Understanding Capital Gains Responses to Taxes Using Transaction-Level Data*

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Abstract

We study how individuals' trading behavior responds to tax incentives using administrative transaction-level data on all taxable sales of broker-traded financial assets between 2011 and 2019. Our empirical design leverages a simple, salient, timing-based tax notch: in the U.S., assets held beyond one year qualify for a 10-20% reduction in capital gains rates. The size and granularity of the data allow us to study how this capital gains tax rate differentiation shapes individuals' trading behaviors across narrowly defined demographic and income groups. We find that: (1) retiming responses around the tax rate notch are weak in general; (2) individuals make clear misoptimization errors by realizing gains just before the notch; and (3) this pattern can be explained by both heterogeneous capital gains responses by asset type combined with rigidities in individual trading styles. Finally, we use our empirical results to show theoretically that the weak deferral elasticities imply that a revenue-maximizing government would eliminate short- vs long-term tax differentiation.

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Capital gains taxes in the United States accounted for 9.8% of individual income tax receipts and 4.9% of federal tax revenues in 2019, paid primarily by high-net-worth individuals.[1] As a result, the optimal taxation of capital gains has stoked several heated policy debates. On the one hand, capital gains should be highly elastic since individuals have full control over capital gains realizations: they can sell an asset at any time to take advantage of tax regulations. On the other hand, realizations are also driven by market conditions and individuals' trading styles, with the latter being determined by one's skills, beliefs, and preferences. Understanding the interaction of these two considerations for capital gain realization behavior is thus a necessary first step to designing an optimal capital gains tax structure.

In this paper, we use detailed transaction-level data on all individual taxable capital gains realized on directly-held assets between 2011 and 2019 to open the "black box" of capital gains realizations. Our data contains all sales of directly-held stock and mutual fund realizations held in individual taxable brokerage accounts, which are directly reported to the United States Internal Revenue Service (IRS) by brokers. We start by describing the distribution of holding periods over the years, and estimating the (eventually traded) *stock* of outstanding paper gains. Next, we estimate responses to a simple, salient, and large tax incentive arising from the fact that long-term gains are taxed at lower marginal tax rates than short-term gains. Our detailed data and identification approach present three key advantages relative to most prior work. First, our data allows us to observe the specifics of individuals' trading behavior and not just the end-of-the-year totals. Second, the large and salient nature of our tax variation provides a simple and clean test of capital gains' responsiveness to taxation, thus alleviating identification concerns inherent in prior aggregate analyses. Third, by linking transaction-level data to individuals' tax return information, we are able to explore the relevance of various characteristics on realization behavior, such as income, experience, and occupation.

We leverage three administrative tax datasets housed at the IRS. We begin with Forms 1099-B, a transaction-level dataset of broker-traded taxable asset sales that records sale and purchase prices, the sale and purchase dates, and the asset's unique identification number. Importantly, Form 1099-B is third-party reported directly by brokers rather than individual

[1] Tax revenue figures taken from Congressional Budget Office, 2023 budget report. For other years, see https://www.cbo.gov/data/budget-economic-data.

taxpayers, alleviating potential concerns about misreporting or mismeasurement of key tax-relevant variables. We merge these details with individual tax return data: individual income tax filings (Form 1040) and aggregate capital gains and losses filings (Form 1040, Schedule D). Together, Form 1040 and Schedule D provide information on individuals' demographics (age, income, tax preparer use, etc), and capital gains activity (available loss carryovers, other types of capital gains reported, frequency of capital gains reports, etc). While the main Form 1040 is available starting in 1996, our transaction level and Schedule D data is available starting in 2011.

The bulk of our analysis focuses on a simple tax incentive: realizations with holding periods of 366 days or more ("long-term gains") are taxed at 10-20 percentage points lower rates than realizations with holding periods of 365 days or less ("short-term gains"). This tax structure encourages individuals to delay gain realizations and speed up loss realizations, particularly around the 366-day threshold. This incentive permits estimation of capital gains responsiveness by measuring the amount of bunching in the distribution of capital gains realizations at the 1-year short-term/long-term threshold. Our analysis generates four key insights: (1) A very large share of capital gains realized do not qualify for preferential long-term treatment, implying an outstanding stock of (eventually traded) paper gains to be just 2.15 times the typical yearly sale volume; (2) Capital gains responses to taxes are weak, with implied elasticities of 0.5 or less; (3) These weak responses cannot be explained with rational expectations about the rates of return, but are instead likely to be driven by rigid trading styles by individuals, and (4) Given estimated elasticities, differentiation between short- and long-term gains is not revenue maximizing. We now describe our results in detail.

We begin by describing the overall distribution of capital gains holding periods. We find that while individuals appear to understand the relevant tax incentives, they generally do not follow optimal tax strategies. Nearly 40% of gains are realized before they qualify for the long-term tax treatment, with many gains realized within weeks or even days of the 1-year mark. Similarly, loss realizations occur both before and after 1-year mark, though a larger share of losses (around 60%) are realized in the short-term.

We can use the overall distribution of capital gains holding periods to back out the stock of outstanding capital gains. Our calculations suggest that this stock is equal to just 2.15 times the amount of gains realized in a typical year, or roughly $323 billion: a dramatically lower estimate compared to previous estimates using the Survey of Consumer Finances (Saez et al., 2021). Given that we only observe capital gains on assets that are eventually sold, our results thus imply that many outstanding financial asset capital gains are never realized. Instead, these assets are passed on to heirs or given to charitable organizations tax-free. As a result, a large share of outstanding paper gains are unlikely to be responsive to tax reform incentives, since deferring capital gains is always more tax-efficient than realizing during one's lifetime. This also means that retiming around the 1-year threshold is conceptually similar to retiming around a general tax reform that reduces marginal tax rates: in both cases, likely capital gains realizations are delayed by a short number of years.

Next, we study behavioral responses around the 1-year threshold. The preferential taxation of long-term capital gains should lead to bunching at or above the 1-year threshold, as individuals retime sales just before the threshold to avoid taxation. While we indeed find some bunching at the 1-year threshold, the amount of retiming is not very large. Interestingly, a number of individuals make simple mistakes by realizing at 364 or 365 days: they either incorrectly count the number of days by including the day of purchase, and/or believe that it is sufficient to hold the asset for 1 year (instead of *over* a year) to qualify for long-term treatment.

We measure capital gains elasticities by scaling the amount of bunching at the threshold by the tax differential between short-term and long-term tax rates, following the approaches of Kleven and Waseem (2013) and Dowd and McClelland (2019). We consider a variety of elasticity definitions, but across specifications our results imply modest deferral elasticities of 0.5 or less, substantially smaller than most comparable estimates. The richness of our data allows us to investigate which groups of individuals are most responsive and why. We find that the amount of bunching does not vary with individuals' end-of-year short-term tax liability: individuals who are liable for short-term capital gains tax show just as little bunching as individuals who have sufficient amount of losses to avoid tax liability. Similarly, we find no differences in bunching for individuals living in different states, despite the fact that some states treat long-term gains preferentially while other states do not. We also exploit non-linearities in the long-term tax schedule that allow us to compare individuals with different levels of income but the same tax differential at the 1-year threshold. We see that both tax incentives and individuals' income level matter: bunching increases with income (holding tax wedge constant) and with the tax wedge (holding income approximately constant). Overall, we find that high-income, young, and experienced (as proxied by the frequency of Schedule D filings) show the largest bunching. At the same time, however, these differences are relatively small given the large tax incentive, resulting in economically insignificant differences in elasticities.

We next consider a number of potential explanations for our weak observed retiming responses, such as individuals' expectations over asset rates of return, liquidity constraints, and trading styles. First, we show that weak retiming responses cannot be explained with rational expectations of rates of return. One potential explanation for our results is that gains realizations before the 1-year threshold are either "locking-in" especially high returns or avoiding large return declines. We show that this is not the case; if anything, the average rate of return is higher for re-timed transactions, suggesting that individuals delay realizations with unusually high returns. While the rate of return for transactions realized in week 52 decreases over the next 4 weeks on average, this decrease is of a similar pattern to transactions realized in week 54. Overall, it is unlikely that weak deferral responses are driven by rational expectations of asset returns.

Second, we argue that liquidity constraints are unlikely to explain the observed behavior because the tax incentive we study is very large while borrowing rates during the period of study were low. To rationalize the observed behavior, individuals would need to experience liquidity shocks that are large and extremely time-sensitive.

Third, we show that individuals' trading styles are not very responsive to tax incentives. To do so, we evaluate the extent to which individuals specialize in long-term vs short-term trading. We find that in any given year, approximately 35% of individuals realize only short-term gains/losses, while 10% of individuals realize only long-term gains/losses. The remaining 45% realize both short-term and long-term transactions. Importantly, these shares do not change with tax incentives: we see little change in trading behavior as a result of the 2018 reform that decreased short-term tax rates but left long-term capital gains rates unchanged. However, we do see that these trading styles change with age and income: short-term trading is most popular with younger (e.g. 60% of individuals under age 30 realize only short-term transactions, compared to only 20% aged 70+) and lower-income individuals.

How our elasticity estimate be used to make predictions about capital gains responsiveness to a typical tax change, and how can we reconcile our results with previous evidence of strong retiming responses around tax reforms?[2] Our approach and setting deviate from

[2]For example, Auten and Clotfelter (1982); Lindsey (1987); Auten et al. (1989); Burman and Randolph

a typical tax change in the following ways. First, retiming around tax decreases, including due to the short-/long-term differentiation, is more complicated than retiming around tax increases. The latter can be achieved without changes to one's portfolio (by realizing the gain and then immediately re-purchasing the asset), while the former requires an active delay and exposes individuals to price fluctuation risk. For this reason, one should expect larger spikes in realizations around tax increases (e.g. in response to the Tax Reform Act of 1986) than in response to tax decreases or to take advantage of lower long-term rates. Second, our analysis focuses on gains from directly-held financial assets, which constitute around 20% of overall realized gains. We provide some suggestive evidence that the broker-traded transactions we focus on may respond differently to tax incentives than other types of gains. In some years, we see larger responses for these gains, while in other years these responses are larger for other types of assets (e.g., passthrough income on Schedule K-1). Our analysis thus highlights the importance of carefully considering relevant tax incentives and differentiating between capital gains types when analyzing aggregate responses. Third, the stock of outstanding capital gains that can be retimed to the 1-year threshold is smaller than the stock of gains that can be retimed around tax reforms. This is because only realizations with holding periods of less than 366 days can be retimed to 1-year threshold, while capital gains of any holding period duration can be retimed around tax reforms. While adjusting the elasticity tax base to account for the stock of outstanding capital gains cuts previous estimates in half, this change does not fully reconcile our estimates. Finally, the incentive we study is large and permanent, while tax reforms are typically unpredictable. As a result, one would expect individuals to take short-/long-term threshold into account when designing their trading strategies. Practically, this should lead to stronger responses than in the case of tax reforms. Overall, we believe our results are indicative of potential capital gains responses to tax decreases by individuals who predominantly realize gains from financial assets.

We conclude our analysis by discussing optimal selection of the short-term/long-term threshold across an asset's holding period. While the current definition of long-term gains in the U.S. – over one year – has been in place since 2002, the definition has varied in the past, from 6 months to infinity (no preferential tax rate). Other countries also vary in their treatment: some countries do not differentiate, while others offer preferential treatment

(1994); Auerbach and Siegel (2000); Dowd et al. (2015); Saez (2017) all find much large estimates of similar "transitory" responses.

to long-term gains, with minimum holding period ranging between 6 months and 20 years.[3] Using a simple theoretical model, we show that as long as the short-term rate is less than 50% and the elasticity of capital gains is less than one, differentiating between short- and long-term capital gains is not revenue-maximizing. This result relies on few assumptions, and for this reason is very intuitive and robust: a threshold increase leads to higher revenue as long as the mechanical gain in revenue is larger than the reduction in gains due to behavioral response. For small elasticities (i.e. < 1) and modest short-term rates (i.e. $< 50\%$), the mechanical revenue increase always dominates any behavioral response.

Our work contributes to a sizeable literature that studies capital gains responses to taxes (Feldstein et al., 1980; Minarik, 1981; Auten and Clotfelter, 1982; Lindsey, 1987; Poterba, 1987; Auerbach and Poterba, 1988; Auten et al., 1989; Slemrod and Shobe, 1990; Gillingham and Greenless, 1992; Burman and Randolph, 1994; Bogart and Gentry, 1995; Auerbach and Siegel, 2000; Landsman et al., 2002; Dowd et al., 2015; Bakija and Gentry, 2014; Agersnap and Zidar, 2021; Lavecchia and Tazhitdinova, 2021). The majority of these studies exploit small (<1pp) tax rate variation across U.S. states over time applied to aggregate or individual-level data of end-of-year net totals. In contrast, we study a persistent and large (10-20pp) tax change using transaction-level data.

Our work is thus closest to a handful of studies that explore the effects of short-/long-term differentiation on capital gains behavior (Reese, 1998; Dowd and McClelland, 2019; Buhlmann et al., 2020).[4] Using a sample of Initial Public Offerings (IPOs), Reese (1998) provides the first evidence of short-/long-term threshold retiming: he finds that IPO stocks that appreciated in value are more likely to be sold after they qualify for the long-term tax treatment while the opposite is true for the IPO stocks that depreciated in value. More recently, Dowd and McClelland (2019) and Buhlmann et al. (2020) study bunching at the short-/long-term threshold in the U.S. and in Germany, respectively. We build on this work in three ways. First, using panel data on multiple years instead of one year only ensures the robustness of our results: Dowd and McClelland (2019) use 2012 data, while

[3] For example, Canada, UK, France, Finland, and Germany currently do not differentiate between short- and long-term gains, while the Czech Republic, Luxembourg, Slovakia, and Slovenia offer preferential treatment to long-term capital gains.https://taxfoundation.org/capital-gains-tax-rates-in-europe-2021/

[4] In addition, Shackelford and Verrecchia (2002) discuss the theoretical implications while Blouin et al. (2003) provide empirical evidence on the effects of short-/long-term differentiation on equity trading around public disclosures.

Buhlmann et al. (2020) focus on 2009/2010.[5] Second, our analysis focuses on possible causes of weak responses, including life-cycle trading styles, importance of asset types, rates of return expectations, and more. The latter is achieved by merging realization information with asset price data. Finally, we use the distribution of capital gains holding periods to back out the stock of outstanding capital gains that are eventually traded.

Our work also contributes to a large literature in finance that studies optimal timing of capital gains realizations by empirically evaluating to what extent individuals follow such optimal strategies in practice (Constantinides, 1983, 1984; Dammon and Spatt, 1996; Dammon et al., 2001, 2004; Gallmeyer et al., 2006; Marekwica, 2012; Dai et al., 2015). Our work is also complementary to other studies that explore the nature of trading strategies, including in response to other tax rules (e.g., Odean, 1998; Ivković et al., 2005; Grinblatt and Keloharju, 2000, 2001a,b, 2004, 2009; Grinblatt et al., 2011, 2012).

Finally, we provide the first formal evaluation of the short-/long-term threshold optimality. Previous theoretical work has focused exclusively on optimal tax rates and disregarded other tax features. Our analysis demonstrates that having a short-/long-term threshold is distortionary and not revenue-maximizing.

1 Capital Gains Taxation and Data

1.1 Capital Gains Tax Rules

Basic Tax Rules. Only realized capital gains in the U.S. are subject to capital gains tax, with the amount of tax due depending on the duration since the asset's acquisition. If the asset is held for more than one year, the gain (loss) is considered long-term, while assets held for a year or less generate short-term gains (losses). The holding period is determined by the total number of days following the asset's acquisition, including the day of sale.[6] Therefore, only transactions with holding periods of 366 days (367 in leap years) or more are considered long-term. Short term gains are treated as ordinary income and thus are subject to a taxpayer's ordinary marginal tax rate (MTR). Long term gains, on the other hand, enjoy preferential treatment, with rates 7-20 percentage points lower than those applied to

[5] See Appendix C.3 for a detailed comparison of our results to Dowd and McClelland (2019).

[6] For instance, an asset bought on January 1st and sold on January 8th would have a holding period of 7 days. For more details, see https://www.irs.gov/taxtopics/tc409.

short-term gains. Beginning in 2013, an additional 3.8% Net Investment Income Tax was assessed on most high-income taxpayers' short-term and long-term capital gains.[7] Upon one's death, capital gains are erased by "stepping up" the cost basis (i.e. purchase price) to its current market value. Capital gains tax rates between 2011 and 2019, our period of analysis, are summarized in Table 1.

State taxation of capital gains varies, but generally fall into one of three regimes. Most states treat short and long-term capital gains identically as part of taxable income. Other states without income taxes – AK, FL, NH, NV, SD, TN, TX, WA and WY – also do not tax capital gains, and therefore also do not differentiate between short- and long-term gains. Lastly, a number of states – AZ, AR, HI, MT, ND, NM, SC, VT, and WI – offer preferential treatment for long-term capital gains, typically by excluding a portion of capital gains from taxation.

While the current 1-year rule for short vs long-term differentiation has been in place since 2002, the rule has changed in the past. In some periods, federal tax rules did not differentiate between short- and long-term gains at all, while in other years, the minimum holding period was lower (6 months) or higher (18 months or 5 years). This variability matches international rules: in some countries, e.g. in Canada, all capital gains are taxed the same, while other countries, e.g. Germany before 2009, tax long-term gains preferentially.[8]

Treatment of Gains vs Losses. Individuals are taxed on their end-of-year net total amount of capital gains; if they have both capital losses and gains, then these are aggregated as follows. First, short-term losses are subtracted from short-term gains, while long-term losses are subtracted from long-term gains. Total short-term losses are then subtracted from the total long-term gains, or vice-versa. When total net losses exceed total net gains, up to $3,000 can be used to offset ordinary income (short-term losses must be used first, then long-term losses). The remaining short-term and long-term losses can be carried over to future years to offset future short-term and long-term gains respectively. To avoid excessive loss write-offs, one cannot claim losses on asset sales that are repurchased within 30 days (known as "wash sales"). The implied loss in a wash sale is not lost, but rather used to

[7] Taxpayers with modified adjusted gross income over $125,000 (married filing separately), $200,000 (single or head of household), or $250,000 (married filing jointly) are subject to the NIIT. These thresholds do not change with inflation.

[8] Prior to 2009, capital gains with holding periods of 365 days or more were subject to a 50% discount in Germany. Since 2009, all capital gains are taxed at the lower of one's MTR or 25% (Buhlmann et al., 2020).

inflate the cost basis of the repurchase transaction.

"Optimal" Trading Strategies. A large literature in theoretical finance studies the optimal timing of capital gain realizations.[9] The general consensus of this literature is that gains should be realized right after qualifying for long term tax treatment, but losses should be realized while still short term. The intuition for this strategy is twofold: since long term gains are taxed at preferential rates, short term losses can be deducted against more heavily taxed short term gains. This approach of realizing capital gains with losses to deduct against gains – commonly known as "tax-loss harvesting" – typically produces a large number of realized losses in December, as investors better understand their net portfolio positions and accumulated realized gains by the end of the year (Dyl, 1977; Badrinath and Lewellen, 1991; Poterba and Weisbenner, 2001; Ivković et al., 2005). However, Dai et al. (2015) show that under some conditions, it may be optimal to defer not only short-term losses but also large long-term gains and long-term losses, in a model that accounts for the $3,000 loss offset and allows long-term losses to be used to offset short-term rate gains. The Dai et al. (2015) results stem from the fact that since long-term losses can in principle be used to offset short-term gains, long-term status strictly dominates short-term status. Recall that long-term losses can be used to offset net short-term gains in a given year, and can also be used to offset ordinary income, up to $3,000. Deferring gains and losses is more attractive to high-income investors than low-income investors, since the latter are less likely to exceed the $3,000 loss offset limit. As Dai et al. (2015) explain: "The main intuition is that there is an additional benefit of deferring the realization of gains for high-income investors: it makes incremental losses effectively tax rebatable without limit. When there is a large long-term loss, and the long-term rate is much lower than the short-term rate, keeping the long-term status by deferring realization can provide significant benefit from the much lower long-term rate when stock prices rise and current losses turn into gains. In addition, the benefit of realizing long-term gains or losses to reestablish the short-term status for future losses is small for high-income investors because only a small fraction of losses can be tax deductible at the higher short-term rate for these investors."

[9] See Constantinides (1983, 1984), Dammon and Spatt (1996); Dammon et al. (2001, 2004), Gallmeyer et al. (2006), Marekwica (2012), Dai et al. (2015).

1.2 Data

We leverage transaction-level IRS data on individuals' broker-traded asset sales on Form 1099-B. In aggregate, these transactions cover a diverse set of financial asset transactions, including sales of stocks, mutual funds, commodities, options, futures contracts, and asset barter sales. Importantly, these forms are third-party reported by sale brokers and disaggregated to the individual sale lot transaction level.[10] The data also only cover sales occurring in taxable accounts.[11] For assets acquired since January 1st, 2011, the forms report the asset sold (with CUSIP number identifying the asset), the sale price, the cost basis (i.e. the purchase price), the date sold, and, if all assets sold were purchased on the same day, the date of acquisition.

Starting from the form-level 1099-B data, we construct our analysis dataset as follows. First, for computational tractability, we restrict to a 10% population random sample[12] instead of all Forms 1099-B (which comprise over 6 billion transactions between 2011 and 2019). We restrict to stock and mutual fund transactions to avoid complex financial transactions for which net capital gains or holding periods are not straightforward.[13] Next, we restrict to sales that occur between 2011 and 2019. We exclude pre-2011 sales since pre-2011 asset acquisitions are not required to report cost basis and date of acquisition, which are key to calculate the capital gain amount and asset holding period.[14] We exclude post-2019 sales because of COVID. We further exclude transactions that cannot be matched to a Form 1040 tax return in the same year. Lastly, using Form 1040, we exclude sales by individuals under age 18. Match rates and summary statistics are available in Appendix A.

Because acquisition dates are not observed for transactions with acquisition dates prior

[10]For example, if 5 shares of Company XYZ are bought on January 1st, with 3 shares sold on January 2nd and the remaining 2 shares sold on January 3rd, we observe these as two separate transactions.

[11]Therefore transactions in tax-exempt accounts (e.g. 401-k and IRA plans), capital gain distributions (reported on Form 1099-DIV), real estate sales (reported on Form 1099-S), or other non-financial transactions are not reported on the 1099-B.

[12]That is, we select a subsample of individuals using the last digit of the social security number, and retain all associated tax forms for each individual.

[13]We do this by exclusion by removing the other asset types using internal flags in the IRS data. In practice, we are largely left with stock and mutual fund transactions; we validate this during a later merge to outside price data on stock and mutual funds, where we can match about 90% of 1099-B observations.

[14]In general, cost basis and date of acquisition are *only* missing for securities bought before the 2011 expanded reporting regulations. This restriction is relatively innocuous in our setting, as our main analysis sample further restricts to 2015-2019 sales and we analyze variation in transactions around the 1-year holding period.

to 2011, we impute these as having been purchased at the end of 2010. Practically, this means that sales with holding period of 1 year or more in 2012 are imputed as 1 year; similarly sales with holding period of 2 years or more in 2013 are imputed as 2 years; and so on. Our main analysis focuses on sales that occurred in 2015-2019 tax years, for which we can observe true holding periods of 4 years or more.

In addition to the 1099-B data, we also take advantage of other characteristics available on Form 1040, such as filing status (single, married, etc), gender, age, occupation[15], income (AGI, taxable income), implied marginal tax rates (MTRs), whether tax return was filed by a tax preparer, total amount of capital gains reported, historical frequency of Schedule D filings, etc. For the population of electronic tax filers, we are able to additionally use line-level information from Schedule D (e.g., the amount of loss carryovers from previous years).

Calculating Tax Rates. The tax incentives associated with capital gains realizations can be measured in several ways. One could measure the last-dollar MTR, which applies to any future capital gain realization. Alternatively, one could instead subtract all capital gains and thus calculate the first-dollar MTR. For individuals with small capital gains, the two rates are approximately the same. However, they can be dramatically different for individuals who rely on capital gains as their primary source of income. For these taxpayers, the first-dollar and the last-dollar MTRs can be seen as the lower and upper bounds on taxpayers' MTRs.

In this paper we use two approaches to calculate MTRs that better leverage the transaction-level nature of our data. First, for each capital gain realization, we calculate the MTR by excluding that specific transaction from taxable income and then calculating the MTR that

[15]For e-filers, we have taxpayers' self-reported occupation (taken from a free-text field on Form 1040). For each taxpayer, we clean the free-text string and cross-match to O*Net SOC code text descriptions. Using this process, we can recover SOC codes for over 70% of all e-filers. We then produce two proxies for financial trading sophistication arising from these constructed occupation codes. First, we tag individuals working in tax or finance-relevant occupations, including financial managers, investment fund managers, market research analysts, accountants, investment analysts, personal finance advisors, financial examiners, tax preparers, economists, securities sales agents, and business professors. As a second proxy, we leverage O*Net survey measures of various skills' importance for each profession. These surveys have been used to proxy for occupation-specific skills in prior research, for example by Autor et al. (2003) to estimate occupational skill content, Autor and Dorn (2013) to estimate offshoring potential, and Deming (2017) to estimate social skill intensity for various occupations. Using the critical thinking survey measure, we construct deciles of the occupation-level distribution and assign workers a value based on their constructed SOC code.

applies to the first dollar of the excluded transaction. In practice, this is similar to the last-dollar MTR approach but adjusts for the fact that large capital gain realizations may change individuals' tax bracket. For the e-filer subsample, where we have more detailed information on capital gains reported outside Form 1099-B, we can calculate a "rolling basis MTR" that captures the tax incentives the individual faces at the time of realization given the stock of prior realizations within the same year.

Reconstructing Price Histories. One shortcoming in the tax data is that we only observe asset values at the time of realization, rather than the weeks before or after a sale. As a result, we cannot directly test (in the IRS data alone) whether asset sales around the threshold occur following a surge in value or in advance of a large loss. To ameliorate this concern, we gather information on daily asset prices for stock and mutual funds from the Center for Research on Security Prices (CRSP). We then merge these price histories to the 1099-B transaction data using the asset's CUSIP code. For computational reasons, we do this only for transactions with 355-375 day holding periods (i.e. sales that occurred within 10 days of the 1-year threshold) and retain only 4 weeks of price histories before and after the actual sale date. We are able to match about 90% of the 1099-B transactions to the CRSP data, suggesting that our data cleaning process restricting to stock and mutual fund transactions works relatively well.

In this section we present graphical evidence on the effects of short-term vs long-term tax differentiation on capital gains realizations. Section 2 shows that relatively few individuals delay capital gains realizations past the 1-year mark, even in years when individuals face a positive short-term tax liability at the end of the year. Section 2.2.2 shows that while responses vary with individuals' tax incentives and demographic characteristics, differences are not economically significant. We show how to convert these retiming responses into elasticities in Section 3.

2 Main Empirical Evidence

In this section we summarize our main empirical results. Section 2.1 provides evidence on the distribution of capital gains holding periods, implications on the stock of outstanding financial capital gains and how these compare to other types of capital gains. Section 2.2 focuses on the behavioral responses around the 1-year threshold: the amount of bunching and how it varies with individuals' incentives and demographic characteristics.

2.1 Short- vs Long-Term Capital Gains

2.1.1 Disaggregated Distribution of Capital Gains

Figure 1 shows the distribution of transactions by holding period for years 2015-2019. Recall first that due to unobserved acquisition dates for pre-2011 asset purchases, we impute missing buy dates as having occurred at the end of 2010, generating artificial density spikes for longer holding period durations that are observed for each panel. Panel (a) shows the cumulative distribution function (cdf) of the number of transactions: we see that roughly 50% of transactions with gains and nearly 70% of transactions with losses fall into the short-term category.[16] Panel (b) shows cumulative distributions in billions of dollars, and shows that individuals realize many more losses than gains, irrespective of holding period, but particularly before the 1-year mark. One may worry that short-term realizations – while plentiful – are small in magnitude and thus lead to little or no tax revenue. Panel (c) plots the cdf of absolute value of realizations, separately for gains and losses. This shows that short-term transactions are economically relevant, accounting for just under 40% of all realized gains and just over 60% of all losses. Note that individuals realize many more losses than gains: in fact, the aggregate amount of losses realized with holding period of 1 year or less is enough to cover aggregate gains with holding periods of 7 years or less, as can be seen in Panel (d).

Cumulative distributions of realizations for individual years are shown in Appendix Figure B.1. These figures show that while the exact share of short- vs long-term transactions and gains varies across years, the qualitative conclusion remains: a large share – between 50-80% realizations occur prior to one year mark, and these account for 46-60% of all realizations.

Figure 1 highlights two important findings. First, the location of the ST/LT threshold is economically relevant: many realizations have relatively short holding periods, and gain realizations are more frequent for longer holding periods. Second, while individuals seem to react to tax incentives the overall effect is rather small – an important share of gain real-

[16] An important point here is that this is not a mechanical result arising from removing pre-2011 transactions. We do not remove transactions with very long holding periods – where the date of acquisition is missing – but rather bottom-code the holding period to ensure they stay in the graph.

izations occur before they qualify for long-term treatment. This phenomenon runs contrary to the theoretically optimal strategies discussed in Section 1.1. Similarly, while individuals favor realizing losses earlier than gains, the differences are not as dramatic as theory would predict.

2.1.2 Outstanding Stock of Financial Capital Gains

Figure 1 allows us to estimate the amount of overall outstanding (financial transaction) capital gains in the economy arising from directly-held assets. We perform the following back-of-the-envelope calculation: we assume that every year, (i) the same amount of capital gains are realized and (ii) that these realized capital gains have holding periods implied by the empirical CDF from Figure 1(c) (gains series, in green). Further, we assume that (iii) capital gains accumulate evenly over time. Together, these three assumptions allow us to back out the volume of outstanding capital gains as a function of the typical yearly volume. Our calculations suggest that the total outstanding volume of financial capital gains is approximately *2.15 times the amount of gains realized in an typical year*, or roughly $323 billion (using 2014 SOI statistics as the baseline, Wilson and Liddell, 2016).

Our estimate of outstanding financial capital gains can be compared to those of Saez et al. (2021). Using the 2019 Survey of Consumer Finances (SCF) combined with the Forbes billionaire list, they estimate that roughly $6,030 billion, or 18% of the overall $33.5 trillion unrealized capital gains take form of publicly traded stocks. While our simplifying assumptions are likely to generate some measurement error, our estimates of financial gains are 18 times smaller than estimates of Saez et al. (2021). The most probable explanation for this inconsistency is the fact that many outstanding capital gains are never realized, and instead are passed on to heirs or given to charitable organizations tax-free. Indeed, US Treasury (2014) find that in the top wealth estates, financial asset capital gains account for 30% of unrealized gains.

Our results imply that a large share of outstanding paper gains are not responsive to tax reform incentives, since deferring capital gains is always more tax-efficient than realizing during one's lifetime. This also means that retiming around the 1-year threshold is akin to retiming around the tax reforms: in both cases, capital gains realizations are delayed by a short number of years. This is confirmed in Appendix Figure B.1 that shows that overall distributions of gains are generally similar across years, including in 2012 (before the 2013 tax rate increase) and 2018 (after the short-term tax decrease). Therefore, our estimates of retiming responses around the 1-year threshold will be informative about individuals' propensities to respond to tax reforms.

2.1.3 Aggregated Distributions

Figure 1 suggests that a large share of capital gains are realized before they qualify for the long-term status. This is surprising in light of the U.S. Department of Treasury statistics that show that only between 3-14.5% of capital gains in any given year are subject to the short-term tax rate (1977-2014 average of 7.2%, US Treasury, 2016a,b).

To reconcile our results with Treasury statistics, we perform the following exercise. In Figure 2(a), we analyze how individuals' gains and losses offset each other. We start with the ("uncollapsed") cumulative distribution function of capital gains and losses shown in Figure 1(c). This distribution treats each gain and each loss as an independent transaction. Next, we gradually aggregate these gain and loss transactions of each individual. First, we sum gain and loss transactions with the same holding period of the same individual. Then we repeat this procedure, aggregating capital gains of each person into larger holding period bins – monthly, 3 months, 6 months, yearly bins, and finally short-term/long-term bins. Next we account for the fact that individuals can offset current tax year net gains with losses from previous years, and that they can offset short-term gains with long-term losses, and vice versa. At each level of aggregation, individual's net position in a given holding-period bin is either a loss or a gain. Figure 2(a) shows the resulting cumulative distribution of *gains*, equivalent results for losses are shown in Appendix Figure B.9. We see that short-term gains and losses are more likely to offset each other than long-term gains and losses. As a result, short-term gains account for a smaller share of overall net gains – only 25% instead of the 40% implied by the disaggregated distribution. However, accounting for loss carryovers and short/long-term offsets does not affect the relative shares of short- and long-term net gains (though they do affect the overall amount of taxable gains as shown in Appendix Figure B.9(c)).

While the aggregate share of short-term gains is lower than the disaggregated share, it is still higher than the share reported in Treasury statistics. This suggests that directly held financial transaction capital gains may not respond in the same way to tax incentives as other types of capital gains. We consider this possibility next. Focusing on Schedule D data for electronic filers with end-of-the-year net positive capital gains, Figures 2(b) show the share of short-term gains relative to overall gains for Schedule D totals as well as for the following types of capital gains: broker-traded gains (Form 1099-B gains), other self-reported financial gains without Form 1099-B, gains reported on various other forms (Forms 6252, 4684, 6781, 8824), and gains passed from partnerships, S corporations, estates and trusts (e.g Schedule K-1).[17] To create this series, we only include non-negative gains for each person. Figure 2(b) shows that the 1099-b capital gains feature higher shares of short-term gains than other types of capital gains, thus reconciling our estimates with Treasury's.

2.2 Retiming Responses at the ST/LT Threshold

2.2.1 Overall Responses

Next, Figure 3 zooms on behavior around the 1-year threshold. Panel (a) first plots the distributions at the transaction level, showing that loss transactions are more frequent than gain transactions. Importantly, for transactions with losses we see a relatively smooth distribution around 1-year threshold; for transactions with gains, however, we see pronounced bunching at the 1-year threshold. Turning now to Panel (b), we see that this bunching is significantly larger when looking at the absolute value of capital gains rather than the number of transactions. This comparison suggests that sales that occur with holding periods of 1 year or more result in larger taxable gains.

While the amount of bunching is non-trivial, it is not particularly large given the large tax incentives.[18] Furthermore, despite individuals in principle having full control over their realizations we see a large number of realizations happening with holding periods just below the 1-year cutoff, even within one week of the threshold. This suggests that either individuals are unaware of the rules, or that they are liquidity constrained.

To investigate the exact timing of realizations, Appendix Figure B.2 plots daily distributions. Three features are particularly notable. First, we see an increase in gains realizations for holding periods of 364 and 365 days. Therefore, a number of individuals make simple mistakes: they either incorrectly count the number of days by including the day of purchase,

[17]Respectively, lines (1a+1b) and (8a+8b), lines 3 and 10, lines 4 and 11, lines 5 and 12.

[18]We return to this point in more detail throughout Section 3.2, where we compute net of tax elasticity responses.

and/or believe that it is sufficient to hold the asset for 1 year (instead of *over* a year) to qualify for long-term treatment. These mistakes are surprising given that the long term tax difference is large, relatively simple to understand, and accessible by searching online (e.g., many financial websites have guides specifying optimal behavior). In the next section, we examine how these errors covary with different demographic and tax incentives. Second, the small bunching in loss realizations appears to be driven by an increase in loss realizations both immediately before and immediately after the 1-year mark. Again, this is not consistent with theoretical predictions, which generally suggest that ST losses are preferred to LT losses (an exception is Dai et al., 2015) but is consistent with prior evidence (Badrinath and Lewellen, 1991; Dowd and McClelland, 2019).

Figure 3 shows distributions for all individuals and all transactions. However, since losses can be used to offset gains, not every gain is eventually taxed. Therefore, the observed weak responses could be due to the fact that many of the short-term gain realizations may not be subject to tax liability. It is not possible to precisely identify which transactions are subject to tax and which ones are not, since transactions are not necessarily realized in an offsetting manner, and individuals face at least some uncertainty about their end-of-the-year tax position.

To overcome this difficulty, we employ several proxies for the likely relevance of the 1-year threshold incentives to a given individual and a given transaction. To start, Figure 4(a) shows distributions of gains for two types of individuals: those who actually faced a positive short-term capital gains tax liability at the end of the year and for those who did not. While not every realized gain among the first group of individuals was eventually taxed, they faced a stronger incentive to optimize than the latter group. We see that bunching is approximately equal for both groups, however, suggesting that individuals face sufficient amount of uncertainty throughout the year to make 1-year threshold relevant.

The comparison in Figure 4(a) assumes that individuals are forward-looking and have appropriate expectations about their end-of-the-year tax liability. An alternative approach is to assume that individuals are naive and only optimize if their current net gain position will trigger a tax liability. In other words, we can group each transaction into "projected taxed gain" and "projected untaxed gain" group based on the sum of gains and losses up to and including the transaction in question. If the net is positive, we expect the individual to optimize; if it is negative, then optimizing is less relevant since individual has enough losses to offset current gain. Figure 4(b) shows that the conclusion remains the same: whether using actual end-of-the-year tax liability, or projected tax liability based on contemporaneous sum of gains/losses, individuals with net gains behave similarly to individuals with net losses.

To what extent do the weak empirical responses reflect insufficient incentives for optimization? In Figure 5 we next perform four additional tests to assess the importance of the 1-year threshold, this time focusing on individuals with positive end-of-the-year short-term capital gains tax liability. First, we group individuals based on the share of short-term gains that are subject to tax: Panel (a) breaks individuals into groups by the share of short-term gains to overall short-term realizations (i.e. gains plus losses). Individuals who realize many short-term gains and few losses have a stronger incentive to optimize around the 1-year threshold than individuals who realize relatively equal number of gains and losses, as they are more likely to face short-term tax liability at the end of the year. In contrast, however, we see larger bunching for individuals with a small share of gains (relative to overall short-term realizations). The most plausible explanation to this is that tax-savvy individuals follow the optimal strategy by realizing most of their losses short-term, and deferring gains to long-term status. Next, Panel (b) breaks individuals into groups by the share of short-term transactions with relatively long holding periods – 271-365 days versus with relatively short holding periods – under 270 days. Intuitively, since it is easier to re-time transactions closer to the 1-year threshold, we should see more bunching among individuals with longer short-term holding periods. Yet, we see approximately equal-sized bunching among all groups. Panel (c) groups transactions by month of realization. Individuals should be most uncertain about their eventual tax liability when realizing in January-February and most certain in November-December. Again, we see approximately equal amount of bunching among all three groups.[19] Finally, individuals may be most careful when realizing gains with large cost basis than with small cost basis. Panel (d) confirms that individuals are more likely to optimize high-value transactions, but the differences in bunching are economically insignificant.

Overall, we conclude that individuals show weak responses to the ST/LT threshold that cannot be justified by lack of incentives.

[19]This evidence resonates with findings of Badrinath and Lewellen (1991) who documents increased realization of losses in November-December for both short-term and long-term gains.

2.2.2 Heterogeneity of Retiming Responses

We now explore how realization behavior varies in response to different magnitudes of tax incentives, as well as individual characteristics. Figure 6 explores the importance of tax incentives. Figure 6(a) shows that there is no difference in bunching when comparing individuals residing in states with varying treatment of long-term capital gains. Recall that some states tax long-term gains at lower rates, similar to the federal government, while others do not differentiate between short- and long-term gains, or simply do not have an income tax. Lack of differences in bunching suggests that taxpayers are not attentive to state tax incentives, or that these incentives are too small to trigger a response.

Figure 6(b) shows how bunching varies by long-term capital gains tax rate: we see that higher-tax individuals show larger bunching overall. However, this difference can either be due to heterogenous structural elasticities or due to the fact that, on average, higher-income individuals experience larger tax break at the 1-year threshold. To disentangle these effects, we can exploit the fact that the same long-term tax rate applies to individuals with different levels of short-term rates. For example, individuals in the 0% long-term tax bracket face 10% or 15% tax rate on the short-term gains, while individuals in the 15% long-term gains bracket face between 25% to 35% tax rate on short-term gains. Therefore, we can shut down the tax differential channel by comparing individuals with the same difference between short- and long-term tax rates but different income levels.[20] Figure 6(c)-(e) show that higher-income individuals indeed show stronger response to taxes, though the differences are not very large.[21]

Figures 7 and 8 explore how the magnitude of bunching and thus intertemporal responses depend on one's AGI, age, capital gains experience, types of capital gains income reported, occupation-specific proxies for sophistication, tax preparer use and broker type. We see that bunching increases with adjusted gross income, but decreases with age, and increases with years of experience, proxied by the number of times individual filed Schedule D. Turning to occupation results, bunching responses are roughly similar across workers in tax or finance occupations compared to the general population. At the same time, however, we see slightly

[20] Appendix Figure B.4 provides an alternative comparison by holding LT MTR fixed.

[21] In the next section, we make this intuition more precise by directly estimating net-of-tax elasticities. Table 2 shows that while bunching increases with tax incentives, the increase is not sufficiently large so that the implied elasticities are often lower for high-income individuals than for low-income individuals.

larger responses for taxpayers reporting occupations in high-critical thinking fields. We see little difference in bunching for individuals who filed returns themselves or used a tax preparer.

Overall, the differences in realizations seen in Figures 6-7 are economically insignificant. We conclude that while individuals differ in their propensity to delay capital gains realizations past the 1-year threshold, these differences are not economically meaningful.

3 Implied Elasticities and Optimal Threshold Choice

In this section we outline a simple reduced-form model that illustrates the effect of the ST/LT threshold on individuals' capital gain realizations. Section 3.1 outlines the basic setup. Section 3.2 describes how we convert observed bunching at the ST/LT threshold into elasticity estimates. Finally, Section 3.3 discusses the optimal choice of ST/LT threshold given our estimated elasticities.

3.1 Conceptual Framework

Suppose the ST/LT capital gains threshold is set at T_1, such that all realizations with holding periods greater than T_1 are taxed at rate τ^{LT}, while realizations with holding periods less than T_1 are taxed at rate $\tau^{ST} > \tau^{LT}$. We assume that individuals' realization behavior is governed by two key elasticity parameters.

The first elasticity ε describes how the magnitude of realizations responds to the prevailing net-of-tax rate. This elasticity is driven by multiple decision margins, including savings decisions, portfolio allocation across types of assets, investment, and the timing of realizations. This parameter is the main object of interest in studies that measure how capital gains realizations respond to changes of long-term or short-term capital gains tax rates (e.g., Burman and Randolph, 1994; Auerbach and Siegel, 2000; Agersnap and Zidar, 2021).

The second elasticity ε^{defer} determines individuals' willingness to re-time capital gains by delaying or bringing forward asset sales. In our setting, this elasticity governs individuals' willingness to convert short-term capital gains into long-term capital gains locally around the 1-year threshold. Intuitively, in the terminology of Burman and Randolph (1994); Auerbach and Siegel (2000) and others, ε^{defer} is closest to the so-called "transitory elasticity" while

ε is closest to the "permanent elasticity." Our primary object of interest in this paper is estimation of ε^{defer} by measuring the amount of bunching in the distribution of capital gains at the 1-year threshold, similar to Dowd and McClelland (2019).

Empirically, the realization elasticity ε should govern the amount of realizations, in other words, the "height" of the distribution of capital gains over holding periods t. We denote this distribution by $h(t)$ and illustrate this distribution with a thin solid blue line in Figure 9(a). When the tax rate decreases from τ^{ST} to τ^{LT}, the amount of realizations at the threshold T_1, i.e. the height of the realizations distribution, should increase by $\varepsilon(\tau^{ST}-\tau^{LT})/(1-\tau^{ST})\cdot 100\%$. Figure 9(a) illustrates this jump with a small discontinuity at T_1.

On the other hand, the amount of intertemporal shifting – or the amount of bunching at the threshold T_1 and amount of missing mass to the right of T_1 – should be governed by elasticity ε^{defer}. This response is shown with thick blue lines in Figure 9(a).

3.2 Measuring the Magnitude of Retiming Response

Estimation of Bunching Mass. Figure 9(a) illustrates that to properly estimate the retiming elasticity ε^{defer} from the amount of threshold bunching, one must also account for the jump in the distribution of capital gains at the ST/LT threshold, which is governed by unobserved elasticity ε. Intuitively, there exist an infinite number of combinations of elasticities ε^{defer} and ε that would lead to the same amount of bunching. We circumvent this difficulty by estimating bunching under two extreme scenarios to derive rough bounds on the bunching mass (and thus the elasticity ε^{defer}).

To derive an upper bound on ε^{defer}, first assume that $\varepsilon = 0$ so that there is no density jump in the holding period distribution at the ST/LT threshold. As a result, all observed bunching loads onto retiming responses, and we can identify the upper bound elasticity $\overline{\varepsilon^{defer}}$ directly from the bunching mass. To measure bunching, we closely follow the bunching methodology of Kleven and Waseem (2013). We fit a 4th degree polynomial to the distribution of capital gains and losses in weekly bins, excluding a $[lb, ub]$ region around the 1-year threshold. The polynomial is fit recursively, such that the bunching mass $\overline{B}$ (defined as the difference between the observed density and the counterfactual density in the $[T_1, ub]$ region) is approximately equal to the missing mass (defined as the difference between the counterfactual density and the observed density in the $[lb, T_1)$ region). The lb threshold is thus determined recursively, while the ub threshold is chosen based on visual examination. The resulting bunching mass $\overline{B}$ measures the amount of capital gains deferred past the 1-year mark under the assumption that $\varepsilon = 0$. This procedure results in an estimate of an upper bound elasticity $\overline{\varepsilon^{defer}}$, and is illustrated in Appendix Figure C.10(a). Our empirical implementation sets $ub = 13$, and fits polynomial to 45 weekly bins to the left of the threshold, and 60 weekly bins to the right of the threshold.

Deriving a second bound under $\varepsilon \neq 0$ is more complex. First note that this implies a jump in the distribution of capital gains at zero, so then the previous bunching estimate represents an upper bound because the counterfactual density "splits" between the true densities at the threshold (see Appendix Figure C.10(a)). To estimate a lower bound on bunching mass we proceed as follows. First, we fit a 1st degree polynomial to the distribution of capital gains between ub and some higher threshold ub_2. We set $ub_2 = ub + 20$, but the estimation procedure is not sensitive to small changes of ub_2. This allows us to locally predict the values of the counterfactual distribution in the bunching window (i.e. between T_1 and ub), in other words, recover the thin blue line to the right of the threshold. For a small right bunching window $[T_1, ub)$, the local linear approximation should be reasonably robust to misspecification. To set the lower bound bunching mass $\underline{B}$, we seek to identify the largest elasticity ε such that missing mass to the left of the threshold can be equated to excess mass estimated from the counterfactual procedure. In other words, we seek the upper bound elasticity $\overline{\varepsilon}$ that maximizes the density jump at the threshold but also allows for missing mass. We identify the jump recursively. We start by fitting a 4th degree polynomial to the modified distribution of capital gains omitting a missing mass window $[lb, T_1)$. The lower bound of the omitted window lb is obtained from the previous procedure when estimating $\overline{B}$. The modified distribution is constructed as follows: it equals the observed distribution to the right of the threshold (i.e. $(0, T_1)$), to $1/(1+k)$ times the linear prediction in the window $[T_1, ub]$ and to $1/(1+k)$ times the observed distribution in the window $[ub, +\infty]$, with k identifying the size of the jump. If the resulting missing mass is smaller than the bunching mass $\underline{B}$, we try a smaller value of jump k. We continue this procedure until the missing mass equals $\underline{B}$ or $k = 0$. This procedure pins down the upper bound elasticity $\overline{\varepsilon} = k^*(1-\tau^{ST})/(\tau^{ST} - \tau^{LT})$, where k^* measures the maximum jump. This approach is illustrated in Appendix Figure C.10(b).

Appendix Figure C.11 shows the results of these estimations. Two things are worth noting. First, in most cases, upper bound and lower bound bunching amounts are very similar, thus allowing for a very small discontinuity at the threshold. Second, in some cases, there is no potential for a jump at ST/LT threshold, as the distribution at week 52 is higher than predicted distribution at week 53. In this case, the upper bound estimate $\overline{\varepsilon^{defer}}$ yields a point estimate for ε^{defer}.

Converting bunching mass estimates into elasticity estimates. Since net-of-tax elasticities measure the percent change in outcome of interest relative to percent change in net-of-tax rate, one must convert bunching – which simply measures the change in capital gains – into a percent change in order to calculate an elasticity. Thus the second difficulty we face is that, in our setting, it is unclear what the percent change is relative to. We implement three approaches to convert estimated bunching mass into an elasticity.

A first approach follows Dowd and McClelland (2019), who measure ε^{defer} as a change in the short-term realizations relative to potential amount of realizations below the threshold, i.e.

$$\varepsilon_1^{defer} = \frac{B}{\text{Counterfactual CGs in } [lb, T_1)} \Big/ \left(\frac{\tau^{ST} - \tau^{LT}}{1 - \tau^{ST}}\right)$$

In this formulation, bunching measures the change in capital gains realizations while the potential realizations are given by would-have-occurred realizations in the missing mass window (i.e. all capital gains below the counterfactual density). The disadvantage of this approach is that the elasticity measure depends on the nature of shifting behavior. To see this, note that if the missing mass is thinly spread over a large window, the number of potential realizations is large, while if the same bunching is highly concentrated in a small window, the number of potential realizations is small. Therefore, the same amount of bunching – and hence, forgone revenue – will imply different measures of elasticity depending on the nature of response. Furthermore, this elasticity definition is highly sensitive to the estimation procedure which determines not only the bunching mass B but also the denominator (counterfactual gains).

A second approach eliminates these disadvantages by closely following the usual bunching methodology, originally developed by Saez (2010) and Kleven and Waseem (2013). This elasticity measures how holding period duration changes in response to tax incentives:

$$\varepsilon_2^{defer} = \frac{B/h(53)}{53} \Big/ \left(\frac{\tau^{ST} - \tau^{LT}}{1 - \tau^{ST}}\right), \tag{1}$$

where $h(53)$ denotes the height of the counterfactual distribution of capital gains at the 53-week threshold. Here, $B/h(53)$ measures the number of bin-equivalents that result in bunching, which gives the average number of weeks individuals are willing to defer because of the tax decrease at the 53-week threshold.[22] The downside of this elasticity measure is that it measures holding period responses rather than capital gains responses, making it difficult to compare to previous estimates.

Finally, our third and preferred elasticity definition is to measure what share of capital gains that could be re-timed were actually re-timed in response to tax decrease at the ST/LT threshold, i.e.:

$$\varepsilon_3^{defer} = \frac{B}{\text{Counterfactual CGs in } [0, T_1)} \Big/ \left(\frac{\tau^{ST} - \tau^{LT}}{1 - \tau^{ST}}\right).$$

Here, the denominator measures all capital gains with holding period of 365 days or less. This elasticity specification avoids disadvantages of the previous specifications discussed earlier, and is most comparable to estimates from previous work that measure retiming responses around reforms ("transitory elasticites"). To see this, note that spikes in realizations around tax reforms imply retiming of capital gains by a year or more. Since in our setting, individuals can delay by at-most one year, a perfect elasticity comparison would adjust reform-based estimates to account for the stock of all outstanding capital gains. We perform this exercise in Section 4.2.

Our elasticity estimates are summarized in Tables 2-4, with corresponding counterfactual fits shown in Appendix Figures C.11-C.13. The first row of Table 2 shows that for an average taxpayer, the tax rate decreases by 14 pp at the threshold: from 30% to 16%. The lower and upper bound estimates and, therefore, of deferral elasticities are tight. The total bunching mass is relatively small – equivalent to between 4.7 to 5.19 weekly bins. The first two definitions of ε^{defer} – using Dowd and McClelland (2019) approach or when measuring retiming responses in weeks imply elasticities of around 0.44-0.55. The third approach – that measures the percent change response relative to all re-timeable gains (i.e. capital gains with holding periods of 1 year or less) – implies smaller elasticities of 0.17-0.18. Our results

[22] This elasticity formula assumes that bunching will become bigger for higher thresholds. This is a subjective assumption that should be tested empirically. The formula can be easily converted to a semi-elasticity version, so that the response is measured in number of deferral days by dropping the division by 53.

also suggest an upper bound estimate on elasticity ε of 0.45, an estimate of comparable magnitude to Agersnap and Zidar (2021). However, the estimate is somewhat noisy. In Appendix C.3 we outline how our estimates compare to estimates of Dowd and McClelland (2019).

Tables 2-3 show that estimates vary with demographics and tax incentives, but the differences are economically small. For example, for individuals in the zero long-term tax rate, our preferred elasticity estimate (version 3) is 0.18-0.19, while it is 0.27-0.29 for individuals with long-term tax rate of 15% and 0.06-0.11 for individuals with long-term rate of 20%.

3.3 Optimal Threshold Determination

In this section, we explore how one might think about the choice of optimal threshold in light of our estimates from Section 3.2. Our framework explores the effects of a threshold increase from T_1 to T_2 on tax revenue estimates.

Under threshold T_1 tax revenue from capital gains taxation can be measured as:

$$TaxRevenueT_1 = \left(\sum_{t<T_1} h(t) - B_{T_1} \right) \cdot \tau^{ST} + \left(\frac{\sum_{t=T_1}^{T_2} h(t)}{(1+d)^{T_1}} + \frac{B_{T_1}}{(1+d)^{T_1}} + \frac{\sum_{t>T_2} h(t)}{(1+d)^{T_2}} \right) \cdot \tau^{LT},$$

where $h(t)$ measures the number of realizations in bin t, bunching is identified by B_{T_1}, and all long-term capital gains are discounted with factor d. For simplicity we discount all realizations using the time at the beginning of a given period.

When the threshold increases to T_2, capital gains realizations with holding periods between T_1 and T_2 become subject to rate τ^{ST}. This should reduce the amount of realized gains by $\varepsilon(\tau^{ST} - \tau^{LT})/(1 - \tau^{ST})100\%$. These are shown in Figure 9(b) as the shaded blue area. Let $\alpha = \varepsilon(\tau^{ST} - \tau^{LT})/(1 - \tau^{ST})$ represent the fraction by which realizations in the $[T_1, T_2]$ region decrease.

It is unclear what happens with these realizations. On the one hand, individuals may choose to delay realizations to period T_2 or later, in which case these realizations will still be taxed but at the original long-term rate τ^{LT}. Alternatively, a threshold increase may lead to a change in investment behavior: individuals may switch the types of assets they purchase to those that do not generate capital gains, and/or they may change the frequency of realizations but without affecting the type of realizations. In these latter cases α-realizations will disappear. The most natural approach is to assume that elasticity ε^{defer} will govern the decision whether to defer these realizations to period T_2. In this case the share of α-realizations that are deferred is $\gamma = \varepsilon^{defer} \frac{\tau^{ST} - \tau^{LT}}{1 - \tau_{ST}}$, and therefore the tax revenue under threshold T_2 is

$$TaxRevenueT_2 = \left(\sum_{t<T_1} h(t) - B_{T_2} + (1-\alpha) \frac{\sum_{t=T_1}^{T_2} h(t)}{(1+d)^{T_1}} \right) \cdot \tau^{ST} \\ + \left(\gamma\alpha \frac{\sum_{t=T_1}^{T_2} h(t)}{(1+d)^{T_2}} + \frac{B_{T_2}}{(1+d)^{T_2}} + \frac{\sum_{t>T_2} h(t)}{(1+d)^{T_2}} \right) \cdot \tau^{LT}.$$

The difference in tax revenues under threshold T_2 versus T_1 is then

$$\Delta TaxRevenue = \sum_{t=T_1}^{T_2} h(t) \left[(1-\alpha) \frac{\tau^{ST}}{(1+d)^{T_1}} + \gamma\alpha \frac{\tau^{LT}}{(1+d)^{T_2}} - \frac{\tau^{LT}}{(1+d)^{T_1}} \right] \\ + B_{T_1} \left[\tau^{ST} - \frac{\tau^{LT}}{(1+d)^{T_1}} \right] - B_{T_2} \left[\tau^{ST} - \frac{\tau^{LT}}{(1+d)^{T_2}} \right]. \quad (2)$$

Note that the second line – the differences in bunching – should be approximately zero if $T_2 - T_1$ is small, the discount factor d is close to zero, and the distribution of capital gains is relatively flat.[23]

The first term, summarizes the main incentives when increasing the threshold. Consider the simplest scenario, where $d = 0$ and all α-realizations are fully deferred to period T_2, so that $\gamma = 1$. The first line simplifies to $\sum_{t=T_1}^{T_2} h(t)(1-\alpha)(\tau^{ST} - \tau^{LT})$, implying $TaxRevenueT_2 > TaxRevenueT_1$. The intuition is simple: under this scenario, the threshold increase simply shifts a portion of capital gains into higher short-term tax rate and results in no losses. Therefore, if the difference in bunching is approximately zero, then the optimal threshold should be set to infinity. Allowing for non-zero discount factor will result in finite but high optimal threshold.

On the other hand, if a substantial portion of α-realizations disappear, so that $\gamma << 1$, policymakers face a trade-off: higher threshold leads to more revenue because of higher tax rate but smaller tax base because of a reduction in realizations. In this case, optimal

[23] In general, bunching becomes smaller (larger) for higher levels of threshold for a downward (upward) sloping distribution, making the second line positive (negative).

threshold depends on a number of parameters: the magnitude of realization responses α and γ that are governed by elasticities ε and ε^{defer}, the desired short- and long-term tax rates τ^{ST} and τ^{LT}, and the discount factor d. Figure 9(c) shows the lowest value of ε such that $(1-\alpha)\tau^{ST}-\tau^{LT} < 0$ and therefore the threshold should be zero rather than infinity, under the assumptions that $d = \gamma = 0$ and $B_{T_1} = B_{T_2}$. Results demonstrate that for short-term and long-term tax rates observed in the U.S. (well under 50%), the optimal ST/LT threshold should be very high (close to infinity) unless the elasticity of capital gains is believed to be very large – i.e. well over 1, estimates that are not consistent with Section 3.2 results. Allowing for positive values of γ, and accounting for bunching responses will typically make the conclusions stronger because both result in larger revenues for higher thresholds.

Our results suggest that from a revenue-maximizing perspective, existing 1-year threshold is sub-optimal, and that the ST/LT threshold should be set higher, or eliminated altogether. One may worry however, that our simple model does not take into consideration important factors, such as investment incentives or speculation. Indeed, the main justification for a two-rate capital gains tax structure is the desire to reduce speculative trading while promoting (or at least not double-taxing) investment activity (He et al., 2022). An alternative approach to a two-rate tax structure is to provide tax breaks to certain desirable investment activities directly. For example, in Canada, capital gains realizations are taxed at a uniform rate, irrespective of the holding period. However, sales of small businesses are subject to a large life-time exemption. These incentives can be easily incorporated in our framework.

One approach to account for speculation, is to amend tax revenue formulas by including a penalty term that penalizes revenues from very short-term capital gains. It is easy to see that inclusion of such a term will make higher threshold even more desirable than in the current specification.

While we do not explicitly model investment responses, we indirectly account for these via the elasticity ε. Optimal policy can thus be determined in a two-step procedure: first, policymakers determine the optimal ST/LT threshold for each combination of tax rates τ^{ST} and τ^{LT}. Then they choose the optimal tax rates. Our results then provide the answer to the first step of this procedure. The magnitude of investment responses, on the other hand, will govern the optimal choice of τ^{ST} and τ^{LT}.[24]

[24] Poterba (1989) casts some doubts on the relevance of capital gains taxation on entrepreneurial activity:

4 Why Are ST/LT Retiming Responses So Weak?

Our results demonstrate that responses to the 1-year threshold incentives are weak. This finding is puzzling in light of the large retiming responses around tax reforms, documented by the earlier work but is consistent with findings of Dowd and McClelland (2019) and Agersnap and Zidar (2021). For example, Auten and Clotfelter (1982); Lindsey (1987); Auten et al. (1989); Burman and Randolph (1994); Auerbach and Siegel (2000); Dowd et al. (2015); Saez (2017) estimate retiming semi-elasticities with respect to tax rates ranging between -1.2 to -6.4, implying net-of-tax elasticities of approximately 0.8-4.5, significantly larger than our estimates. Yet, these types of responses are conceptually similar: delaying realizations to 1-year threshold is analogous to retiming realizations around tax reforms. Moreover, the incentives we study are large, salient and simple to understand. This raises the question: why are retiming responses around the ST/LT threshold so weak? In this section we provide some explanations.

First, Section 4.1 considers several specific explanations for the lack of response. We explore whether individuals are unwilling to delay realizations because they are facing abnormally high returns, or, on the contrary, because they expect their assets to fall in value. We do not find empirical support for this hypothesis. We then show that individuals have relatively rigid trading styles, suggesting that capital gains are not as flexible as previously believed. Finally, we discuss the potential influence of liquidity constraints and behavioral biases.

Second, in Section 4.2 we evaluate the assertion that retiming around tax reforms is equivalent to retiming around the ST/LT threshold. We argue that responses are different in three key aspects: first, ST/LT retiming is similar to retiming in anticipation of a tax decrease but not in anticipation of a tax increase. Second, the stock of capital gains that could be re-timed is different, and generally lower in our setting. Third, previous work estimated retiming responses for the sum of capital gains, thus not differentiating between broker-traded assets and other types of capital gains, which may differ in their responsiveness.

more than three quarters of start up funding is provided by investors not subject to capital gains tax.

4.1 Return Expectations, Trading Styles and Behavioral Biases

In this section we consider how other decision margins may affect individuals' willingness to delay capital gains realizations.

Rates of Return Expectations. Theoretically, individuals should only realize capital gains just before the threshold if the return is abnormally high, or if they expect future returns to be abnormally low. Both scenarios could explain the large number of realizations just prior to the 1-year threshold. Figure 10 provides evidence against these explanations.

Figures 10(a)-(b) plot average annualized rate of return (absolute value) by holding period week, separately for losses and gains.[25] Figure 10(a) shows a simple average while 10(b) shows average weighted by the absolute value of capital gains reported. Regardless of weighting choice, we see no notable increase in rates of return just prior to the 1-year threshold, instead, the return is highest in week 53, when realizations become eligible for the long-term tax rate. This suggests that assets that were sold shortly before they qualified for the long-term status were not sold because of abnormally high returns. If anything, individuals delay realizations for assets with unusually high returns, to ensure a favorable tax treatment. Appendix Figure B.7 provides additional evidence: we show similar results for individuals with positive short-term tax liability at the end of the year and those with no short-term tax liability.

Figures 10(c)-(d) use the 1099-B–CRSP matched sample to explore how the assets that were sold in week 52 – just before they qualified for the long-term status – performed before and after the sale. Figure 10(c) plots the simple average annualized rate of return (absolute value) for assets that were sold in week 52, while Figure 10(d) shows absolute gains-weighted average. We see that the average return remains relatively stable, with no notable changes shortly after the sale. This shows that individuals are not realizing gains immediately before the ST/LT threshold because the asset value is expected to drop sharply. We find similar results for individuals with positive short-term tax liability at the end of the year and those

[25] Annualized return is calculated as follows: $r = (1 + CapGain/PurchasePrice)^{52/HoldingPeriodWeek} - 1$. Note that while the highest rate of return for losses is 1; for gains, the rate of return is unbounded. Therefore, plotting the raw averages results in highly volatile estimates of average returns. We address this issue by top-coding extremely high returns at the 99.9th percentile of returns in that tax year. Practically, for most years, the 99.9th percentile is very high – greater or equal 1000%. We report the number of top-coded returns by holding period week in Appendix Figure B.5-B.6, and show that it is not unusually high just prior to 1-year threshold. We show that our results are robust to the choice of top-coding level in Figures B.5-B.6.

with no short-term tax liability (see Figure B.7).

Figure 10 shows that sales of assets in the weeks immediately preceding the ST/LT threshold are not due to temporary price increases, and cannot be justified with rational expectations of impending price decreases. Nonetheless, individuals may have acted based on their expectations, albeit inaccurate ones. While we cannot rule out this possibility, we must stress that individuals' expectations must be extreme to justify the observed behavior. Given that the long-term tax rates are 10-20pp lower than short-term rates, individuals must expect a price change of more than 10-20pp over a few week period. While such price fluctuations are not unheard of, they are uncommon.

Trading styles. Individuals' ability to respond to taxes crucially depends on how easily they can adjust income streams in response to changing tax incentives. Compared to labor income, capital gains income is considered more flexible, since individuals have greater control over capital gain realizations than over their working hours. In this section we provide empirical evidence suggesting that capital gains realizations may not be as flexible as commonly believed because individuals' trading styles are rigid.

We start by evaluating to what extent individuals specialize in long-term vs short-term trading in Figure 11. To construct this figure, we record the nature of each individual's transactions over a 5 year period (2015 through 2019). Figures 11 (a) and (b) show that individuals show notable levels of specialization: for 10% of individuals we only observe super short term holding periods – i.e. 30 days or less, with many assets held for a day only. Another 25% of individuals also specialize in short-term trading but do not restrict realizations to super short term transactions. At the other extreme, for just over 10% of individuals, we only observe long-term capital transactions, with approximately half of these individuals only realizing transactions with holding periods of 600 days or more. The remaining 53% report both short- and long-term capital gains and losses. Importantly, these shares remain the same irrespective of the method used to aggregate transactions: whether looking at transaction counts or when weighting transactions by the absolute value of capital gains/losses.

Figures 11(c)-(e) show how these trading styles relate to individuals' age, income, as well as end-of-the-year net gain status. We see that older individuals are significantly less likely to engage in short-term trading than younger individuals: while approximately 60% of individuals under age 30 realize only short-term transactions, this share decreases to 20%

for individuals over 80 years old. Older individuals are more likely to realize long-term gains only, though the increase is less dramatic than for short-term trading. Overall, as individuals age, they tend to realize gains of both types. Specialization in short-term trading is also less favorable with high-income individuals, but so is long-term trading. Approximately 80% of individuals in the top 0.01% of the adjusted gross income distribution realize both short-term and long-term transactions. Finally, we do not observe any notable patterns in trading behavior by individuals' end-of-the-year gain/loss status. We see highest levels of short-term traders among individuals who report zero to $5,000 dollars of net capital gains.

Do these trading styles respond to tax incentives? Figure 12 repeats Figure 11(a) but separately for each tax year. Since the 2018 reform reduced short-term tax rates for nearly all individuals, we should observe a decrease in traders specializing in long-term transactions. Yet, the shares remain stable throughout the years.

Figures 11-12 thus suggest that while individuals could reduce their capital gains tax bill by realizing sooner or later in response to tax incentives, many of them choose not to. In any given year, approximately 35% of individuals entirely forgo the 10-20% tax break by realizing short-term gains only. Furthermore, individuals do not adjust their trading approaches in response to changing tax incentives: we see no decrease in long-term trading as a result of the 2018 reform that kept long-term rates unchanged but decreased short-term rates.

Liquidity constraints. Individuals may choose to sell their assets shortly before the assets qualify for long-term tax treatment if individuals are liquidity-constrained. While this explanation is intuitive, it is unsatisfactory in light of the low interest rates in 2015-2019. For example, borrowing $X at 5% interest rate for a month would cost approximately $0.004X. Realizing and paying 15% higher capital gains tax instead would cost $0.15G. As long as the gain amount is large relative to the total funds needed, i.e. the gain represents at least 2.7% of overall investment, borrowing is a cheaper alternative. Furthermore, Figure 5(d) showed that even transactions with small cost basis were sold sub-optimally early: it is unlikely that liquidity constraints drove these decisions.

4.2 ST/LT Threshold Retiming vs Tax Reform Retiming

While retiming around the ST/LT threshold is conceptually similar to retiming around tax reforms, these responses are different in several aspects.

Tax increases vs tax decreases. Retiming in anticipation of a tax increase does not require individuals to change their asset position, as they can simply lock-in the low tax rate by selling the asset and then immediately re-purchasing it. By comparison, retiming when facing a tax decrease or when taking advantage of lower long-term tax rate requires individuals to delay realization, potentially for long periods. This action exposes investors to asset price fluctuations and prevents them from taking advantage of any abnormally high returns in the meantime. For these reasons, one should expect stronger retiming responses before tax increases (e.g. TRA 1986 or ACA 2012) than after tax decreases (e.g TCJA 2017).[26]

Stock of retimeable gains. Responses to tax reforms are likely to be larger than to the ST/LT threshold because the magnitude of retiming response is implicitly bound by the stock of "retimeable" capital gains. In our setting, the only assets that can be re-timed on a given day are assets that were purchased less than a year ago. However, in case of tax reforms, any outstanding capital gain can be realized sooner or later. Therefore, large spikes in capital gains realizations around tax reforms may be driven by realizations of gains with very long holding periods. Since elasticities measure changes in capital gains realizations relative to the average yearly volume of realizations, they do not take into consideration the amount of outstanding "retimeable" capital gains.

Thus, a more appropriate comparison to the share of short-term capital gains delayed to 1-year threshold estimated in Section 3.2 is the the share of all outstanding unrealized gains that are re-timed in response to tax reforms. While we are not able to observe unrealized capital gains directly, we can use our estimate of the oustanding volume of paper capital gains from Section 2.1.2. Recall that our calculations suggest that the total outstanding volume of financial capital gains is approximately 2.15 times the amount of gains realized in an average year. Therefore, in order to account for the amount of outstanding capital gains that can be realized around tax reforms, we need to divide previous elasticity estimates by 2.15. These adjusted elasticities – 0.37-2.1 – provide a better comparison to elasticities of Section 3.2 but are still substantially larger. Therefore, we conclude that differences in retiming responses are unlikely to be primarily explained by differences in tax bases.

Aggregate vs transaction level data. The analysis in this paper relies on individual transaction data rather than yearly net totals. One may be concerned that our low estimates

[26] This patterns appears to hold for major tax reforms in the past 70 years, see Auten et al. (2016).

may be driven by a small share of tax-inert individuals who transact very frequently. If this were the case then the disaggregated data may imply weak responses to taxes, while aggregated data would imply larger responses. The nature of our tax variation precludes us from repeating our analysis on the aggregated data. However, the time series of Figure 13(a) provide evidence against such explanation: Figure 13(a) shows that aggregated and disaggregated series show very similar trends over time.[27]

Types of capital gains. Our analysis uses directly held, broker-traded financial transactions from Form 1099b, and therefore disregards other types of capital gains. However, as Figure 2(b) showed, financial capital gains appear to be realized differently than other type of gains, suggesting that different types of capital gains may respond differently to tax incentives. For example, real estate assets experience smaller short-term price fluctuations and thus are more amenable to short-term retiming than financial assets. A large share of Schedule K-1 gains represent capital gains passed through from hedge funds. These professionally managed funds may be more responsive to tax incentives than individuals' own portfolio transactions reported on Form 1099-B which are the focus of this paper.

Figure 13(b) confirms this: focusing on electronic filers with end-of-the-year positive net capital gains, we plot the time series of reported capital gains by type of gain. We break capital gains into several groups: broker-traded transaction gains (Form 1099-B gains), other self-reported financial gains without Form 1099-B, gains reported on various other forms (i.e. line 4 and line 11 – Forms 6252, 4684, 6781, 8824), and gains passed from partnerships, S corporations, estates and trusts (e.g Schedule K-1). To calculate the totals, we only included non-negative gains, in other words, for each individual, net gain of each type is either zero or positive. Unfortunately, since gains and losses of different types and ST/LT status offset each other, the resulting figures may exaggerate the importance of certain type of gains if these are frequently offset by losses from a different category. Overall, we see that different types of gains indeed respond differently to tax incentives. During this period, federal tax rates changed twice: in 2013, the Affordable Care Act surtax was introduced for high-AGI individuals, resulting in 3.8% higher short- and long-term capital gains tax rates. This tax increase should have led a spike in realizations in 2012. In 2018, short-term tax rates decreased for most individuals, as a result of income tax schedule changes, but the long-term

[27] To construct this series we re-use aggregations from Figure 2(a) and then plot the sum of realized capital gains in each year.

rate remained unchanged. Form 1099-B gains appear to respond strongly in 2018, but weaker in 2012. The caveat to this exercise is that all series deviate from the overall Schedule D total (which matches well the SOI Statistics), suggesting that cross-type offsets are an important part of the story.

Finally, Figure 13(c) shows that in a typical year, approximately 10-20% of capital gains are due to financial transactions, roughly 30-40% are due to various miscellaneous forms (e.g. Forms 6252, 4684, 6781, 8824), and another 30% are passthrough gains. Self-reported realizations with no Form 1099b and capital gains distributions account for remaining 10-20% of reported net gains. Overall, Figure 13 shows that previous work primarily explored responses of other capital gains types, since only 20% of capital gains are due to financial transactions.

Salience and magnitudes. Retiming incentives we study are unusually large, salient and simple to understand, in contrast to typical tax reform changes. A lot of previous work relied on tax changes across U.S. states. These tax changes are very small – typically under 1pp and often depend on individuals' tax bracket. In contrast, the ST/LT threshold incentive we study is well-known and very large – implying a tax decrease of 10-20pp upon crossing the 1-year mark. Another advantage of our setting is the ease of causal identification: the only way individuals can respond to the tax incentive is by delaying capital gains past 1-year mark.

The empirical evidence of Figures 6 and B.4 caution against the use of state tax variation for causal identification: individuals appear to be inattentive to the exact magnitude of tax incentives, and particularly so, if these occur at the state level. We see no difference in bunching despite notable differences in state tax rules in Figure 6(a). For these reasons, small state-level tax changes coupled with strenuous identification assumptions may lead to biased estimates of capital gains responses.

5 Conclusion

In this paper we use transaction-level data on broker-traded asset sales to estimate how capital gains respond to a simple and salient tax incentive: a tax break for realizations with holding periods of 366 days or more. Our analysis demonstrates that despite having full control over their realizations, individuals are not very responsive to tax incentives.

Our results suggest that capital gains responsiveness is restricted by market conditions, individuals trading skills, and/or investor beliefs.

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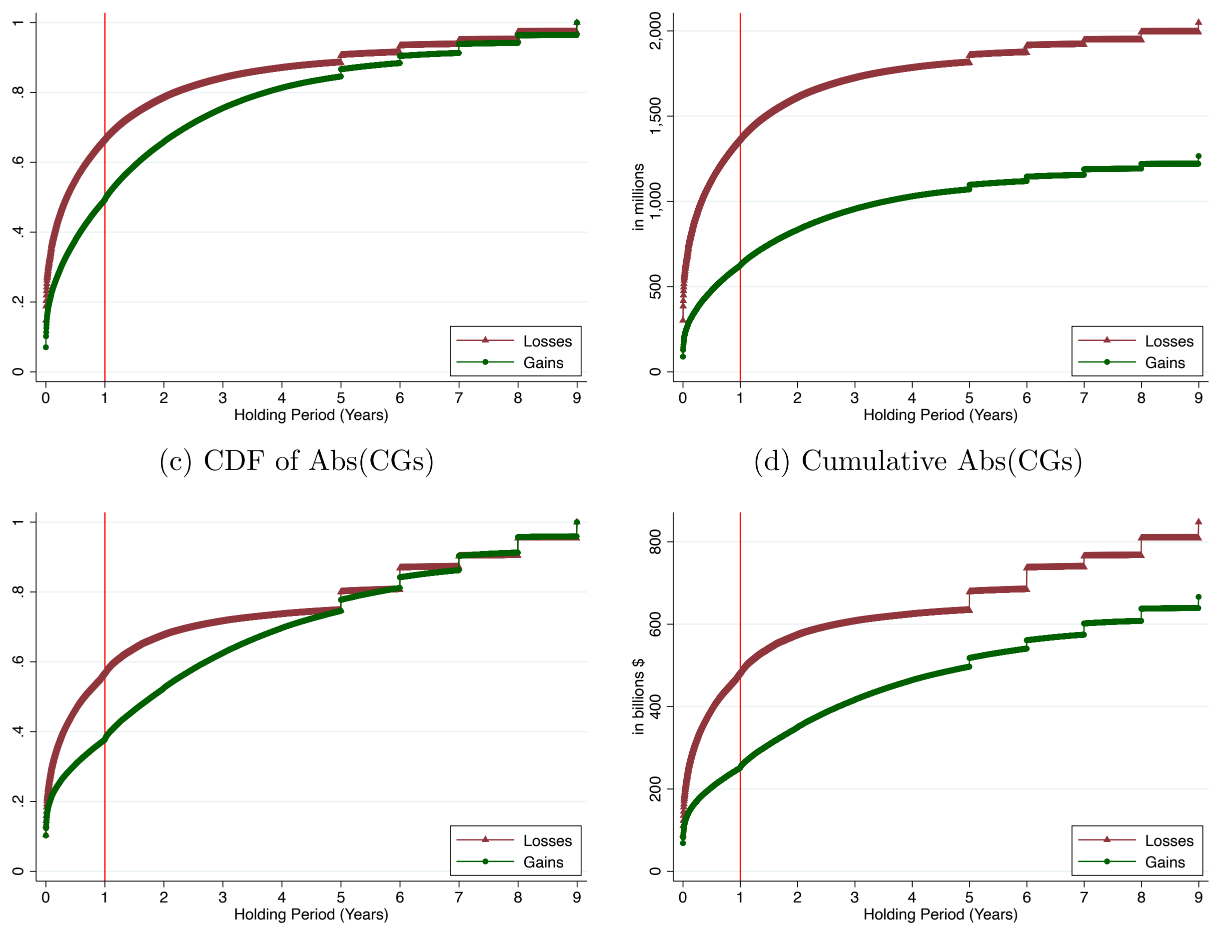
Figure 1: Gains/Losses Realizations by Holding Period



(a) CDF of Transactions

(b) Cumulative Transaction Counts

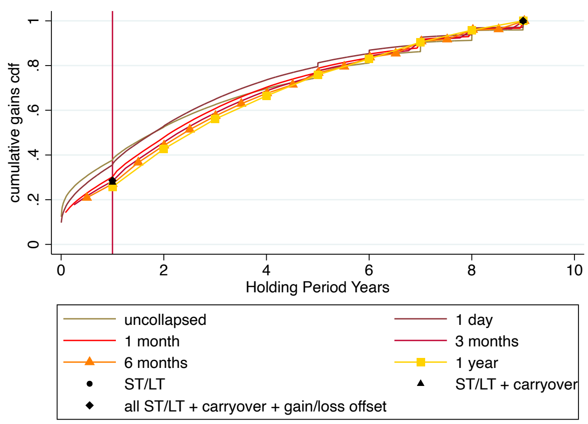
(c) CDF of Abs(CGs)

(d) Cumulative Abs(CGs)

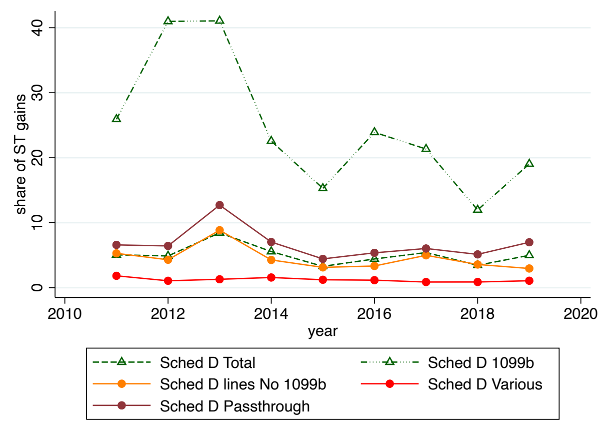
Notes: Figures (a) and (b) show the cumulative distribution of transactions, as percent and in actual counts. Figures (c) and (d) weigh transactions by the absolute value of realized capital gains. The vertical line identifies the 1-year threshold. Values are scaled from our 10% random sample of taxpayers to represent 2015-2019 tax year totals. Transactions with holding periods of 5+ years are censored as described in Section 1.2.

Figure 2: Aggregations over Holding Periods

(a) CDF of Gains 2015-19



(b) ST Gains Share – Other CG Types



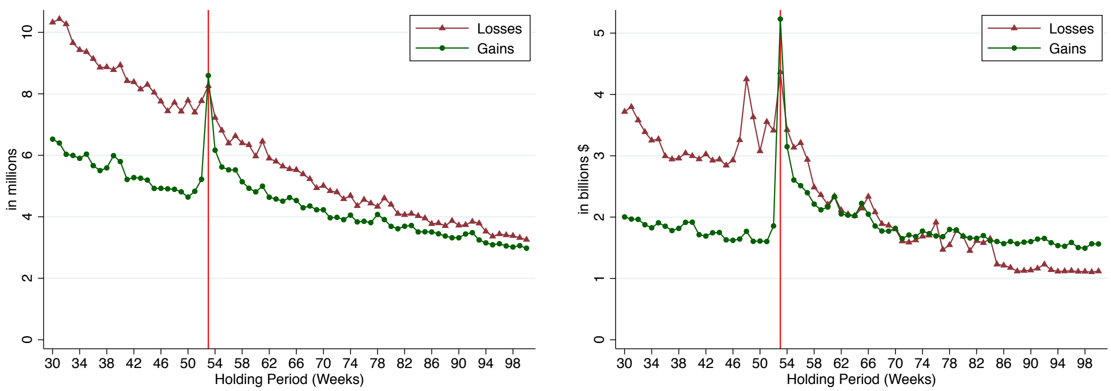
Notes: Figure (a) presents the results of the following exercise: we start with the cumulative distribution function of capital gains and losses shown in Figure 1(c) (see "uncollapsed"). First, we sum gain and loss transactions with the same holding period of the same individual ("1 day"). Second, we repeat this procedure, aggregating capital gains of each person into larger holding period bins – monthly, 3 months, 6 months, or yearly bins ("1 month",..., "1 year"). Third, we aggregate all transactions of each person into two bins: short-term transactions and long-term transactions ("all ST/LT"). Finally, we account for the fact that individuals can offset current tax year net gains with losses from previous years ("all ST/LT + carryforwards"), and that ST losses can offset LT gains and vice versa ("all ST/LT + carryforwards+gain/loss offset"). Note that at each level of aggregation, a given individual's net position in a given holding-period bin is either a loss or a gain. Similar distributions for losses are shown in Appendix Figure B.9. The vertical line identifies the 1-year threshold. Based on a 10% random sample of the U.S. population.

Figure (b) plots the ratio of the sum of all non-negative short-term capital gains to the sum of all non-negative long-term gains for e-filers, for various types of capital gains.

Figure 3: Gains/Losses Realizations Around 1-Year Threshold

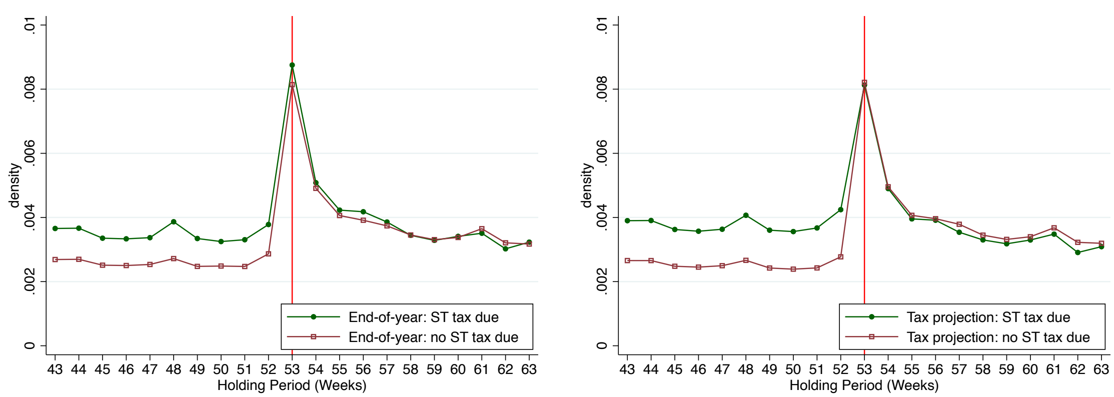
(a) Transaction Counts

(b) Density of Abs(CGs)



Notes: Figure (a) shows the number of gain and loss transactions that occur in the vicinity of the 1-year threshold. Figure (b) shows the amount of capital gains and losses realized in the vicinity of the 1-year threshold. The vertical line identifies the 1-year threshold, i.e week 53. Values are scaled from our 10% random sample of taxpayers to represent 2015-2019 tax year totals.

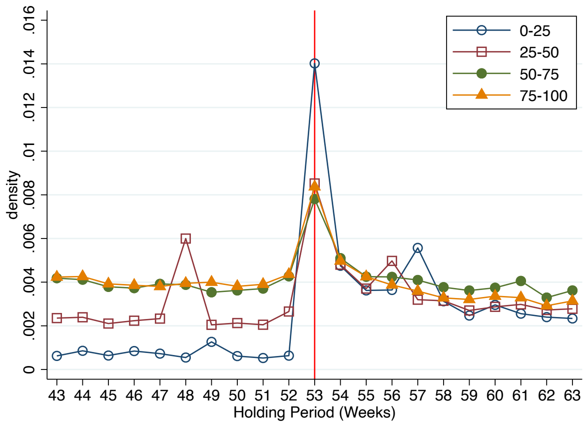
Figure 4: Gains Realizations Around 1-Year Threshold by End-of-Year Tax Liability



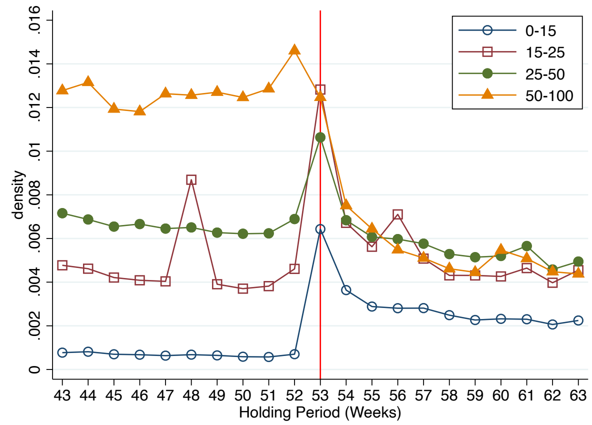
Notes: Figure (a) shows the density of *gains* realizations around the 1-year threshold for individuals who have a positive *short-term capital gains tax liability* at the end of the year versus for individuals who do not. Therefore, the first group consists of individuals with positive net ST gains after loss carryovers (Sch. D line 7) and positive overall net capital gains after loss carryovers (Sch. D line 16). Figure (b) groups individuals by rolling cumulative gains: for each transaction, we identify individual's gain or loss status based on the sum of gain/loss realizations that occurred between Jan 1 of that year and up to and including this transaction. The vertical line identifies the 1-year threshold, i.e week 53. Based on a 10% random sample of the U.S. population.

Figure 5: Gains Realizations Around 1-Year Threshold by Relevance of ST/LT Incentive

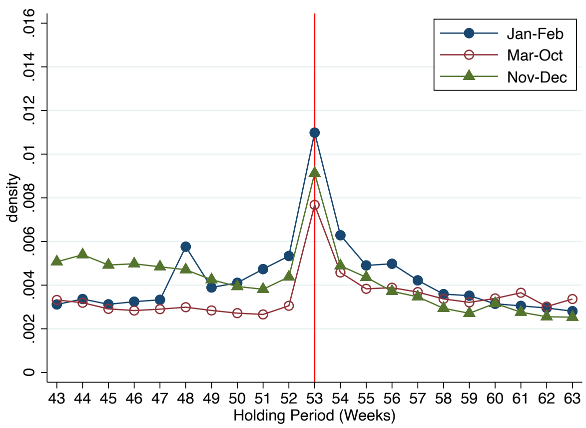
(a) by ST Gains/(ST Gains+ST Losses)



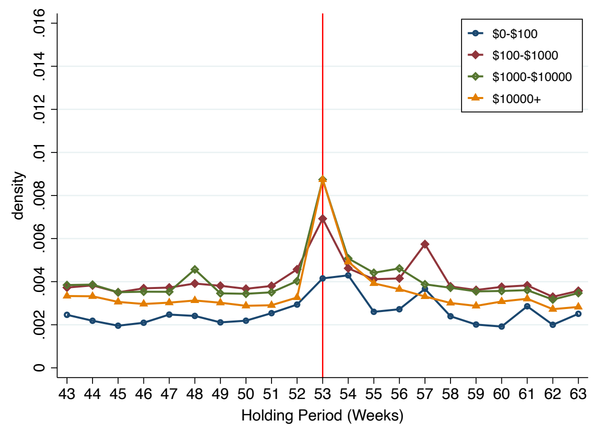
(b) by Share of ST Gains Near Threshold



(c) by Month of Realization



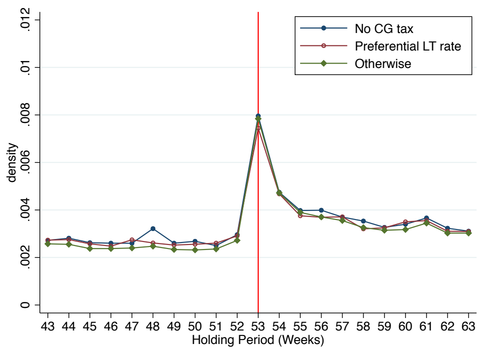
(d) by Basis



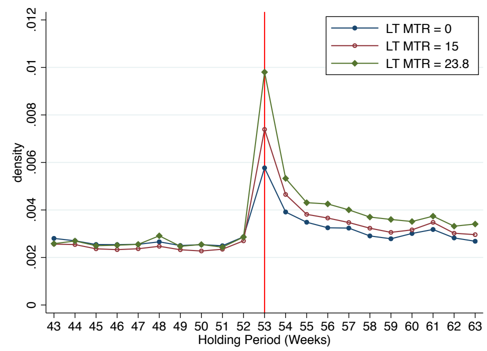
Notes: This figure shows the density of *gains* realizations around the 1-year threshold for individuals who have a positive *short-term capital gains tax liability* at the end of the year. Equivalent figures for the full population are shown in Appendix Figure B.3.
Figure (a) groups individuals by shares of realized short-term gains relative to short-term gains and short-term losses. Figure (b) groups individuals by shares of short-term gains that have holding periods between 270 and 365 days. Figure (c) groups individuals by month of realization. Figure (d) groups individuals by cost basis (i.e. purchase price). The vertical line identifies the 1-year threshold, i.e week 53. Based on a 10% random sample of the U.S. population.

Figure 6: Heterogeneity of Behavior Around 1-Year Threshold: Tax Incentives

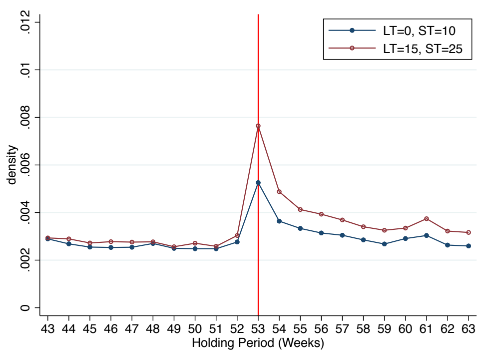
(a) By State Taxation



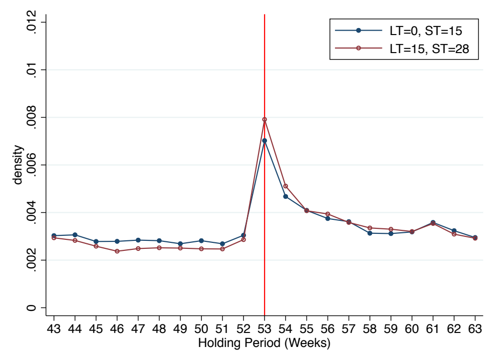
(b) By LTCG Tax Rate



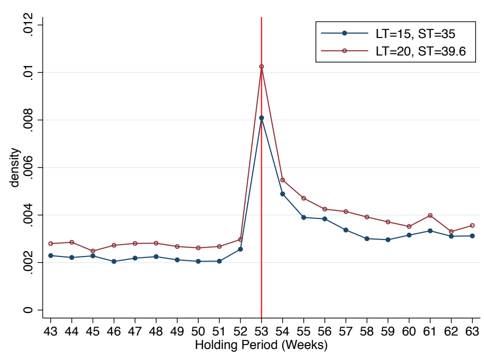
(c) LT-ST=10pp



(d) LT-ST=13-15pp



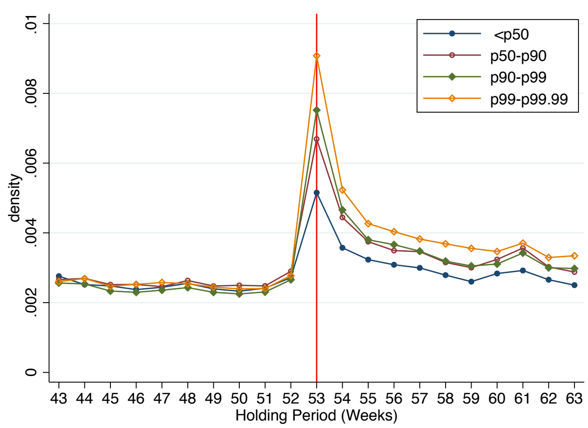
(e) LT-ST=19.6-20pp



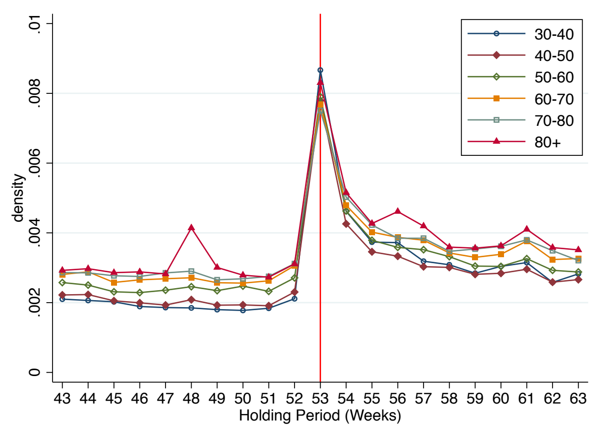
Notes: This figure shows the density of *gains* realizations around the 1-year threshold. Distributions are shown for individuals with different levels of ST and LT tax rate combinations. Figure (a) considers individuals living in states with varying treatment of short-term gains. Figure (b) breaks individuals by varying levels of long-term capital gains rate. Figures (c)-(e) hold the difference between ST and LT tax rates approximately constant. Comparisons holding LT rate fixed are available in Figure B.4. The vertical line identifies the 1-year threshold, i.e week 53. Based on a 10% random sample of the U.S. population.

Figure 7: Gains: Heterogeneity of Behavior Around 1-Year Threshold

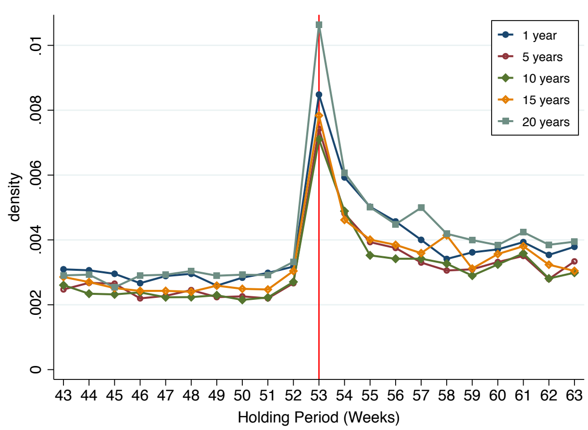
(a) By AGI Group



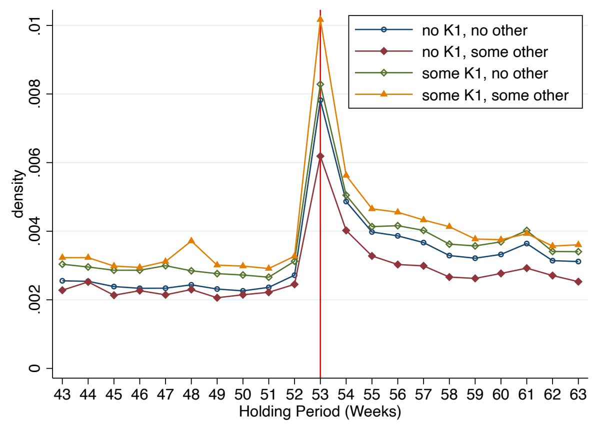
(b) By Age



(c) By Experience



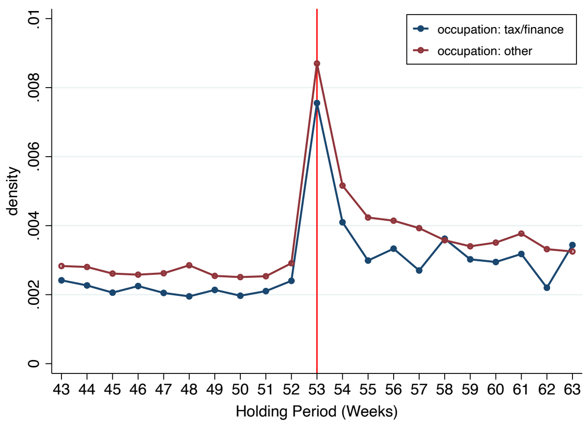
(d) By Schedule D income



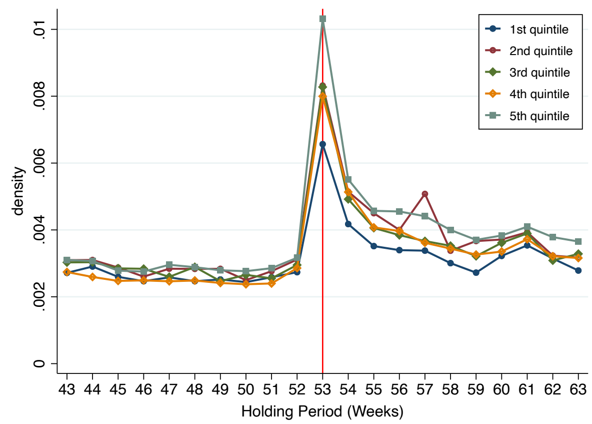
Notes: These figures show the density functions of *gains* realizations around the 1-year threshold. Densities are shown for individuals with different percentiles of AGI (a), different ages (b), by the number of times they filed Schedule D between 1996 and 2020 (c), and by the type of Schedule D income reported. Specifically, whether or not they report Schedule K-1 passthrough income and/or gains from Forms 4684, 6781, 8824. The vertical line identifies the 1-year threshold, i.e week 53. Based on a 10% random sample of the U.S. population.

Figure 8: Gains: Heterogeneity of Behavior Around 1-Year Threshold, Continued

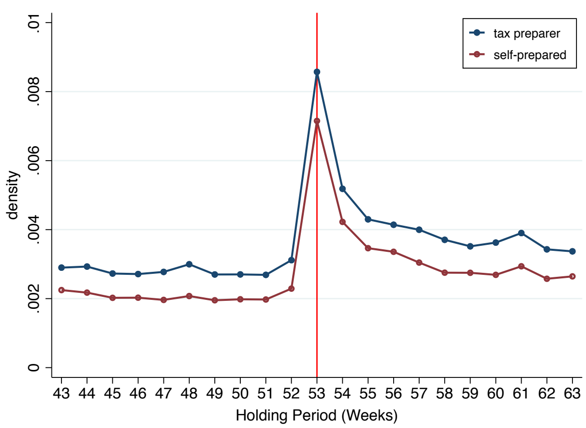
(a) By Occupation



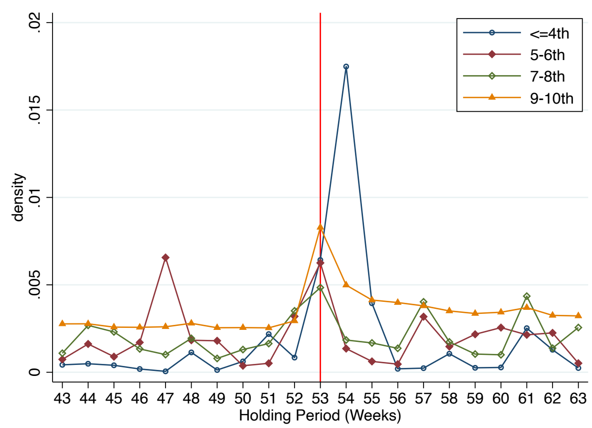
(b) By Critical Thinking



(c) By Tax Preparer Taxation



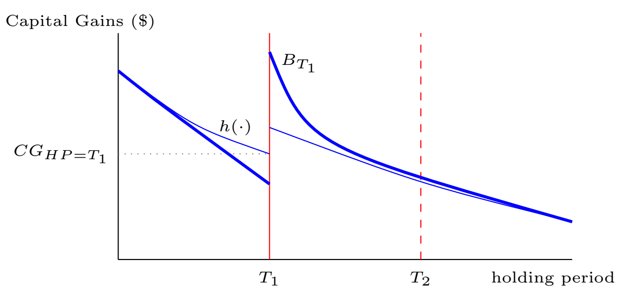
(d) By Broker



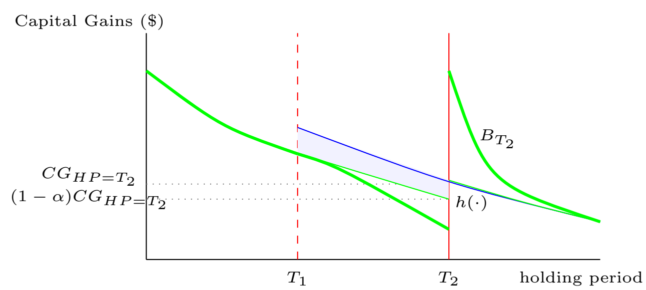
Notes: These figures show the density functions of *gains* realizations around the 1-year threshold. Densities are shown for individuals with tax/finance related occupations or other occupations (a), by level of critical thinking required in one's occupation (b), by whether they prepared the tax return themselves or used a tax preparer (c), and by brokerage decile (d). Specifically, we tag each broker by the number of taxpayers they file on behalf of, then break them into deciles by number of customers. The vertical line identifies the 1-year threshold, i.e week 53. Based on a 10% random sample of the U.S. population.

Figure 9: Conceptual Framework and Optimal ST/LT Threshold

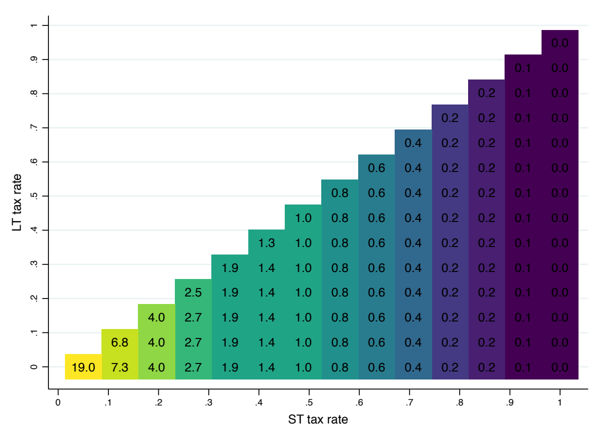
(a) CGs Distribution Under Threshold T_1



(b) CGs Distribution Under Threshold T_1



(c) Min Elasticity ε s.t. $T^* \approx 0$

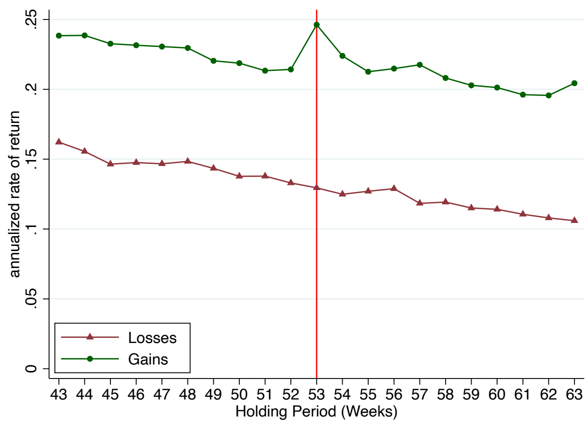


Notes: Figures (a) and (b): thin blue and green lines represent the distribution of capital gains $h(t)$ without intertemporal shifting. Jumps in thin lines at T_1 and T_2 represent the increase in realizations due to lower long-term tax rate. Thick blue lines account for intertemporal shifting that leads to bunching at T_1 or T_2, and a missing mass to the left of the threshold. Thick lines represent the observed distributions of capital gains. Shaded blue area identifies capital gain realizations that may disappear or shift because of increase in tax rate due to threshold increase, determined by parameters α. See Section 3.1 for more details.
Figure (c) shows the minimum value of elasticity ε needed so that $\Delta TaxRevenue$ of (2) is negative and therefore optimal threshold should be set at zero, assuming $d = \gamma = 0$ and $B_{T_1} = B_{T_2}$.

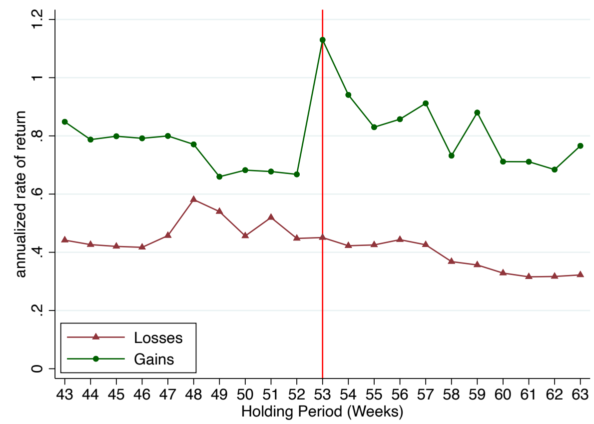
Figure 10: Average Rates of Return

Panel A: Average Rate of Return around 1-Year Threshold

(a) Simple Average

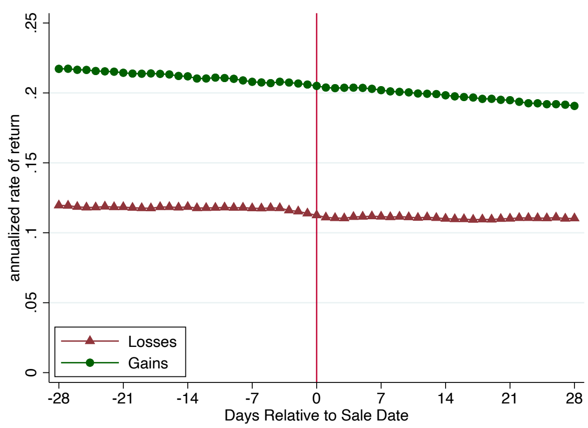


(b) Abs(CGs)-weighted Average

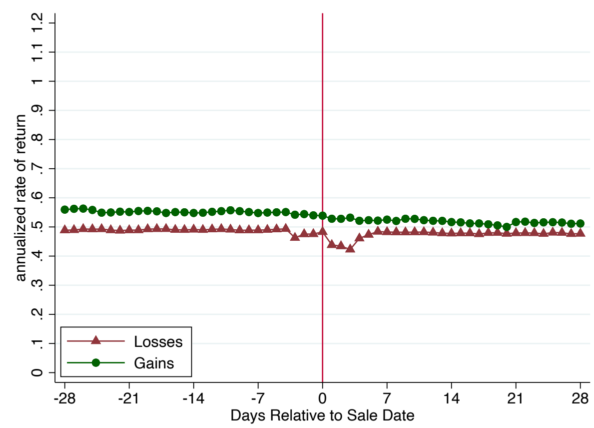


Panel B: Average Rate of Return for Week 52 Sales

(c) Simple Average



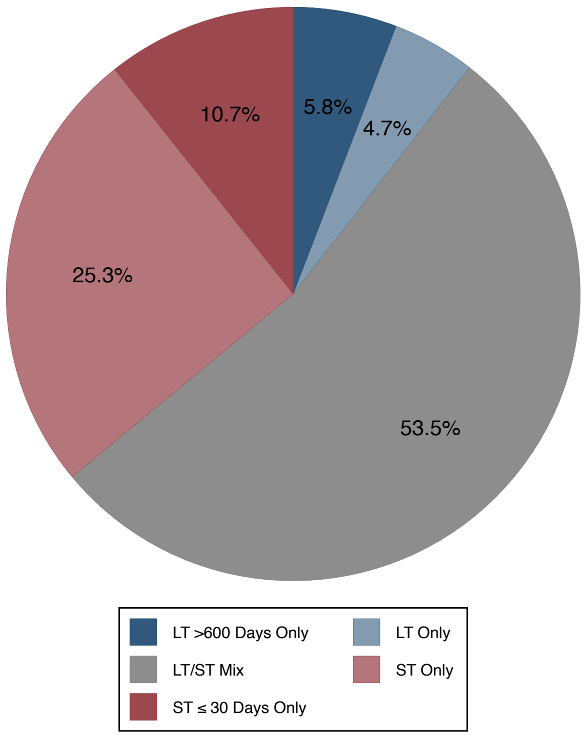
(d) Abs(CGs)-weighted Average



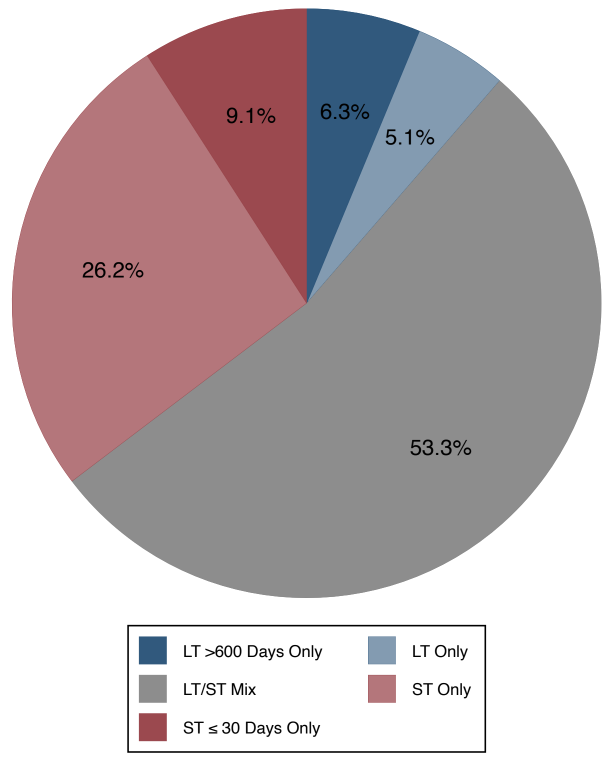
Notes: Figures (a) and (b) plot the average annualized rate of return (absolute value) by holding period week, separately for losses and gains. The vertical line identifies the 1-year threshold, i.e week 53. Figures (c) and (d) plot the average annualized rate of return for assets that were sold in week 52, separately for losses and gains, up to 28 days before and after the sale. The vertical line identifies the day of sale. For all figures, extremely high returns are top-coded at the 99.9th percentile of returns in that tax year. These 99.9th percentiles are very high – greater or equal to 1000%. We report the number of top-coded returns in Appendix Figures B.5 and B.6. Annualized return is calculated as $r = ((1 + CapGain/PurchasePrice)^{52/weeks} - 1)$. Based on a 10% random sample of the U.S. population.

Figure 11: Types of Person-Level Realization Behavior

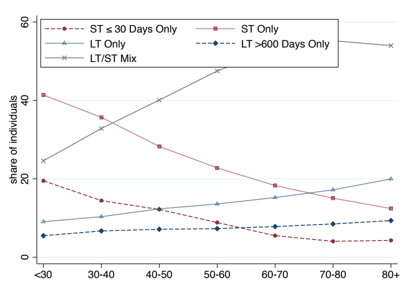
(a) Transaction-Weighted



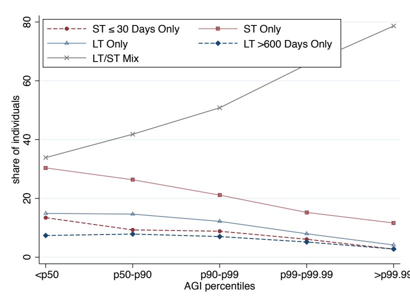
(b) Abs(CGs)-Weighted



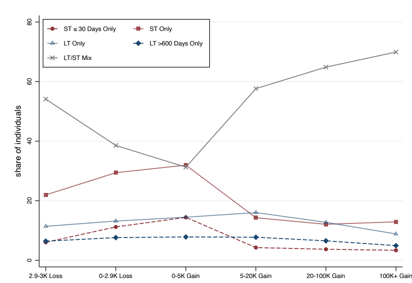
(c) By Age Groups



(d) By AGI Groups



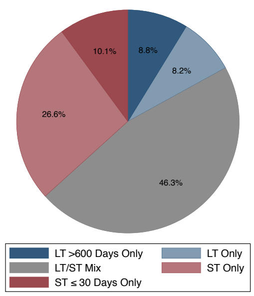
(e) By End-of-Year Gain/Loss



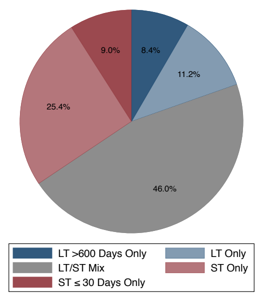
Notes: These figures show the share of individuals that realize only very (≤ 30 days) short-term gains/losses, various short-term only, both short- and long-term, only long-term of various holding periods, or very (>600 days) long term gains/losses only. Based on a 10% random sample of financial asset transactions realized during a 5-year period (2015-2019 tax years). Figures (a) and (b) show shares separately for unweighted transactions and transactions weighted by the absolute value of realized capital gains. Figures (c)-(e) break individuals down by age, adjusted gross income group, or end-of-the year net gain status. Based on a 10% random sample of the U.S. population.

Figure 12: Types of Person-Level Realization Behavior

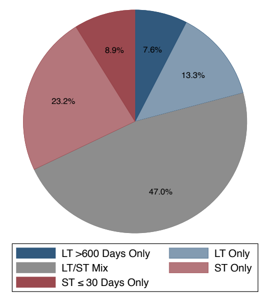
(a) 2014



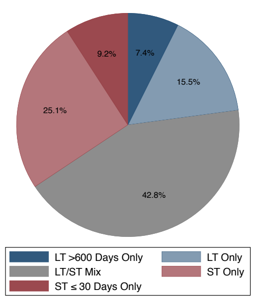
(b) 2015



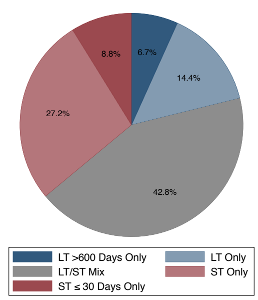
(c) 2016



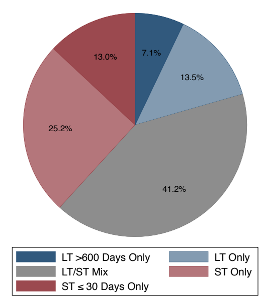
(d) 2017



(e) 2018



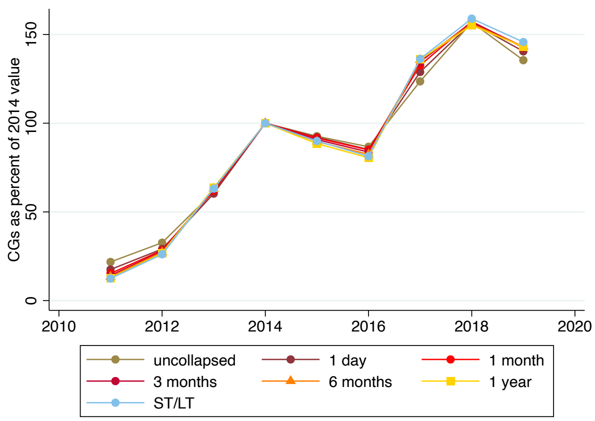
(f) 2019



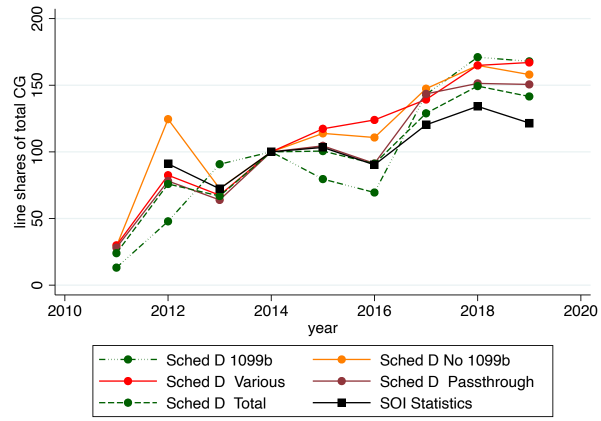
Notes: These figures show the share of individuals that realize only very ($\leq$ 30 days) short-term gains/losses, various short-term only, both short- and long-term, only long-term of various holding periods, or very (>600 days) long term gains/losses only, in any given year. Based on a 10% random sample of taxpayers that occurred in 2014-2019 tax years.

Figure 13: Capital Gain Realizations by Type of Capital Gain

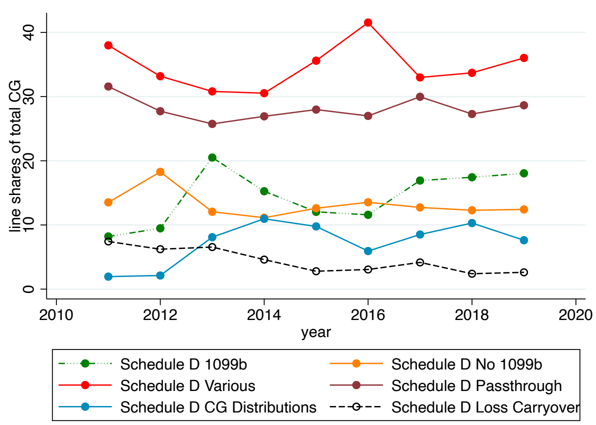
(a) CGs Time Series as % of 2014



(b) CGs Time Series as % of 2014



(c) Types of Capital Gains



Notes: Figure (a) shows the time series of aggregations of Form 1099B data from Figure 2(a). Based on a 10% random sample of the U.S. population. Figure (b) shows the time series of various types of Schedule D gains, as well as SOI time series (Table 1.4A, 2012-2019). Figure (c) plots the corresponding shares of each Schedule D capital gain type, as percent of the overall net gains (both short- and long-term gains included). Figures (b) and (ca) are based on a 10% random sample of Schedule Ds filed by electronic filers to represent U.S. totals. Additional evidence available in the Appendix D.

Table 1: ST and LT Capital Gains Tax Structure

Year	LT MTR=0	LT MTR=15	LT MTR=20
2011	ST MTR$\in$ {10, 15}	ST MTR$\in$ {25, 28, 33, 35 }	n/a
2012	ST MTR$\in$ {10, 15}	ST MTR$\in$ {25, 28, 33, 35 }	n/a
2013^{α}	ST MTR$\in$ {10, 15}	ST MTR$\in$ {25, 28, 33, 35 }	ST MTR$\in$ {39.6}
2014^{α}	ST MTR$\in$ {10, 15}	ST MTR$\in$ {25, 28, 33, 35 }	ST MTR$\in$ {39.6}
2015^{α}	ST MTR$\in$ {10, 15}	ST MTR$\in$ {25, 28, 33, 35 }	ST MTR$\in$ {39.6}
2016^{α}	ST MTR$\in$ {10, 15}	ST MTR$\in$ {25, 28, 33, 35 }	ST MTR$\in$ {39.6}
2017^{α}	ST MTR$\in$ {10, 15}	ST MTR$\in$ {25, 28, 33, 35 }	ST MTR$\in$ {39.6}
2018^{α}	ST MTR$\in$ {10, 12}	ST MTR$\in$ {12, 22, 24, 32, 35 }	ST MTR$\in$ {35, 37}
2019^{α}	ST MTR$\in$ {10, 12}	ST MTR$\in$ {12, 22, 24, 32, 35 }	ST MTR$\in$ {35, 37}

Notes: This table lists short-term marginal tax rates faced by individuals who qualify for the long-term tax rate of 0%, 15%, or 20%. Individuals' short- and long-term tax rates depend on individuals' taxable income, filing status, and since 2013, on individuals' adjusted gross income (AGI).

$^{\alpha}$ For years 2013 and later: the shown rates do not include Affordable Care Act surtax: high-AGI individuals are subject to an additional 3.8% tax both on short-term and long-term capital gains. High-AGI is defined as those with modified adjusted gross income greater than $250,000 (joint filers), $125,000 (married filing separately), $200,000 (all other filers).

Table 2: Bunching Estimates and Estimates of Elasticity ε^{defer}

	Upper Bound Estimate	Bunching estimates		Deferral Elasticity Estimates						Tax Incentives	
				v1		v2		v3			
	$\overline{\varepsilon}$	$\underline{B}$	$\overline{B}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	τ^{ST}	τ^{LT}
All	.43	4.78	5.28	.52	.56	.45	.5	.17	.18	.3	.16
	(.34)	(.849)	(.453)	(.062)	(.033)	(.08)	(.043)	(.02)	(.011)		
By end-of-year tax liability:											
End-of-year: no ST tax due	.5	4.78	5.3	.53	.57	.45	.5	.17	.18	.3	.16
	(.336)	(.789)	(9.937)	(.061)	(.067)	(.075)	(.941)	(.02)	(.022)		
End-of-year: ST tax due		5.09	4.94	.39	.39	.47	.45	.17	.17	.31	.16
		(.772)	(203.608)	(.039)	(.119)	(.071)	(18.714)	(.017)	(.053)		
By state tax rules:											
No CG tax	.74	4.16	5.11	.46	.53	.39	.47	.16	.19	.3	.16
	(.307)	(.713)	(.348)	(.056)	(.027)	(.066)	(.032)	(.02)	(.01)		
Pref LT	.57	4.01	4.92	.49	.57	.41	.5	.18	.21	.28	.14
	(.328)	(.946)	(2.794)	(.084)	(.128)	(.096)	(.283)	(.031)	(.048)		
No Pref LT	.27	5.24	5.33	.57	.57	.5	.5	.18	.18	.3	.16
	(.341)	(.992)	(87.717)	(.07)	(.104)	(.094)	(8.294)	(.022)	(.033)		
By AGI:											
<p50	.73	3.32	3.81	.51	.57	.53	.61	.15	.17	.11	0
	(.272)	(.991)	(5.656)	(.117)	(.096)	(.158)	(.903)	(.035)	(.028)		
p50-p90	.59	5.25	5.2	.73	.73	.74	.74	.27	.27	.19	.08
	(.274)	(1.145)	(.75)	(.104)	(.066)	(.162)	(.106)	(.039)	(.024)		
p90-p99	.82	4.69	5.04	.54	.58	.49	.52	.18	.19	.3	.17
	(.427)	(.981)	(.459)	(.077)	(.036)	(.102)	(.048)	(.025)	(.012)		
p99-p99.99	.22	4.62	5.43	.38	.43	.29	.34	.12	.14	.41	.23
	(.273)	(.712)	(52.522)	(.04)	(.098)	(.044)	(3.258)	(.013)	(.032)		
>p99.99		8.96	8.36	.62	.6	.54	.5	.27	.26	.42	.24
		(5.936)	(11.435)	(.172)	(.289)	(.357)	(.688)	(.076)	(.127)		
By age:											
<30	.34	5.92	6.71	.71	.75	.76	.86	.22	.23	.21	.09
	(.593)	(1.316)	(1849.156)	(.099)	(.455)	(.17)	(238.273)	(.031)	(.141)		
30–40	1.27	5.56	7.44	.66	.8	.55	.74	.15	.18	.29	.16
	(.708)	(1.047)	(.718)	(.08)	(.047)	(.103)	(.071)	(.018)	(.01)		
40–50	.37	6	5.96	.54	.54	.52	.52	.12	.12	.32	.17
	(.37)	(1.088)	(.544)	(.063)	(.03)	(.095)	(.047)	(.014)	(.007)		
50–60	.43	4.77	4.85	.49	.49	.42	.42	.14	.14	.32	.17
	(.302)	(.709)	(140.545)	(.051)	(.116)	(.062)	(12.286)	(.014)	(.033)		
60–70	.27	4.25	5.15	.52	.59	.41	.5	.2	.22	.29	.15
	(.325)	(.828)	(3.818)	(.071)	(.13)	(.08)	(.37)	(.027)	(.049)		
70–80	.55	4.23	5.03	.49	.57	.42	.5	.22	.25	.29	.15
	(.295)	(1.013)	(.654)	(.085)	(.047)	(.1)	(.065)	(.037)	(.021)		
80+	0	5.52	5.54	.67	.67	.57	.58	.37	.37	.27	.14
	(.104)	(1.11)	(.579)	(.089)	(.048)	(.115)	(.06)	(.049)	(.027)		

Notes: For estimation details see Section 3.2. Estimate $\overline{\varepsilon}$ identifies the upper bound on elasticity of capital gains ε. Bunching estimates $\underline{B}$ and $\overline{B}$ are measured in weeks. Estimates $\underline{\varepsilon^{defer}}$ and $\overline{\varepsilon^{defer}}$ represent lower and upper bound estimates of deferral elasticity, which are calculated in three ways as described in Section 3.2: v1 follows the approach of Dowd and McClelland (2019), v2 estimates retiming responses in weeks, and v3 measures what share of capital gains is deferred past one year mark. Bunching fits are available in Appendix C. Estimates of $\overline{\varepsilon}$ are missing in cases where the observed distribution to the right of the 1-year threshold is lower (after removing bunching) than the observed distribution to the left of the 1-year threshold.

Table 3: Bunching Estimates and Estimates of Elasticity ε^{defer}

	Upper Bound Estimate	Bunching estimates		Deferral Elasticity Estimates						Tax Incentives	
				v1		v2		v3			
	$\overline{\varepsilon}$	$\underline{B}$	$\overline{B}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	τ^{ST}	τ^{LT}
By long-term tax rate:											
.1	.67	2.91	3.76	.49	.62	.5	.65	.15	.19	.1	0
	(.202)	(.801)	(.586)	(.104)	(.066)	(.138)	(.101)	(.031)	(.02)		
.12		5.57	5.83	.72	.78	.79	.82	.23	.25	.12	0
		(1.787)	(1.028)	(.148)	(.082)	(.253)	(.145)	(.048)	(.026)		
.15	.4	4.3	4.59	.45	.48	.47	.5	.17	.19	.15	0
	(.177)	(1.029)	(8.352)	(.075)	(.09)	(.111)	(.904)	(.029)	(.035)		
.25	1.02	4.44	4.8	.68	.72	.64	.69	.25	.27	.25	.15
	(.433)	(.881)	(.497)	(.095)	(.05)	(.126)	(.071)	(.035)	(.018)		
.28	.3	4.63	5.16	.58	.63	.48	.54	.18	.2	.29	.16
	(.396)	(.963)	(3.536)	(.083)	(.12)	(.1)	(.367)	(.026)	(.038)		
.33	.17	4.72	5.12	.38	.41	.32	.34	.11	.12	.37	.19
	(.264)	(.904)	(3.576)	(.05)	(.043)	(.061)	(.24)	(.014)	(.013)		
.35	.09	5.12	6.09	.44	.5	.32	.39	.12	.14	.39	.2
	(.277)	(1.117)	(.451)	(.061)	(.028)	(.071)	(.029)	(.017)	(.008)		
.396	.44	4.59	5.49	.33	.37	.25	.3	.11	.12	.43	.24
	(.222)	(.6)	(.442)	(.03)	(.019)	(.033)	(.024)	(.01)	(.006)		
By tax preparer:											
no tax preparer	1.62	4.76	6.08	.61	.71	.57	.73	.15	.17	.24	.12
	(.55)	(.899)	(.688)	(.077)	(.051)	(.108)	(.083)	(.019)	(.012)		
tax preparer	.37	4.72	5.07	.57	.6	.49	.52	.21	.22	.27	.14
	(.298)	(.784)	(12.356)	(.064)	(.15)	(.081)	(1.276)	(.024)	(.055)		
By frequency of Schedule D filing:											
0 times		3.91	4.35	.45	.49	.54	.6	.13	.15	.18	.07
		(.781)	(59.183)	(.064)	(.189)	(.107)	(8.112)	(.019)	(.057)		
1–5 times	0	6.63	5.58	.88	.78	.85	.72	.26	.23	.21	.1
	(.195)	(1.052)	(38.457)	(.085)	(.42)	(.135)	(4.947)	(.026)	(.126)		
6–10 times	.52	5.14	5.65	.7	.75	.61	.67	.2	.22	.23	.11
	(.486)	(.97)	(.63)	(.088)	(.055)	(.116)	(.075)	(.025)	(.016)		
11–15 times	1.09	4.44	5.03	.59	.64	.49	.56	.17	.19	.25	.12
	(.496)	(.83)	(.542)	(.079)	(.043)	(.092)	(.06)	(.023)	(.013)		
16–20 times	.57	4.56	5.03	.52	.55	.44	.49	.18	.19	.28	.14
	(.331)	(.746)	(7.172)	(.059)	(.065)	(.073)	(.698)	(.021)	(.023)		

Notes: For estimation details see Section 3.2. Estimate $\overline{\varepsilon}$ identifies the upper bound on elasticity of capital gains ε. Bunching estimates $\underline{B}$ and $\overline{B}$ are measured in weeks. Estimates $\underline{\varepsilon^{defer}}$ and $\overline{\varepsilon^{defer}}$ represent lower and upper bound estimates of deferral elasticity, which are calculated in three ways as described in Section 3.2: v1 follows the approach of Dowd and McClelland (2019), v2 estimates retiming responses in weeks, and v3 measures what share of capital gains is deferred past one year mark. Bunching fits are available in Appendix C. Estimates of $\overline{\varepsilon}$ are missing in cases where the observed distribution to the right of the 1-year threshold is lower (after removing bunching) than the observed distribution to the left of the 1-year threshold.

Table 4: Bunching Estimates and Estimates of Elasticity ε^{defer}

	Upper Bound Estimate	Bunching estimates		Deferral Elasticity Estimates						Tax Incentives	
				v1		v2		v3			
	$\overline{\varepsilon}$	$\underline{B}$	$\overline{B}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	τ^{ST}	τ^{LT}
By filing month:											
Jan-Feb		9.68	10.56	.82	.88	.77	.84	.26	.28	.3	.13
		(3.674)	(1.698)	(.143)	(.073)	(.292)	(.135)	(.045)	(.023)		
Mar-Oct	.58	3.22	3.7	.32	.35	.25	.29	.1	.11	.3	.12
	(.369)	(.597)	(.401)	(.044)	(.025)	(.046)	(.031)	(.014)	(.008)		
Nov-Dec		7	6.33	.4	.4	.54	.49	.15	.15	.3	.13
		(1.994)	(1.322)	(.062)	(.045)	(.155)	(.103)	(.023)	(.017)		
By occupation type:											
occupation: other	.49	4.9	5.34	.59	.63	.51	.56	.18	.2	.27	.14
	(.381)	(.779)	(.434)	(.064)	(.035)	(.081)	(.045)	(.02)	(.011)		
occupation: tax/finance	2.07	3.03	6.6	.38	.63	.29	.62	.09	.15	.3	.16
	(.506)	(.917)	(.935)	(.087)	(.061)	(.087)	(.089)	(.02)	(.014)		
By use of critical thinking in occupation:											
1st quintile	.34	4.47	5.49	.66	.78	.58	.72	.22	.26	.19	.07
	(.183)	(1.072)	(.634)	(.112)	(.063)	(.14)	(.083)	(.037)	(.021)		
2nd quintile	1.77	3.07	4.24	.47	.6	.36	.5	.16	.21	.23	.11
	(.724)	(1.169)	(.498)	(.133)	(.051)	(.137)	(.058)	(.046)	(.018)		
3rd quintile	.23	4.66	5.5	.66	.76	.56	.66	.22	.25	.23	.11
	(.346)	(1.114)	(.493)	(.105)	(.049)	(.133)	(.059)	(.035)	(.016)		
4th quintile	.07	5.71	6.28	.65	.69	.62	.68	.2	.21	.27	.14
	(.362)	(1.04)	(116.744)	(.074)	(.214)	(.113)	(12.705)	(.022)	(.065)		
5th quintile	.31	4.6	5.37	.53	.59	.4	.47	.18	.21	.32	.17
	(.356)	(.813)	(6.758)	(.062)	(.096)	(.072)	(.595)	(.022)	(.034)		
By type of Schedule D gains:											
no K1, no other	.5	5.34	5.33	.64	.64	.57	.57	.2	.2	.27	.14
	(.444)	(1.133)	(64.709)	(.089)	(.098)	(.121)	(6.897)	(.028)	(.03)		
no K1, some other	1.02	3.98	3.95	.35	.35	.42	.42	.11	.11	.29	.16
	(.247)	(.94)	(4.003)	(.057)	(.177)	(.1)	(.425)	(.018)	(.055)		
some K1, no other	.14	4.34	5.33	.53	.6	.39	.47	.22	.25	.32	.17
	(.29)	(.861)	(3.164)	(.074)	(.117)	(.077)	(.282)	(.03)	(.048)		
some K1, some other	.39	4.28	4.65	.33	.35	.28	.31	.15	.16	.37	.19
	(.197)	(.725)	(.659)	(.039)	(.028)	(.048)	(.044)	(.017)	(.013)		

Notes: For estimation details see Section 3.2. Estimate $\overline{\varepsilon}$ identifies the upper bound on elasticity of capital gains ε. Bunching estimates $\underline{B}$ and $\overline{B}$ are measured in weeks. Estimates $\underline{\varepsilon^{defer}}$ and $\overline{\varepsilon^{defer}}$ represent lower and upper bound estimates of deferral elasticity, which are calculated in three ways as described in Section 3.2: v1 follows the approach of Dowd and McClelland (2019), v2 estimates retiming responses in weeks, and v3 measures what share of capital gains is deferred past one year mark. Bunching fits are available in Appendix C. Estimates of $\overline{\varepsilon}$ are missing in cases where the observed distribution to the right of the 1-year threshold is lower (after removing bunching) than the observed distribution to the left of the 1-year threshold.

APPENDIX FOR ONLINE PUBLICATION

A Dataset Construction

Table A.1: 1099B-1040 Match Rates

Year	Match Rate 1099B-1040	Num. of Obs. All 1099B	Num. of Obs. All Matched 1099B-1040	Num. of Obs. with Non-missing Amounts 1099B-1040	Num. of Obs. with Non-missing Amounts & Dates 1099B-1040
2011	.83	64,240,863	53,469,330	24,703,707	22,602,502
2012	.84	54,791,777	46,132,203	27,182,916	23,886,178
2013	.83	61,721,310	51,228,072	36,874,459	32,155,229
2014	.82	63,119,741	51,779,210	40,187,493	34,669,982
2015	.83	73,600,522	61,417,048	51,155,122	44,292,183
2016	.83	79,450,217	66,299,668	57,179,528	50,599,675
2017	.83	84,097,201	70,133,673	61,931,491	56,110,296
2018	.83	117,642,338	97,718,149	89,338,566	81,980,272
2019	.82	98,813,548	80,736,095	72,434,303	62,342,276
Total	.83	697,477,517	578,913,448	460,987,585	408,638,593

Notes: This table shows the match rates between Form 1099Bs and Form 1040, as well as corresponding number of observations for all Form 1099b, forms matched to Form 1040, matched forms with non-missing amounts (basis and sale price), and with non-missing amounts and date of acquisition.

Table A.2: 1099B-1040 Matched Sample Summary Statistics

Transaction Level: 408,638,593 Transactions								
Variable	p5	p10	p25	p50	p75	p95	p99	Mean
Value of Stocks/Bonds Sold ($)	5	11	60	354	2,039	19,758	84,036	4,068
Cost Basis ($)	5	12	66	367	2,076	20,000	85,645	4,157
1(Long-Term Capital Gain)	0	0	0	0	1	1	1	.28
Holding Period (Days)	0	0	6	103	409	1,253	2,017	298
Capital Gain ($)	-882	-318	-45	-1	17	611	3,322	-89
Person Level: 3,150,045 Taxpayers								
Variable	p5	p10	p25	p50	p75	p95	p99	Mean
Age	23	27	38	55	68	85	93	54
AGI ($)	4,414	12,365	39,242	89,304	174,476	566,403	1,846,017	187,188
Taxable Income ($)	0	0	20,053	64,252	138,808	498,444	1,651,467	158,251
Total Capital Gains, 1040 ($)	-54,807	-14,689	-71	0	3,421	53,082	325,273	8,533
Total ST Gains, Sched. D ($)	-24,486	-6,077	-110	0	8	4,272	28,446	-8,188
Total LT Gains, Sched. D ($)	-29,506	-6,361	0	0	3,285	55,558	338,828	16,869
MTR, Ordinary Income	.1	.1	.12	.22	.25	.39	.43	.21
MTR, LT Capital Gains	0	0	0	.15	.15	.2	.24	.092
Taxes Assessed ($)	0	0	1,661	8,602	25,567	139,280	529,315	39,325
N 1099-B Trans Per Yr	1	1	2	5	20	146	509	43
Sales Volume	21	77	1,231	10,000	50,685	425,582	2,063,757	179,366

Notes: This table shows the summary statistics (mean, as well as the 5th, 10th, 25th, 50th, 75th, 95th and 99th percentiles) of selected variables from a 10% random sample used in the analysis. Percentile statistics represent the average of the 20 observations surrounding the percentile value, so as to not identify any individual taxpayer.

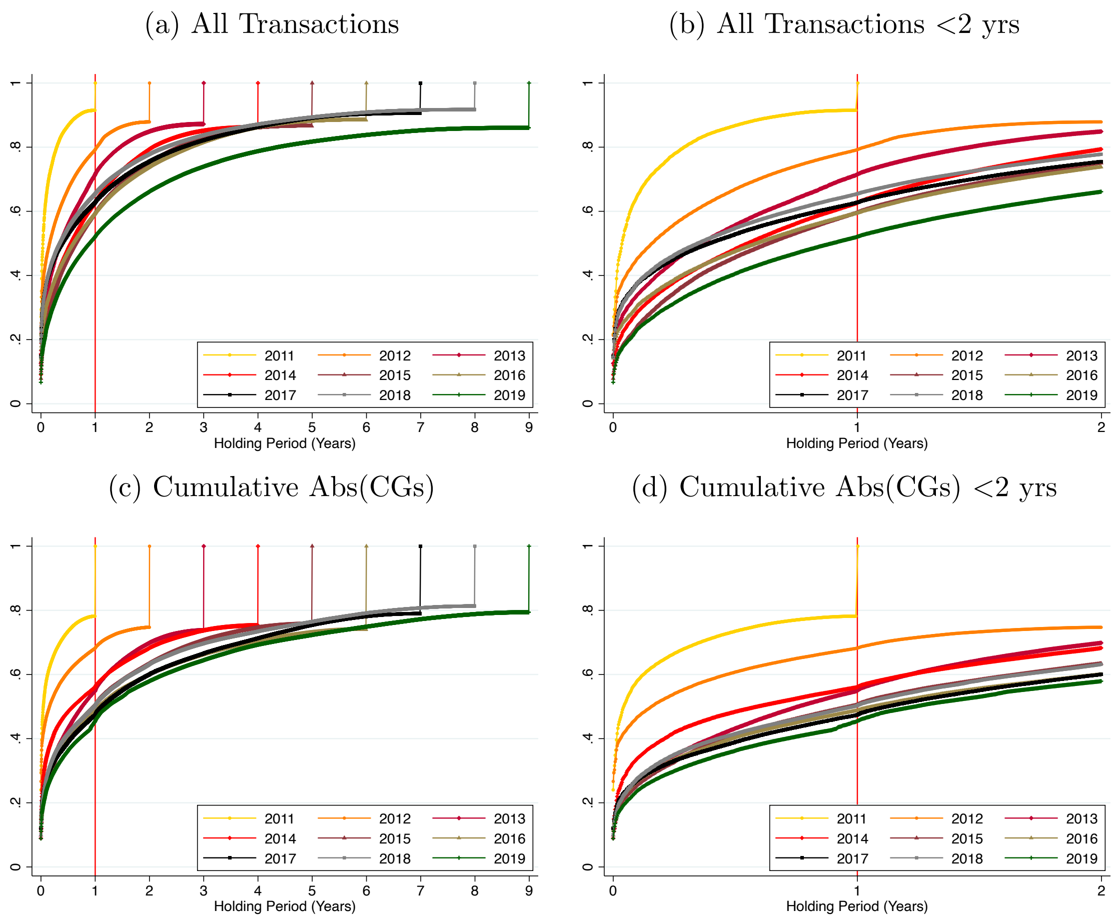
Table A.3: 1099-B Variable Distributions by Year

Variable	p1	p5	p10	p25	p40	p50	p60	p75	p90	p95	p99	Mean	N
Holding Period (Days)													
2011	0	0	0	1	5	8	17	46	125	185	275	38	26,839,015
2012	0	0	0	1	13	39	82	184	369	443	589	115	27,338,364
2013	0	0	0	5	44	91	157	298	500	633	853	180	38,019,134
2014	0	0	0	13	68	133	221	393	678	843	1,137	246	42,088,842
2015	0	0	1	29	97	168	269	474	849	1,065	1,404	307	52,557,239
2016	0	0	0	10	78	161	277	524	1,008	1,286	1,701	342	60,097,706
2017	0	0	0	4	36	104	223	500	1,078	1,457	1,965	341	66,804,359
2018	0	0	0	4	36	95	196	448	1,028	1,484	2,180	330	98,380,765
2019	0	0	1	32	121	221	366	690	1,362	1,846	2,548	474	76,416,519
All	0	0	0	6	49	110	204	423	902	1,276	2,037	306	488,541,943
Capital Gain ($)													
2011	-17,473	-1,654	-688	-166	-59	-31	-14	-1	75	244	1,279	-435	26,839,015
2012	-17,616	-1,330	-482	-78	-13	-2	0	13	164	460	2,259	-397	27,338,364
2013	-5,849	-780	-273	-43	-8	-1	1	25	235	636	3,024	-71	38,019,134
2014	-7,552	-1,097	-362	-37	-2	0	3	44	341	899	4,453	-73	42,088,842
2015	-4,580	-1,135	-417	-64	-10	-2	0	14	204	609	3,527	-84	52,557,239
2016	-4,547	-1,038	-346	-42	-8	-2	0	10	165	504	2,909	-101	60,097,706
2017	-3,019	-455	-146	-18	-2	0	1	26	255	779	3,530	41	66,804,359
2018	-3,752	-665	-265	-43	-8	-2	0	8	169	542	3,402	-29	98,380,765
2019	-3,712	-616	-203	-18	-1	0	2	31	255	655	3,648	2.1	76,416,519
All	-5,036	-846	-304	-42	-6	-1	0	17	210	603	3,280	-79	488,541,943

Notes: This table summarizes the distributions of holding periods and capital gains for each year in our sample. Percentile statistics represent the average of the 20 observations surrounding the percentile value, so as to not identify any individual taxpayer.

B Additional Empirical Evidence

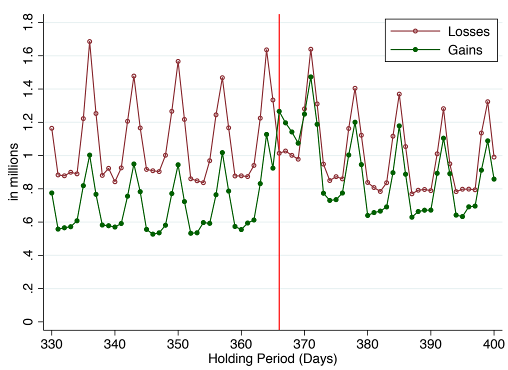
Figure B.1: Gains/Losses Realizations by Holding Period by Year



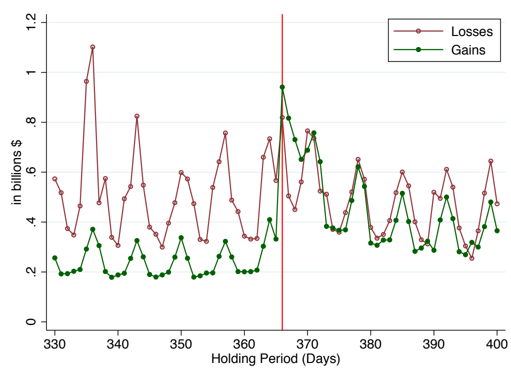
Notes: These figures show the cumulative distribution of transactions, and transactions weighted by the absolute value of realized capital gains for each tax year between 2011 and 2019. Figures (b) and (d) simply "zoom in" on the first two years. The vertical line identifies the 1-year threshold. Based on a 10% random sample of taxpayers that occurred in 2011-2019 tax years scaled to represent U.S. totals. Holding periods are censored as described in Section 1.2.

Figure B.2: Behavior Around 1-Year Threshold – Daily Distributions

(a) Transactions



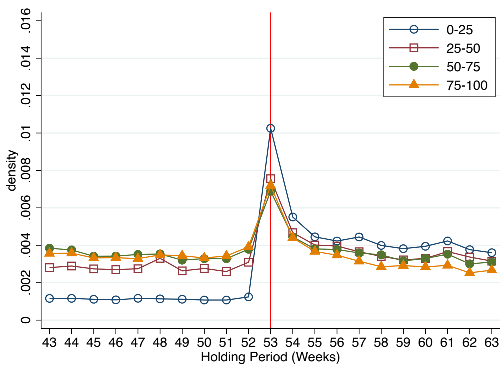
(b) Abs(CGs)



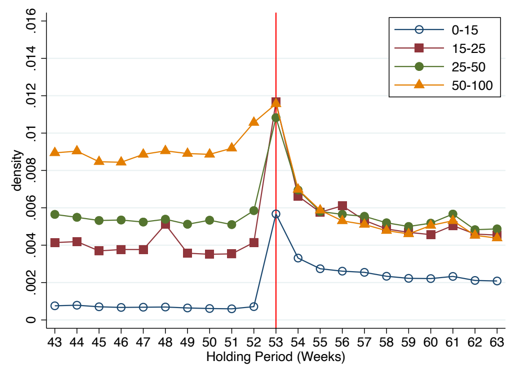
Notes: These figures show the density functions around the 1-year threshold. Figures (a) shows distributions of transactions, while figures (b) shows distributions of absolute capital gains. All shown separately for transactions with losses and gains. The vertical line identifies the 1-year threshold, day 366. Based on a 10% random sample of financial asset sales that occurred in 2015-2019 tax years scaled to represent U.S. totals.

Figure B.3: Gains Realizations Around 1-Year Threshold by Relevance of ST/LT Incentive

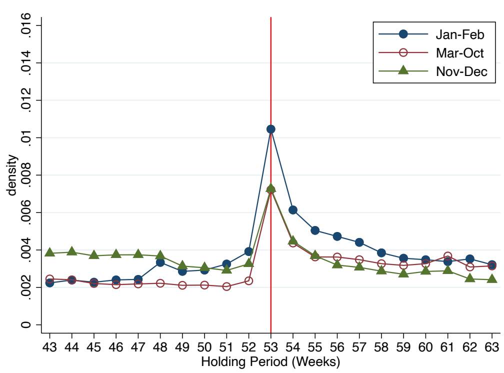
(a) by ST Gains/(ST Gains+ST Losses)



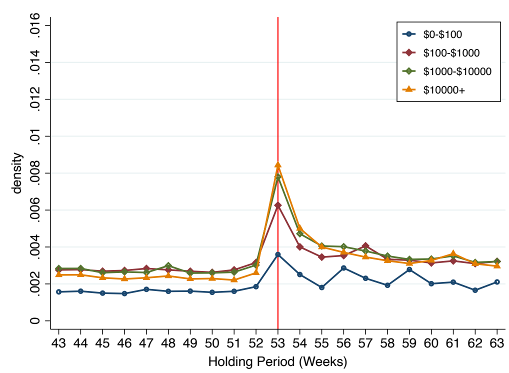
(b) by Share of ST Gains Near Threshold



(c) by Month of Realization



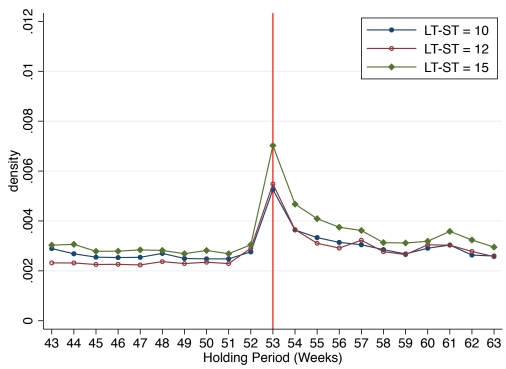
(d) by Basis



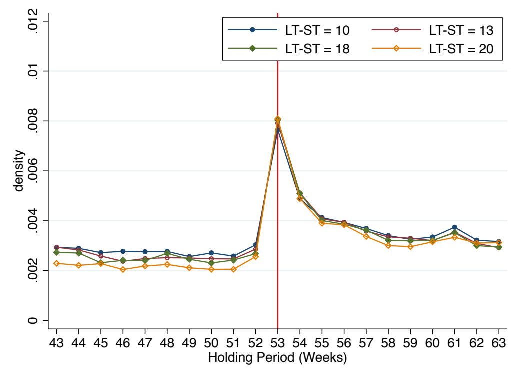
Notes: This figure shows the density of gains realizations around the 1-year threshold for all individuals. Figure (a) groups individuals by shares of realized short-term gains relative to short-term gains and short-term losses. Figure (b) groups individuals by shares of short-term gains that have holding periods between 270 and 365 days. Figure (c) groups individuals by months of realization. Figure (d) groups individuals by cost basis (i.e. purchase price). The vertical line identifies the 1-year threshold, i.e week 53. Based on a 10% random sample of the U.S. population.

Figure B.4: Heterogeneity of Behavior Around 1-Year Threshold: Tax Incentives

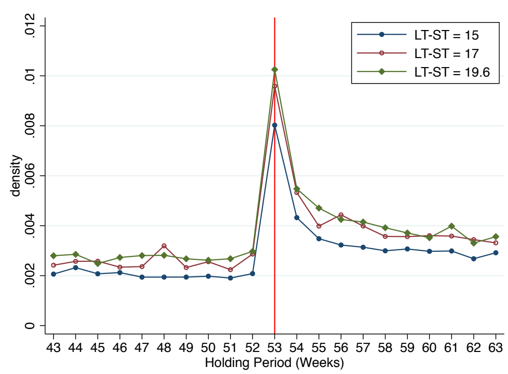
(a) LT MTR = 0



(b) LT MTR = 15



(c) LT MTR = 20

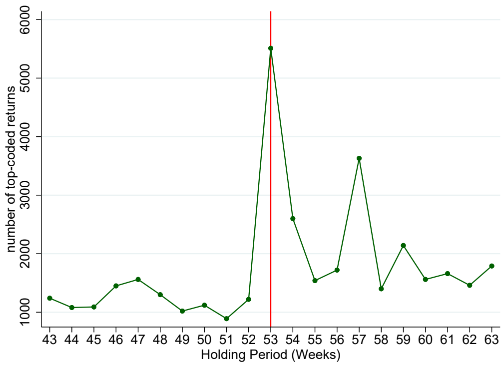


Notes: This figure shows the density of *gains* realizations around the 1-year threshold. Distributions are shown for individuals with different levels of ST and LT tax rate combinations. See also Figure 6 for alternative comparisons. The vertical line identifies the 1-year threshold, i.e week 53. Based on a 10% random sample of the U.S. population.

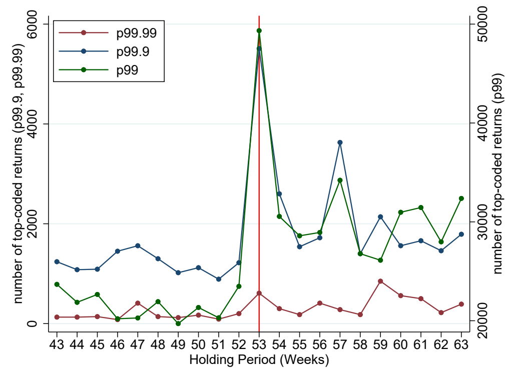
Figure B.5: Average Rate of Return Around 1-Year Threshold: Robustness of Top-coding

Panel A: Number of Top-Coded Returns

(a) Number Topcoded: p99.9

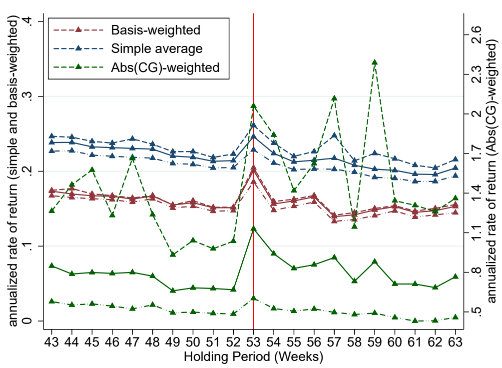


(b) Number Topcoded: p99-99.99

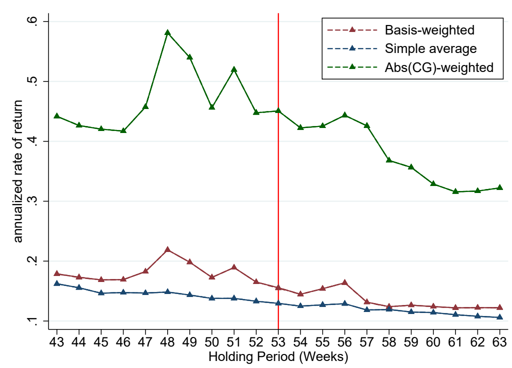


Panel B: Return Robustness to Top-coding and Weights

(c) Topcoded Returns: Gains



(d) Topcoded Returns: Losses

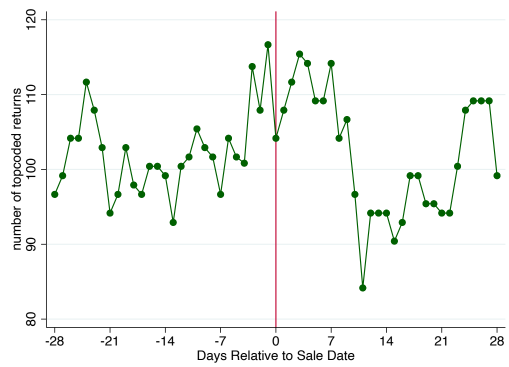


Notes: Average rates of return shown in Figure 10(a) and (b) are top-coded at the 99.9th percentile of returns in that tax year. Figure (a) plots the number of top-coded returns by holding period week. Figure (b) shows number of top-coded returns if returns are top-coded at 99th, 99.9th, or 99.99th percentiles. Figures (c) and (d) show average rates of return, calculated under 9 different assumptions: varying top-coding cutoff (99th, 99.9, or 99.99th percentiles) and varying weighting procedure (simple average, cost-basis weighted average or absolute capital gains-weighted average). Note that top-coding only applies to gains and does not affect loss returns.
Annualized return is calculated as $r = ((1 + CapGain/PurchasePrice)^{52/weeks} - 1)$. The vertical line identifies the 1-year threshold, i.e week 53 for weekly plots. Values are scaled from our 10% random sample of taxpayers to represent 2015-2019 tax year totals.

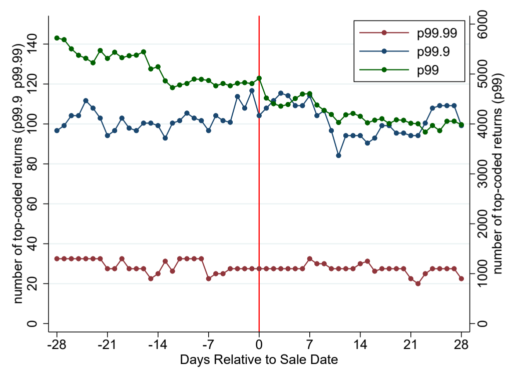
Figure B.6: Average Rate of Return for Week 52 Sales

Panel A: Number of Top-Coded Returns

(a) Number Topcoded: p99.9

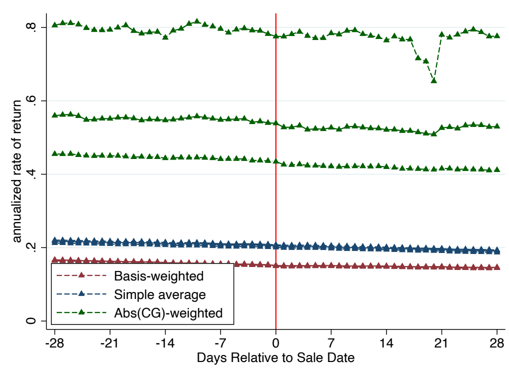


(b) Number Topcoded: p99, p99.9, p99.99

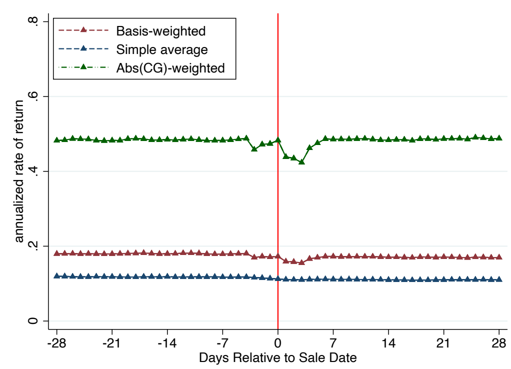


Panel B: Robustness to Top-coding and Weights

(c) Topcoded Returns: Gains



(d) Topcoded Returns: Losses

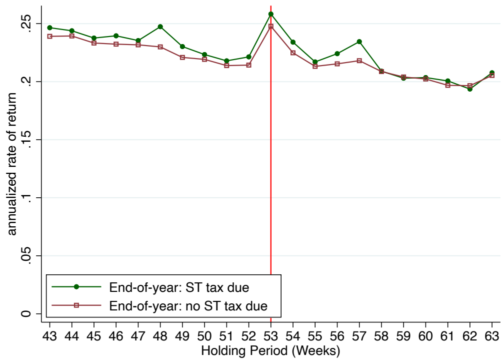


Notes: Average rates of return shown in Figure 10(c) and (d) are top-coded at the 99.9th percentile of returns in that tax year. Figure (a) plots the number of top-coded returns by holding period week. Figure (b) shows number of top-coded returns if returns are top-coded at 99.99th, 99.999, or 99.9999th percentiles. Figures (c) and (d) show average rates of return, calculated under 9 different assumptions: varying top-coding cutoff (99.99th, 99.999, or 99.9999th percentiles) and varying weighting procedure (simple average, cost-basis weighted average or absolute capital gains-weighted average). Note that top-coding only applies to gains and does not affect loss returns. Figure (e) plots the average change in asset value relative to sale price measured as percent of sale price for sales that occurred in week 52. The vertical line identifies the 1-year threshold, i.e week 53 for weekly plots. Values are scaled from our 10% random sample of taxpayers to represent 2015-2019 tax year totals.

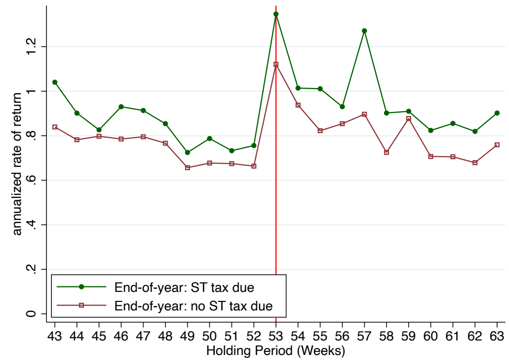
Figure B.7: Average Rates of Return by End-of-Year Tax Liability

Panel A: Average Rate of Return around 1-Year Threshold

(a) Simple Average

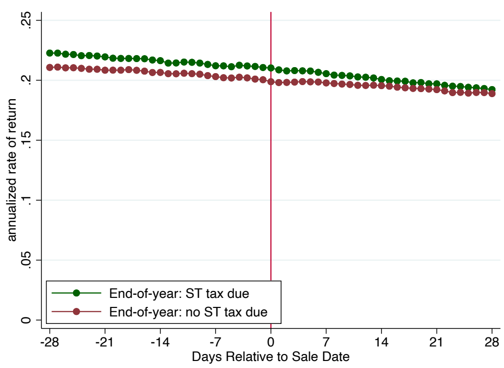


(b) Abs(CGs)-weighted Average

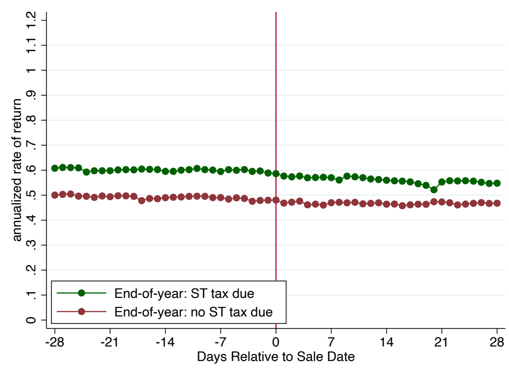


Panel B: Average Rate of Return for Week 52 Sales

(c) Simple Average

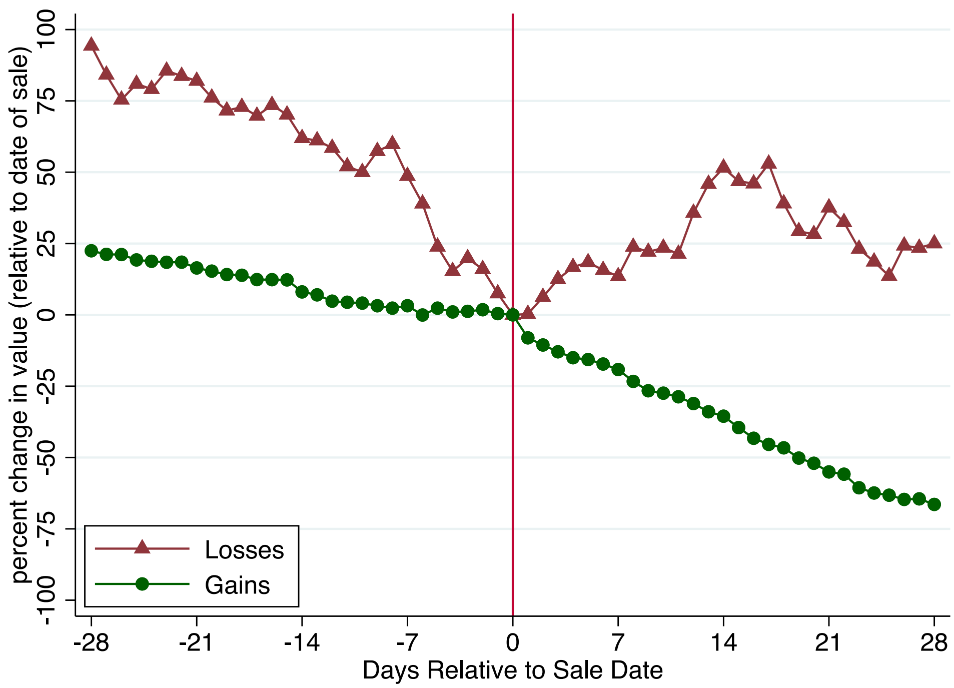


(d) Abs(CGs)-weighted Average



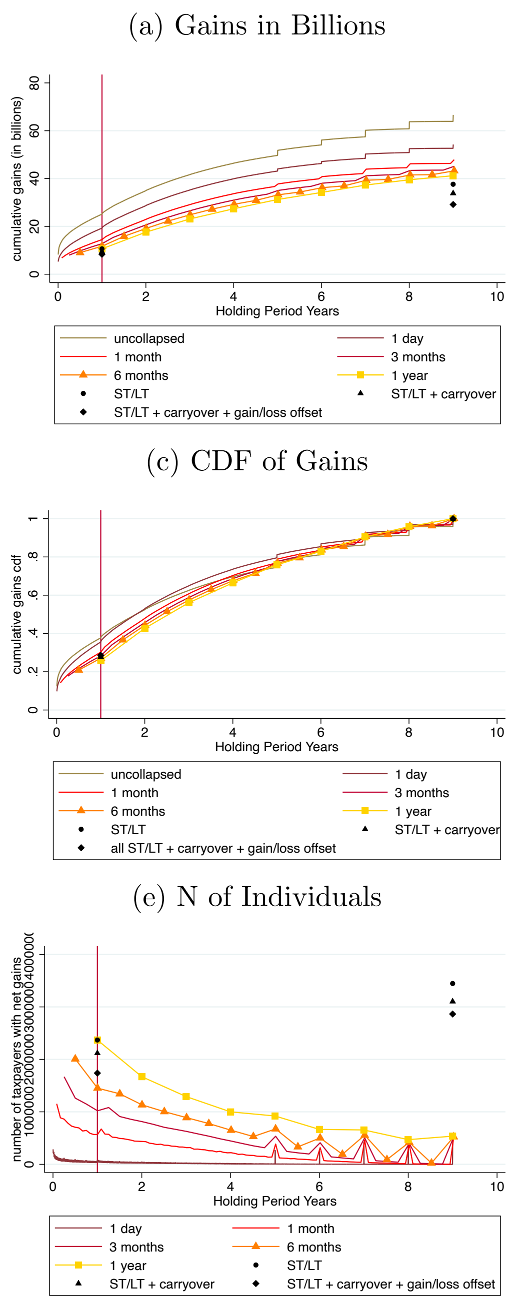
Notes: Figures (a) and (b) plot the average annualized rate of return (absolute value) by holding period week, separately for individuals who have a positive short-term tax liability at the end of the year, and for individuals who do not. The vertical line identifies the 1-year threshold, i.e week 53. Figures (c) and (d) plot the average annualized rate of return for assets that were sold in week 52, separately for individuals who have a positive short-term tax liability at the end of the year, and for individuals who do not, up to 28 days before and after the sale. The vertical line identifies the day of sale.
For all figures, extremely high returns are top-coded at the 99.9th percentile of returns in that tax year. These 99.9th percentiles are very high – greater or equal to 1000%. We report the number of top-coded returns in Appendix Figures B.5 and B.6. Annualized return is calculated as $r = ((1 + CapGain/PurchasePrice)^{52/weeks} - 1)$. Based on a 10% random sample of the U.S. population.

Figure B.8: Change in Value Relative to Sale Price, Week 52 Sales



Notes: Figure plots the average change in asset value relative to sale price measured as percent of sale price for sales that occurred in week 52. The vertical line identifies the 1-year threshold, i.e week 53 for weekly plots. Values are scaled from our 10% random sample of taxpayers to represent 2015-2019 tax year totals.

Figure B.9: Aggregations over Holding Periods



Notes: For details on how these figures are constructed, see notes to Figure 2. The vertical line identifies the 1-year threshold. Values are scaled from our 10% random sample of taxpayers to represent 2015-2019 tax year totals.

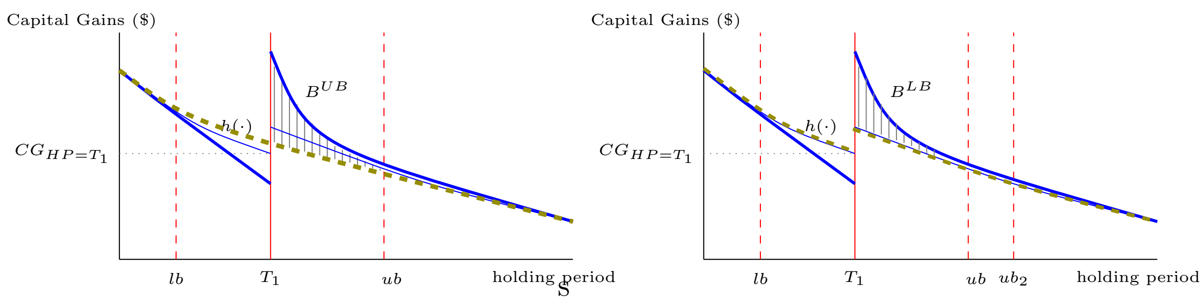
C Bunching Calculations

C.1 Main Results – Bunching Fits

Figure C.10: Estimation of Bunching Mass

(a) Estimation of UB Bunching

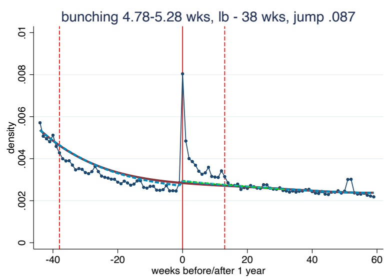
(b) Estimation of LB Bunching



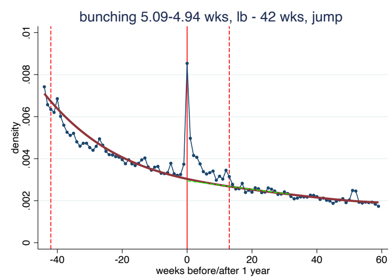
Notes: thin blue lines represent the distribution of capital gains $h(t)$ without intertemporal shifting. Jumps in thin lines at T_1 and T_2 represent the increase in realizations due to lower long-term tax rate. Thick blue lines account for intertemporal shifting that leads to bunching at T_1 or T_2, and a missing mass to the left of the threshold. Thick lines represent the observed distributions of capital gains. Thick dashed lines are constructed counterfactual, shaded area identifies bunching. See Section 3.2 for more details.
In (a), a 4th degree polynomial is fit to the distribution of capital gains and losses in weekly bins, excluding a $[lb, ub]$ region around the 1-year threshold. The polynomial is fit recursively, such that the bunching mass B_{UB} (defined as the difference between the observed density and the counterfactual density in the $[T_1, ub]$ region) is approximately equal to the missing mass (defined as the difference between the counterfactual density and the observed density in the $[lb, T_1)$ region). Our empirical implementation sets $ub = 13$, and fits polynomial to 45 weekly bins to the left of the threshold, and 60 weekly bins to the right of the threshold.
In (b), the counterfactual distribution is estimated in two steps. First, a 1-st degree polynomial is fit to the distribution of capital gains between ub and some higher threshold ub_2. We set $ub_2 = ub + 20$. This counterfactual allows us to measure lower-bound bunching B_{LB}. Second, we fit a 4th degree polynomial to the modified distribution of capital gains omitting a missing mass window $[lb, T_1)$. The lower bound of the omitted window lb is obtained from the first step (Figure (a)). The modified distribution is constructed as follows: it equals to the observed distribution to the right of the threshold (i.e. $(0, T_1)$), to $1/(1 + k)$ times the linear prediction in the window $[T_1, ub]$ and to $1/(1 + k)$ times the observed distribution in the window $[ub, +\infty]$, with k identifying the size of the jump. If the resulting missing mass is smaller than the bunching mass B_{LB}, we try a smaller value of jump k. We continue this procedure until the missing mass equals B_{LB} or $k = 0$. Our starting value of k measures the observed jump in the distribution at the 1-year threshold. Note that lower-bound estimates will actually be larger than upper bound estimates if the observed density to the right of the 1-year threshold is lower than the observed density to the left of the 1-year threshold.

Figure C.11: Bunching Fits: Overall, by End-of-Year ST Tax Liability, By Month of Sale, by State Rules

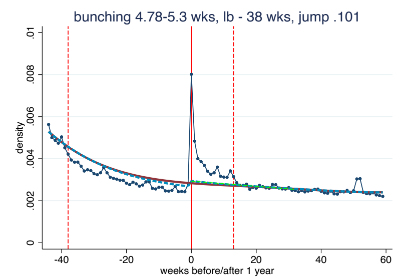
(a) All Gains



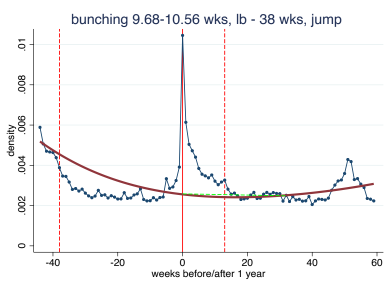
(b) End-of-year ST liability



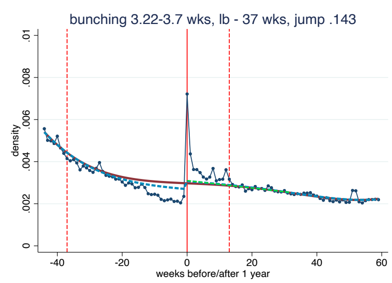
(c) No End-of-year ST liability



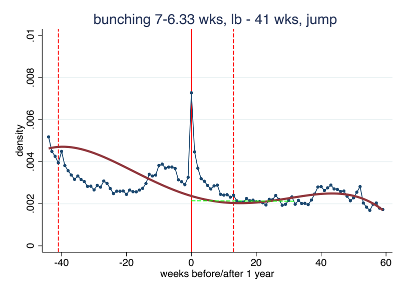
(d) Jan-Feb Sales



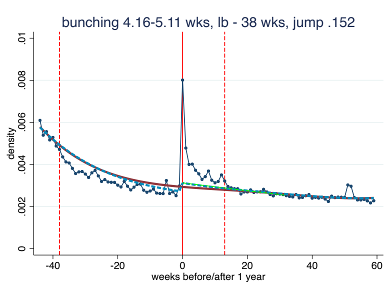
(e) Mar-Oct Sales



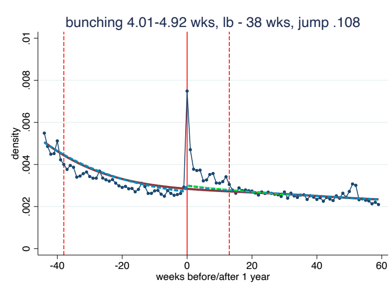
(f) Nov-Dec Sales



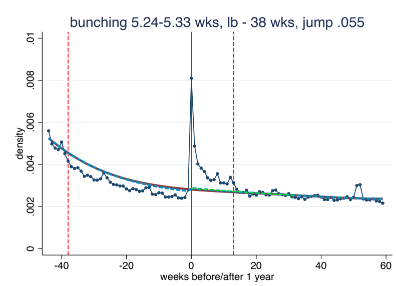
(g) No State Tax



(h) States w/ Preferential LT Rate



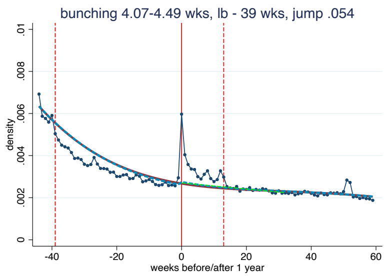
(i) States w/ No Preferential State



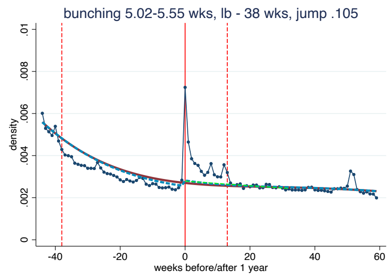
Notes: All figures show distributions of capital gains (not losses). The vertical dashed lines identify ub and lb. The upper-bound counterfactual is given by the solid red curve. The lower-bound counterfactual that allows for a jump is shown by dashed blue curve. The liner local approximation is shown with a dashed green curve.

Figure C.12: Bunching Fits – By Tax Rates

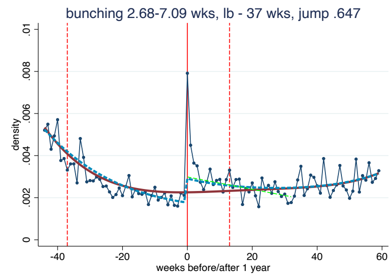
(a) LT MTR=0



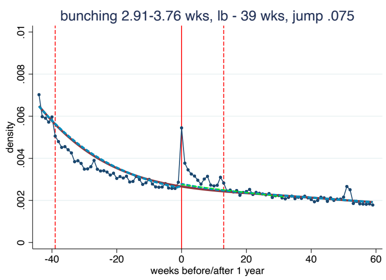
(b) LT MTR=15



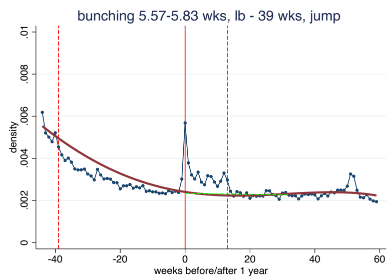
(c) LT MTR=20



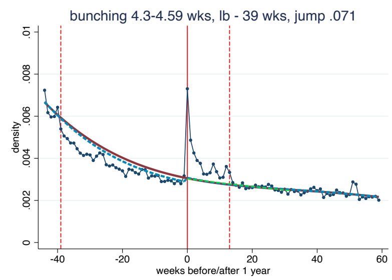
(d) ST MTR=10



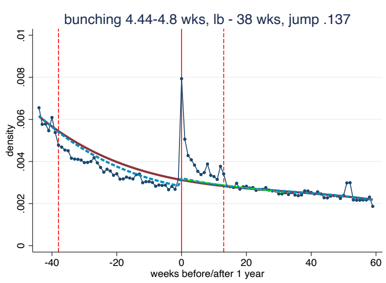
(e) ST MTR=12



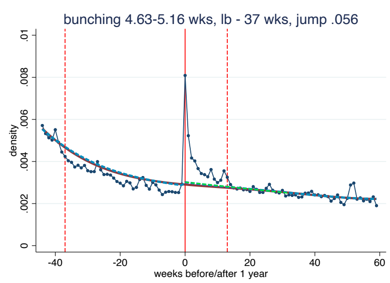
(f) ST MTR=15



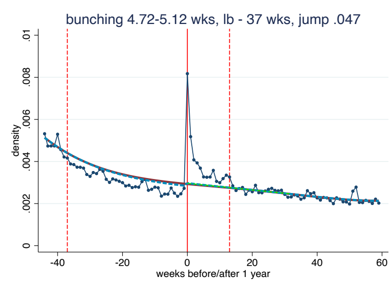
(g) ST MTR=25



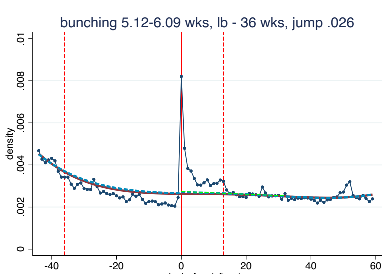
(h) ST MTR=28



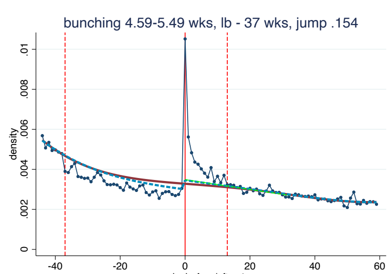
(i) ST MTR=33



(j) ST MTR=35



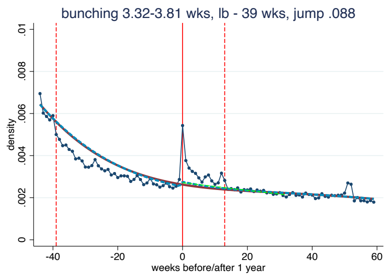
(k) ST MTR=39.6



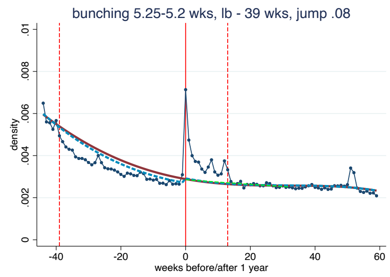
Notes: All figures show distributions of capital gains (not losses). The vertical dashed lines identify *ub* and *lb*. The upper-bound counterfactual is given by the solid red curve. The lower-bound counterfactual that allows for a jump is shown by dashed blue curve. The liner local approximation is shown with a dashed green curve.

Figure C.13: Bunching Fits – AGI and Age

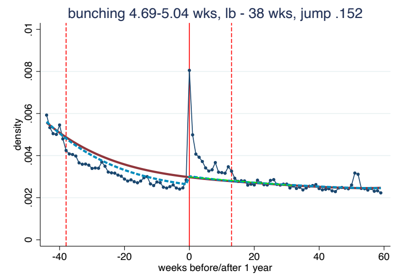
(a) AGI<p50



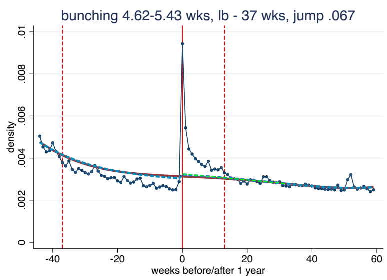
(b) p50<AGI<p90



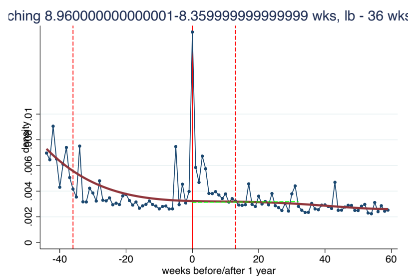
(c) p90<AGI<p99



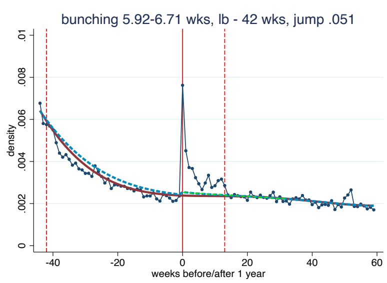
(d) p99<AGI<p99.99



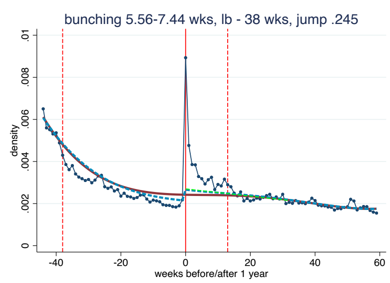
(e) AGI<p99.99



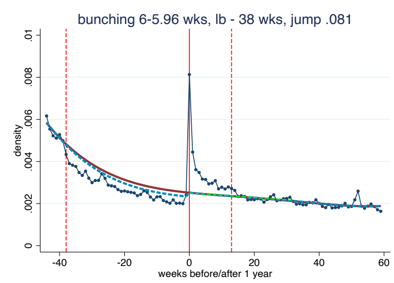
(f) Age<30



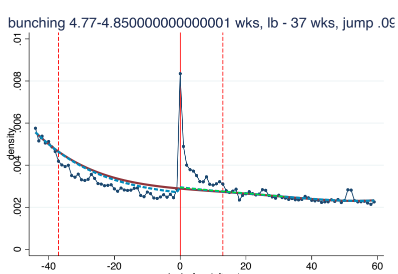
(g) 30<Age<40



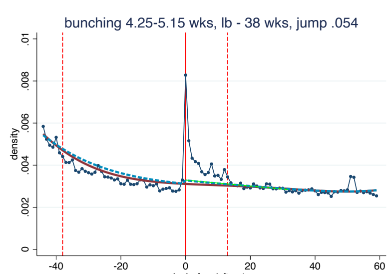
(h) 40<Age<50



(i) 50<Age<60



(j) 60<Age<70



Notes: All figures show distributions of capital gains (not losses). The vertical dashed lines identify *ub* and *lb*. The upper-bound counterfactual is given by the solid red curve. The lower-bound counterfactual that allows for a jump is shown by dashed blue curve. The liner local approximation is shown with a dashed green curve.

C.2 Robustness Checks

Table C.4 shows how our results change when we change estimation parameters. Note that for some parameter choices, our estimation approach is not able to recover meaningful results. For example, when we use a 5th degree polynomial, the implied upper bound bunching mass is lower than lower bound bunching mass. We omit such cases from the table.

C.3 Comparison with Dowd and McClelland (2019)

Similarly to this study, Dowd and McClelland (2019) estimate retimining responses around the 1-year threshold. Our approaches differ in the ways described below.

Data. Dowd and McClelland (2019) use transaction-level data from Form 8949 for tax year 2012. In addition to financial transactions we focus on, Form 8949 includes other transactions – e.g. real estate sales and many other sales that are not third-party reported. However, Form 8949 does not include all financial transactions. Note that individuals who receive Forms 1099b can choose how to include these gains on their tax return. They can either report these capital gains in Box 1a of Schedule D, or list them on Form 8949 and *then* include them in Box 1b of Schedule D.

In contrast, we utilize the full population of 1099b forms (minus sample restrictions outlined in Section 1.2 that are similar to those made by Dowd and McClelland (2019)), irrespective of whether these are later claimed in Box 1a or Box 1b, and use data for tax years 2011 through 2019. Our analysis does not include non-financial transactions as these are not reported via Form 1099b.

It is unknown what drives individuals' decision to report Form 1099b gains on Form 8949. Intuitively, individuals with a large number of transactions should be less likely to report these transactions on Form 8949, as doing so will require a lot of effort. This is consistent with the observed differences in sample statistics: we see a larger number of transactions per person in our data, we see many more transactions with short holding periods, many more transactions with smaller gains, and many transactions with losses.

Bunching Fits. Our approaches to estimating the counterfactual distributions are similar, and the resulting estimates of bunching are similar. As can be see in Section C.2, our setting yields robust estimates of the bunching mass, irrespective of the parameters chosen (e.g. polynomial degree, bunching window, estimation window, etc.) However, estimates of

Table C.4: Bunching Estimates and Estimates of Elasticity ε^{defer}

	Upper Bound Estimate	Bunching estimates		Deferral Elasticity Estimates						Tax Incentives	
				v1		v2		v3			
	$\bar{\varepsilon}$	$\underline{B}$	$\overline{B}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	$\underline{\varepsilon^{defer}}$	$\overline{\varepsilon^{defer}}$	τ^{ST}	τ^{LT}
Preferred specification: polynomial degree 4, left window $lb = -45$, right window $ub = 60$											
All	.43	4.78	5.28	.52	.56	.45	.5	.17	.18	.3	.16
	(.34)	(.849)	(.453)	(.062)	(.033)	(.08)	(.043)	(.02)	(.011)		
End-of-year: no ST tax due	.5	4.78	5.3	.53	.57	.45	.5	.17	.18	.3	.16
	(.336)	(.789)	(9.937)	(.061)	(.067)	(.075)	(.941)	(.02)	(.022)		
End-of-year: ST tax due		5.09	4.94	.39	.39	.47	.45	.17	.17	.31	.16
		(.772)	(203.608)	(.039)	(.119)	(.071)	(18.714)	(.017)	(.053)		
0	.4	4.07	4.49	.55	.6	.58	.64	.18	.2	.12	0
	(.158)	(.997)	(.585)	(.101)	(.054)	(.141)	(.083)	(.033)	(.018)		
.15	.82	5.02	5.55	.83	.89	.75	.83	.28	.3	.25	.15
	(.474)	(1.191)	(.564)	(.136)	(.061)	(.179)	(.085)	(.046)	(.021)		
.2	2.01	2.68	7.09	.24	.49	.16	.42	.06	.11	.4	.2
	(.725)	(2.895)	(2.752)	(.171)	(.089)	(.172)	(.163)	(.04)	(.02)		
Robustness check 1: polynomial degree 5, left window $lb = -45$, right window $ub = 60$											
All			3.78		.73		.35		.15	.3	.16
			(.311)		(.042)		(.029)		(.009)		
End-of-year: no ST tax due			3.8		.74		.36		.15	.3	.16
			(.488)		(.071)		(.046)		(.014)		
End-of-year: ST tax due			3.63		.33		.33		.14	.31	.16
			(6.853)		(.176)		(.63)		(.072)		
0			2.64		.88		.37		.13	.12	0
			(.579)		(.155)		(.082)		(.023)		
.15			3.53		1.22		.53		.22	.25	.15
			(.318)		(.07)		(.048)		(.013)		
.2	1.17	2.68	5.19	.32	.52	.16	.31	.06	.09	.4	.2
	(.872)	(4.016)	(4.937)	(.243)	(.187)	(.238)	(.293)	(.042)	(.032)		
Robustness check 2: polynomial degree 4, left window $lb = -45$, right window $ub = 40$											
All	.03	4.78	4.78	.51	.51	.45	.45	.17	.17	.3	.16
	(.26)	(.601)	(1.4)	(.043)	(.094)	(.056)	(.131)	(.014)	(.032)		
End-of-year: no ST tax due	.09	4.78	4.79	.52	.52	.45	.45	.17	.17	.3	.16
	(.212)	(.597)	(2.46)	(.045)	(.108)	(.057)	(.233)	(.015)	(.036)		
End-of-year: ST tax due		5.09		.59		.47		.21		.31	.16
		(.414)		(.032)		(.038)		(.011)			
0	.07	4.07		.75		.58		.21		.12	0
	(.152)	(.295)		(.04)		(.042)		(.011)			
.15			4.6		.76		.69		.26	.25	.15
			(4.52)		(.252)		(.679)		(.087)		
.2	.76	2.68	4.09	.41	.56	.16	.24	.06	.08	.4	.2
		(1.974)	(.604)	(.218)	(.063)	(.117)	(.036)	(.03)	(.009)		
Robustness check 3: polynomial degree 4, left window $lb = -35$, right window $ub = 60$											
All			4.7		.72		.44		.17	.3	.16
			(.297)		(.035)		(.028)		(.008)		
End-of-year: no ST tax due			4.72		.74		.45		.17	.3	.16
			(.202)		(.027)		(.019)		(.006)		
End-of-year: ST tax due											
0			3.98		.86		.56		.18	.12	0
			(.217)		(.041)		(.031)		(.009)		
.15			4.49		1.12		.67		.26	.25	.15
			(.251)		(.045)		(.038)		(.01)		
.2	1.83	2.68	6.39	.33	.61	.16	.38	.06	.11	.4	.2
		(2.972)	(1.241)	(.233)	(.082)	(.176)	(.074)	(.04)	(.014)		

Notes: For estimation details see Section 3.2. Estimate $\bar{\varepsilon}$ identifies the upper bound on elasticity of capital gains ε. Bunching estimates $\underline{B}$ and $\overline{B}$ are measured in weeks. Estimates $\underline{\varepsilon^{defer}}$ and $\overline{\varepsilon^{defer}}$ represent lower and upper bound estimates of deferral elasticity, which are calculated in three ways as described in Section 3.2: v1 follows the approach of Dowd and McClelland (2019), v2 estimates retiming responses in weeks, and v3 measures what share of capital gains is deferred past one year mark. Bunching fits are available in Appendix C. Estimates of $\bar{\varepsilon}$ are missing in cases where the observed distribution to the right of the 1-year threshold is lower (after removing bunching) than the observed distribution to the left of the 1-year threshold.

the missing mass window are sensitive to specification. For example, our preferred specification implies a missing mass window of 38 weeks, which is significantly larger than the 24 weeks in Dowd and McClelland (2019). In our subjective opinion, our preferred counterfactual fit is "better" in a sense that our counterfactual distribution in Figure C.11(a) is a continuously decreasing distribution, while the counterfactual distribution shown in Figure 6 of Dowd and McClelland (2019) features a notable hump in the missing mass window.

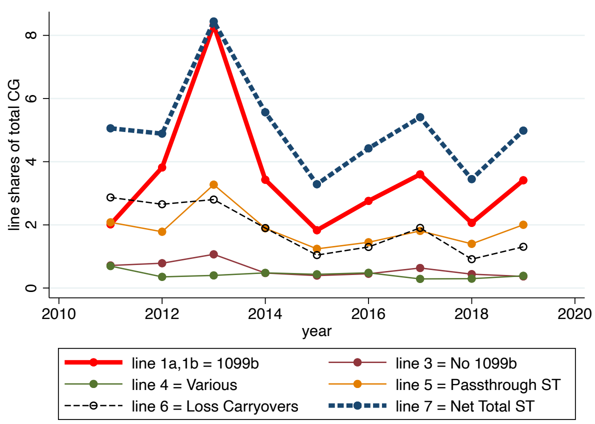
Elasticity calculation. Our elasticity calculations differ in three ways. First, Dowd and McClelland (2019) report tax elasticities, while we report net-of-tax elasticities. Therefore, one must multiply their elasticity estimates by $(1-t)/t$ before comparing to our estimates. Second, Dowd and McClelland (2019) use average federal plus state long- and short-term tax rates (13.6% and 27.4%), while we use capital-gain-weighted federal tax rates (16% and 30%). Third and the primary difference, is how we calculate the percent change in capital gains. As discussed in Section 3.2, their approach is to measure the change in short-term realizations relative to *potential amount of realizations*, in other words, divide bunching mass by the counterfactual capital gains in the missing mass window. As we discussed earlier, our estimates of counterfactual capital gains are very different: their missing mass window (24 weeks) is much smaller than ours (38 weeks), implying a lower level of counterfactual gains. As a result, their estimate of capital gains elasticity is much higher.

Multiplying Dowd and McClelland (2019) elasticity estimate of -0.468 by (1-0.274)/0.274 to convert to net-of-tax elasticity and then by 24/38 as a transparent but very rough correction for the differences in the counterfactual gains in the missing mass window, gives a comparable estimate of 0.78. This estimate is higher compared to our version 1 upper bound estimate of 0.55 from Table 2, but not fundamentally different. We are able to recover a similar elasticity when using a 5th degree polynomial (see Table C.4, robustness check 1.)

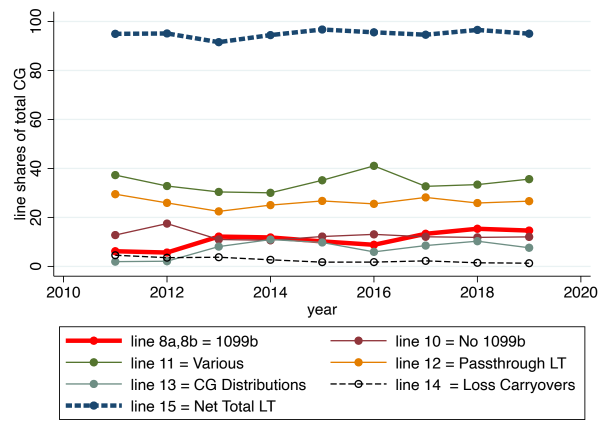
D Schedule D – Additional Evidence

Figure D.14: Capital Gain Realizations by Type of Capital Gain

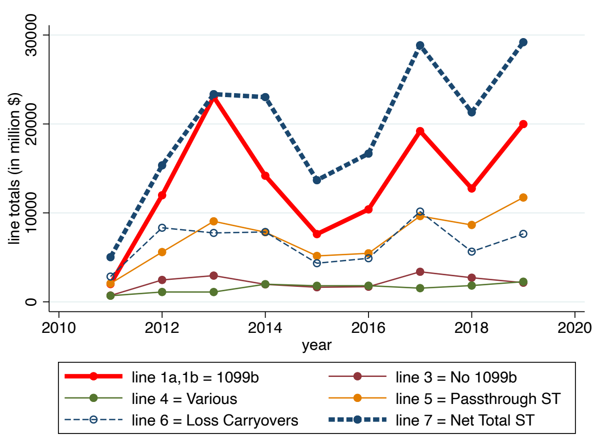
(a) ST Gain Shares of Overall Net Gains



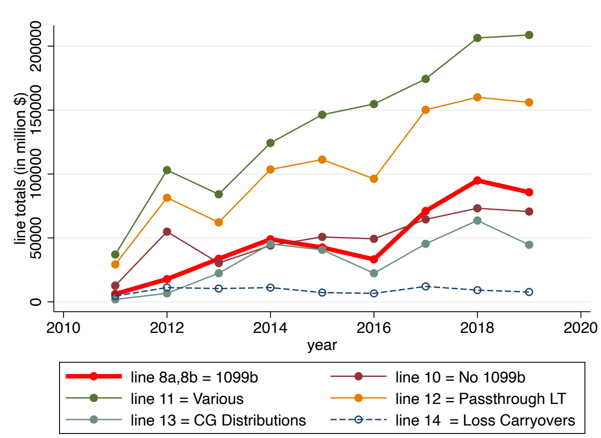
(b) LT Gain Shares of Overall Net Gains



(c) ST Gain Total



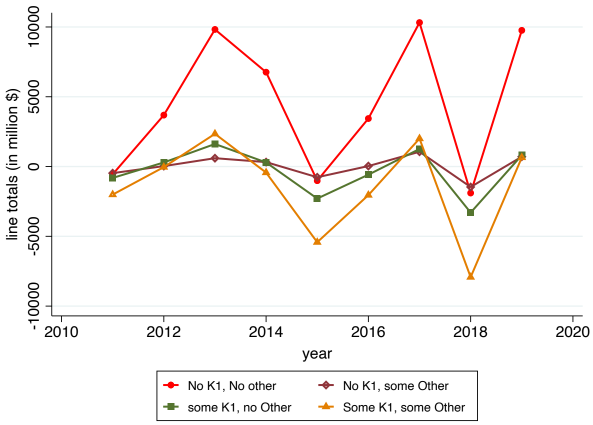
(d) LT Gain Total



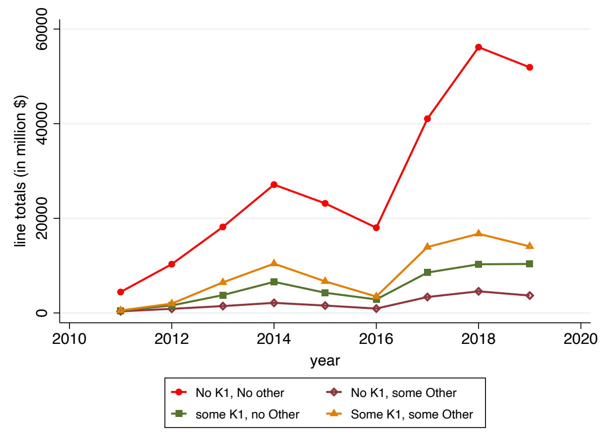
Notes: Figures (a) and (b) show the Schedule D line totals as percent of overall net gain total (i.e. Schedule D line 16, sum of ST and LT gains) while Figures (c) and (d) show actual dollar totals, all among individuals with positive net gain total (i.e. positive Schedule D line 16). Scaled from a 10% random sample of Schedule Ds filed by electronic filers to represent U.S. totals.

Figure D.15: Schedule D Totals (Aggregate Capital Gains) by Type of Individuals

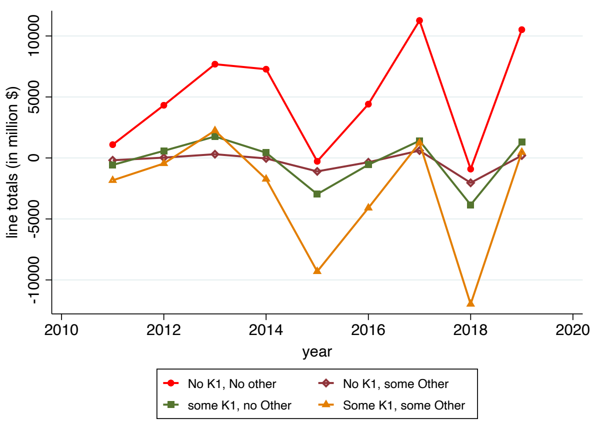
(a) 1099B ST (lines 1a, 1b, 2)



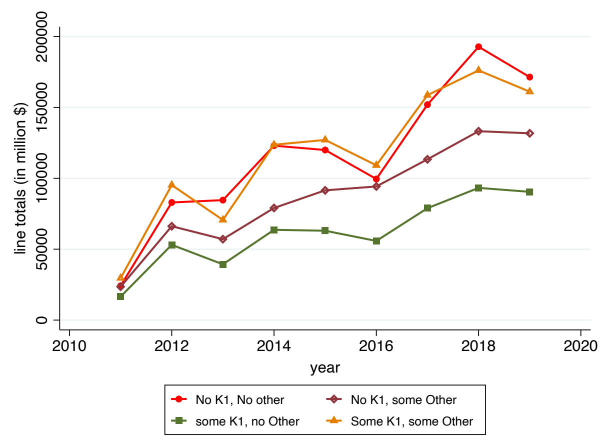
(b) 1099B LT (lines 8a, 8b, 9)



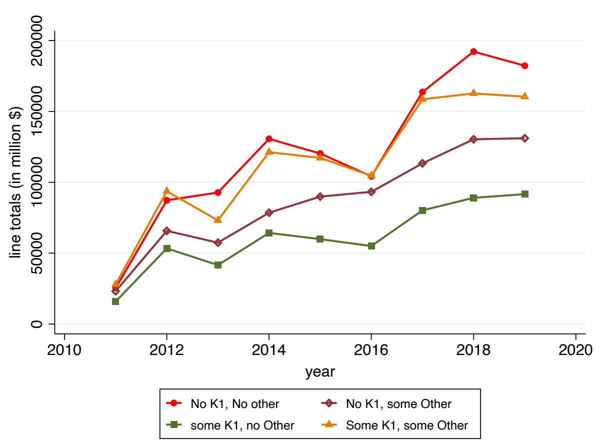
(c) ST total (line 7)



(d) LT total (line 15)

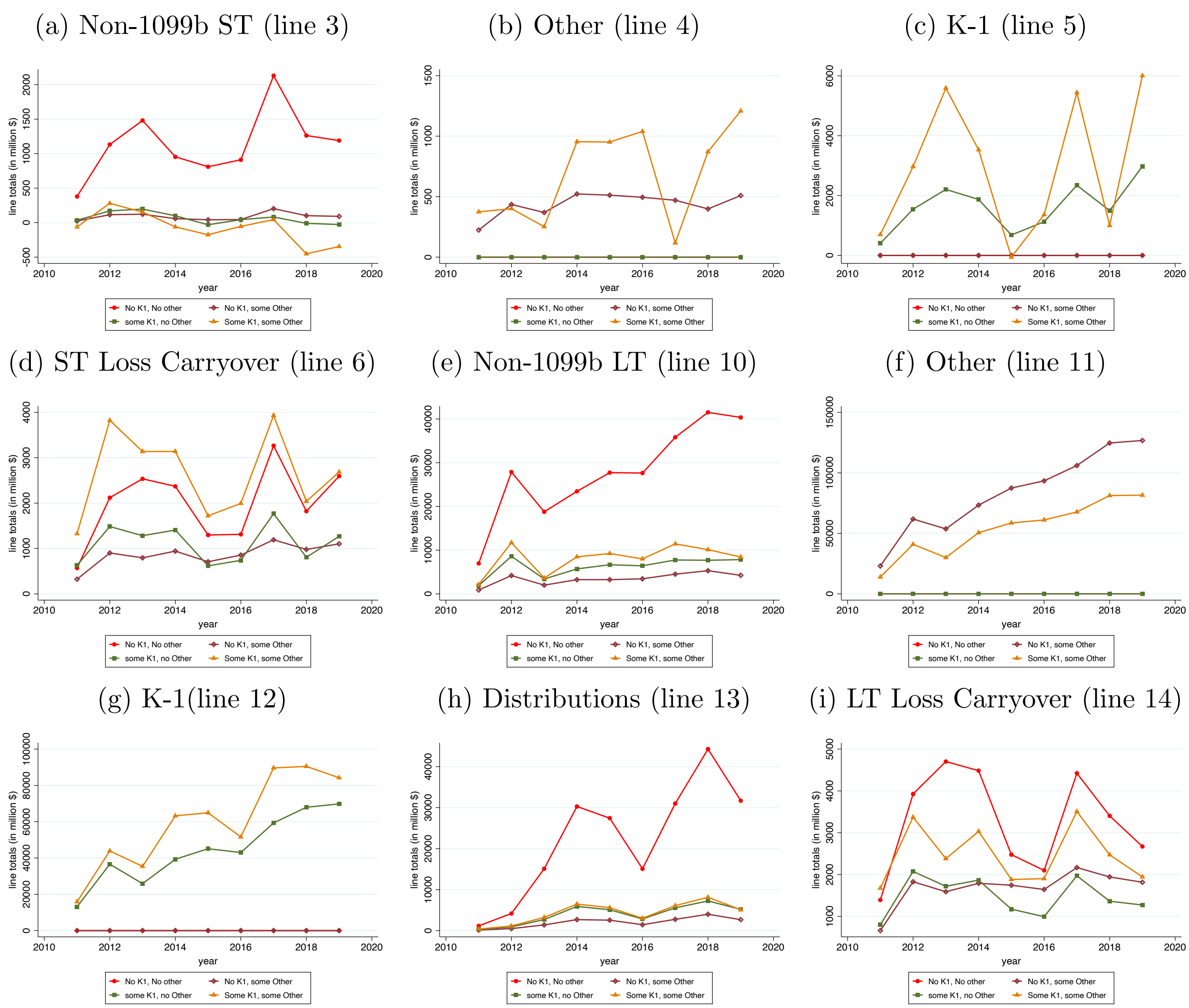


(e) Overall Total (line 16)



Notes: Values are scaled from our 10% random sample of taxpayers to represent 2015-2019 tax year totals.

Figure D.16: Schedule D Totals (Aggregate Capital Gains) by Type of Individuals



Notes: Values are scaled from our 10% random sample of taxpayers to represent 2015-2019 tax year totals.