital gains among high-income individuals is substantially greater under a proportional tax than under a progressive tax regime.

Second, I examine the effect of taxation on capital gains realizations in the presence of liquidity constraints at the individual level. In general, individuals are more likely to realize capital gains if current income is below long-term average income. Apart from compensating liquidity constraints, temporary lower capital gains rates additionally incentivize individuals to realize capital gains. In contrast, if current income exceeds average income, temporary higher tax rates additionally lock-in accrued capital gains. Nonparametric tests support this simple prediction. Using aggregated statistics over the 1974–2005 period, I find that individuals with liquidity constraints realize more capital gains than individuals with excess income under the progressive tax regime. Under proportional taxation, this relation changes considerably as neither of these temporary tax effects is relevant. The share of aggregated net capital gains realized by individuals with excess income jumps to a constant higher level and dwarfs capital gains realized by individuals with liquidity constraints under proportional taxation in all years after the reform.

⁵The reaction to the reform cannot be explained by the economic downturn at the beginning of the 1990s in Sweden. When repeating the percentile-wise regression around the 2001 stock market crash, the response is very small and often insignificant.

I also use linear regressions to obtain parametric estimates of the effect of tax regimes on capital gains realizations of financially constrained individuals and of investors with excess income. I restrict this analysis to the more homogeneous sample of tax-sensitive individuals in the top decile of the income distribution. These parametric tests also allow for more detailed control for socioeconomic variables. The regressions confirm that individuals with liquidity constraints are more likely to realize capital gains than individuals with excess income under progressive taxation. The estimated effects are large. The likelihood of realizing capital gains is 3.6 percentage points higher if the individual has lower current income as opposed to excess income. Also, individuals with liquidity constraints realize higher capital gains than individuals with excess income. This relation substantially changes after the introduction of the proportional tax. In fact, individuals with excess income are now *more* likely to realize capital gains than individuals with temporarily lower income. The difference amounts to 21.3 percentage points. They also realize substantially higher capital gains than individuals with liquidity constraints. There are two explanations for these results. First, individuals with excess income increase capital gains realization activity under progressive taxation. These individuals are not additionally locked-in by temporarily higher tax rates. Second, individuals with liquidity constraints cut capital gains realization. The tax incentive of temporarily lower tax rates under progressive taxation appears to be more relevant than compensating liquidity constraints.

This study contributes to a large body of empirical work studying tax effects on capital gains realizations. It is also related to studies on household decision making (Campbell, 2006; Calvet, Campbell, and Sodini, 2009). My results indicate that not only the level of capital gains taxation but also the tax regime—progressive versus proportional taxation—matters for capital gains realizations, particularly in the presence of liquidity constraints at the individual level.

My results have three main implications. First, capital gains tax regimes affect trading activity and the volume of realized capital gains of individual investors. Graham, Harvey, and Huang (2009) show that overconfident and high-income investors trade more often than other investors. A flat tax on capital gains additionally encourages high-income individuals to realize capital gains more often and to increase trading activity. My results also generally point to the

relevance of progressive versus proportional taxation on capital gains realization activity. A proportional tax might add to the effect that individual investors trade too much (Odean, 1999; Barber and Odean, 2000; Frazzini and Lamont, 2008; Barber, Lee, Liu, and Odean, 2009). Second, the effect of tax regimes on capital gains realization is related to liquidity constraints. At the individual level, a progressive capital gains tax sets additional tax incentives such that constrained individuals realize accrued capital gains. When trading against financially distressed investors, the provider of liquidity earns significant positive returns at the cost of distressed investors (Andrade and Kaplan, 1998; Coval and Stafford, 2007). Third, the composition of aggregated capital gains realized by individual investors is patently different across tax regimes. Therefore, cross-country differences and changes in capital gains tax regimes over time may explain differences in the effect of individual investors on stock returns (Jackson, 2003; Dorn, Huberman, and Sengmueller, 2008; Kaniel, Saar, and Titman, 2008; Hvidkjaer, 2008; Barber, Odean, and Zhu, 2009).

The remainder of this paper is organized as follows. In Section 2, I briefly discuss the 1991 tax reform and the data. Section 3 provides descriptive statistics of the evolution of capital gains taxes in Sweden. Section 4 analyzes the impact of the 1991 tax reform on selling activity and the timing of capital gains realization. Finally, Section 5 sets forth my conclusions.

2 Swedish Tax Reform and Associated Data

2.1 The 1991 Tax Reform—General Information

In 1991, Sweden thoroughly revised its income tax system and moved away from a *global* income system to a *dual* income tax (see Agell, Englund, and Södersten, 1998, for a comprehensive overview on the reform).⁶ The old tax system encouraged tax avoidance and tax planning, for example, by shifting income across family members. For many years, net revenue from capital income taxes was negative as, for example, individuals in the top marginal income tax bracket deducted interest expenses against highly taxed labor income (Agell, Englund, and Södersten,

⁶While the reform implied many changes to income taxation, the wealth tax and especially the definition of taxable wealth did not change around the 1991 tax reform.

1996). In contrast, income from capital assets, particularly owner-occupied housing, was tax-preferred with low imputed rents and generous indexation schemes. Sweden thus implemented a dual income tax, which taxes earned income such as labor income separately from capital income (see Sørensen, 1994, for an overview). This regime is still in effect.

The reform was first discussed in the late 1980s (see Salsbäck, 1993, for the reform process). In June 1989, a first proposal was published and included the idea of a dual income tax. However, this proposal, which was about 5000 pages in length, was highly controversial and it appeared completely unrealistic at that time that the reform would be signed in 1990. Yet the political parties managed to agree on the timeline and content of the reform. The tax reform was passed by parliament on April 17, 1990 and signed into law in June 1990. While the tax reform implied major changes to the income tax system, the wealth tax, which was repealed in 2007, and the inheritance tax, which was repealed in 2004, were not affected by the 1991 reform.

The 1991 tax reform reduced (global) marginal income tax rates from over 80% to a progressive tax rate of 31-51% on earned income. The tax rate on capital income was lowered to a proportional tax rate of 30%. The Swedish tax authority further broadened the tax base and eliminated various tax shelters and loopholes in the income codes to finance the reform. Table 6 presents bottom and top marginal income tax rates for the 1981–2005 period.

2.2 Tax Treatment of Capital Gains

Prior to the reform, the individual marginal income tax rate and the holding period determined the capital gains tax burden. Individuals were allowed to exclude 60% (50% in 1990) of long-term capital gains from their taxable income. Shareholdings qualified for long-term gains after a holding period of two years. The range of short-term and long-term capital gains tax rates is presented in Table 1. The introduction of the proportional tax rate of 30% had a substantial impact on the taxation of capital gains. As of 1991, nominal capital gains were taxed at 30% regardless of individual income and holding period.⁷ The capital gains tax rate was further

⁷Exemptions for long-term capital gains and indexation schemes for gains on the sale of private real estate have been eliminated and nominal gains are taxed at the rate of 30%. However, certain provisions were main-

Table 1: Development of Marginal Capital Gains Tax Rates 1981-2005

This table reports marginal income tax rates. Column (1) presents the lowest marginal income tax rate. The top marginal tax rate is reported in Column (3). Column (4) reports the number of income tax brackets. Columns (5) and (6) present the resulting marginal income tax rates for short-term and long-term capital gains. As of 1991, long-term and short-term capital gains are taxed at a flat rate. The marginal tax rate does not apply to capital gains as of 1991.

Year	Bottom Marginal Tax Rate	Top Marginal Tax Rate	Number of Tax Brackets	Short-Term Capital Gains Tax Rate	Long-Term Capital Gains Tax Rate
1981	29.55%	87.55%	18	29.55%–87.55%	11.82%–35.02%
1982	29.74%	87.74%	15	29.74%–87.74%	11.90%–35.10%
1983	30.15%	84.15%	20	30.15%–84.15%	12.06%–33.66%
1984	33.30%	82.30%	19	33.30%–82.30%	13.32%–32.92%
1985	30.37%	80.37%	11	30.37%–80.37%	12.15%–32.15%
1986	30.34%	80.34%	11	30.34%–80.34%	12.14%–32.14%
1987	34.94%	77.40%	10	34.94%–77.40%	13.98%–30.96%
1988	35.56%	75.56%	4	35.56%–75.56%	14.22%–30.22%
1989	35.80%	72.80%	4	35.80%–72.80%	14.32%–29.12%
1990	34.16%	66.16%	4	34.16%–66.16%	17.08%–33.08%
1991	31.65%	51.65%	2		30%
1992	31.65%	51.65%	2		25%
1993	31.50%	56.50%	3		25%
1994	31.05%	56.05%	3		12.5%
1995	31.04%	56.04%	3		30%
1996	31.65%	56.65%	3		30%
1997	31.65%	56.65%	3		30%
1998	31.65%	56.65%	3		30%
1999	31.48%	56.48%	3		30%
2000	30.38%	55.38%	3		30%
2001	30.53%	55.53%	3		30%
2002	30.52%	55.53%	3		30%
2003	31.17%	56.17%	3		30%
2004	31.51%	56.51%	3		30%
2005	31.60%	56.60%	3		30%

lowered to 25% in 1992/1993 and to 12.5% in 1994. The 1992/1994 tax rate cuts were not part of the actual 1991 tax reform process. In 1995, the capital gains tax rate was increased to the 1991 level of 30%.

The separation of income into earned income and capital income also affected the treatment of capital losses. Prior to the reform, capital losses could be offset against positive income from

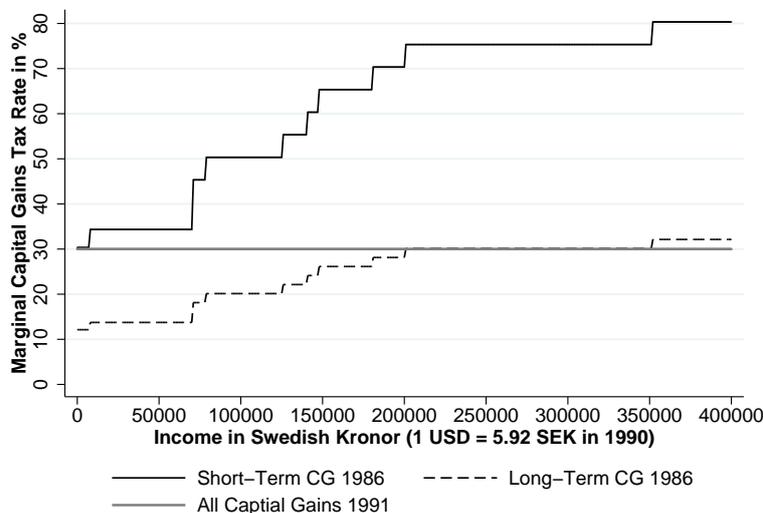
tained for owner-occupied real estate. For example, the taxpayer may opt for an alternative tax of 9% of the sales price of permanent residences or the possibility to postpone the tax liability.

other income sources, for example, against labor income. After the reform, capital losses could only be offset against other capital income. The deductibility of capital losses is further restricted to 70% of the nominal loss. There is one exception to this rule. Capital losses from the disposal of listed shares may be fully offset against gains from the sale of listed shares. Remaining losses may be carried forward indefinitely both before and after the reform. Another issue affecting capital gains realization is treatment of capital gains at death. In Sweden, there is no step-up in the tax base for capital gains tax purposes at death that would enable taxpayers to avoid capital gains taxes at death as in the U.S. (see, for example, Stiglitz, 1983).

For an individual in the top marginal income tax bracket, the marginal tax rate on long-term capital gains thus remained almost constant. From 1989 to 1991, the marginal tax rate on short-term gains decreased by 42 percentage points to 30%. Individuals in lower tax brackets even faced a higher marginal income tax rate on long-term gains after the reform. Hence, the nominal tax rate cut applies only to short-term shareholdings for higher income taxpayers.

Figure 1: Capital Gains Tax Rates 1986 and 1991

This figure illustrates marginal statutory income tax rates on realized capital gains for 1986 and 1991.



Hence, the reform does not change tax incentives with respect to realization of capital gains for most taxpayers. The 1994 tax rate cut, which was not enacted at the time of the 1991 reform, may however, create incentives to realize capital gains. The major change is the separation between progressively taxed labor income and proportionally taxed capital income.

After the reform, capital gains are taxed at 30%, whereas labor income and income from self-employment are taxed at rates ranging from 31% to 56%.

2.3 Data

This study is based on a comprehensive panel data set (Longitudinal INdividual DAta – LINDA) that covers the period 1971–2005. This unique data set is provided by Statistics Sweden and is a representative panel of 3.35% of the Swedish population. It contains information on income, aggregated household wealth, employment status, education, and demographic characteristics, such as age, gender, marital status, and household size.⁸ The principle data sources are income registers as well as the population and housing census. Edin and Fredriksson (2000) provide a detailed description of LINDA, its sources, and variables.

From the original data set, I restrict my analysis to individuals with information on income and demographic characteristics for at least five consecutive years. Further, I exclude all observations where the individual’s age is below 18. To prevent extreme incomes and outliers distorting the results (see Roine and Waldenström, 2008 for Sweden), I further eliminate income observations that are not within the 0.01st and the 99.99th percentiles of the total income distribution. This returns the final sample of 336,924 individuals and 7,003,822 observations.

2.4 Dependent and Independent Variables

Table 2, Panel A, presents summary statistics for the capital gains variables for the 1974–2005 period around the tax reform. The main capital gains measure is $CG_Realized_t$. This is an indicator variable equal to 100 for individuals realizing capital gains in year t , 0 otherwise. Second, CG_Init_t is an indicator variable equal to 100 if an individual realizes a capital gain in year t without having realized a capital gain in the prior year $t - 1$, 0 otherwise. CG is the SEK amount of realized capital gains in year t , in thousands. I translate all monetary values into real terms (base year 2000) using the Swedish GNP deflator provided by Statistics Sweden.

⁸Information on wealth is available only if total individual wealth exceeds a certain threshold, which, for example, amounted to 900,000 Swedish krona (SEK) in 2000. This is equivalent to 98,127 USD using the 2000 average exchange rate of 9.1718 SEK/USD. I use information on aggregated wealth at the household level. The wealth variable does not contain information on portfolio composition.

In the sample, 11% of all individual-year observations contain capital gains. This corresponds to an initiation rate (CG_Init_t) of 5.8%. The average realized taxable capital gain amounts to SEK 30,611 (in 1990, USD 1 = SEK 5.92).

The amount of capital gains is defined as net realized capital gains over all transactions in one fiscal year. Unfortunately, data on number of transactions, gross capital gains and losses, as well as short-term and long-term capital gains, are not available in LINDA. There is no information on whether the gain arises from listed shares, unlisted shares, or real estate. With respect to the holding period, net capital gains comprise the taxable part of all capital gains in one year, that is, 40% of all long-term gains and 100% of all short-term gains before 1991 and all capital gains as of 1991. This information is available only in another data set (the HINK data—Household Income Distribution Survey) for 24,080 individuals, but it is restricted to one cross-section of 1989. About 2.8% (1.4%) of all individuals realize long-term (short-term) capital gains (see Figure A.1 in the Appendix) in 1989. For the top decile of the income distribution, the percentage of individuals with long-term gains is 11.1%. Despite the high marginal tax rates on short-term gains, about 6% of individuals in the top decile realize short-term gains in 1989. This suggests that short-term as well as long-term capital gains were realized under progressive taxation.

Panel B of Table 2 presents summary statistics for income, wealth, and demographic control variables. $Income_t$ is the individual's taxable income in year t without capital gains. $AvIncome_{t-2,t}$ is the average income from $t - 2$ to t without capital gains. $Wealth_t$ is reported wealth for tax purposes. Controlling for wealth mitigates concerns that the results are driven by penetration of financial assets.⁹ Data on the asset mix of the household portfolio are unfortunately not available in LINDA.¹⁰ On average, income amounts to SEK 153,586 per year over the

⁹I repeat all tests conditioned on having a non-zero value for reported wealth in the household. The results are very similar, since I include three lags of wealth in all regressions with controls.

¹⁰There is some aggregated information on portfolio composition based on 19,708 individuals in 1989 and 1990 from the HINK data. I sort these individuals into deciles in accordance with the income deciles from LINDA. For these deciles, I compute average portfolio shares of stocks and mutual funds, cash holdings, and real estate. Results (see Figure A.2 in the Appendix) indicate that the relevance of stocks and funds increases in income. Some 10.8% of the average portfolio of individuals in the bottom decile consists of shares and funds. This fraction increases to 20.4% for the top decile. About 44% (70%) of low (high) income individuals own shares, funds, or other securities. The importance of real estate (cash holdings) increases (decreases) from 21% (68%) in the bottom decile to 57% (23%) in the top decile.

Table 2: Summary Statistics 1974–2005

This table reports summary statistics for capital gains variables (Panel A), and it presents the basic distribution parameters for income, wealth, and demographic controls (Panel B). *CG_Realized* is an indicator variable equal to 100 for individuals realizing capital gains, 0 otherwise. *CG_Init* is an indicator variable equal to 100 if an individual realizes a capital gain in t without having reported a capital gain in the prior year $t - 1$, zero otherwise. *CG* is the Swedish krona (SEK) amount of realized capital gain in year t . *Income* is the individual's income in year t without capital gains. *AvIncome_{t-2,t}* is the average income from $t - 2$ to t without capital gains. *Delta_Inc_{t-2,t}* is the difference between current income (*Income*) and average income (*AvIncome_{t-2,t}*). *Wealth* is reported wealth for tax purposes. All monetary values are reported in real thousand SEK with base year 2000. *MTR* is the first-SEK marginal tax rate on capital gains. *Age* denotes the taxpayer's age in years. *Female* is a dummy equal to 100 if the taxpayer is female, 0 otherwise. *Married* is an indicator variable equal to 100 if the individual is married, 0 otherwise. *Town* is an indicator variable equal to 100 for individuals residing in towns (usually) with less than 10,000 inhabitants, 0 otherwise. *City* is an indicator variable equal to 100 for individuals residing in cities with more than 10,000 inhabitants, 0 otherwise. *Capital* is an indicator variable equal to 100 for individuals residing in the county's capital, 0 otherwise. *Age* is the individual's age in years. *Move* is an indicator variable equal to 100 if the individual moved from one municipality to another from $t - 1$ to t , 0 otherwise. *Household Size* represents the number of family members in the household. *HS Inc (HS Dec)* is an indicator variable equal to 100 if household size increases (decreases) from $t - 1$ to t , 0 otherwise. *BusInc* is an indicator variable equal to 100 if the individual generates income from business activity, 0 otherwise. *SocAss (Pension)* is an indicator variable equal to 100 if the individual receives social assistance (pension), 0 otherwise.

Panel A: Capital Gains Variables						
Variable	N	Mean	Standard Deviation	10th Percentile	Median	90th Percentile
CG_Realized	7,003,854	10.948	31.224	0.000	0.000	100.000
CG_Init	7,003,854	5.778	23.334	0.000	0.000	0.000
CG	766,769	30.611	154.563	-2.560	2.425	66.513

Panel B: Income, Wealth, and Demographic Controls						
Variable	N	Mean	Std. Dev.	P10	Median	P90
Income	7,003,854	153.586	125.698	37.727	142.829	263.942
AvIncome _{t-2,t}	7,003,854	145.128	202.205	29.799	135.887	251.736
Wealth	7,003,854	180.115	2,067.325	0.000	0.000	514.856
MTR	5,615,159	34.716	11.596	25.000	30.000	52.740
Age	7,003,854	48.639	18.709	24.000	47.000	75.000
Female	7,003,854	50.928	49.991	0.000	100.000	100.000
Married	7,003,854	50.209	50.000	0.000	100.000	100.000
Town	7,003,854	11.675	32.113	0.000	0.000	100.000
City	7,003,854	73.743	44.003	0.000	100.000	100.000
Capital	7,003,854	35.388	47.817	0.000	0.000	100.000
Move	7,003,854	6.769	25.122	0.000	0.000	0.000
Household Size	7,003,854	2.104	1.235	1.000	2.000	4.000
HS Inc	7,003,854	5.344	22.491	0.000	0.000	0.000
HS Dec	7,003,854	6.552	24.745	0.000	0.000	0.000
BusInc	7,003,854	4.855	21.492	0.000	0.000	0.000
SocAss	7,003,854	17.041	37.599	0.000	0.000	100.000
Pension	7,003,854	32.868	46.974	0.000	0.000	100.000

1974–2005 period. The range of values of income and wealth measures is considerable—from SEK 37,727 (10th percentile) to 263,942 (90th percentile) (*Income_t*), SEK 29,799 to 251,736

($AvIncome_{t-2,t}$), and SEK 0 to SEK 514,856 ($Wealth_t$). About 40% of all observations contain non-zero values for taxable wealth.

I use two proxies for tax-sensitivity. First, I use the percentile of average income distribution. Percentiles of income distribution are based on three-year average income excluding capital gains, to prevent reverse endogeneity in the income measure. Using the average over several years mitigates the problem that individuals may increase labor supply due to temporary non-availability of capital gains. Second, I use the first-SEK (short-term) marginal capital gains tax rate (MTR_t) based on current income. The average MTR amounts to 34.72% and varies considerably across individuals. Demographic controls include 12 variables (see also Calvet, Campbell, and Sodini 2009; Daunfeldt, Praski-Ståhlgren, and Rudholm 2010). These variables cover information on age, gender, marital status, household size, income composition, and regional differences. Table 2 presents summary statistics and variable definitions for the socioeconomic controls.

3 Capital Gains Realizations and the 1991 Tax Reform

3.1 The Evolution of Capital Gains in Sweden 1974–2005

Total realized capital gains increased from SEK 0.6 billion in 1974 to SEK 21 billion in 2005. The performance of the Swedish stock market is highly correlated to the development of aggregated capital gains, except for 1991 and 1994. The time-series correlation between stock market performance and aggregated capital gains is above 0.8 for the 1974–2005 sample (see, also, Roine and Waldenström, 2008). The 1991 reform led to a 60.5% surge in aggregated capital gains from SEK 7.4 billion to SEK 11.9 billion, despite an 18% decline in the Swedish stock market index. The effect of the 1991 reform is much stronger for the top percentile of the income distribution. Aggregated capital gains more than tripled from SEK 0.82 billion in 1990 to SEK 3.56 billion in 1991. The top 1% of the income distribution thus accounts for over 60% of the total increase in capital gains from 1990 to 1991.

The trend in aggregated realized capital gains results from an increasing number of people accessing stock and housing markets. The percentage of individuals realizing capital gains steadily increases over the sample period; in the early 1970s, this figure was only 30% for the entire sample. From 1990 to 1991, the share of individuals realizing capital gains increased by 2.7 percentage points. The increase is greater for the top percentile. The share of individuals with capital gains almost doubled from 20.7% in 1990 to 40.3% in 1991. From 1974 to 1991, average income from capital gains rose from SEK 26,665 to a peak of SEK 109,185 in 1991. After 1991, average capital gains fell well below the level of the late 1980s. The top percentile nearly tripled average capital gains from SEK 176,529 in 1990 to SEK 515,574 in 1991. Further, and in contrast to all individuals, taxpayers in the top percentile realized higher average capital gains in the post-reform period than in any year of the pre-reform period. In sum, the increase in aggregated capital gains largely stems from more individuals realizing lower capital gains after the 1991 reform.

These are the earliest indications that the 1991 tax reform affects realization of capital gains. However, interpreting time-series of aggregated and average capital gains cannot provide precise estimates of tax effects when relevant controls such as wealth, income, and demographic variables are excluded. Since there were major changes in tax legislation from 1980 to 1985 (Södersten, 1993), I restrict regression analyses on the aggregate reform effect on capital gains realizations to the 1985–1996 period.¹¹ The choice of 1985 is reasonable to mark the start of the pre-reform period, to ensure an almost constant capital gains tax regime for the subsequent analyses. I examine a 6-year as well as a 12-year period around the 1991 reform and integrate relevant control variables to ensure robust estimates of changes in capital gains realizations.

¹¹I restrict my sample to the 1985–1996 period to avoid overlapping effects with changing stock market activity in Sweden. In 1997, the first Swedish online bank opened and transaction costs declined substantially in the following years. This restriction ensures that the effects are driven more by tax regimes and less by changing capital markets.

Table 3: Changes in Capital Gains Pre- and Post-1991 Reform

This table reports average capital gain realizations, initiations, terminations, and realized values pre-reform (Column 1) and post-reform (Column 2), as well as estimates of the change between the two periods without (Column 3) and with controls (Column 4). Panel A covers the 6-year period around the 1991 tax reform (1988–1993). The sample consists of 229,393 individuals and 1,253,738 observations. Panel B covers the 12-year period around the tax reform (1985–1996). The second sample consists of 253,517 individuals and 2,508,429 observations. Standard errors of the differences with and without controls (reported in parentheses) allow for heteroskedasticity and are clustered by county-years. ***, **, * indicate statistical significance of the difference at the 1%, 5%, and 10% levels, respectively.

Panel A: 1988-1993				
	Pre-reform 1988-1990 (1)	Post-reform 1991-1993 (2)	Difference (post- minus pre-reform) (3)	Difference with controls (4)
Capital Gains Realizations (in %)	5.007	7.365	2.358 (0.334)***	2.007 (0.166)***
Capital Gains Initiations (in %)	3.685	5.516	1.831 (0.250)***	1.784 (0.180)***
Average Realized Capital Gain	71.263	42.947	-28.316 (6.982)***	-20.081 (6.115)***
Panel B: 1985-1996				
	Pre-reform 1985-1990	Post-reform 1991-1996	Difference (post- minus pre-reform)	Difference with controls
Capital Gains Realizations (in %)	4.162	11.873	7.711 (0.646)***	6.845 (0.611)***
Capital Gains Initiations (in %)	3.085	7.869	4.784 (0.398)***	4.422 (0.355)***
Average Realized Capital Gain	58.068	25.876	-32.192 (4.701)***	-25.000 (4.735)***

Table 3 summarizes the magnitude of the effects on capital gains realizations around the reform. First, Panel A covers three years prior to the reform (1988–1990) and three years after the reform (1991–1993). This sample is an unbalanced panel and consists of 229,393 individuals and 1,253,738 observations. Second, an extended period (Panel B) covers 12 years around the reform (1985–1996). Panel B consists of 253,517 individuals and 2,508,429 observations. The first row of Table 3, Panel A, shows that the average percentage of capital gains realization increased by 2.4 percentage points. For the 12-year period around the tax reform, the surge in capital gains realizations amounts to 7.7 percentage points. Average realized capital gains decrease by SEK 28,316 for Panel A and by SEK 32,192 for the 1985–1996 period.

These figures are based on the assumption that no other unobservable determinants of capital gains realization activity changed during the respective time horizon. This assumption does not hold given the economic crisis and the fundamental tax reform of 1991. To ensure robustness of differences between post- and pre-reform capital gains realizations, I control for a rich set of variables. I run the following regression for the capital gains variables:

$$CG_{i,t} = \alpha_0 + \beta \cdot Post_t + \sum_{a=1}^3 \gamma_a \cdot I_{i,t-a} + \chi \cdot X_{i,t-1} + \alpha \cdot County_i + \epsilon_{i,t} \quad (1)$$

where $CG_{i,t}$ is the respective capital gains measure of individual i in year t . $Post_t$ is a dummy variable for the post-reform period, which takes the value 1 after enactment of the reform, and 0 for years prior to 1991. The first set of control variables includes three lags of income and taxable wealth, denoted by vector I . The second set of control variables (vector X) consists of income deviation, marital status, household size, indicator variables for pension, social assistance, business income, and increase as well as decrease in household size. I further include a dummy variable that takes the value 1 if the individual resides in a small town, a large city, or the county capital. Third, I control for regional disparities between 21 counties in Sweden and include county fixed effects ($County_i$). Throughout the paper, standard errors allow for heteroskedasticity and are clustered by county-years.

The fourth column of Table 3 shows results for the difference after controls (β) between post-reform and pre-reform variations in capital gains realizations and initiations. Adding controls, the estimate of the before-and-after difference in the likelihood to realize capital gains is 2.0 percentage points, or 40% of the unconditional pre-reform average. In Panel B, the difference with controls is larger than in Panel A. In the 6 years following the reform, the likelihood of realizing capital gains increases by 6.85 percentage points, or over 150% of the unconditional pre-reform average. This can be explained by the subsequent tax reductions and positive stock market returns after 1993. At the same time, average realized capital gains decrease substantially.

Table 4: Change in Capital Gains Realizations—Robustness Tests

This table reports estimates of the change between pre- and post-reform capital gains realizations with controls for the 1988–1993 and the 1985–1996 sample periods. Panel B uses the amount of realized capital gains. Column (1) presents results where the sample is restricted to individuals aged between 30 and 60. In Columns (1) and (3), observations from 1991 and 1994 are excluded from the regressions. Column (2) and (4) include control variables for the relevance of interest deductions. In Columns (3) and (6), the sample is restricted to the Swedish regions of Småland and the Islands and Northern Central Sweden, where the house price index is least volatile. Standard errors (reported in parentheses) allow for heteroskedasticity and are clustered by county-years.

Panel A: Likelihood to Realize Capital Gains						
	Without 1991	Control for Interest Deduction	Regions with Lowest Volatility	Without 1991/1994	Control for Interest Deduction	Regions with Lowest Volatility
	1988-1993			1985-1996		
Reform	1.923 (0.261)***	2.507 (0.165)***	1.738 (0.213)***	3.770 (0.113)***	7.041 (0.599)***	6.703 (0.835)***
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,044,248	1,253,738	239,435	2,508,519	2,508,519	478,983
Panel B: Amount of Realized Capital Gains						
	1988-1993			1985-1996		
Reform	-40.314 (5.972)***	-17.764 (6.266)***	-13.002 (6.229)**	-33.015 (5.348)***	-23.459 (4.304)***	-15.272 (4.665)***
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	60,533	77,704	12,598	149,694	203,006	34,802

Let us now turn to several important additional robustness tests for the difference estimates. The first concern pertains to long-run responsiveness to a cut in capital gains tax rates. The literature on capital gains reaches consensus that short-run elasticity to capital gains tax rates is substantially greater than long-run elasticity (see, among others, Auten and Clotfelter, 1982). One might expect the reaction to the reform to be substantially lower when observations from 1991 and 1994 are excluded. The results in Column 1 show that the estimate for the 1988–1993 sample is very similar when 1991 is excluded. For the 1985–1996 sample, the effect is slightly smaller but still economically large when 1991 and 1994 are excluded. It appears that the significant long-run effect of lower capital gains tax rates stems largely from transition of a progressive capital gains tax to a proportional tax. Further, there are other features of the tax reform that potentially affect capital gains realization. The 1991 tax reform effectively limited the deductibility of interest payments on real estate from highly taxed labor income. As a consequence, higher net borrowing costs could have triggered realization of capital gains from real estate. Columns 2 and 5 present regression results with an additional control for

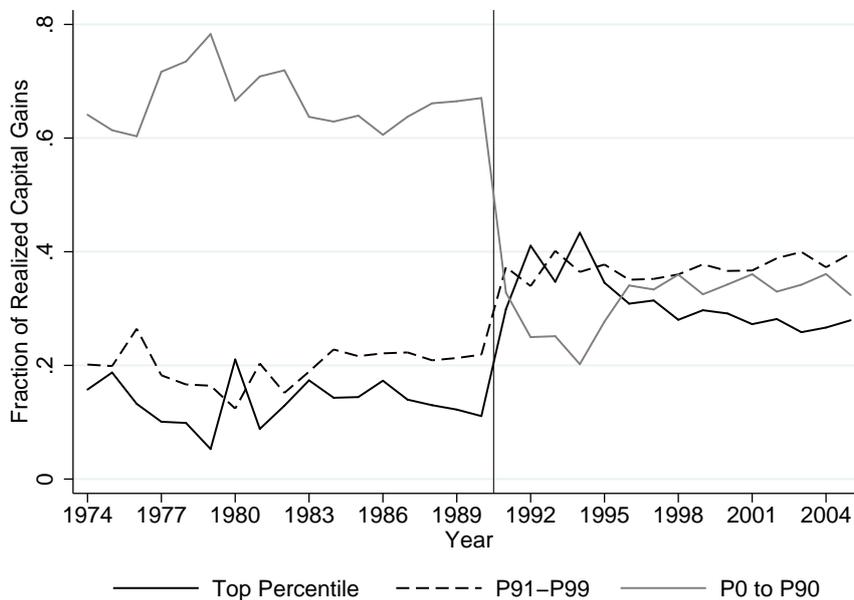
the importance of interest deductions on real estate. As expected, individuals with substantial interest deductions are more likely to realize capital gains (estimates not reported). Most importantly, the estimate for the reform dummy is very similar to the baseline results. Finally, I run a robustness test focused on the two Swedish regions (Småland and the Islands and Northern Central Sweden) with the least volatile real estate markets. This is to ensure that capital gains realizations are not driven by collapsing local real estate markets. Again, results are very similar to the baseline effect.

3.2 High-Income Taxpayers and Capital Gains Responses

These results provide the first indications that the 1991 tax reform increased capital gains realization activity while decreasing average net realized gains. I now turn to the question of who responded to the 1991 reform and exploit cross-sectional differences in capital gains tax incentives. First, I am interested in structural differences across tax regimes. Under a progressive taxation regime, high-income (low-income) individuals face a high (low) marginal capital gains tax rate. According to the “lock-in” effect of capital gains taxation (see, among others, Reese, 1998; Ivković, Poterba, and Weisbenner, 2005; Dai, Maydew, Shackelford, and Zhang, 2008), capital gains realizations should decrease in the income tax rate and thus in income. Even though high-income and wealthy individuals are more likely to own capital gains assets, a high capital gains tax rate locks-in their capital gains. Under a proportional tax, the marginal capital gains tax rate is independent of overall income. There are no cross-sectional differences in the lock-in effect across income percentiles. The tax wedge between capital gains taxes and tax rates on earned income, such as labor income and income from self-employment, may create an incentive to realize capital gains (Poterba and Samwick, 2002). Further, the proportional tax is very salient (Chetty, Looney, and Kroft, 2009; Finkelstein, 2009). Individuals know exactly their marginal tax capital burden and may realize capital gains because the flat capital gains tax is below the marginal income tax rate. I thus expect that the role of high-income individuals differs between a proportional and a progressive tax system.

Figure 2: Distribution of Realized Capital Gains Across Individuals—Breakdown by Income Percentiles, 1974–2005

This figure plots the distribution of capital gains across individuals. This figure uses the fraction of capital gains realized by individuals in the top percentile, the top decile, and the remaining taxpayers (P0-P90) as a percentage of total realized capital gains. The vertical line separates years 1990 and 1991.



To test this simple prediction, Figure 2 plots the percentage of total aggregated realized capital gains in each year over the 1974–2005 period realized by the top percentile, the 91st to the 99th percentile (P91-P99), and the remaining 90% of the sample in any given year over the 1974–2005 period. Individuals are sorted into percentiles of the three-year average income distribution before capital gains. This ensures that large, one-time capital gains do not affect the definition of income percentiles. Figure 2 shows that the role of the top percentile and the 91st to the 99th percentile in capital gains realization changes considerably after tax reform. Under the progressive tax regime, both the top percentile and the P91-P99 group have a constant share of aggregated realized capital gains of around 16% and 18%, respectively, without a significant trend. High capital gains taxes lock-in gains of high-income investors. In total, the top 10% of the income distribution realizes about one-third of all realized gains under progressive taxation. The share of total capital gains realized by the top 10% increases significantly following the introduction of the proportional tax. This surge amounts to 15 percentage points for the top decile and 23 percentage points for the top percentile, and reaches a constant level post-reform.

Table 5: Tax Regimes and Distribution of Realized Capital Gains—Breakdown by Income Percentiles

This table reports linear regression results for aggregated shares of realized capital gains, estimated over the 1974–2005 period. The share of capital gains realized by the top percentile (row [1]), the share of capital gains realized by individuals in the 91st to 99th percentile (row [2]), and the share of total capital gains realized by the 1st to 90th percentile of the income distribution (row [3]) are used as dependent variables in separate regressions. Standard errors are corrected for autocorrelation via the Cochrane-Orcutt technique. ***, **, * indicate statistical significance of the difference at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable	Constant	Year	Proportional Tax	R-Squared
[1]	Share Top 1%	0.164 (0.019)***	-0.003 (0.002)*	0.232 (0.033)***	0.792
[2]	Share P91-P99	0.184 (0.012)***	0.002 (0.001)	0.147 (0.021)***	0.899
[3]	Share P0-P90	0.654 (0.034)***	0.001 (0.003)	-0.362 (0.043)***	0.848

I separately run OLS regressions with share of realized gains as the dependent variable and with the year and dummy for the proportional tax as independent variables for the top percentile, top decile, and the rest of the sample. Table 5 reports coefficient estimates. The regressions yield a significant constant, a significant coefficient for the reform dummy, and an insignificant effect of the year variable for two of the three groups. The effect of year is borderline significant for the top percentile. Most importantly, the proportional tax dummy is significant and the economic effect is large.¹² Under the proportional tax, the top 10% realize about two-thirds of aggregated realized capital gains, or about twice the level as under progressive taxation. It thus appears as if a proportional tax as opposed to a progressive capital gains tax leads to a higher concentration of realized capital gains among high-income individuals.

I next exploit the cross-sectional variation in capital gains tax rates around the transition from the progressive to the proportional tax in more detail. The tax cut provides an incentive for individuals in the top marginal tax bracket, in particular, to increase their capital gains realization activity. Their marginal tax burden on short-term capital gains fell from over 80% to 30%. Taxpayers in lower tax brackets benefit from a weaker tax cut on short-term capital gains but face an increase in long-term capital gains tax rates. Thus, I divide individuals into 100 income percentiles and regress the effect of the reform (*Post*) on the likelihood of realizing

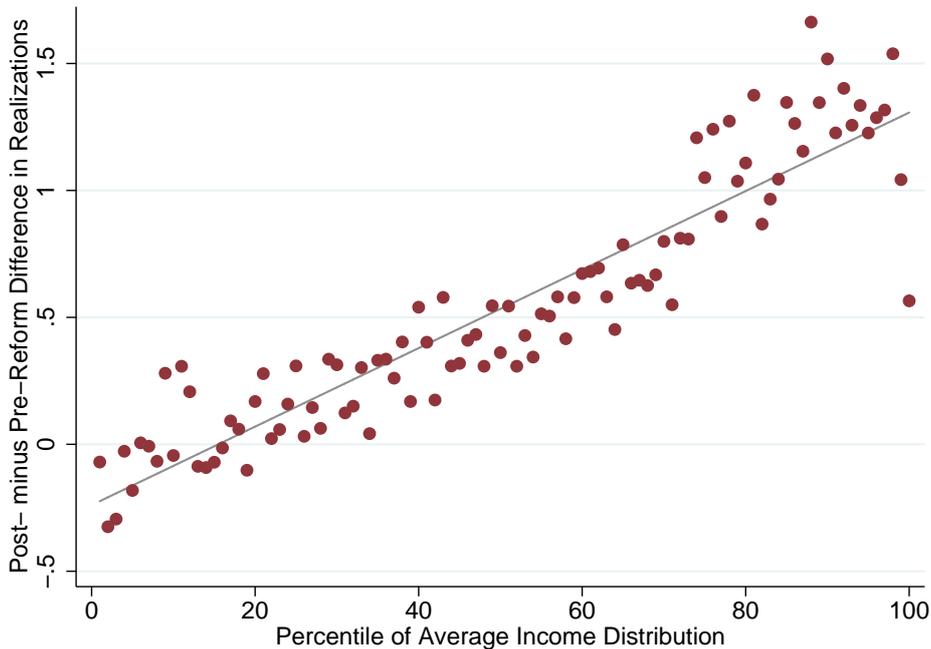
¹²The results are robust to the inclusion of GDP growth and stock market performance. Both variables are insignificant. The proportional tax dummy is very similar when adding these controls.

capital gains separately for each percentile, using the model from equation (1). If the effect of the reform increases in income, the coefficient on *Post* is expected to increase in income.

The results for the β coefficients on the propensity to realize capital gains are illustrated in Figure 3. The estimated coefficients are normalized by the unconditional pre-reform averages. This approach ensures that the results are not misinterpreted. Absolute changes do not recognize differences in stock market participation, penetration of financial assets, and pre-reform realization activity. By normalizing with pre-reform averages, the estimates reflect relative changes in realization behavior and ensure comparability of results. I then regress the relative increases against the percentile rank and simply treat relative coefficients as data points. The effect increases in income percentile rank. The linear regression yields a point estimate of 0.015 and a very high t-statistic. The R-squared of the hundred-data-point regression is 85%.

Figure 3: Difference in Capital Gains Realizations by Income Percentile 1988–1993

This figure depicts the average increase in the percentage of individuals realizing capital gains in each income percentile. The difference between post-reform (1991–1993) and pre-reform (1988–1990) realization activity is estimated separately for each percentile of the income distribution. The estimated model is defined as in equation (1).



For the first 40 percentiles, the difference between post- and pre-reform realization activity is small and often insignificant. I find positive and statistically significant results for higher percentiles. The likelihood that individuals in the top-20 percentile of the income distribution realize capital gains more than doubles after the reform (relative change $\geq 100\%$). The results

are very similar when analyzing the 1985–1996 sample.¹³ Still, the magnitude of the effect is surprising, as tax rates on long-term capital gains are almost constant in the top tax brackets around the reform. The tax wedge between capital gains income and labor income, as well as the salience of the flat capital gains tax, may explain this effect.

Again, there could be concern that this pattern is driven by the economic crisis of 1991 and 1992. If the reaction to the crisis is concentrated among wealthy, sophisticated investors, I misinterpret crisis effects as tax effects. I address this concern by repeating the percentile-wise regressions around the stock market crash in the years around 2001.¹⁴ If this “pseudo” tax reform leads to a similar pattern, the effect is very likely to be driven by the economic downturn. The pattern of the relative coefficients around 2001 (see Figure 4) differs substantially from the pattern around the 1991 reform. The pattern is hump-shaped and the reaction is negative for top income earners. These earners realize less capital gains (or losses) post-crisis. Most importantly, the relative response is very small and often insignificant. This observation is in line with the “ostrich effect,” which indicates that investors “put their heads in the sand to shield themselves” from bad news (Karlsson, Loewenstein, and Seppi, 2009). It thus appears that the reaction to the 1991 tax reform is driven by the introduction of the proportional tax and less by the economic crisis.

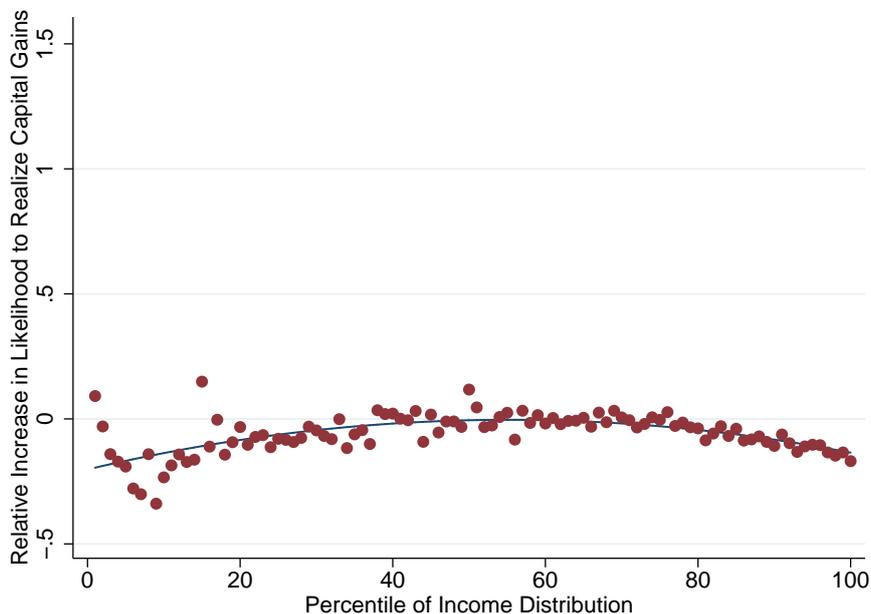
Finally, there may be a concern that income and not the marginal tax rate drives the results. I use the likelihood to realize capital gains (Columns 1–3) and the natural logarithm of capital gains (Columns 4–6) as dependent variables. Table 6 presents coefficient estimates for the current first-SEK long-term capital gains tax rate MTR as the independent variable of interest. In line with the lock-in effect of capital gains taxation, I expect a negative coefficient for MTR . Regressions include control variables from equation (1). When estimating the tax effect on the amount of capital gains, I include the inverse Mills ratio from a first-stage probit model to control for sample selection. I address concerns about the endogeneity of marginal

¹³I additionally run OLS regressions with fixed effects on the individual level, which simultaneously estimates response to the reform across income deciles (See Table A.1 in the Appendix). Response to the tax reform is increasing in income and is strongest in higher income percentiles. The results are very similar when excluding the reform years 1991 and 1994.

¹⁴Between 1998 and 2000 the stock market index increased annually by 14.35% to 38.98%. During the 2001 crisis, the stock market index fell in 2001, 2002, and 2003 by -37.65%, -28.34%, and -14.16%, respectively.

Figure 4: Difference in Capital Gains Realizations by Income Percentile 1998–2003

This figure depicts average increase in the percentage of individuals realizing capital gains in each income percentile. The difference between crisis (2001–2003) and pre-crisis (1998–2000) realization activity is estimated separately for each percentile of the income distribution. The estimated model is defined as in equation (1).



tax rates in two ways. I first use a two-stage least-squares approach where I use two lags of MTR as instruments (Columns 2 and 5). Second, I use one lag of the marginal income tax rate (Columns 3 and 6) as the tax rate measure. The results show that the marginal income tax rate MTR has a negative effect on the likelihood of realizing capital gains and on the amount of realized capital gains. A 10-percentage point increase in the marginal income tax rate decreases the likelihood of realizing capital gains by 2.6 percentage points, or 27% of the unconditional average. Likewise, a 10-percentage point increase in MTR reduces realized net capital gains by 45%.

Table 6: Effect of Marginal Tax Rates on Capital Gains Realizations

This table presents coefficient estimates from linear regressions for the likelihood to realize capital gains (Columns 1–3) and for the amount of realized capital gains (Columns 4–6). As tax measures, I use the first-SEK marginal capital gains tax rate (*MTR*). Columns 2 and 5 use an instrumental variable approach where two lags of the tax measure are used as instruments. Columns 3 and 6 use one lag of the *MTR* as an independent variable. Columns 3 and 4 use the natural logarithm of realized capital gains as the dependent variable. The model includes an inverse Mills ration from a first-stage probit model to control for selection. Standard errors of the differences with and without controls (reported in parentheses) allow for heteroskedasticity and are clustered by county-years. ***, **, * indicate statistical significance of the difference at the 1%, 5%, and 10% levels, respectively.

	Likelihood to Realize Capital Gains			Amount of Realized Capital Gains		
	(1)	(2)	(3)	(4)	(5)	(6)
MTR	-0.164 (0.012)***	-0.262 (0.019)***		-0.031 (0.002)***	-0.045 (0.003)***	
Lagged MTR			-0.172 (0.013)***			-0.028 (0.002)***
Inverse Mills	No	No	No	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	OLS	2SLS	OLS	OLS	2SLS	OLS
Observations	2,884,395	2,884,395	2,884,395	175,559	175,559	175,559
R-squared	0.074	0.073	0.074	0.148	0.146	0.146

4 Capital Gains and Liquidity Constraints

Having established the result that there is a positive relationship between income and the reaction to the 1991 tax reform, I examine the role of liquidity constraints at the individual level. I exploit cross-sectional variation in the tax incentive to realize capital gains in the group of high-income individuals, namely the top decile. Individuals can optimize their net-of-tax wealth by shifting capital gains realization to periods with lower marginal tax rates. If individuals temporarily have low income, they might realize accrued capital gains and smooth income to maintain their expected level of consumption. Progressive taxation strengthens the tendency to sell assets to overcome temporary liquidity constraints (see, for example, Auten and Clotfelter, 1982; Stiglitz, 1983). If the temporary marginal tax rate is significantly lower than the average, permanent marginal tax rate, an investor can effectively lower his capital gains tax burden by realizing capital gains in years with liquidity constraints. In contrast, if an investor has a higher income than on average, he is less likely to realize capital gains. Capital gains are additionally locked-in by the tax wedge between current and average marginal tax

rates. Under the proportional capital gains tax regime, individuals with liquidity constraints no longer have a temporary tax incentive to realize capital gains. In contrast, individuals with excess income are not additionally locked-in by temporary high tax rates. Put differently, under the proportional tax regime, there is no cross-sectional variation in the lock-in effect of capital gains taxes.

If these predictions hold, I should be able to identify an effect from the 1991 tax reform on the relation between current income, average income, and the likelihood of realizing capital gains. I present results in two stages. First, I present nonparametric results using all individuals in the sample. Second, I focus on a more homogeneous sample of the top decile of the income distribution using OLS regressions.

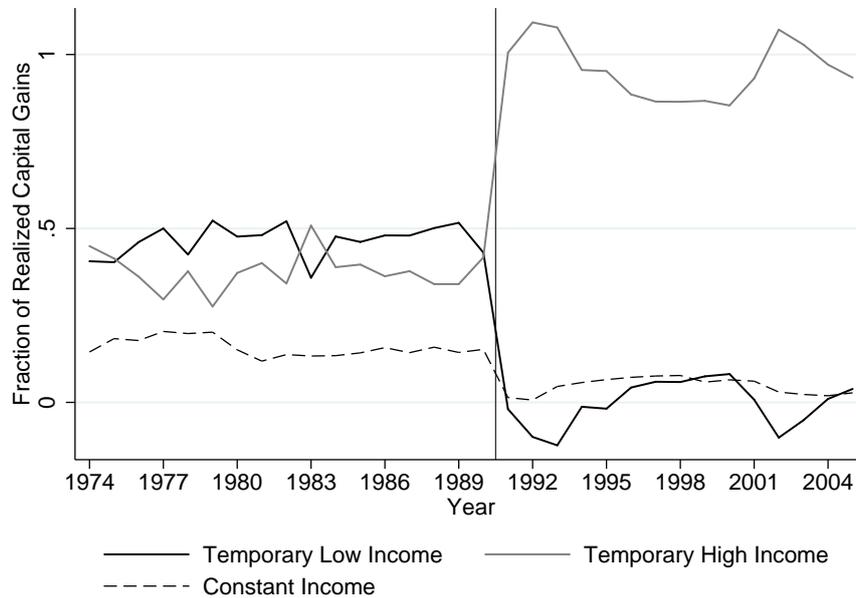
4.1 Taxes, Capital Gains Realizations, and Liquidity Constraints: Nonparametric results

The simplest way of testing these predictions is to track capital gains realizations of individuals with and without liquidity constraints over time. For the nonparametric tests, I sort observations into deciles of the difference between current income and three-year average income (*Delta_Inc*) separately for each year. I am then interested in the percentage of capital gains realized by individuals with (1) temporary liquidity constraints, (2) temporary excess income, and (3) constant income. The bottom (top) three deciles of the *Delta_Inc* distribution, i.e., individuals with the highest negative (positive) income deviation, form the group of individuals with liquidity constraints (excess income). On average, individuals with liquidity constraints (excess income) face a negative (positive) income deviation of 27%(70%). The remaining four deciles form the group *Constant Income*. This group's current income is, on average, 5% above the three-year average income.

Figure 5 shows that the role of individuals with liquidity constraints differs considerably across tax regimes. Under progressive taxation, individuals with liquidity constraints realize higher capital gains than individuals with excess income or individuals with constant income. This changes considerably after the introduction of the proportional capital gains tax. The share

Figure 5: Distribution of Realized Capital Gains Across Individuals—Breakdown by Liquidity Constraints, 1974–2005

This figure plots the distribution of capital gains across individuals. This figure presents the fraction of capital gains realized by individuals with high negative temporary income differences (*Temporary Low Income*), high positive income differences (*Temporary High Income*), and constant income as a percentage of total realized capital gains. The vertical line separates years 1990 and 1991.



of capital gains realized by individuals with liquidity constraints falls to a very low level and is even negative in years with low stock market returns. At the same time, the share of capital gains realized by individuals with excess income increases substantially. Under proportional taxation, where these individuals are not additionally locked-in by temporary, high capital gains taxes, they realize almost all aggregate net capital gains. In fact, the share of capital gains realized by individuals with excess income dwarfs capital gains realizations by financially constrained individuals.

Table 7: Tax Regimes and Distribution of Realized Capital Gains—Breakdown by Liquidity Constraints

This table reports linear regression results for aggregated shares of realized capital gains, estimated over the 1974–2005 period. The shares of total capital gains across groups sorted by liquidity constraints are used. Individuals are sorted into deciles of the income deviation distribution in each year. The bottom three deciles (highest negative deviation) form the group of individuals with liquidity constraints (*Share Temporary Low Income*). The top three deciles form the group of individuals with excess income. The remaining four deciles form the group of individuals with constant income. As independent variables, year (after 1974) and a dummy variable equal to 1 for all years under proportional taxation (*Proportional Tax*) are used. Standard errors are corrected for autocorrelation via the Cochrane-Orcutt technique. ***, **, * indicate statistical significance of the difference at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable	Constant	Year	Proportional Tax	R-Squared
[1]	Share Temporary Low Income Individuals	0.448*** (0.034)	0.002 (0.003)	-0.501*** (0.048)	0.920
[2]	Share Constant Income Individuals	0.173*** (0.032)	-0.000 (0.002)	-0.129*** (0.020)	0.695
[3]	Share Temporary High Income Individuals	0.372*** (0.051)	-0.000 (0.004)	0.592*** (0.062)	0.897

Table 7 presents OLS regression results with the share of realized gains as the dependent variable. I include year and the dummy for proportional tax as independent variables. The regressions yield significant constants, significant coefficients for the reform dummy, and an insignificant effect of the year variable for all three groups. The proportional tax dummy is significant and the economic effects are large. The results are also robust to the inclusion of GDP growth and aggregated stock market return, which are both insignificant (not reported).

It appears that individuals with excess income would rather sell winning stocks while holding losing stocks too long (see, for example, Shefrin and Statman, 1985; Odean, 1998). In contrast, individuals with liquidity constraints appear to sell losing stocks or stocks with low accrued gains under proportional taxation where there is no temporary tax incentive. Under progressive taxation, the temporary lower capital gains tax rates seem to incentivize constrained individuals to realize their accrued gains.

4.2 Taxes, Capital Gains Realizations, and Liquidity Constraints: OLS results

Let us now turn to regressions that allow for more detailed control of heterogeneity across individuals. I restrict the analysis to a sample of high-income individuals in the top decile of

the income distribution, to pick up meaningful variation in temporary income differences within the group of tax-sensitive individuals. Restricting the sample to high-income individuals also has the advantage of a more homogeneous sample. I sort individuals in the top decile of the average income distribution into 10 equal bins according to the *Delta_Inc* distribution in each year. I define individuals in the bottom decile of the *Delta_Inc* distribution, i.e., those taxpayers with the lowest income relative to average income, as individuals with temporary liquidity constraints. Taxpayers in the top decile of the *Delta_Inc* distribution are regarded as individuals with excess income. Individuals with temporary low income have an average annual income of SEK 474,484. Current income before capital gains is about 43% (median 37%) lower than average income over the preceding three years. Prior to the reform, these individuals' first-SEK capital gains tax rate is about 6 percentage points below their permanent capital gains tax rate. Individuals with temporary high income have an average income of SEK 432,831. Their current income is about 50% (median 36%) higher than their three-year average income. Their current first-SEK capital gains tax rate is about 5.4 percentage points above the tax rate based on the average income of the three preceding years.

Figure 6: Capital Gains Realizations and Temporary Income Deviations

This figure depicts the median realized capital gain (conditional on capital gains realization). The sample contains the 10% largest negative and 10% largest positive income deviations from three-year average income. The vertical line separates years 1990 and 1991.

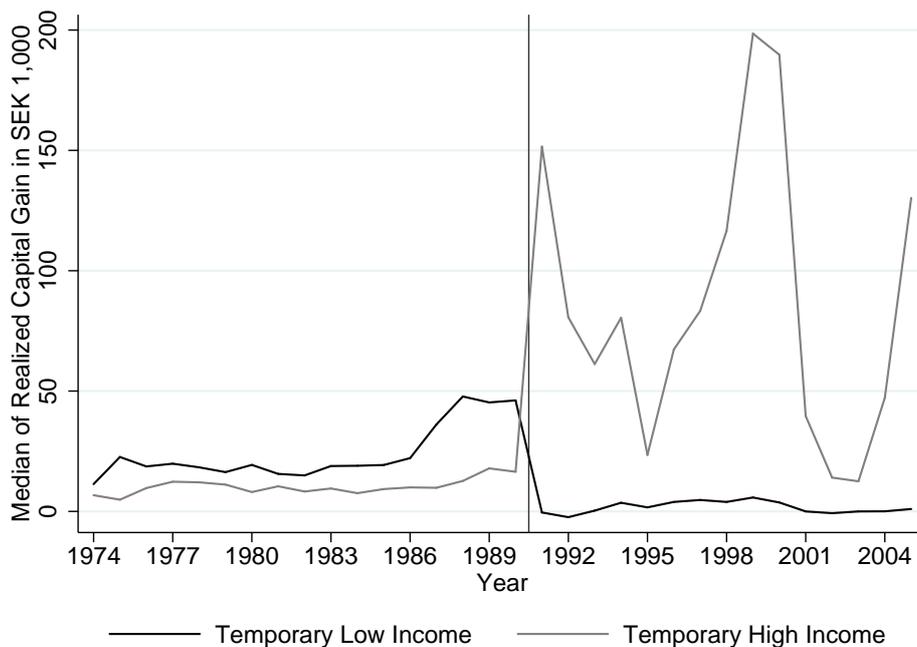


Figure 6 plots the median realized capital gains of individuals with temporary low income (black line) and temporary high income (gray line) using the sample of high-income individuals. As expected, capital gains are locked-in when income tax rates are temporarily high. Under progressive taxation, individuals with temporary low income (and temporary lower tax rates) realize higher net capital gains than individuals with excess income (and temporary higher tax rates). After implementation of the proportional tax regime, this relation changed. Individuals with liquidity constraints reduce average realized capital gains to a very low level. In contrast, individuals with temporary high income significantly increase realized capital gains, as they are not additionally locked-in by temporary high tax rates under the proportional tax scheme. The trend post-reform follows stock market performance. The overall pattern is similar for the percentage of individuals that realize capital gains: Individuals with liquidity constraints are more (less) likely to realize capital gains than individuals with excess income under progressive (proportional) taxation. This finding also points toward the relevance of temporary tax incentives vis-à-vis compensation for liquidity constraints.

Table 8 presents difference-in-difference estimates between both groups and periods for the likelihood to realize capital gains (Panel A) and the amount of realized capital gains (Panel B) with and without control variables. This addresses concerns that the aggregated results are driven by other covariates. These regressions control for income, wealth, and demographic controls, and county fixed effects. The difference-in-difference estimates are based on linear regressions with individual-fixed effects. I use the 12-year period around the 1991 tax reform.

Table 8 confirms the observations from Figure 5 and 6. Under progressive taxation, the difference in the likelihood to realize (amount of realized) capital gains between individuals with temporary low and temporary high income amounts to 3.3 percentage points (SEK 32,796), or 22% (over 55%) of the unconditional mean of pre-reform realization activity of individuals with temporary high income.¹⁵ This changes post-reform. Individuals with excess income are

¹⁵Even if all capital gains of individuals with excess income were long-term gains (40% on gross gain included in tax base) and all gains of individuals with liquidity constraints were short-term gains (100% of gross gain included in tax base), the average capital gains of individuals with liquidity constraints would still be significantly higher.

Table 8: Income Deviation and Tax Regimes—Top Decile

This table reports average capital gains realizations for the bottom (Column 1) and top (Column 2) decile of the income deviation distribution, as well as estimates of the change between the two periods with (Column 3) and without controls (Column 4). The sample consists of individuals in the top decile of the income distribution. The sample covers 26,604 observations of constrained individuals and 26,830 observations from individuals with excess income. Panel A uses the dummy CG_Realized as the dependent variable. Panel B uses the amount of realized capital gain as the dependent variable. Standard errors (reported in parentheses) allow for heteroskedasticity and are clustered by county-years. ***, **, * indicate statistical significance of differences at the 1%, 5%, and 10% levels, respectively.

Panel A: Likelihood to Realize Capital Gains				
	Temporary Low Income (1)	Temporary High Income (2)	Difference between Groups (3)	Difference with Controls (4)
Pre-reform 1985-1990	17.996 (0.802)***	14.676 (0.537)***	-3.320 (0.581)***	-3.558 (0.623)***
Post-reform 1991-1996	32.663 (2.056)***	51.997 (1.859)***	19.334 (2.002)***	21.266 (1.796)***
Difference between Periods	14.667 (2.202)***	37.321 (1.935)***	22.654 (2.080)***	
Difference with Controls	10.584 (2.069)***	36.332 (1.651)***		26.965 (2.153)***
Panel B: Average Realized Capital Gain				
	Temporary Low Income (1)	Temporary High Income (2)	Difference between Groups (3)	Difference with Controls (4)
Pre-reform 1985-1990	91.923 (4.674)***	59.126 (4.007)***	-32.796 (4.901)***	-36.851 (4.750)***
Post-reform 1991-1996	41.292 (1.577)***	151.119 (6.232)***	109.827 (6.709)***	122.237 (4.704)***
Difference between Periods	-50.630 (4.923)***	91.993 (7.409)***	142.623 (8.292)***	
Difference with Controls	-63.816 (4.888)***	99.466 (9.517)***		214.149 (12.582)***

now more likely to realize capital gains and realize higher capital gains than individuals with liquidity constraints.

Individuals with excess income in the top decile increase capital gains realization activity by 36 percentage points and increase average capital gains by SEK 99,466. One explanation for this finding could be the tax wedge between capital income and ordinary income (Poterba and Samwick, 2002). If capital income, such as capital gains and dividends, is taxed at lower rates than labor income, then individuals may generate a higher proportion of their income from capital income. The effect for constrained individuals differs substantially. While the

likelihood to realize capital gains also increases for individuals with liquidity constraints by 10.6 percentage points, average gains decrease after introduction of the flat tax by SEK 63,816.

Of primary interest here are the difference-in-difference estimates. The estimates for the individual groups can be affected by general macroeconomic trends and more individuals accessing financial markets. The identifying variation from the difference-in-difference coefficient stems from the different reaction of individuals with liquidity constraints vis-à-vis individuals with excess income to proportional versus progressive taxation. The estimated difference-in-difference in the likelihood to realize capital gains is 26.97. That is, the likelihood that individuals with excess income as opposed to constrained individuals realize capital gains increases by 26.97 percentage points. Similarly, the difference in average realized capital gains increases from -36,851 (individuals with liquidity constraints realize higher capital gains under progressive taxation) to 122,237 (individuals with excess income realize higher gains on average under proportional taxation). The resulting difference-in-difference estimate with controls is 214,149.

These positive difference-in-difference estimates suggest that tax regimes affect the motivations behind capital market transactions and the amount of realized capital gains. Under progressive taxation, individual investors appear to realize accrued capital gains when liquidity constraints are high and thus marginal tax rates are low. Individuals with excess income account for about 37% of realized net capital gains. Post-reform, capital gains realizations are less driven by individual liquidity constraints. In fact, under proportional taxation, individuals with excess income realize capital gains more actively than individuals with liquidity constraints. Net capital gains are highly concentrated within the group of individuals with excess income. Under proportional taxation, individuals with liquidity constraints appear to sell predominantly those shares with accrued losses or very low gains.

5 Conclusion

This paper shows that progressive versus proportional taxation affects capital gains realization behavior. Using a comprehensive Swedish panel data set for the period 1971–2005, I show that: 1) the likelihood of realizing capital gains increases after introduction of a proportional

tax; 2) the reaction to this reform is more pronounced among high-income individuals; and 3) capital gains realizations of individuals with excess income increase while financially constrained individuals cut capital gains realizations. The results generally relate to the importance of taxes in household portfolio decisions. They show that, apart from the level of taxation, the structure of the tax—progressive versus proportional—has substantial effects on capital gains realizations with respect to income and liquidity constraints.

The results have three main implications. A better understanding of the effect of capital gains taxation is quite topical given the numerous income tax reforms over the past two decades in OECD countries and the ongoing debate about capital gains taxation in the United States.¹⁶ First, capital gains tax regimes affect trading activity and the volume of realized capital gains of individual investors. When the capital gains tax rate is independent of overall income, high-income individuals are encouraged to increase their trading activity, because of the tax wedge between capital and labor income. The results also generally point to the relevance of progressive versus proportional taxation on capital gains realization activity. Odean (1999); Barber and Odean (2000); Frazzini and Lamont (2008); Barber, Lee, Liu, and Odean (2009) show that individual investors lose by trading too much. If the tax system additionally encourages trading and capital gains realization, individual investors may underperform the market to an even greater extent.

Second, the effect of tax regimes on capital gains realizations is related to liquidity constraints. At the individual level, a progressive capital gains tax sets additional tax incentives for constrained individuals to realize accrued capital gains. This incentive affects individual investors and has important implications on the returns of constrained individuals. When trading against financially distressed investors, the provider of liquidity earns significant positive returns at the cost of the distressed investor (Andrade and Kaplan, 1998; Coval and Stafford, 2007). A proportional capital gains tax mitigates this problem as it does not provide constrained individuals with a temporary tax incentive to realize accrued capital gains.

¹⁶For example, long-term capital gains in the U.S. have been taxed at a proportional rate of 15% since 2003, except for taxpayers in the lowest two tax brackets. Short-term capital gains are added to taxable income and are taxed at the marginal income tax rate.

Third, under progressive taxation, financially constrained individuals and middle-income individuals trade more often and realize large net capital gains. This is patently different under proportional taxation, where capital gains are predominantly realized by high-income individuals and individuals with excess income. Therefore, cross-country and time-series variation in capital gains tax regimes may explain differences in the effect of individual investors on stock returns (Jackson, 2003; Dorn, Huberman, and Sengmueller, 2008; Kaniel, Saar, and Titman, 2008; Hvidkjaer, 2008; Barber, Odean, and Zhu, 2009). Studying the effects of progressive versus proportional capital gains taxation on returns, trading volume, and ownership structure of firms is an interesting avenue for future research.

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Appendix — Not for publication

Figure A.1: Short-term versus Long-term Capital Gains 1989–1990

This figure plots the fraction of individuals with short-term, long-term, or any capital gains for different income deciles. Statistics are based on 24,080 individuals in 1989 using the HINK data set.

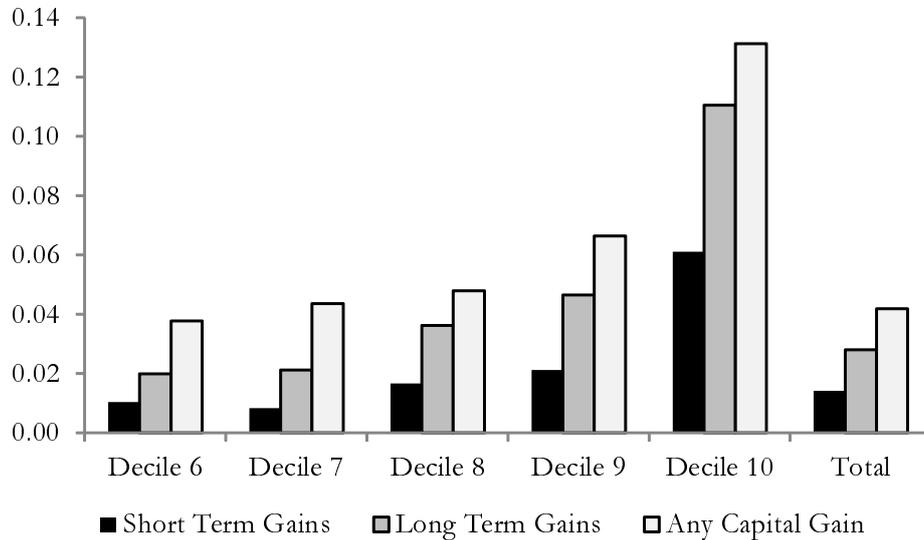


Figure A.2: Average Portfolio Composition 1989–1990

This figure plots average portfolio composition (shares and funds, cash holdings, and real estate wealth) for individuals in various deciles of the income distribution. Statistics are based on 19,708 individuals in 1989 and 1990 using the HINK data set.

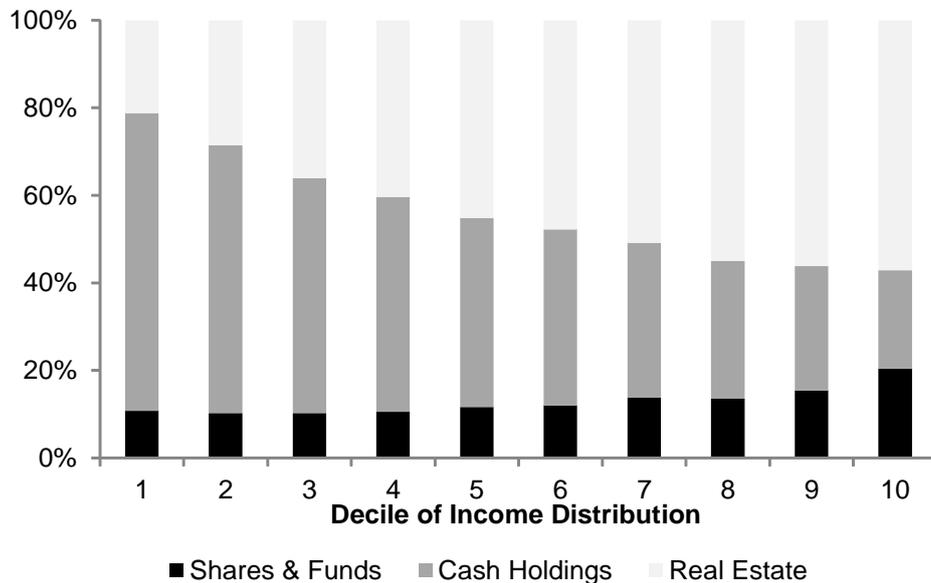


Table A.1: Income and Reaction to the 1991 Tax Reform—Likelihood to Realize Capital Gains

This table presents coefficient estimates for differences in post- and pre-reform capital gain realizations for the 1988–1993 sample and the 1985–1996 sample. Individuals are sorted into percentiles of three-year-average income. The first group accumulates the lowest five deciles (P0-P50). The next four groups refer to the sixth to ninth decile of the income distribution. The sixth group consists of the 91st to 99th percentiles. Finally, the last group consists of individuals in the top percentile. β_i is the coefficient estimate for the post-reform effect in group i , (se) is the heteroskedasticity-robust standard error clustered by county-years, and t-stat is the t-statistic of the significant differences between β_n and β_{n-1} .

	CG_Realized: 1988-1993			CG_Realized: 1985-1996		
	β_i	(se)	[t-stat]	β_i	(se)	[t-stat]
β_1 (P0-P50)	1.282	(0.382)	-	3.557	(0.327)	-
β_2 (P51-P60)	2.417	(0.214)	[0.819]	5.766	(0.456)	[5.471]
β_3 (P61-P70)	2.792	(0.219)	[1.587]	6.737	(0.535)	[5.376]
β_4 (P71-P80)	3.787	(0.242)	[4.806]	8.158	(0.578)	[8.579]
β_5 (P81-P90)	4.945	(0.377)	[4.785]	10.691	(0.784)	[8.625]
β_6 (P91-P99)	7.821	(0.551)	[9.528]	15.490	(1.191)	[8.925]
β_7 (P100)	14.381	(1.129)	[7.275]	23.183	(1.835)	[7.697]
Controls	Yes			Yes		
Observations	1,274,440			2,336,056		
R-squared	0.3517			0.2927		

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