# Internet Appendix to "Stock prices under pressure: How tax and interest rates drive returns at the turn of the tax year"

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# 1 Data Description

The raw U.S. firm-level data come from five different databases. The first of these, the Center for Research in Securities Prices (CRSP) stock file, provides daily prices, shares outstanding, trading volumes, and returns for all NYSE, AMEX, and NASDAQ listed stocks. The second database, the Compustat North America annual file, contains the relevant accounting information for most publicly traded U.S. stocks. The third database is the Trade and Quote (TAQ) trade-level data, which is used to compute the selling pressure variable. The fourth database contains the trades and positions of individual investors from a large discount brokerage, described in Odean (1998).[2]

We measure the log book-to-market equity ratio (denoting the transformed quantity by $BM$ in contrast to simple book-to-market by $BE/ME$) as of the end of June in year $t$. We measure $BE$ for the fiscal year ending in calendar year $t-1$, and $ME$ (market value of equity) at the end of June of year $t$. Following Fama and French, we define $BE$ as stockholders' equity, plus balance sheet deferred taxes (Compustat data item 74) and investment tax credit (data item 208) (if available), plus post-retirement benefit liabilities (data item 330) (if available), minus the book value of preferred stock.[3] We require each firm-year observation to have a valid past $BE/ME$ ratio that must be positive in value. Moreover, in order to eliminate likely data errors, we censor the $BE/ME$ variables of these firms to the range (.01,100) by adjusting the book value. To avoid influential observations created by the log transform, we first shrink the $BE/ME$ towards one by defining $BM \equiv \log[(.9BE + .1ME)/ME]$.

As mentioned in the paper, we examine individual trading behavior using two data sources. First, we follow Lee and Ready (1991) and Hvidkjaer (2005) to form a selling pressure variable from the 1993-2005 TAQ dataset. Buy versus sell trades are identified in terms of their relation to the midpoint of the bid-ask spread. We classify trades as individual or institutional based on trade size, identifying individual

[2] We thank Terry Odean for providing the database.

[3] Depending on availability, we use redemption (data item 56), liquidation (data item 10), or par value (data item 130) (in that order) for the book value of preferred stock. We calculate stockholders' equity used in the above formula as follows. We prefer the stockholders' equity number reported by Moody's, or Compustat (data item 216). If neither one is available, we measure stockholders' equity as the book value of common equity (data item 60) plus the book value of preferred stock. (Note that the preferred stock is added at this stage, because it is later subtracted in the book equity formula.) If common equity is not available, we compute stockholders' equity as the book value of assets (data item 6) minus total liabilities (data item 181), all from Compustat.

trades as those trades under a \$10,000 cutoff. We define selling pressure ($Sell$) as the ratio of sell trades to all trades for that classification. Second, we analyze individual investor trades using the Odean dataset, which contains the 1.27 million transactions of retail clients of a US based brokerage from 1991 until 1996. We identify purchase and sell orders at the firm-level using cusip codes.

The raw U.K. firm-level data come from the Compustat Global database. We obtain daily prices, shares outstanding, trading volumes, and returns from the Security Data tables. We obtain accounting information from the Fundamentals Annual tables in order to construct log book-to-market equity ($BM$) and book-to-market ($BE/ME$) ratios as defined for the U.S.

# 2 Alternative specifications of the tax-selling premium

In this section, we analyze the behavior of our proposed variable $\gamma$ and its relation to interest rates and capital gains tax rates in the US data. The analysis in the main body of the paper is based on the one-year Fama-Bliss interest rate, but we also considered other proxies for interest rates. These alternative proxies include seasonally-unadjusted rates on auto loans, personal loans, and credit card loans and are available from the Federal Reserve Table "Terms of Credit at Commercial Banks and Finance Companies".[4] Specifically, auto loans are 48-month new auto loans provided by commercial banks. Personal loans are 24-month personal loans provided by commercial banks. The last proxy we consider is the rate on credit card loans from credit card companies.

Our primary interest rate, our capital gains tax rate and the resulting $\gamma$ are plotted in Figure IA.1 using the one-year Fama-Bliss interest rate. Figure IA.2 plots the resulting $\gamma's$ for each of four alternative interest proxies that also include credit risk. All five proxies for $\gamma$ appear persistent but stationary. Generally speaking, the significant common variation in the five proxies for $\gamma$ over this period suggests a possibly large time-series variation in the incentives for tax-motivated selling. One advantage of the Fama-Bliss proxy is that this is the only proxy with the desired constant one-year horizon. Nevertheless, all versions are highly correlated. The al-

[4] http://www.federalreserve.gov/releases/g19/Current/

ternative to the Fama-Bliss $\gamma$ with the lowest correlation is the credit card $\gamma$, but correlation remains high at 0.73. A noticeable difference among these series can be seen in 2008 when the Fama-Bliss $\gamma$ is at its lowest level, but all the other measures are essentially stable relative to the previous year or even slightly higher as in the case of the Auto Financing rate. In 2008, one might expect (and in actuality there was) a wide cross-sectional variation in interest rates among individuals as there was a wide range of credit worthiness.

We find that most of the time-series variation in $\gamma$ is due to changes in interest rates although capital gains tax rates also explain part of the variation. Table IA.I provides regression analysis of the relation between $\gamma$ and its components. The linear model explains 95% of the variation in $\gamma$. A variance decomposition analysis based on this regression shows that the component of interest rates that is orthogonal to tax rate variation explains 42% of the total variation in $\gamma$ while the corresponding number for variation attributable to tax rates is 28%. Based on this comparison, interest rates are more important than tax rates in explaining variation in $\gamma$. Table IA.I also reports descriptive statistics for our tax-selling variable, $\gamma$, as well as for its two components. Interest rates had significant variation during this time period. The maximum capital gains tax rate varies from 20% to almost 40% over this period. While not shown, most of the time-variation in the U.K. version of $\gamma$ is also due to changes in interest rates since the U.K. capital gains tax rate changes only once in our sample.

# 3 Estimated taxes and tax-loss selling

In this section, we analyze whether the interest rate channel remains the important driver of time variation in turn-of-the-year mispricing linked to tax-loss selling once quarterly estimated tax payments are taken into account. The typical taxpayer prepays the majority of their tax through a wage withholding system where tax is automatically subtracted from gross income by an employer. For income which is not subject to withholding such as gains from the sale of assets, taxpayers are required to make quarterly estimated tax payments. These estimated tax payments are due on April 15, June 15, September 15, and January 15. The analysis in the main body of the paper ignores these quarterly payments. If a significant number of investors must pay estimated taxes, there are at least two concerns.

The first concern follows directly from the fact that the last quarterly estimated tax payment for the current tax year (year $t$) is due January 15 of year $t+1$ and the first estimated tax payment for the subsequent tax year (year $t+1$) is due April 15 of year $t+1$. Thus it may be the case that deferring a sale from December of year $t$ to January of year $t+1$ only moves the tax consequences arising from the sale from January 15 to April 15. This deferral of only three months is significantly less than the 12 months assumed in the analysis in the paper.

However, a careful examination of the tax code indicates that this concern is mitigated by the fact that estimated tax payments for each tax quarter are not tied directly to income in that tax quarter. Instead, the general rule determining the minimum year $t+1$ quarterly estimated tax payment is that it must be the smaller of 22.5% of whatever year $t+1$'s tax turns out to be *or* 25% of the tax paid in year $t$ (see page 48 of IRS Publication 505).[5] The ability to tie the subsequent year $t+1$'s estimated tax payments to the previous year $t$'s tax is commonly called the safe harbor rule. For those investors who take advantage of the safe harbor rule, the estimated tax payment due in April as well as the three subsequent estimated tax payments are completely insensitive to the increase in tax owed for year $t+1$ by the deferred sale. Any additional tax on that sale is only due on April 15th of year $t+2$.

Of course, if it is not optimal for a taxpayer to take advantage of the safe harbor rule, quarterly estimated tax payments will depend on the tax consequences of the sale. However, the first quarterly estimated tax payment in April would only increase by 22.5% of the tax increase (as 67.5% will be spread evenly over the three subsequent quarterly estimated tax payments and 10% will be due in April of year $t+2$). As a consequence, though estimated tax payments are paid quarterly, the effective discounting will still be at a longer horizon than quarterly and thus the benefit of deferring the sale will still be significant.

Table IA.II measures the effective discounting horizon when delaying a sale from December year $t$ to January year $t+1$ under the current quarterly estimated tax payment system. We study the four cases that arise when the investor does or does not qualify for the safe harbor rule in tax years $t$ and $t+1$. Case 1 of Table IA.II involves a safe harbor for year $t$ as well as a safe harbor for year $t+1$. Selling a winner in January of year $t+1$ would not make the investor pay more estimated taxes in year

[5] Taxpayers with adjusted gross income more than $150,000 ($75,000 if married filing a separate return) compare 22.5% of this years tax to 27.5% of last year's tax in order to calculate the minimum estimated tax payment.

$t+1$ because of the safe harbor.[6] Instead, the investor would pay capital gains tax in the following year's tax return, therefore April 15th at $t+2$ (15 months and 15 days later) without a penalty. If selling in December of year $t$ implies a payment on April 15th at $t+1$ (under the assumption that the investor waits as long as possible to file his or her taxes), the relevant discounting horizon is then 12 months (15.5 months – 3.5 months). In Case 1, one could realize an unlimited amount of capital gains at the beginning of year $t+1$ but pay taxes on those gains more than a year later.

Case 2 of Table IA.II involves safe harbor for year $t$ but no safe harbor for year $t+1$. The investor pays 90% of any increase to the current year's taxes spread evenly over the next four tax quarters and the remaining 10% is paid on April 15th of year $t+2$. The average discounting horizon is thus 5.03 months. Of course, as the investor sells more and more capital gains, he or she would eventually move back to Case 1 with the relevant discounting period becoming again 12 months.

Case 3 of Table IA.II involves no safe harbor for year $t$ but safe harbor for year $t+1$. This case corresponds to an effective discounting period longer than that assumed in the main analysis as the investor compares a tax payment of 90% on January 15th of year $t+1$ and 10% on April 15th of year $t+1$ to a 100% payment on April 15th of year $t+2$. In this case, the relevant discounting horizon is 14.7 months.[7] Finally, case 4 of Table IA.II involves no safe harbor for year $t$ as well as no safe harbor for year $t+1$. In this case, the relevant discounting period is 7.73 months.

Taken together, these cases indicate that even if the marginal investor is paying quarterly estimated taxes, in two of the four typical cases, the effective discounting horizon is a year or more and in no case is the effective discounting horizon three months. Under the conservative assumption that being in or out of safe harbor status is equally likely each year, the average discounting horizon is nearly 10 months (9.86 months).[8] Thus, we conclude that it is not obviously the case that the presence

[6] All else equal, estimated taxes for year t+1 will increase if the investor realizes the gain in December of year t. For the sake of simplicity, we ignore this consequence of the decision to defer sale of the stock to January of t+1. Note, however, that this consequence further increases the benefit of delaying capital gains and accelerating capital losses at the turn of the year.

[7] Again, we ignore the consequences on estimated taxes for t+1. However, this consequence again further increases the benefit of delaying capital gains and accelerating capital losses at the turn of the year.

[8] Safe harbors are more likely when income is increasing. As incomes have been increasing over our sample period, one could argue that the case with no safe harbor in either year t or year t+1 should be downweighted. As that case has a discount horizon of 7.73 which is less than the average

of quarterly estimated taxes invalidates our annual approach. Nevertheless, in Table IA.IV, we re-estimate our main results using a quarterly discount rate instead of an annual discount rate. We find that the statistical significance of our results remains effectively the same. However, the absolute magnitude of the coefficients on the relevant December and January dummies are now implausibly high. We conclude that an annual rather than a quarterly discounting horizon is a more plausible description of the data.

The second concern is that the deferral around the other estimated tax quarters should matter as well, not just the deferral at the end of the year. A turn-of-the-tax-quarter effect seems less likely than a turn-of-the-tax-year effect, however, as the discussion above makes it clear that estimated tax payments for each tax quarter are not tied directly to income in that tax quarter. If an investor is using the safe harbor rule, then the quarterly timing of the sale is clearly irrelevant. Moreover, even if it is not optimal for the investor to use the safe harbor rule, estimated tax payments are made based on a percentage (22.5%) of the *annual* estimated tax.

There are two clarifications to that conclusion. First, estimated tax payments do not have to start until the taxpayer has income on which he or she will owe income tax. As a consequence, an investor who at a particular point in time has realized no income that is not subject to withholding can delay paying estimated tax by delaying his or her initial capital gains realization. Second, the IRS does recognize that some investors may not receive income evenly throughout the year and, as a consequence, allows investors the option to vary their estimated tax payments with their realized income. This approach to determining estimated taxes is dubbed the annualized income installment method (AIIM) by the IRS. Note that AIIM is not a requirement to align more closely estimated tax payments to realized income but is instead only an option. As a consequence, this method will typically only be used for those investors who both expect to have a significant increase in income near the end of the tax year and who, relatively speaking, paid a lot of tax last year.[9]

The aspect of AIIM that is critical to our conclusion is that despite the perception of AIIM being beneficial to an investor with income distributed unevenly throughout

discount horizon of 9.86, more reasonable assumptions concerning the likelihood of the four cases may in fact increase the average discount horizon.

[9]There exist ways in which a tax-savvy investor can minimize the present value of his or her taxes more effectively than through AIIM. For example, an investor who only has capital gains realizations as income can skip a year between those capital gains realizations, never pay estimated tax, realize unlimited amounts of capital gains, and yet never be subject to penalty.

the year, AIIM is not a pure quarterly tax system. To illustrate this point, Table IA.III provides the estimated tax payments under AIIM for an investor realizing a single income payment of $100,000 (for example from selling a stock) in one of the four possible tax quarters of the year.[10] These calculations follow directly from the AIIM worksheet provided by the IRS. Table IA.III shows that there are benefits from delaying payments from one tax quarter to the next. However, these benefits are muted due to two important aspects of the problem. One, the deferral is only over a tax quarter. Two, the change in estimated tax is less than 100% of the tax owed. For example, the delay in payment from the first to the second tax quarter is 22.5% of the amount of total tax required. In conjunction with the delay being for only (approximately) three months, the effect is quite small relative to the annual effects our main analysis studies where 100% of the tax owed can be delayed by a year or more.[11]

In summary, many investors pay equal installments for their estimated tax (whether due to a safe harbor or not). For those investors that do not pay equal installments, the turn-of-the-tax-quarter effect is much smaller than the turn-of-the-tax-year effect because of the shorter horizon and smaller portion of tax being delayed. Nevertheless, in regression (1) of Table IA.V, we re-estimate our main results introducing dummies for turn of the tax quarter.

$$\begin{aligned}
r_{i,t} \; = \; & a_1\gamma_{t-1}g_{i,t-1}RoY \\
& +a_2\gamma_{t-1}g_{i,t-1}QW(-4) + a_3\gamma_{t-1}g_{i,t-1}QW(-3) + a_4\gamma_{t-1}g_{i,t-1}QW(-2) + a_5\gamma_{t-1}g_{i,t-1}QW(-1) \\
& +a_6\gamma_{t-1}g_{i,t-1}QW(+1) + a_7\gamma_{t-1}g_{i,t-1}QW(+2) + a_8\gamma_{t-1}g_{i,t-1}QW(+3) + a_9\gamma_{t-1}g_{i,t-1}QW(+4) \\
& +a_{10}\gamma_{t-1}g_{i,t-1}YW(-4) + a_{11}\gamma_{t-1}g_{i,t-1}YW(-3) + a_{12}\gamma_{t-1}g_{i,t-1}YW(-2) + a_{13}\gamma_{t-1}g_{i,t-1}YW(-1) \\
& +a_{14}\gamma_{t-1}g_{i,t-1}YW(+1) + a_{15}\gamma_{t-1}g_{i,t-1}YW(+2) + a_{16}\gamma_{t-1}g_{i,t-1}YW(+3) + a_{17}\gamma_{t-1}g_{i,t-1}YW(+4) \\
& +a_{18}g_{i,t-1} + a_{19}\ln ME_{i,t-1} + a_{20}\ln BM_{i,t-1} + a_{21}\ln ME_{i,t-1}Jan + \varepsilon_{i,t}.
\end{aligned}$$

The main dummy variables are $QW(w)$, $YW(w)$, and $RoY$. These variables refer to the week ($w$) relative to the turn of the tax quarter (in the case of $QW(w)$) and the turn of the year (in the case of $YW(w)$) of the return being predicted. $RoY$ refers to the remaining weeks in the year not captured by $QW(w)$ and $YW(w)$. We find no evidence of a turn-of-the-tax-quarter effect.

[10] Note that the actual amount of the gain is mostly irrelevant and only provided in the text and the table for illustrative purposes.

[11] We emphasize that turn-of-the-year calculations are independent of whether the AIIM method is used for the calculation of estimated taxes.

To increase power, we would ideally exploit variation in the rules concerning estimated tax payments. We were unable to find good documentation as to the way rules concerning estimated taxes have varied over time. However, even if the rules have not changed, the relative importance of the safe harbor aspect of the estimated tax payment rules should vary over time with economic conditions. Regression (2) of Table IA.V reports results where we interact the relevant coefficients in regression (1) with a dummy equal to 1 if the current year (up to and including the tax quarter in question) had any month classified as a NBER recession and the previous year did not. We now find evidence of a turn-of-the-tax-quarter effect for those years. Specifically, the NBER recession dummy interaction is statistically significant in the last week of the tax quarter. Moreover, a one-sided joint hypothesis test on the vector of the total effect (coefficient throughout the sample plus the interaction coefficient) rejects with a $p$ value less than 5% the null that the total effect during those NBER quarters is jointly negative in the week before the turn of the tax quarter and positive in the week after the turn of the tax quarter. This finding is consistent not only with price pressure bounds at the turn of the tax quarter that are linked to our tax-selling premium but also with our argument that safe harbors play an important role in the sensitivity of estimated taxes to the timing of harvesting capital losses.

# 4 Anticipated changes in capital gains tax rates

In this section, we analyze whether incorporating anticipated tax rate changes at the turn of the year affect our conclusions. In some cases, investors knew with near certainty at the end of December what the change in the capital gains tax rate will be in the following year. If that is the case, then it is straightforward to show that our tax-selling premium, $\gamma = \tau\frac{(1-B)}{(1-B\tau)}$, becomes $\gamma = \frac{(\tau_t - \tau_{t+1}B)}{(1-B\tau_{t+1})}$. In Tables IA.VI and IA.VII we reestimate Table II from the main paper using this two-tax-rate formulation. Table IA.VI uses this two-tax-rate formula for $\gamma$ except for those major tax rate changes which, based on our analysis, were retroactive (1976, 1997, and 2003). For those three major tax rate changes, we continue to use the one-rate formulation. We find that results are qualitatively the same and remain statistically significant though less strongly. As even retroactive tax rates could be anticipated, Table VII uses the two-tax-rate formula in every case with similar results. Overall, we conclude that taking into account anticipation of tax rate changes across the turn of the year does not eliminate our results. Marginally weaker results when our tax-selling premium is adjusted for changes in tax rates are, however, consistent with investors not anticipating changes in tax rates.

Table IA.I: Descriptive Statistics and Correlations of Macro Variables: 1954-2008
We compute the tax-selling premium, $\gamma = \tau\frac{(1-B)}{(1-B\tau)}$, using the highest long-term capital gains tax rate, $\tau$, from the IRS and the one-year interest rate, $r$, from the Fama-Bliss dataset to compute a one-year discount factor, $B$. As the tax rate changes at most once a year, we report below sample characteristics of $\gamma$ and its components as well as regression output using values as of the end of December of each year. Therefore, the sample consists of 55 years of data from 1954 to 2008. $T$-statistics are in parentheses. Panel A shows simple descriptive statistics. Panel B estimates the linear relation between interest rates and capital gains tax rates. Panel C shows that a linear approximation explains 95% of the variance in $\gamma$. Panel D shows that interest rates explain most of the variation in $\gamma$.

Panel A: Descriptive Statistics

| Variable | N | Mean | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| $r$ | 55 | 0.055 | 0.028 | 0.004 | 0.129 |
| $\tau$ | 55 | 0.261 | 0.061 | 0.157 | 0.399 |
| $\gamma$ | 55 | 0.019 | 0.013 | 0.001 | 0.060 |

Panel B: Regression: $r = a + b\tau + e$

| | Intercept | $\tau$ | | $R^2$ |
|---|---|---|---|---|
| Coefficient | 0.029 | 0.102 | | 0.04 |
| $t$-statistic | (1.82) | (1.72) | | |

Panel C: Regression: $\gamma = a + br + c\tau + e$

| | Intercept | $r$ | $\tau$ | $R^2$ |
|---|---|---|---|---|
| Coefficient | -0.026 | 0.299 | 0.110 | 0.95 |
| $t$-statistic | (-14.93) | (19.56) | (15.86) | |

Panel D: Variance Decomposition of $\gamma = a + br + c\tau + e$

| $R^2 =$ | $b^2\frac{Var(r)}{Var(\gamma)}$ | $+c^2\frac{Var(\tau)}{Var(\gamma)}$ | $+2bc\frac{Cov(r,\tau)}{Var(\gamma)}$ |
|---|---|---|---|
| 0.95 | 0.42 | 0.28 | 0.25 |

Table IA.II: Safe Harbor Case

We calculate the relevant discounting horizons for an investor who is deciding whether to realize a capital gain/loss before or after the turn of the year (from $t$ to $t+1$). Our analysis studies the four possible cases that arise depending upon whether the investor can take advantage of the safe harbor rule in year $t$ and/or year $t+1$. In each case, we detail both the amount (as a percentage of total tax) and timing (in months from the turn of the year) of tax due if the investor decides to sell the stock at the end of year $t$ or at the beginning of year $t+1$. In each instance, we compute the average value-weighted timing of the tax payment(s) due. In the final column, we report the relevant discount horizon (in months from the turn of the year), which is the increase in the value-weighted timing due to delaying the realization of the capital gain/loss across the turn of the year.

| | Safe Harbor Rule applies in tax year | | Sell Stock last day of Dec., year $t$ | | Sell Stock first day of Jan., year $t+1$ | | **Relevant Discount Horizon** |
|---|---|---|---|---|---|---|---|
| | $t$ | $t+1$ | tax due | at Month | tax due | at Month | |
| **Case 1** | **Yes** | **Yes** | 100% | 3.5 | 100% | 15.5 | |
| | | | | **3.5** | | **15.5** | **12** |
| **Case 2** | **Yes** | **No** | 100% | 3.5 | 22.5% | 3.5 | |
| | | | | | 22.5% | 6.5 | |
| | | | | | 22.5% | 8.5 | |
| | | | | | 22.5% | 12.5 | |
| | | | | | 10% | 15.5 | |
| | | | | **3.5** | | **8.525** | **5.025** |
| **Case 3** | **No** | **Yes** | 90% | 0.5 | 100% | 15.5 | |
| | | | 10% | 3.5 | | | |
| | | | | **0.8** | | **15.5** | **14.7** |
| **Case 4** | **No** | **No** | 90% | 0.5 | 22.5% | 3.5 | |
| | | | 10% | 3.5 | 22.5% | 6.5 | |
| | | | | | 22.5% | 8.5 | |
| | | | | | 22.5% | 12.5 | |
| | | | | | 10% | 15.5 | |
| | | | | **0.8** | | **8.525** | **7.725** |

Table IA.III: AIIM Case

We analyze the tax consequences of choosing to delay a single capital gain of $100,000 across the turn of each tax quarter in year $t$ under the IRS's annualized income installment method (AIIM). We report a triplet of columns for each turn-of-the-tax-quarter decision. The first of these three columns reports the amount of the gain (in thousands of dollars) as well as the estimated taxes and final tax payment due (as a percentage of total taxes paid) across the five relevant tax quarters (all four tax quarters in year $t$ and the first tax quarter of year $t+1$) under the AIIM system if the gain is realized before ($B$) the turn of the tax quarter. The second of these three columns reports the corresponding information if the gain is realized after ($A$) the turn of the tax quarter. The final column of the triplet reports the difference ($\Delta$) in estimated taxes for each tax quarter as a result of deferring the gain across the turn of the tax quarter. This information is calculated using the 2010 Estimated Taxes worksheet provided by the IRS.

| | | Quarter 1 Decision | | | Quarter 2 Decision | | | Quarter 3 Decision | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $B$ | $A$ | $\Delta$ | $B$ | $A$ | $\Delta$ | $B$ | $A$ | $\Delta$ |
| **year t** | | | | | | | | | | |
| Q1 | gain | 100 | 0 | | 0 | 0 | | 0 | 0 | |
| | tax due | 22.5% | 0 | -22.5% | | | | | | |
| Q2 | gain | 0 | 100 | | 100 | 0 | | 0 | 0 | |
| | tax due | 22.5% | 45% | 22.5% | 45% | 0% | -45% | | | |
| Q3 | gain | 0 | 0 | | 0 | 100 | | 100 | 0 | |
| | tax due | 22.5% | 22.5% | 0 | 22.5% | 72.5% | 45% | 72.5% | 0 | -72.5% |
| Q4 | gain | 0 | 0 | | 0 | 0 | | 0 | 100 | |
| | tax due | 22.5% | 22.5% | 0 | 22.5% | 22.5% | 0 | 22.5% | 90% | 72.5% |
| **year $\mathbf{t+1}$** | | | | | | | | | | |
| Q1 | gain | 0 | 0 | | 0 | 0 | | 0 | 0 | |
| | tax due | 10% | 10% | 0 | 10% | 10% | 0 | 10% | 10% | 0 |

## Table IA.IV: Pooled Return Regression Estimates, Quarterly Discounting: 1954-2008

We report the results from pooled regressions of day or week $t$ stock returns on $t-1$ characteristics. Characteristics are measured on a weekly basis for conciseness. All firm-specific variables, defined in Table I of the paper, are cross-sectionally demeaned, and when appropriate, interacted with our proposed tax-selling premium variable, $\gamma_t = \tau_t \left(\frac{1-B_t}{1-B_t\tau_t}\right)$, a function of capital gains tax rates ($\tau_t$) and interest rates ($r_t = \frac{1}{B_t} - 1$) as derived in Section 1 of the paper, and with dummy variables for different periods of the year. The interest rate is the three-month T-bill rate. The dummy variables are $FN$, $D(W)$, and $J(W)$ for February-November, December, and January respectively and refer to the month of the return being predicted, with $W$ indicating the week of the particular month in question. $t$-statistics (in parentheses) are robust to cross-correlation in the residuals using the clustered standard errors of Rogers (1983, 1993). We also consider a case where we split the dummy variable $FN$ into two halves: $FebJun$ and $JulNov$. The sample starts in February of 1954 and ends in December 2008. Panel A presents weekly regressions of returns on weekly interactions of weekly dummies, $g$ and $\gamma$, also including $g$, $ME$ and $BM$ as controls. Panel B reports daily return regressions using weekly variables for conciseness and direct comparison with Panel A. We expand the set of interactions also to include dummies for the business day before Christmas ($XE$) and the business day before New Year's Day ($NYE$). Regression (2) in Panel B includes interactions between the calendar dummy variables and a stock's average relative (to price) bid-ask spread ($\frac{bid-ask}{P}$) during month $t-1$. Regression (3) in Panel B accounts for a possible trend in the effect of $g$ on returns. Regression (4) in Panel B considers the possibility that the trend depends on the month, week, or day of the year. Regression (5) in Panel B analyzes whether the interactive effect of $\gamma$ can be explained simply through interactions with its components, capital gains tax rates ($\tau$) or interest rates ($r$) individually. Regression (6) in Panel B considers an alternative set of controls using the same variables as in Grinblatt and Han (2005), also defined in Table I. For Panel A, these regressions generally take the form

$$\begin{aligned} r_{i,t} \quad = \quad & a_1\gamma_{t-1}g_{i,t-1}FN \\ & +a_2\gamma_{t-1}g_{i,t-1}D1 + a_3\gamma_{t-1}g_{i,t-1}D2 + a_4\gamma_{t-1}g_{i,t-1}D3 + a_5\gamma_{t-1}g_{i,t-1}D4 \\ & +a_6\gamma_{t-1}g_{i,t-1}J1 + a_7\gamma_{t-1}g_{i,t-1}J2 + a_8\gamma_{t-1}g_{i,t-1}J3 + a_9\gamma_{t-1}g_{i,t-1}J4 \\ & +a_4 g_{i,t-1} + a_5 \ln ME_{i,t-1} + a_6 \ln BM_{i,t-1} + \varepsilon_{i,t}. \end{aligned}$$

| Panel A | | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $\gamma * g * FN$ | -0.13333 | -0.09288 | 0.20832 | 0.20177 | |
| | (-3.84) | (-2.56) | (2.73) | (2.64) | |
| $\gamma * g * D1$ | 0.51761 | 0.48390 | 0.77709 | 0.77149 | 0.76885 |
| | (1.72) | (1.57) | (2.50) | (2.49) | (2.48) |
| $\gamma * g * D2$ | 0.59960 | 0.49065 | 0.78235 | 0.77701 | 0.77438 |
| | (3.12) | (2.04) | (3.21) | (3.20) | (3.19) |
| $\gamma * g * D3$ | 0.83023 | 0.83708 | 1.12438 | 1.11934 | 1.11674 |
| | (4.34) | (3.86) | (4.73) | (4.71) | (4.70) |
| $\gamma * g * D4$ | -0.48073 | -0.57093 | -0.28462 | -0.28940 | -0.29199 |
| | (-2.14) | (-2.37) | (-1.15) | (-1.16) | (-1.17) |
| $\gamma * g * J1$ | -3.74787 | -3.77735 | -3.48258 | -3.43159 | -3.43422 |
| | (-5.16) | (-5.41) | (-5.07) | (-5.04) | (-5.04) |
| $\gamma * g * J2$ | -1.48377 | -1.46443 | -1.16807 | -1.10916 | -1.11182 |
| | (-3.03) | (-2.80) | (-2.31) | (-2.21) | (-2.21) |
| $\gamma * g * J3$ | -1.02056 | -0.91569 | -0.61889 | -0.55733 | -0.56000 |
| | (-2.71) | (-3.02) | (-2.01) | (-1.86) | (-1.87) |
| $\gamma * g * J4$ | -1.19032 | -1.14420 | -0.84828 | -0.78703 | -0.78969 |
| | (-4.85) | (-4.16) | (-2.92) | (-2.73) | (-2.74) |
| $\gamma * g * FebJun$ | | | | | 0.04561 |
| | | | | | (0.50) |
| $\gamma * g * JulNov$ | | | | | 0.32657 |
| | | | | | (4.28) |
| $g$ | | | -0.00204 | -0.00203 | -0.00202 |
| | | | (-4.14) | (-4.13) | (-4.08) |
| $\ln ME$ | | -0.02098 | -0.01211 | -0.00845 | -0.00786 |
| | | (-3.21) | (-1.86) | (-1.31) | (-1.22) |
| $\ln BM$ | | 0.05691 | 0.04900 | 0.04892 | 0.05176 |
| | | (3.14) | (2.66) | (2.66) | (2.81) |
| $\ln ME * Jan$ | | | | -0.04520 | -0.04525 |
| | | | | (-9.04) | (-9.06) |

| Panel B | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | | (3) | (4) | | (5) | | (6) |
| | | | interact $\gamma * g$ with | | | interact $g$ with | replace $\gamma$ with both | | |
| | | $\gamma * g$ | $\frac{bid-ask}{P}$ | | $\gamma * g$ | $trend$ | $\tau$ | $r$ | |
| $\gamma * g * FN$ | 0.03077 | 0.03247 | -0.00286 | -0.00431 | -0.00360 | -0.00001 | 0.45977 | -0.00416 | 0.02746 |
| | (2.17) | (2.30) | (-0.29) | (-0.26) | (-0.21) | (-2.70) | (4.58) | (-4.55) | (1.99) |
| $\gamma * g * D1$ | 0.13962 | 0.19220 | -0.24668 | 0.10452 | 0.08527 | 0.00001 | 0.23570 | -0.00040 | 0.15365 |
| | (2.29) | (3.34) | (-3.05) | (1.73) | (1.30) | (0.58) | (0.42) | (-0.20) | (2.52) |
| $\gamma * g * D2$ | 0.10770 | 0.20355 | -0.44178 | 0.07305 | 0.08556 | -0.00003 | 0.69127 | -0.00323 | 0.14657 |
| | (1.41) | (5.31) | (-1.88) | (0.96) | (1.19) | (-2.10) | (0.93) | (-1.21) | (2.48) |
| $\gamma * g * D3$ | 0.21057 | 0.20997 | 0.00815 | 0.17542 | 0.12561 | 0.00005 | 0.41989 | 0.00131 | 0.21876 |
| | (4.47) | (4.06) | (0.10) | (3.50) | (3.40) | (2.36) | (0.46) | (0.41) | (5.34) |
| $\gamma * g * D4$ | 0.17498 | 0.19398 | -0.09433 | 0.13849 | 0.13593 | -0.00001 | 1.40771 | -0.00445 | 0.19090 |
| | (4.85) | (4.95) | (-1.02) | (3.83) | (3.90) | (-0.68) | (2.46) | (-1.81) | (4.44) |
| $\gamma * g * J1$ | -0.64439 | -0.82886 | 0.95361 | -0.68008 | -0.64221 | -0.00006 | -0.72377 | -0.01488 | -0.63765 |
| | (-5.04) | (-6.59) | (6.00) | (-5.13) | (-5.34) | (-1.30) | (-0.45) | (-2.53) | (-4.94) |
| $\gamma * g * J2$ | -0.14911 | -0.16510 | 0.07782 | -0.18448 | -0.14557 | -0.00006 | 0.25281 | -0.00769 | -0.16652 |
| | (-2.41) | (-2.79) | (0.99) | (-2.80) | (-2.61) | (-1.57) | (0.33) | (-2.95) | (-2.77) |
| $\gamma * g * J3$ | -0.08347 | -0.12596 | 0.19453 | -0.11800 | -0.11999 | -0.00001 | 0.08118 | -0.00512 | -0.11595 |
| | (-1.66) | (-2.75) | (2.35) | (-2.23) | (-2.44) | (-0.48) | (0.13) | (-1.73) | (-1.87) |
| $\gamma * g * J4$ | -0.14315 | -0.20089 | 0.26124 | -0.17740 | -0.19233 | 0.00000 | 0.27388 | -0.00673 | -0.21258 |
| | (-2.56) | (-2.99) | (2.32) | (-3.07) | (-3.20) | (0.10) | (0.30) | (-1.58) | (-3.82) |
| $\gamma * g * XE$ | -0.47298 | -0.47884 | 0.03435 | -0.47171 | -0.46269 | -0.00001 | -2.02631 | -0.00355 | -0.49673 |
| | (-6.31) | (-5.10) | (0.10) | (-6.31) | (-6.07) | (-0.36) | (-1.61) | (-0.69) | (-6.81) |
| $\gamma * g * NYE$ | -0.99388 | -1.21049 | 1.09205 | -0.99266 | -0.89546 | -0.00013 | -3.58103 | -0.01073 | -1.05071 |
| | (-3.81) | (-6.66) | (2.63) | (-3.80) | (-3.34) | (-2.21) | (-1.25) | (-1.44) | (-4.47) |
| $g$ | -0.00072 | -0.00073 | | -0.00040 | -0.00041 | | 0.00005 | | -0.00079 |
| | (-7.96) | (-7.97) | | (-3.10) | (-3.15) | | (0.24) | | (-8.83) |
| $g * trend$ | | | | -0.00001 | | | | | |
| | | | | (-2.58) | | | | | |
| $\ln ME$ | -0.00640 | -0.00641 | | -0.00677 | -0.00678 | | -0.00667 | | |
| | (-5.21) | (-5.22) | | (-5.52) | (-5.52) | | (-5.45) | | |
| $\ln BM$ | 0.00870 | 0.00852 | | 0.01067 | 0.01075 | | 0.00718 | | |
| | (2.49) | (2.43) | | (3.10) | (3.12) | | (2.09) | | |
| $\ln ME * Jan$ | -0.00853 | -0.00734 | | -0.00855 | -0.00829 | | -0.00763 | | |
| | (-8.93) | (-7.59) | | (-8.93) | (-8.83) | | (-8.61) | | |
| $r_{-1:0}$ | | | | | | | | | -0.00283 |
| | | | | | | | | | (-6.02) |
| $r_{-12:-1}$ | | | | | | | | | 0.00040 |
| | | | | | | | | | (4.46) |
| $r_{-36:-12}$ | | | | | | | | | -0.00005 |
| | | | | | | | | | (-2.00) |
| $\overline{V}$ | | | | | | | | | -0.00143 |
| | | | | | | | | | (-3.02) |
| $SIZE$ | | | | | | | | | -0.00703 |
| | | | | | | | | | (-5.72) |

Table IA.V: Pooled Return Regression Estimates, Turn-of-the-Tax-Quarter: 1954-2008

We report the results from pooled regressions of week $t$ stock returns on $t-1$ characteristics. Characteristics are measured on a weekly basis for conciseness. All firm-specific variables, defined in Table I, are cross-sectionally demeaned, and when appropriate, interacted with our proposed tax-selling premium variable, $\gamma_t = \tau_t \left(\frac{1-B_t}{1-B_t\tau_t}\right)$, a function of capital gains tax rates ($\tau_t$) and interest rates ($r_t = \frac{1}{B_t} - 1$) as derived in Section 1 of the paper, and with dummy variables for different periods of the year. The interest rate is the three-month T-bill rate. The main dummy variables are $QW(w)$, $YW(w)$, and $RoY$. These variables refer to the week ($w$) relative to the turn of the tax quarter (in the case of $QW(w)$) and the turn of the year (in the case of $YW(w)$) of the return being predicted. $RoY$ refers to the remaining weeks in the year not captured by $QW(w)$ and $YW(w)$. We also include as controls $g$, $ME$ and $BM$, and an interaction between $ME$ and the month of January, $Jan$. $t$-statistics (in parentheses) are robust to cross-correlation in the residuals using the clustered standard errors of Rogers (1983, 1993). Column (1) provides the results of the following specification

$$\begin{aligned} r_{i,t} \quad = \quad & a_1\gamma_{t-1}g_{i,t-1}RoY \\ & +a_2\gamma_{t-1}g_{i,t-1}QW(-4) + a_3\gamma_{t-1}g_{i,t-1}QW(-3) + a_4\gamma_{t-1}g_{i,t-1}QW(-2) + a_5\gamma_{t-1}g_{i,t-1}QW(-1) \\ & +a_6\gamma_{t-1}g_{i,t-1}QW(+1) + a_7\gamma_{t-1}g_{i,t-1}QW(+2) + a_8\gamma_{t-1}g_{i,t-1}QW(+3) + a_9\gamma_{t-1}g_{i,t-1}QW(+4) \\ & +a_{10}\gamma_{t-1}g_{i,t-1}YW(-4) + a_{11}\gamma_{t-1}g_{i,t-1}YW(-3) + a_{12}\gamma_{t-1}g_{i,t-1}YW(-2) + a_{13}\gamma_{t-1}g_{i,t-1}YW(-1) \\ & +a_{14}\gamma_{t-1}g_{i,t-1}YW(+1) + a_{15}\gamma_{t-1}g_{i,t-1}YW(+2) + a_{16}\gamma_{t-1}g_{i,t-1}YW(+3) + a_{17}\gamma_{t-1}g_{i,t-1}YW(+4) \\ & +a_{18}g_{i,t-1} + a_{19}\ln ME_{i,t-1} + a_{20}\ln BM_{i,t-1} + a_{21}\ln ME_{i,t-1}Jan + \varepsilon_{i,t}. \end{aligned}$$

Column (2) interacts each independent variable with a dummy ($NBER$) if any portion of the current year (up to and including the quarter in question) is classified by the NBER as a recession and all months in the previous year were not classified as a recession by the NBER.

| | (1) | (2) | |
|---|---|---|---|
| | | $\gamma * g$ | interact $\gamma * g$ with $NBER$ |
| $\gamma * g * ROY$ | 0.03358 | 0.03347 | |
| | (2.09) | (2.08) | |
| $\gamma * g * QW(-4)$ | 0.02585 | 0.03396 | -0.07444 |
| | (1.15) | (1.41) | (-1.64) |
| $\gamma * g * QW(-3)$ | 0.01477 | 0.01041 | 0.03576 |
| | (0.56) | (0.38) | (0.38) |
| $\gamma * g * QW(-2)$ | 0.02496 | 0.02722 | -0.01921 |
| | (1.17) | (1.22) | (-0.44) |
| $\gamma * g * QW(-1)$ | 0.03757 | 0.01476 | 0.16933 |
| | (1.32) | (0.50) | (3.34) |
| $\gamma * g * QW(+1)$ | 0.01560 | 0.01894 | -0.03045 |
| | (0.69) | (0.90) | (-0.37) |
| $\gamma * g * QW(+2)$ | 0.02901 | 0.02594 | 0.02528 |
| | (1.29) | (1.05) | (0.65) |
| $\gamma * g * QW(+3)$ | 0.06058 | 0.06544 | -0.04212 |
| | (3.37) | (3.45) | (-1.26) |
| $\gamma * g * QW(+4)$ | 0.04757 | 0.04561 | 0.01550 |
| | (2.05) | (1.84) | (0.26) |
| $\gamma * g * YW(-4)$ | 0.14089 | 0.14079 | |
| | (2.32) | (2.32) | |
| $\gamma * g * YW(-3)$ | 0.10896 | 0.10886 | |
| | (1.43) | (1.43) | |
| $\gamma * g * YW(-2)$ | 0.21181 | 0.21171 | |
| | (4.50) | (4.50) | |
| $\gamma * g * YW(-1)$ | -0.08464 | -0.08474 | |
| | (-1.93) | (-1.93) | |
| $\gamma * g * YW(+1)$ | -0.64313 | -0.64323 | |
| | (-5.03) | (-5.03) | |
| $\gamma * g * YW(+2)$ | -0.14785 | -0.14795 | |
| | (-2.39) | (-2.39) | |
| $\gamma * g * YW(+3)$ | -0.08222 | -0.08232 | |
| | (-1.64) | (-1.64) | |
| $\gamma * g * YW(+4)$ | -0.14189 | -0.14199 | |
| | (-2.55) | (-2.55) | |
| $g$ | -0.00073 | -0.00073 | |
| | (-8.50) | (-8.50) | |
| $\ln ME$ | -0.00638 | -0.00637 | |
| | (-5.19) | (-5.18) | |
| $\ln BM$ | 0.00882 | 0.00882 | |
| | (2.52) | (2.52) | |
| $\ln ME * Jan$ | -0.00852 | -0.00852 | |
| | (-8.91) | (-8.92) | |

Table IA.VI: Pooled Return Regression Estimates (Two tax rates case, but excluding retroactive changes): 1954-2008

We report the results from pooled regressions of day or week $t$ stock returns on $t-1$ characteristics. Characteristics are measured on a weekly basis for conciseness. All firm-specific variables, defined in Table I, are cross-sectionally demeaned, and when appropriate, interacted with our proposed tax-selling premium variable, $\gamma_t = \frac{\tau_t - \tau_{t+1} B_t}{1 - B_t \tau_{t+1}}$ and with dummy variables for different periods of the year. The tax-selling variable is a function of capital gains tax rates this year and next ($\tau_t$ and $\tau_{t+1}$ respectively) as well as interest rates ($r_t = \frac{1}{B_t} - 1$). The dummy variables are $FN$, $D(W)$, and $J(W)$ for February-November, December, and January respectively and refer to the month of the return being predicted, with $W$ indicating the week of the particular month in question. This gamma function is a simple two-tax-rate generalization of the function derived in Section 1 of the paper. For those years (1976, 1997, and 2003) where the tax rate change in year $t+1$ was made retroactively, we replace $\tau_{t+1}$ with $\tau_t$. $t$-statistics (in parentheses) are robust to cross-correlation in the residuals using the clustered standard errors of Rogers (1983, 1993). We also consider a case where we split the dummy variable $FN$ into two halves: $FebJun$ and $JulNov$. The sample starts in February of 1954 and ends in December 2008. Panel A presents weekly regressions of returns on weekly interactions of weekly dummies, $g$ and $\gamma$, also including $g$, $ME$ and $BM$ as controls. Panel B reports daily return regressions using weekly variables for conciseness and direct comparison with Panel A. We expand the set of interactions also to include dummies for the business day before Christmas ($XE$) and the business day before New Year's Day ($NYE$). Regression (2) in Panel B includes interactions between the calendar dummy variables and a stock's average relative (to price) bid-ask spread ($\frac{bid-ask}{P}$) during month $t-1$. Regression (3) in Panel B accounts for a possible trend in the effect of $g$ on returns. Regression (4) in Panel B considers the possibility that the trend depends on the month, week, or day of the year. Regression (5) in Panel B analyzes whether the interactive effect of $\gamma$ can be explained simply through interactions with its components, interest rates ($r$) or capital gains tax rates ($\tau$) individually. Regression (6) in Panel B considers an alternative set of controls using the same variables as in Grinblatt and Han (2005), also defined in Table I. Panel C shows sub-sample analysis of the first regression in Panel B. The regressions correspond to the sub-periods 1963-2008, 1954-2008, 1980-2008, and 1993-2008 respectively. For Panel A, these regressions generally take the form

$$\begin{aligned} r_{i,t} \;=\; & a_1 \gamma_{t-1} g_{i,t-1} FN \\ & + a_2 \gamma_{t-1} g_{i,t-1} D1 + a_3 \gamma_{t-1} g_{i,t-1} D2 + a_4 \gamma_{t-1} g_{i,t-1} D3 + a_5 \gamma_{t-1} g_{i,t-1} D4 \\ & + a_6 \gamma_{t-1} g_{i,t-1} J1 + a_7 \gamma_{t-1} g_{i,t-1} J2 + a_8 \gamma_{t-1} g_{i,t-1} J3 + a_9 \gamma_{t-1} g_{i,t-1} J4 \\ & + a_4 g_{i,t-1} + a_5 \ln ME_{i,t-1} + a_6 \ln BM_{i,t-1} + \varepsilon_{i,t}. \end{aligned}$$

| Panel A | | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $\gamma * g * FN$ | -0.02753 | -0.02074 | 0.01286 | 0.01168 | |
| | (-4.14) | (-3.10) | (1.28) | (1.18) | |
| $\gamma * g * D1$ | 0.07268 | 0.06889 | 0.10678 | 0.10566 | 0.10553 |
| | (1.26) | (1.19) | (1.64) | (1.63) | (1.63) |
| $\gamma * g * D2$ | 0.09366 | 0.06901 | 0.10750 | 0.10641 | 0.10628 |
| | (2.13) | (1.39) | (1.82) | (1.82) | (1.82) |
| $\gamma * g * D3$ | 0.14573 | 0.14481 | 0.18344 | 0.18240 | 0.18227 |
| | (2.72) | (2.58) | (2.62) | (2.62) | (2.62) |
| $\gamma * g * D4$ | -0.06372 | -0.07250 | -0.03288 | -0.03389 | -0.03403 |
| | (-1.20) | (-1.24) | (-0.64) | (-0.66) | (-0.66) |
| $\gamma * g * J1$ | -0.64983 | -0.64193 | -0.60158 | -0.59139 | -0.59153 |
| | (-3.23) | (-3.13) | (-3.06) | (-3.06) | (-3.06) |
| $\gamma * g * J2$ | -0.20043 | -0.18403 | -0.14666 | -0.13562 | -0.13574 |
| | (-1.48) | (-1.30) | (-1.13) | (-1.07) | (-1.07) |
| $\gamma * g * J3$ | -0.18098 | -0.16752 | -0.12967 | -0.11810 | -0.11822 |
| | (-2.33) | (-2.75) | (-2.36) | (-2.28) | (-2.28) |
| $\gamma * g * J4$ | -0.21840 | -0.20829 | -0.16842 | -0.15642 | -0.15655 |
| | (-3.09) | (-2.88) | (-2.63) | (-2.56) | (-2.56) |
| $\gamma * g * FebJun$ | | | | | -0.01337 |
| | | | | | (-1.05) |
| $\gamma * g * JulNov$ | | | | | 0.03319 |
| | | | | | (2.85) |
| $g$ | | | -0.00172 | -0.00172 | -0.00171 |
| | | | (-4.36) | (-4.39) | (-4.36) |
| $\ln ME$ | | -0.02751 | -0.01084 | -0.00607 | -0.00579 |
| | | (-3.91) | (-1.66) | (-0.94) | (-0.89) |
| $\ln BM$ | | 0.06275 | 0.04735 | 0.04725 | 0.04868 |
| | | (3.49) | (2.55) | (2.55) | (2.63) |
| $\ln ME * Jan$ | | | | -0.05950 | -0.05953 |
| | | | | (-8.87) | (-8.87) |

Panel B

| | (1) | (2) | | (3) | (4) | | (5) | | (6) |
|---|---|---|---|---|---|---|---|---|---|
| | | | interact $\gamma * g$ with | | | interact $g$ with | replace $\gamma$ with both | | |
| | | $\gamma * g$ | $\frac{bid-ask}{P}$ | | $\gamma * g$ | $trend$ | $r$ | $\tau$ | |
| $\gamma * g * FN$ | 0.00026 | 0.00033 | -0.00011 | -0.00117 | -0.00144 | -0.00001 | 0.11494 | -0.00416 | 0.00018 |
| | (0.15) | (0.18) | (-0.10) | (-0.63) | (-0.83) | (-1.72) | (4.58) | (-4.55) | (0.10) |
| $\gamma * g * D1$ | 0.01789 | 0.02723 | -0.04236 | 0.01628 | 0.01173 | 0.00002 | 0.05893 | -0.00040 | 0.02069 |
| | (1.42) | (1.96) | (-2.28) | (1.35) | (0.94) | (1.16) | (0.42) | (-0.20) | (1.60) |
| $\gamma * g * D2$ | 0.01217 | 0.02927 | -0.07722 | 0.01053 | 0.01206 | -0.00002 | 0.17282 | -0.00323 | 0.02043 |
| | (0.86) | (2.36) | (-1.53) | (0.77) | (0.89) | (-1.45) | (0.93) | (-1.21) | (1.66) |
| $\gamma * g * D3$ | 0.03349 | 0.03532 | -0.00837 | 0.03171 | 0.02102 | 0.00006 | 0.10497 | 0.00131 | 0.03604 |
| | (2.47) | (2.93) | (-0.40) | (2.39) | (2.24) | (2.53) | (0.46) | (0.41) | (2.63) |
| $\gamma * g * D4$ | 0.02825 | 0.03504 | -0.03222 | 0.02657 | 0.02554 | 0.00000 | 0.35193 | -0.00445 | 0.02990 |
| | (2.71) | (3.52) | (-1.32) | (2.76) | (2.69) | (-0.21) | (2.46) | (-1.81) | (2.39) |
| $\gamma * g * J1$ | -0.11177 | -0.14400 | 0.15791 | -0.11365 | -0.10165 | -0.00009 | -0.18094 | -0.01488 | -0.11267 |
| | (-3.16) | (-3.61) | (3.85) | (-3.12) | (-2.83) | (-1.56) | (-0.45) | (-2.53) | (-3.27) |
| $\gamma * g * J2$ | -0.01798 | -0.02563 | 0.03517 | -0.01969 | -0.01132 | -0.00007 | 0.06320 | -0.00769 | -0.02277 |
| | (-1.07) | (-1.60) | (2.52) | (-1.12) | (-0.73) | (-1.62) | (0.33) | (-2.95) | (-1.37) |
| $\gamma * g * J3$ | -0.01990 | -0.02821 | 0.03678 | -0.02166 | -0.02167 | -0.00001 | 0.02029 | -0.00512 | -0.02416 |
| | (-2.25) | (-3.26) | (2.02) | (-2.38) | (-2.57) | (-0.46) | (0.13) | (-1.73) | (-2.08) |
| $\gamma * g * J4$ | -0.02997 | -0.03747 | 0.03312 | -0.03163 | -0.03333 | 0.00000 | 0.06847 | -0.00673 | -0.04136 |
| | (-2.62) | (-2.25) | (1.01) | (-2.65) | (-2.52) | (-0.07) | (0.30) | (-1.58) | (-3.04) |
| $\gamma * g * XE$ | -0.07603 | -0.07193 | -0.01929 | -0.07621 | -0.07254 | -0.00002 | -0.50658 | -0.00355 | -0.07914 |
| | (-2.77) | (-2.52) | (-0.28) | (-2.79) | (-2.65) | (-0.65) | (-1.61) | (-0.69) | (-2.46) |
| $\gamma * g * NYE$ | -0.16830 | -0.21864 | 0.23999 | -0.16850 | -0.14527 | -0.00015 | -0.89526 | -0.01073 | -0.18250 |
| | (-2.45) | (-3.16) | (2.92) | (-2.46) | (-2.08) | (-2.07) | (-1.25) | (-1.44) | (-2.70) |
| $g$ | -0.00066 | -0.00066 | | -0.00052 | -0.00051 | | 0.00005 | | -0.00074 |
| | (-9.48) | (-9.68) | | (-5.56) | (-5.91) | | (0.24) | | (-10.35) |
| $g * trend$ | | | | -0.00001 | | | | | |
| | | | | (-1.98) | | | | | |
| $\ln ME$ | -0.00601 | -0.00601 | | -0.00639 | -0.00645 | | -0.00667 | | |
| | (-4.87) | (-4.88) | | (-5.19) | (-5.25) | | (-5.45) | | |
| $\ln BM$ | 0.00837 | 0.00827 | | 0.00989 | 0.01005 | | 0.00718 | | |
| | (2.38) | (2.35) | | (2.84) | (2.88) | | (2.09) | | |
| $\ln ME * Jan$ | -0.01092 | -0.01024 | | -0.01095 | -0.01031 | | -0.00763 | | |
| | (-8.89) | (-7.87) | | (-8.83) | (-9.22) | | (-8.61) | | |
| $r_{-1:0}$ | | | | | | | | | -0.00280 |
| | | | | | | | | | (-6.02) |
| $r_{-12:-1}$ | | | | | | | | | 0.00041 |
| | | | | | | | | | (4.59) |
| $r_{-36:-12}$ | | | | | | | | | -0.00004 |
| | | | | | | | | | (-1.83) |
| $\overline{V}$ | | | | | | | | | -0.00147 |
| | | | | | | | | | (-3.13) |
| $SIZE$ | | | | | | | | | -0.00679 |
| | | | | | | | | | (-5.54) |

| | Panel C | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | 1963-2008 | 1954-1980 | 1980-2008 | 1993-2008 |
| $\gamma * g * FN$ | 0.00033 | 0.00156 | -0.00240 | -0.05125 |
| | (0.19) | (0.37) | (-1.24) | (-4.41) |
| $\gamma * g * D1$ | 0.01759 | 0.03169 | 0.00873 | 0.02886 |
| | (1.40) | (2.19) | (0.71) | (0.98) |
| $\gamma * g * D2$ | 0.01215 | 0.03485 | -0.00084 | -0.01538 |
| | (0.86) | (2.79) | (-0.06) | (-0.55) |
| $\gamma * g * D3$ | 0.03320 | 0.02257 | 0.03611 | 0.17427 |
| | (2.44) | (3.27) | (1.76) | (2.08) |
| $\gamma * g * D4$ | 0.02812 | 0.03512 | 0.02198 | 0.05219 |
| | (2.69) | (2.84) | (1.91) | (1.13) |
| $\gamma * g * J1$ | -0.10954 | -0.14188 | -0.10104 | -0.53572 |
| | (-3.14) | (-5.49) | (-2.19) | (-15.57) |
| $\gamma * g * J2$ | -0.01729 | -0.03681 | -0.01196 | -0.21686 |
| | (-1.04) | (-2.81) | (-0.57) | (-2.08) |
| $\gamma * g * J3$ | -0.01932 | -0.03245 | -0.01686 | -0.14582 |
| | (-2.20) | (-2.63) | (-1.61) | (-3.52) |
| $\gamma * g * J4$ | -0.02966 | -0.05592 | -0.02229 | -0.13114 |
| | (-2.61) | (-2.34) | (-2.06) | (-4.44) |
| $\gamma * g * XE$ | -0.07455 | -0.07113 | -0.08046 | -0.18250 |
| | (-2.73) | (-3.12) | (-2.02) | (-2.16) |
| $\gamma * g * NYE$ | -0.16771 | -0.26285 | -0.12124 | -0.88751 |
| | (-2.44) | (-4.45) | (-1.61) | (-3.87) |
| $g$ | -0.00066 | -0.00034 | -0.00067 | -0.00024 |
| | (-9.49) | (-1.79) | (-9.32) | (-1.89) |
| $\ln ME$ | -0.00672 | -0.00646 | -0.00720 | -0.01122 |
| | (-4.95) | (-3.35) | (-4.50) | (-4.85) |
| $\ln BM$ | 0.01294 | -0.00259 | 0.01606 | 0.01364 |
| | (3.19) | (-0.59) | (3.19) | (1.81) |
| $\ln ME * Jan$ | -0.01163 | -0.01245 | -0.01003 | -0.00498 |
| | (-8.75) | (-6.66) | (-6.67) | (-3.82) |

Table IA.VII: Pooled Return Regression Estimates (Two tax rates case): 1954-2008

We report the results from pooled regressions of day or week $t$ stock returns on $t-1$ characteristics. Characteristics are measured on a weekly basis for conciseness. All firm-specific variables, defined in Table I, are cross-sectionally demeaned, and when appropriate, interacted with our proposed tax-selling premium variable, $\gamma_t = \frac{\tau_t - \tau_{t+1} B_t}{1 - B_t \tau_{t+1}}$ and with dummy variables for different periods of the year. The tax-selling variable is a function of capital gains tax rates this year and next ($\tau_t$ and $\tau_{t+1}$ respectively) as well as interest rates ($r_t = \frac{1}{B_t} - 1$). The dummy variables are $FN$, $D(W)$, and $J(W)$ for February-November, December, and January respectively and refer to the month of the return being predicted, with $W$ indicating the week of the particular month in question.. This gamma function is a simple two-tax-rate generalization of the function derived in Section 1 of the paper. $t$-statistics (in parentheses) are robust to cross-correlation in the residuals using the clustered standard errors of Rogers (1983, 1993). We also consider a case where we split the dummy variable $FN$ into two halves: $FebJun$ and $JulNov$. The sample starts in February of 1954 and ends in December 2008. Panel A presents weekly regressions of returns on weekly interactions of weekly dummies, $g$ and $\gamma$, also including $g$, $ME$ and $BM$ as controls. Panel B reports daily return regressions using weekly variables for conciseness and direct comparison with Panel A. We expand the set of interactions also to include dummies for the business day before Christmas ($XE$) and the business day before New Year's Day ($NYE$). Regression (2) in Panel B includes interactions between the calendar dummy variables and a stock's average relative (to price) bid-ask spread ($\frac{bid-ask}{P}$) during month $t-1$. Regression (3) in Panel B accounts for a possible trend in the effect of $g$ on returns. Regression (4) in Panel B considers the possibility that the trend depends on the month, week, or day of the year. Regression (5) in Panel B analyzes whether the interactive effect of $\gamma$ can be explained simply through interactions with its components, interest rates ($r$) or capital gains tax rates ($\tau$) individually. Regression (6) in Panel B considers an alternative set of controls using the same variables as in Grinblatt and Han (2005), also defined in Table I. Panel C shows sub-sample analysis of the first regression in Panel B. The regressions correspond to the sub-periods 1963-2008, 1954-2008, 1980-2008, and 1993-2008 respectively. For Panel A, these regressions generally take the form

$$\begin{aligned} r_{i,t} \quad = \quad & a_1 \gamma_{t-1} g_{i,t-1} FN \\ & + a_2 \gamma_{t-1} g_{i,t-1} D1 + a_3 \gamma_{t-1} g_{i,t-1} D2 + a_4 \gamma_{t-1} g_{i,t-1} D3 + a_5 \gamma_{t-1} g_{i,t-1} D4 \\ & + a_6 \gamma_{t-1} g_{i,t-1} J1 + a_7 \gamma_{t-1} g_{i,t-1} J2 + a_8 \gamma_{t-1} g_{i,t-1} J3 + a_9 \gamma_{t-1} g_{i,t-1} J4 \\ & + a_4 g_{i,t-1} + a_5 \ln ME_{i,t-1} + a_6 \ln BM_{i,t-1} + \varepsilon_{i,t}. \end{aligned}$$

| Panel A | | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $\gamma * g * FN$ | -0.02024 | -0.01596 | 0.01512 | 0.01430 | |
| | (-2.67) | (-1.94) | (1.54) | (1.47) | |
| $\gamma * g * D1$ | 0.05962 | 0.06522 | 0.09854 | 0.09773 | 0.09773 |
| | (1.92) | (2.49) | (3.11) | (3.10) | (3.10) |
| $\gamma * g * D2$ | 0.07332 | 0.05873 | 0.09318 | 0.09232 | 0.09232 |
| | (2.97) | (2.35) | (2.89) | (2.89) | (2.89) |
| $\gamma * g * D3$ | 0.13788 | 0.14302 | 0.17765 | 0.17683 | 0.17682 |
| | (4.39) | (4.45) | (4.41) | (4.41) | (4.41) |
| $\gamma * g * D4$ | -0.04433 | -0.03148 | 0.00399 | 0.00319 | 0.00318 |
| | (-1.50) | (-1.07) | (0.16) | (0.13) | (0.13) |
| $\gamma * g * J1$ | -0.38208 | -0.36753 | -0.33225 | -0.32506 | -0.32506 |
| | (-2.26) | (-2.29) | (-2.14) | (-2.12) | (-2.12) |
| $\gamma * g * J2$ | -0.11163 | -0.10219 | -0.06883 | -0.06122 | -0.06122 |
| | (-1.51) | (-1.44) | (-1.07) | (-0.98) | (-0.98) |
| $\gamma * g * J3$ | -0.10035 | -0.08522 | -0.05170 | -0.04345 | -0.04345 |
| | (-1.92) | (-1.91) | (-1.22) | (-1.07) | (-1.07) |
| $\gamma * g * J4$ | -0.09535 | -0.08555 | -0.05107 | -0.04280 | -0.04281 |
| | (-1.62) | (-1.49) | (-0.94) | (-0.82) | (-0.82) |
| $\gamma * g * FebJun$ | | | | | 0.01364 |
| | | | | | (1.38) |
| $\gamma * g * JulNov$ | | | | | 0.01470 |
| | | | | | (1.12) |
| $g$ | | | -0.00208 | -0.00207 | -0.00207 |
| | | | (-5.88) | (-5.91) | (-5.91) |
| $\ln ME$ | | -0.02976 | -0.00961 | -0.00449 | -0.00447 |
| | | (-4.21) | (-1.49) | (-0.70) | (-0.70) |
| $\ln BM$ | | 0.06594 | 0.04644 | 0.04638 | 0.04641 |
| | | (3.69) | (2.50) | (2.49) | (2.50) |
| $\ln ME * Jan$ | | | | -0.06413 | -0.06414 |
| | | | | (-9.96) | (-9.96) |

Panel B

| | (1) | (2) | | (3) | (4) | | (5) | | (6) |
|---|---|---|---|---|---|---|---|---|---|
| | | | interact $\gamma * g$ with $\frac{bid-ask}{P}$ | | | interact $g$ with $trend$ | replace $\gamma$ with both | | |
| | | $\gamma * g$ | | | $\gamma * g$ | | $r$ | $\tau$ | |
| $\gamma * g * FN$ | 0.00263 | 0.00273 | -0.00088 | 0.00299 | 0.00263 | -0.00001 | 0.11494 | -0.00416 | 0.00330 |
| | (1.49) | (1.56) | (-0.62) | (1.70) | (1.61) | (-1.16) | (4.58) | (-4.55) | (1.90) |
| $\gamma * g * D1$ | 0.01623 | 0.02533 | -0.05544 | 0.01655 | 0.01081 | 0.00002 | 0.05893 | -0.00040 | 0.01729 |
| | (2.59) | (3.77) | (-2.06) | (2.71) | (1.32) | (0.94) | (0.42) | (-0.20) | (2.40) |
| $\gamma * g * D2$ | 0.01455 | 0.02433 | -0.05918 | 0.01478 | 0.01846 | -0.00002 | 0.17282 | -0.00323 | 0.01985 |
| | (2.14) | (2.92) | (-1.20) | (2.20) | (2.26) | (-2.11) | (0.93) | (-1.21) | (2.95) |
| $\gamma * g * D3$ | 0.03490 | 0.03520 | -0.00209 | 0.03508 | 0.02177 | 0.00005 | 0.10497 | 0.00131 | 0.03587 |
| | (4.10) | (6.70) | (-0.06) | (4.07) | (3.25) | (2.52) | (0.46) | (0.41) | (4.16) |
| $\gamma * g * D4$ | 0.02387 | 0.03345 | -0.05781 | 0.02408 | 0.02415 | -0.00001 | 0.35193 | -0.00445 | 0.02384 |
| | (3.86) | (4.33) | (-1.25) | (4.03) | (3.54) | (-0.53) | (2.46) | (-1.81) | (3.02) |
| $\gamma * g * J1$ | -0.05996 | -0.06843 | 0.05777 | -0.05975 | -0.04612 | -0.00007 | -0.18094 | -0.01488 | -0.06134 |
| | (-2.04) | (-1.94) | (1.11) | (-2.01) | (-1.45) | (-0.85) | (-0.45) | (-2.53) | (-2.00) |
| $\gamma * g * J2$ | -0.00850 | -0.00912 | 0.00379 | -0.00825 | 0.00676 | -0.00008 | 0.06320 | -0.00769 | -0.00989 |
| | (-1.07) | (-1.26) | (0.11) | (-1.01) | (0.54) | (-1.48) | (0.33) | (-2.95) | (-1.11) |
| $\gamma * g * J3$ | -0.00680 | -0.00541 | -0.00968 | -0.00660 | -0.00683 | -0.00001 | 0.02029 | -0.00512 | -0.00981 |
| | (-0.84) | (-0.57) | (-0.40) | (-0.78) | (-0.85) | (-0.21) | (0.13) | (-1.73) | (-1.05) |
| $\gamma * g * J4$ | -0.00640 | -0.00358 | -0.01964 | -0.00609 | -0.00741 | 0.00000 | 0.06847 | -0.00673 | -0.01341 |
| | (-0.59) | (-0.27) | (-0.65) | (-0.54) | (-0.61) | (-0.04) | (0.30) | (-1.58) | (-1.03) |
| $\gamma * g * XE$ | -0.05507 | -0.05756 | 0.01444 | -0.05514 | -0.05409 | 0.00000 | -0.50658 | -0.00355 | -0.06631 |
| | (-3.16) | (-3.53) | (0.12) | (-3.16) | (-2.73) | (-0.17) | (-1.61) | (-0.69) | (-3.07) |
| $\gamma * g * NYE$ | -0.10886 | -0.12545 | 0.10036 | -0.10893 | -0.07990 | -0.00014 | -0.89526 | -0.01073 | -0.11716 |
| | (-2.62) | (-2.76) | (0.96) | (-2.62) | (-1.60) | (-1.56) | (-1.25) | (-1.44) | (-2.58) |
| $g$ | -0.00075 | -0.00075 | | -0.00068 | -0.00067 | | 0.00005 | | -0.00085 |
| | (-11.88) | (-11.92) | | (-9.50) | (-9.41) | | (0.24) | | (-13.18) |
| $g * trend$ | | | | -0.00001 | | | | | |
| | | | | (-1.41) | | | | | |
| $\ln ME$ | -0.00572 | -0.00577 | | -0.00595 | -0.00598 | | -0.00667 | | |
| | (-4.70) | (-4.74) | | (-4.93) | (-4.94) | | (-5.45) | | |
| $\ln BM$ | 0.00828 | 0.00841 | | 0.00935 | 0.00947 | | 0.00718 | | |
| | (2.35) | (2.38) | | (2.70) | (2.73) | | (2.09) | | |
| $\ln ME * Jan$ | -0.01168 | -0.01156 | | -0.01170 | -0.01131 | | -0.00763 | | |
| | (-9.73) | (-9.39) | | (-9.73) | (-9.69) | | (-8.61) | | |
| $r_{-1:0}$ | | | | | | | | | -0.00278 |
| | | | | | | | | | (-6.01) |
| $r_{-12:-1}$ | | | | | | | | | 0.00042 |
| | | | | | | | | | (4.70) |
| $r_{-36:-12}$ | | | | | | | | | -0.00004 |
| | | | | | | | | | (-1.74) |
| $\overline{V}$ | | | | | | | | | -0.00148 |
| | | | | | | | | | (-3.16) |
| $SIZE$ | | | | | | | | | -0.00648 |
| | | | | | | | | | (-5.37) |

| Panel C | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | 1963-2008 | 1954-1980 | 1980-2008 | 1993-2008 |
| $\gamma * g * FN$ | 0.00274 | 0.00721 | 0.00211 | 0.00452 |
| | (1.55) | (2.16) | (1.08) | (1.45) |
| $\gamma * g * D1$ | 0.01615 | 0.04046 | 0.01143 | 0.01470 |
| | (2.58) | (3.34) | (2.15) | (3.74) |
| $\gamma * g * D2$ | 0.01461 | 0.02729 | 0.01093 | 0.01631 |
| | (2.14) | (1.63) | (1.58) | (4.61) |
| $\gamma * g * D3$ | 0.03481 | 0.02245 | 0.03747 | 0.04892 |
| | (4.06) | (3.12) | (3.64) | (5.12) |
| $\gamma * g * D4$ | 0.02387 | 0.04118 | 0.01994 | 0.02370 |
| | (3.84) | (3.68) | (3.65) | (4.52) |
| $\gamma * g * J1$ | -0.05865 | -0.12389 | -0.04840 | -0.03985 |
| | (-2.03) | (-3.98) | (-1.72) | (-1.18) |
| $\gamma * g * J2$ | -0.00804 | -0.02760 | -0.00518 | -0.01082 |
| | (-1.03) | (-2.00) | (-0.65) | (-1.07) |
| $\gamma * g * J3$ | -0.00637 | -0.01471 | -0.00538 | -0.00115 |
| | (-0.79) | (-1.21) | (-0.60) | (-0.10) |
| $\gamma * g * J4$ | -0.00612 | -0.04321 | -0.00101 | 0.00613 |
| | (-0.56) | (-1.62) | (-0.11) | (0.71) |
| $\gamma * g * XE$ | -0.05421 | -0.06549 | -0.05438 | -0.04349 |
| | (-3.12) | (-2.55) | (-2.73) | (-2.09) |
| $\gamma * g * NYE$ | -0.10847 | -0.20094 | -0.08819 | -0.10787 |
| | (-2.61) | (-2.47) | (-2.51) | (-2.06) |
| $g$ | -0.00075 | -0.00053 | -0.00077 | -0.00084 |
| | (-11.86) | (-3.33) | (-11.30) | (-6.75) |
| $\ln ME$ | -0.00640 | -0.00593 | -0.00693 | -0.01321 |
| | (-4.78) | (-3.03) | (-4.39) | (-5.57) |
| $\ln BM$ | 0.01295 | -0.00326 | 0.01597 | 0.01161 |
| | (3.18) | (-0.75) | (3.17) | (1.50) |
| $\ln ME * Jan$ | -0.01244 | -0.01362 | -0.01042 | -0.01034 |
| | (-9.54) | (-6.93) | (-7.09) | (-5.24) |

Figure IA.1: Time-series of the tax-selling premium, the interest rate, and the capital gains tax rate at the turn of the year

This figure shows the evolution of the tax-selling premium (γ) and its two components over the period 1954-2008. These components are the marginal seller's interest rate, proxied by the one-year Fama-Bliss interest rate, and the marginal seller's tax rate, proxied by the maximum capital gains tax rate.

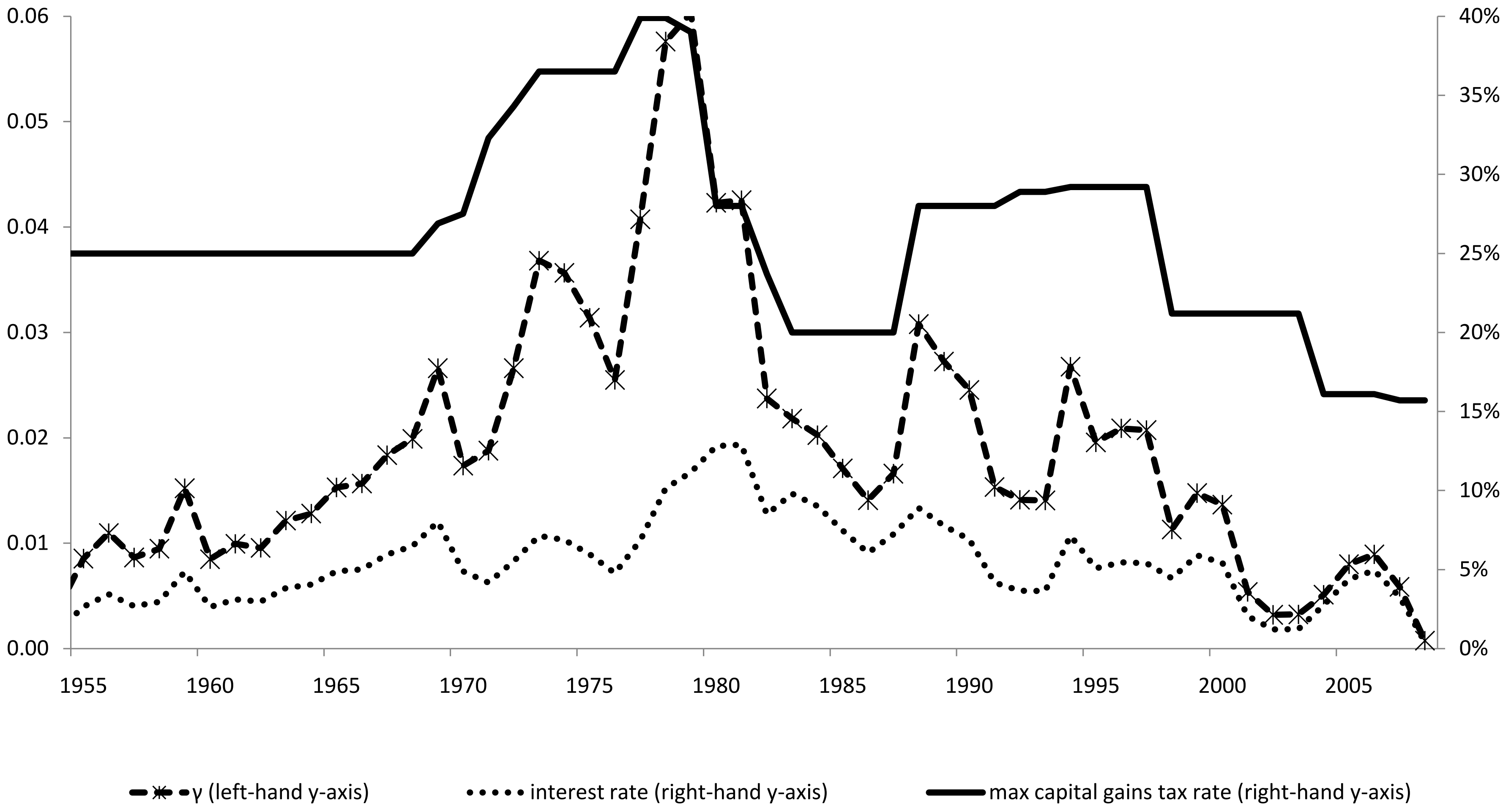

Figure IA.2: Time-series of the tax-selling premium at the turn of the year using different interest rates

This figure shows the evolution of the tax-selling premium (γ) using different rates as proxies for the marginal seller's interest rate. In addition to the Fama-Bliss one-year rate, we consider annual rates on credit card loans, auto loans and personal loans. In contrast to the Fama-Bliss rate, which begins in 1954, data on auto loan rates begin in 1971, while data on personal loans and credit card rates begin in 1972. All data are the latest available rate as of the end of each year.