Rethinking How We Score Capital Gains Tax Reform*

Natasha Sarin
University of Pennsylvania

Lawrence Summers
Harvard University, NBER

Owen Zidar
Princeton University, NBER

Eric Zwick
University of Chicago Booth, NBER

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Abstract

We argue the revenue potential from increasing tax rates on capital gains may be substantially greater than previously understood. First, many prior studies focus primarily on short-run taxpayer responses, and so miss revenue from gains that are deferred when rates change. Second, the rise of pass-throughs and index funds has shifted the composition of capital gains in recent years, such that the share of gains that are highly elastic to the tax rate has likely declined. If some components are less elastic, then their elasticity should get more weight when scoring big changes because they will comprise more of the remaining tax base. Third, closer parity to income rates would provide a backstop to rest of tax system. Fourth, additional base-broadening reforms, like eliminating stepped-up basis, making charitable giving a realization event, reforming donor advised funds, and limiting opportunity zones to places with the highest poverty rates, will decrease the elasticity of the tax base to rate changes. Overall, we do not think the prevailing assumption of many in the scorekeeping community—that raising rates to top ordinary income levels would raise little revenue—is warranted. A crude calculation illustrates that raising capital gains rates to ordinary income levels could raise hundreds of billions more revenue over a decade than other leading estimates suggest.

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1 Introduction

Capital gains taxes are a perennial issue in tax reform debates. Some maintain that preferential rates on capital gains encourage entrepreneurship and capital formation. Others question whether these benefits are sufficiently large to outweigh the equity and fiscal costs of lower rates. While the direct equity costs of lower rates are clear—the wealthiest one percent account for two-thirds of capital gains realizations in the 2019 Survey of Consumer Finances—the fiscal costs are more uncertain.

The Joint Committee on Taxation (JCT) estimates these costs. In the parlance of policymakers, the JCT is the official "scorekeeper" who decides how tax legislation "scores" if implemented. The prevailing wisdom among some in the scorekeeping community (e.g., Tax Policy Center, Tax Foundation, Penn Wharton Budget Model) has been that the revenue-maximizing capital gains rate is around 30 percent, such that setting a rate too far above this level could actually *reduce* the total amount of revenue collected.[1] This "Laffer rate" is well below both current top marginal tax rates on other income and top rates currently under debate. The rationale for a low Laffer rate is that the static revenue gains expected from a high rate will fail to materialize because the dynamic response of taxpayers dramatically shrinks the tax base.

We present a simple example to highlight the role of dynamic responses in revenue estimation. The current "realization elasticity" used by JCT and others in the scorekeeping community is approximately -0.7, based both on historical scores (Joint Committee on Taxation, 1990) and more recent academic research (Dowd, McClelland and Muthitacharoen, 2015). If tax rates increased by 100%, a crude application of this elasticity implies that realizations would fall by 70%.[2] In concrete terms, roughly $1 trillion of annual realizations would shrink to around $300 billion due to an increase in capital gains tax rates from 20% to 40%. This assumed $700 billion response is large enough that raising capital gains rates to ordinary income levels could be scored as losing tax revenue.

Accounting for the difference between static and dynamic scores is clearly important. For example, the official score attached to changes in the top income tax rate is perhaps 12 percent lower than the static score, because some taxpayers will choose to work less, or hire tax planners to help avoid taxes more.[3] And it is reasonable that the dynamic effects in the case of capital gains are more pronounced than for other policies: retiming a capital gain realization in an investor's stock portfolio is easier than changing investment strategy for executives seeking to avoid a corporate tax increase, or reducing labor supply for workers when income tax

[1] For example, McClelland provides a short discussion of revenue-maximizing rates, noting that "the Tax Policy Center uses estimates that imply that the revenue from taxing long-term capital gains is maximized when the top rate is set to be about 28 percent" and the Treasury Department, and JCT appear to use similar estimates. https://www.taxpolicycenter.org/taxvox/new-study-suggests-congress-could-raise-money-increasing-capital-gains-tax-rates-47-percent

[2] It is our understanding that realizations are modeled as falling by 70% over a two-year period (based on the effects described in equation 1) and remain at depressed levels thereafter for years 3-10 of the budget window. In other words, the assumed effects for years 3-10 are zero and therefore the cumulative effective after ten years is approximately a 70% decline in realizations over the collective ten-year period. We assume a starting tax rate of 20%, and calculate percent change in realizations to be the product of the net-of-tax rate and percent change in the net-of-tax rate. To convert -0.7 from a tax elasticity to a net-of-tax rate elasticity, we multiply by the ratio of net-of-tax rate to tax rate. Thus, post-change, we predict realizations will fall by $0.7 \cdot \frac{1-0.2}{0.2} \cdot \frac{0.2}{1-0.2} = 0.7 = 70\%$. This stylized example abstracts from the 3.8% net investment income tax and other tax considerations.

[3] See Saez, Slemrod and Giertz (2012), who use an elasticity of taxable income of -0.2. When comparing elasticity of taxable income estimates with estimates of the elasticity of capital gains, it is most appropriate to focus on the high-income elasticity of taxable income. Another caveat to this comparison is that elasticities of taxable income are typically estimated based on the net-of-tax rate, while capital gains elasticities are traditionally estimated using the tax rate.

rates rise.

However, we suspect that estimates of such large behavioral responses to capital gains rate changes may miss several important factors. For one, medium-term retiming of realizations would offset lost revenues in the short-term. For simplicity, we consider a two-year example.[4] Suppose that doubling capital gains rates from 20% to 40% causes realizations to occur half as often: instead of realizing gains every year, individuals realize gains every two years. If assets grow at 10% annually, then in the low-tax regime, $100 of assets yield realizations of $10 in year 1 and $10.80 in year 2 (after paying two dollars of tax in year 1). In the high-tax regime, $100 of assets yield realizations of $0 in year 1 and $21 in year 2. Despite the appearance in year 1 of a large elasticity of realizations in response to the tax increase, total revenues over both years increase from $4.16 in the low-tax regime to $8.40 in the high-tax regime. In this simple example without other behavioral responses, the short-run revenue score is zero and the medium-run revenue score is double the baseline. Clearly, the latter revenue score is more relevant for policy purposes.

It is not clear to what extent these dynamic factors are incorporated in current scorekeeping methods, or if instead the current approach predicts that annual realizations would permanently fall. It is also unclear how much additional base-broadening reforms—stepped-up basis at death, making charitable giving a realization event, reforming donor advised funds, and limiting opportunity zones to places with the highest poverty rates—would affect estimates of lost tax collection due to indefinite deferrals.

Beyond the issue of deferred gains, we highlight three additional considerations that suggest conventional elasticities may be overstated. First, the composition of capital gains has shifted in recent years, such that the share of capital gains that are highly elastic to the tax rate has fallen. Today, nearly half of capital gains accrue through passthrough and mutual fund distributions outside of the direct control of taxpayers. If half of capital gains are not sensitive to the tax environment, then for $e = -0.7$ to be the right average elasticity across all gains, the elasticity for the other half of gains would be $e = -1.4$. Even if timeable realizations were so sensitive as to fall to zero in response to a tax increase, a large stock of non-timeable gains would remain to be taxed at the higher rates. Moreover, the appropriate elasticity for scoring big tax increases should put more weight on the elasticity of the less timeable portion since it will account for more of the remaining tax base. Finally, revenue estimates may understate the substitution between capital gains and other forms of income. Closer parity to income rates would provide a backstop to rest of tax system, which can affect the level tax avoidance and evasion, as well as the prevalence of recharacterized wages and carried interest compensation.

We conclude with crude estimates of the wide range in revenue potential from raising capital gains rates to the top ordinary income levels under different elasticity assumptions. Applying the conventional elasticity $e = -0.7$ leads to the conclusion that this substantial rate increase would lose over $800 billion in revenue. In contrast, using $e = -0.3$ (the lower of the range of estimates produced by Agersnap and Zidar (2020)) suggests that raising rates to the top ordinary income level could raise more than $800 billion over a decade. And estimates in the middle of the range (i.e., $e = -0.4$) imply a revenue increase of around $450 billion. Pairing rate increases with the elimination of loopholes that erode the capital gains tax base—like stepped-up basis

[4] In practice, we consider short-term effects to include the first two years and medium term effects to cover years three through seven.

and the tax preference for charitable gifts of appreciated assets—would produce larger revenue estimates.

Our point is not to offer an official score, but instead to illustrate the magnitude of potential revenue and how sensitive capital gains revenue estimates are to various assumptions. With our simple calculations, which abstract away many important details, we offer not an official score, but an illustration of how sensitive capital gains revenue estimates are, and how reasonable alternatives to the standard set of assumptions suggest large revenue potential.

2 Short-Run Deferral Increases Medium-Run Realizations

2.1 Longer estimation window produces smaller elasticity estimates

Gains deferred when taxes rise need not be deferred indefinitely. Auerbach (1989) provides a helpful model that we describe in the Appendix. In the model, rate increases may induce less frequent asset turnover, but at least some portion of gains deferred will face a tax burden eventually. And when deferred realizations do occur, the gains will be larger, as they will accrue over many years, offsetting transient losses from delays in realization. Working through the long-run dynamic equilibrium properties of whatever elasticity is estimated is quite important. In general, increasing the frequency of realizations means that the average realization will be smaller, and decreasing the frequency of realizations means that when they do occur, they will be larger. The impact on the size of the taxable gain works against this baseline effect and is missed by short-term elasticity estimates.

There is a long line of empirical research on the responsiveness of capital gains realizations to rate changes, relying on different methodologies for estimating taxpayer response, different sample periods, and different rate changes from which to derive estimates (Dowd and Richards, 2021). One key reason why realization elasticities vary across studies is that they reflect different horizons over which taxpayer responses are estimated. Due largely to data limitations, much of the literature has estimated a short-run elasticity by studying responses within a short window before and after tax changes. If researchers and professional scorekeepers adopt the short-run elasticity as the relevant statistic for revenue estimation, which is generally calculated over a ten-year budget window, they implicitly presume that realizations that are deferred when rates rise will never take place.

Table 1: Tradeoffs of using different approaches to investigate the effects of capital gains taxes

	Individual-level	**State-level**		**Aggregate time series**	**Calibrated models**
	Dowd, McClelland, Muthitacharoen (2015)	*Bakija, Gentry (2014)*	*Agersnap, Zidar (2021)*	*Eichner, Sinai (2000)*	*Jakobsen, Jakobsen, Kleven, Zucman (2020)*
Dynamics	X	X	✓	✓	✓
Aggregation	X	✓	✓	✓	X
Selection model	✓	X	X	X	X
Small changes	✓	✓	✓	X	X
Comparison group	✓	✓	✓	X	✓

Table 1 summarizes some advantages and disadvantages of different approaches to investigate the effects of capital gains taxes. The first column lists some of the advantages and disadvantages of a recent contribution Dowd, McClelland and Muthitacharoen (2015) (DMM), which uses individual-level panel data from the 2000s to estimate a permanent elasticity of around -.72, based on taxpayer responses from the two years surrounding tax changes. Specifically, the main estimating equation is:

$$\ln g_{it} = \beta_1 \tau_{it-1} + \beta_2 \tau_{it} + \beta_3 \tau_{it+1} + X_{it}\beta_4 + \lambda_{it} + \epsilon_{it}; \text{ if Realization}_{it} > 0 \tag{1}$$

where $\ln g_{it}$ are log realized capital gains of tax unit i in year t (measured as the net long-term personal gains before prior-year carryover losses), the τ's are the combined federal and state marginal tax rates on long-term for the respective year t, X_{it} are controls that include wealth, income, and demographic variables.[5] The resulting elasticity, which is characterized by equation 4 in DMM, is:

$$\begin{aligned} \varepsilon_{DMM} &\approx \hat{\tau}_{it+1}(\beta_1 + \beta_2 + \beta_3) \\ &= 17.4\% \times \underbrace{(0.053 - 0.069 - 0.025)}_{=-0.041} = .71(\pm.22) \end{aligned}$$

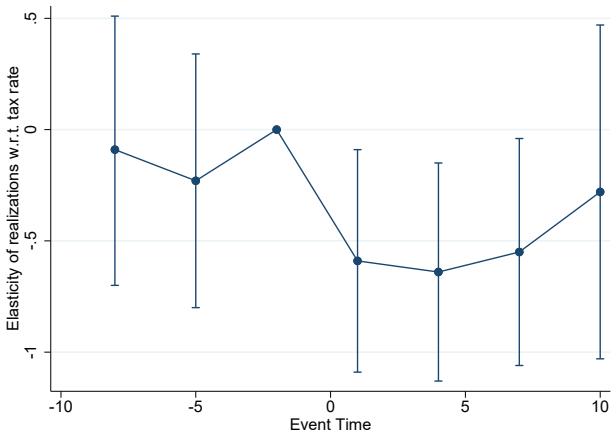
A limitation of this approach is that it misses out on realizations that are deferred when rates change, but occur eventually, just outside of the narrow window of misses effects outside narrow window of years (i.e., years $t-1, t, t+1$) immediately surrounding tax changes. Consistent with this idea, Dowd, McClelland and Muthitacharoen (2015) find that their estimates are exclusively driven by intensive margin effects (i.e., the size of a realized gain), indicating this approach may miss medium-run timing responses that are more likely to appear as extensive margin effects (i.e., the presence of a realized gain). A second limitation of the individual-level approach is aggregation, possible heterogeneity in the β's across observed and unobserved

[5] Note that DMM use first-dollar marginal tax rate variables and the maximum combined state plus federal rate as instruments for the contemporaneous and lead tax rates, i.e., τ_{it} and τ_{it+1}.

investor characteristics, having to correctly specify a selection correction (i.e., if Realization$_{it} > 0$), and having to weight results to aggregate dollars make mapping this elasticity estimate to 10-year score quite difficult. A third limitation is that some of the controls in X_{it}, such as imputed unrealized gains, may be hard to measure and influence the implied impulse response of the path of realizations to a change in the tax rate.

A second type of study uses state-year panel data, which can overcome some of the issues related to aggregation and dynamics. For example, Agersnap and Zidar (2020) capture realizations that occur at the state-level within ten years of a tax change (Figure 1).[6] Consistent with the deferred realization hypothesis, they arrive at an estimate of the behavioral effect of capital gains tax hikes that is much lower than existing estimates (between -.3 and -.5), and consequently an estimate of the revenue-maximizing rate that is much higher, around 38 to 47 percent. There are issues with this ten-year horizon as well. On the one hand, estimates are less precise in later years since other shocks occur during such a lengthy estimation window. On the other, even this more expansive estimation window misses realizations deferred when rates change that occur eventually, just outside of the ten-year horizon.

Figure 1: Evolution of realization responses: Elasticity estimates by horizon from Agersnap and Zidar (2020)



Notes: This figure plots tax rate elasticities within 3-year bins defined relative to the year of a tax change. For instance, the rightmost point indicates that the realizations elasticity to a tax change 9 and 11 years previous is -0.28. This figure is constructed by converting the policy-relevant elasticity ($\varepsilon_{CG} - \varepsilon_N$) series from Figure 3(c) of Agersnap and Zidar (2020) to a tax-rate elasticity. We use a conversion factor of $\frac{-0.22}{1-0.22}$ so that the result is an elasticity at a tax rate of 22 percent.

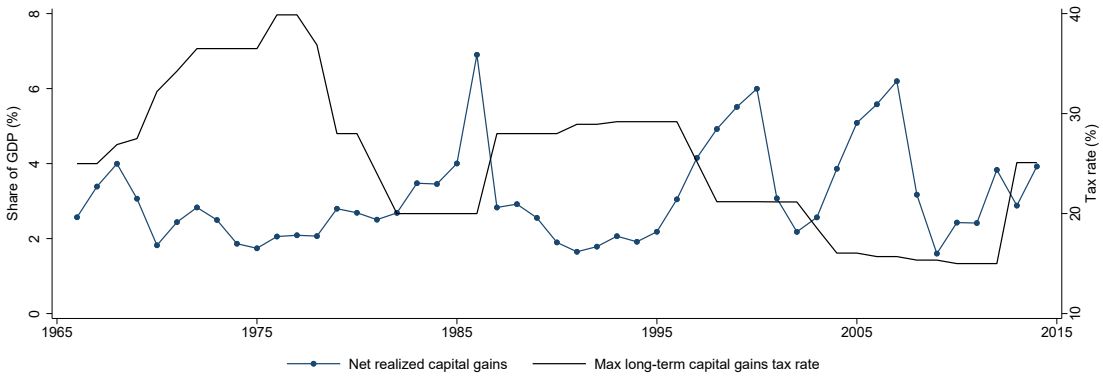
A critique of both Dowd, McClelland and Muthitacharoen (2015) and Agersnap and Zidar (2020) is that their identification relies on relatively small state-level tax changes. An alternative approach would be to use the time series of large federal changes to examine dynamics around larger reforms. The only comparable historical episodes in the U.S. are in the 1970s, when capital gains rates rose following the Tax Reform Act of 1969 to as much as 49 percent for some taxpayers, before being cut to 29 percent by the end of the decade. However, the lack of a comparison group and the existence of confounding shocks makes clear how difficult it is to identify the permanent tax-induced component of this change from the federal time series.

[6] Bakija and Gentry (2014) use a similar state-level identification strategy. Their approach controls for one-year lag and lead changes in the tax rate, but does not consider changes outside this window and thus does not capture medium- or long-term effects.

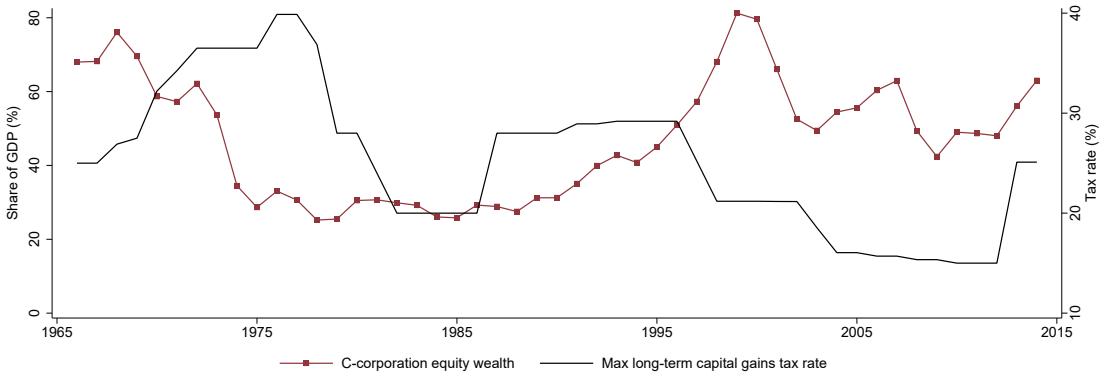
Figure 2 plots aggregate realizations and capital gains tax rates and reveals clear issues with extrapolation from the federal time series. First, the time series show clear anticipatory and transient taxpayer timing, providing more evidence of why elasticities based on just a few years of data can be misleading. Second, the base of capital gains is procylical, so it is hard to disentangle changes in realizations from unrelated market-induced changes in tax collections. The 1970s featured capital gains tax hikes, decreases in capital gains tax collection as a share of GDP, and poor market performance—all of which reversed in the 1980s. Figure 2(b) shows a sharp decline in C-corporation equity wealth as a share of GDP in the 1970s, which confounds inferences about the tax elasticity based solely on time-series fluctuations in rates and realized gains. Looking to state-level changes is thus valuable, as it is a broader sample that allows for separating tax-induced changes from general macroeconomic trends.

Figure 2: Evolution of Net Capital Gains and C-Corporation Equity Wealth

(a) Capital gains



(b) C-Corporation equity wealth



Notes: These graphs plot net realized capital gains and C-corporation equity wealth as a share of GDP, as well as the maximum long-term capital gains tax rates between 1960 and 2014. The maximum tax rate incorporates the effects of exclusions (which were eliminated in 1986), alternative tax rates, and other provisions. Data on capital gains and C-corporation wealth from Smith, Zidar and Zwick (2020). Data on tax rates from the U.S. Treasury (https://www.treasury.gov/resource-center/tax-policy/tax-analysis/Documents/Taxes-Paid-on-Capital-Gains-for-Returns-with-Positive-Net-Capital-Gains.pdf) and the Tax Foundation (https://taxfoundation.org/federal-capital-gains-tax-collections-1954-2009/). GDP data from the World Bank (https://data.worldbank.org/indicator/NY.GDP.MKTP.CD).

A fourth approach is to use a model-based approach with calibrated parameters. Estimates of savings

responses with-respect to after-tax returns can help inform the plausibility of different realization elasticities.[7] Consider an initial investment of $W_0 = \$100,000$, invested for 10 years at a pre-tax return rate of 7%. The after-tax net return rate R is a function of the pre-tax return rate and the capital gains tax rate τ_{cg}, which we assume to be 20%:

$$\begin{aligned} R &= [(1.07)^{10} - 1](1 - 0.2) \\ &= 0.97 \cdot 0.8 = 0.77 \end{aligned} \tag{2}$$

Suppose that τ_{cg} increases from 20% to 40%. Post-tax-change, $R = 0.97 \cdot 0.6 = 0.58$, which implies that the log change in after-tax net return rate $\Delta \ln(R) = \ln(0.58) - \ln(0.77) = -0.29$. We can then back out the post-change initial investment W_0' using our estimated $\Delta \ln(R)$, along with the elasticity of wealth with respect to the after-tax return rate. We use an estimate from Jakobsen, Jakobsen, Kleven and Zucman (2020), which estimates this elasticity at about 0.4 over an 8 year period.

$$\begin{aligned} W_0' &= (1 - \Delta \ln(R) \cdot \varepsilon_{W,R}) \cdot W_0 \\ &= (1 - 0.29 \cdot 0.4) \cdot \$100,000 = \$88,492 \end{aligned} \tag{3}$$

Now that we have both W and W', we can calculate the post-tax increase change in capital gains realizations:

$$\begin{aligned} \Delta CG &= (W_{10}' - W_0') - (W_{10} - W_0) \\ &= \$88,492 \cdot [(1.07)^{10} - 1] - 100,000 \cdot [(1.07)^{10} - 1] \approx \$86K - \$97K = -\$11K \end{aligned} \tag{4}$$

A decrease in capital gains realizations of \$11K given a doubling in the tax rate implies a realizations elasticity with respect to the tax rate of $\varepsilon_{CG,\tau_{CG}} = \frac{-0.11}{1} = -0.11$.

Although this exercise involves several strong assumptions (including abstracting from the decision to realize gains within the 8 year period), it is nonetheless striking that the realizations elasticity it produces is much smaller than the -0.7 used by scorekeepers. In Table 2, we show that the wealth elasticities estimated by Jakobsen, Jakobsen, Kleven and Zucman (2020) over different specifications and time horizons yield similarly small realizations elasticities. Going in the other direction, a -0.7 realizations elasticity would imply a wealth elasticity of 4.2, which is several times larger than the largest wealth elasticity from JJKZ (Table 2, Figure 3).

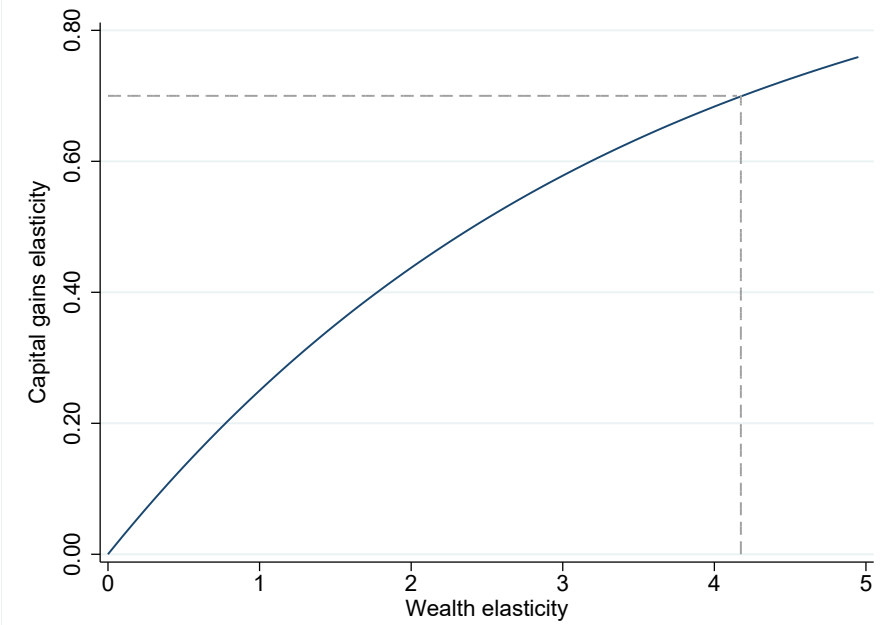
[7] This example builds on the logic of some examples of using savings elasticities with respect to after-tax-rates of return in Ferey and Taubinsky (2021).

Table 2: Wealth and Capital Gains Elasticities

Source	ε_w	$\tau_{CG} = 20\%$ w_0	w_{10}	Gains	R	$\tau_{CG} = 40\%$ w'_0	w'_{10}	Gains	R	ε_{CG}
8-yr couples	0.20	100,000	196,715	96,715	0.77	94,409	185,716	91,308	0.58	0.06
8-yr wealthiest	0.40	100,000	196,715	96,715	0.77	89,130	175,332	86,202	0.58	0.11
30-yr couples	0.77	100,000	196,715	96,715	0.77	80,130	157,629	77,498	0.58	0.20
30-yr wealthiest	1.15	100,000	196,715	96,715	0.77	71,832	141,305	69,473	0.58	0.28
Implied	4.18	100,000	196,715	96,715	0.77	30,087	59,186	29,099	0.58	0.70

Notes: Values in blue represent inputs. We take the first four wealth elasticities from Jakobsen, Jakobsen, Kleven and Zucman (2020), where the relevant specification is indicated under "Source." The fifth wealth elasticity is calculated by assuming $\varepsilon_{CG} = 0.70$ in absolute value.

Figure 3: Capital Gains Realization Elasticities Implied by a Range of Wealth Elasticities



Notes: Dotted lines indicate a capital gains elasticity of 0.70 and the corresponding wealth elasticity (4.18). See Table 2 for details on the underlying calculations.

The bottom line from this example is that leading wealth elasticity estimates imply much smaller realization elasticities than those used by scorekeepers.

2.2 Some portion of deferred gains are eventually realized

A limitation of many empirical estimates in the capital gains literature is that they do not measure relevant medium- and long-term responses. If taxpayers respond to increases in capital gains rates by realizing gains less frequently—but not deferring indefinitely—then these longer-run responses would suggest the impact of rate changes on capital gains tax collection is more temporary than previously believed.

If this were the case, one would expect to observe a few patterns in the data when rates increase. First, the duration that taxpayers hold their gains before realizing would rise. Second, the ratio of sales price to

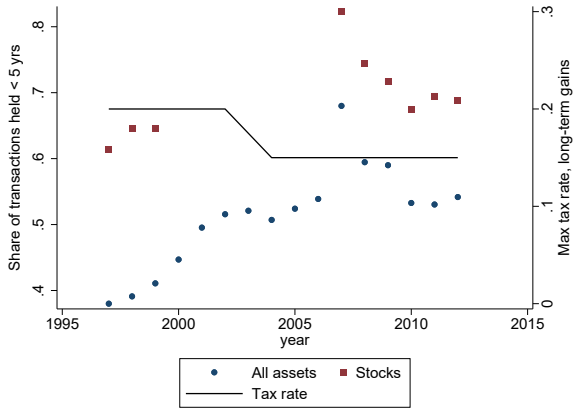
basis would be higher: In the Auerbach framework discussed in the Appendix, δ represents the share of realizations that occur annually. If a capital gains change affects δ, the share of annual realizations falls, but when realizations occur, gains relative to purchase basis are higher.

The IRS SOCA (Sales of Capital Assets) study provides some suggestive evidence on these patterns. The SOCA panel data includes the sales price, basis, gain or loss, and the purchase and sales date for capital gains transactions for a representative sample of taxpayers. This data is at the federal level and only for certain years between 1997-2012.[8] As such, there is just one federal tax change during the time covered by these data, the 2003 reform, which reduced the top rate from 20% to 15%. This is one of many areas where more recent and comprehensive IRS data would be invaluable: Regular SOCA panels would enable better inference about the extent to which realization behavior has changed over time.

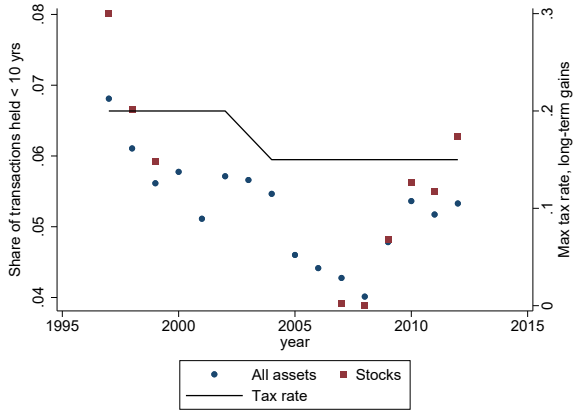
Figure 4 shows that, for all transactions and corporate stock transactions specifically, duration decreases in lockstep with the rate change. In other words, the share of assets held for more than ten years drops when the rate falls, and the ratio of sales price to basis falls (Figure 5). It is worth noting that this evidence is purely suggestive—these two periods are distinct and differences in macroeconomic conditions may well be driving the results.[9] But the figures are consistent with the notion that at least some of the changes induced by capital gains reforms have to do with the timing of gains, and not just the decision of whether or not to realize. Models that assume only the latter channel is operating will miss out on the revenue potential of rate changes.

Figure 4: Holding Length by Asset Class

(a) Held less than 5 years



(b) Held 10 years or more

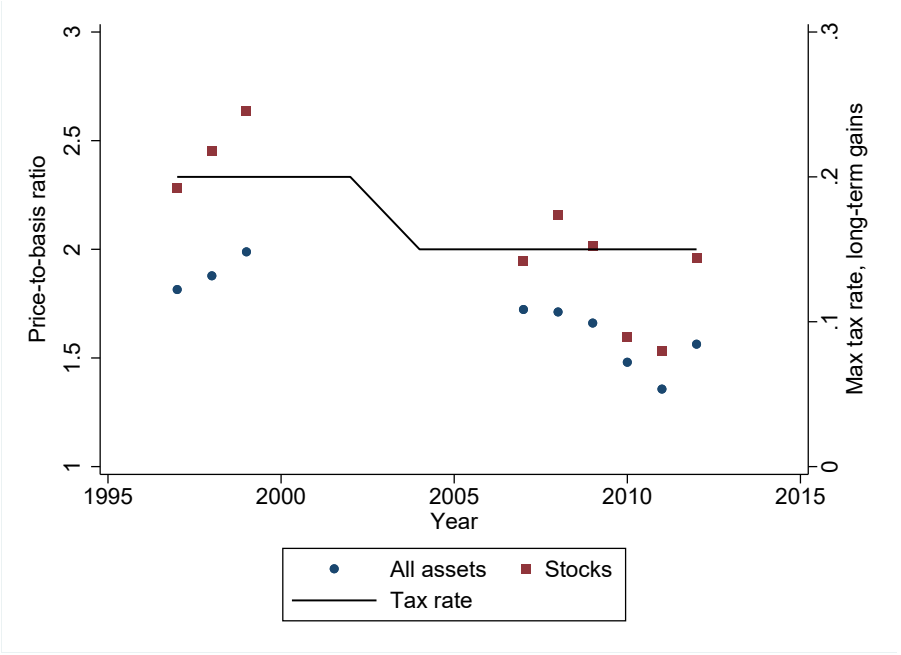


Notes: These graphs plot the average share of capital gains realizations that are held for less than five years and for more than 10 years. For reference, we also plot the maximum federal long-term capital gains tax rate. Data from the IRS SOCA.

[8] There is also a 1985 SOCA study but there are no study files for other years in the 1980s and early 1990s.

[9] Indeed, the share of assets held for long periods is mechanically tied to recent market movements: when the stock of capital gains rises significantly in a year, the share of total gains that have been held for long periods drops.

Figure 5: Price-to-Basis Ratio by Asset Class



Notes: This graph plots the ratio of sales price to basis for long-term gain realizations of all assets and for stocks only. For reference, we also plot the maximum federal long-term capital gains tax rate. Data from the IRS SOCA.

2.3 Tax law changes make it unlikely that taxpayers can defer gains indefinitely

An early theoretical paper by Stiglitz (1983) suggests that the avoidance opportunities for capital gains taxes are so rampant that the existence of a tax would have no impact on individual consumption, because the tax can be avoided entirely through a range of techniques like the use of derivatives.

Whether the assumptions that underlie this model were ever realistic is debatable. A long line of literature documents that most trading activity is inconsistent with tax-motivated realizations, which pushes against the idea that investors are so active in their tax avoidance strategies.[10] Further, to the extent that these opportunities did exist, they are more limited today than they were in the 1980s.

For example, Section 1259 of the tax code was adopted in 1997 and required that a constructive sale of property held by a taxpayer be treated for the purposes of recognizing gain and establishing a holding period as if she had sold the property in question for its fair market value. Section 1259 leaves some room for forward contracts designed for the holder to defer tax liability for a period (typically three to five years) while receiving cash today. But recent legal precedent makes clear that there are limits to this strategy that make it infeasible for gains periods to be rolled over indefinitely.[11] Thus, this strategy offers only a temporary salve to inevitable capital gains tax liability.

For those at the top of the wealth distribution, diversification, rather than consumption, needs likely drive

[10] See, for example, Odean (1998, 1999) and Barber and Odean (2000). In more recent work looking at bunching behavior around capital gains tax thresholds, Dowd and McClelland (2019) find that many taxpayers appear to pursue "distinctly inferior tax minimization [strategies]" when selling assets (p.347).

[11] See, for example, Estate of Andrew J. McKelvey V. Commissioner, No. 17-2554 (2d Cir. 2018).

some realization choices. But for taxpayers who are looking to consume out of their gains, it is plausible that they could borrow against shares that have accumulated in value, thus deferring capital gains liability. However, potential borrowers are likely to face sizable marginal calls because of the volatility of their underlying shares. They thus need to have sufficient liquidity on hand, which makes consumption without realization challenging.

Outside of the wealthiest who actively choose not to diversify (e.g., founders with large equity stakes), it seems unlikely that rate changes could conceivably lock-in accrued gains until death. More quantitative work is needed to try and measure the behavior of and share of gains held by taxpayers across the wealth distribution.[12]

3 A Rising Share of Capital Gains Cannot Be Easily Retimed

Relative to the 1990s, the portion of assets where accumulated capital gains could conceivably be deferred—and thus untaxed—has declined. The prototypical example of a capital gain is a share of corporate stock. An individual who bought a share of Amazon when it IPO-ed at $18 could sell that share today, and pay taxes on more than $3,100 of appreciation. Or, if she does not face consumption needs during her lifetime, she could defer the gains indefinitely and bequest the share of stock to her heirs, at which point the basis will adjust and wipe out any tax liabilities for appreciated gains during her lifetime.

Stock transactions are among the most elastic form of capital gains, since the taxpayer can proactively decide whether or not to realize. But, as Figure 6 shows, the share of capital gains that stock transactions represent has fallen substantially over the course of the last several decades, while more inelastic gains are growing in import: between 1997 and 2012, the share of long-term gains that involved corporate stock transactions fell from 41.2% to 26.9%.

The largest corresponding growth is in passthrough gains or losses, which rose from just 22.6% of long-term gains to 37.7%. Pass-through gains refer to distributed gains from pass-through entities owned by taxpayers. This category includes the growth of "carried interest" compensation to general partners of hedge funds, venture capital, and private equity firms. Partnership agreements typically require funds to be returned within ten to twelve years of the initial commitment. Investors in these structures cannot time realization decisions around favorable tax environments, as their participation is limited, nor can they typically defer their gains indefinitely like stockholders. Instead, they receive—and pay taxes on—gains when the general partners exit underlying investments. Moreover, many of the limited partners in these funds are non-taxable, such that the decision to exit an investment is likely to be less responsive to capital gains tax changes.

Considering this shift in composition is one reason why conventional elasticities may be overstated. The most recent data available from the IRS reveal that nearly half of capital gains accrue from passthrough and mutual fund distributions.[13] It is hard to know what share of non-personal capital gains are timeable around tax changes (e.g., corporate stock held by partnerships) and what share are inelastic (e.g., carried interest, which itself represents around 10% of annual capital gains in recent years (Smith, Zidar and Zwick, 2020)).

[12] Larrimore, Burkhauser, Auten and Armour (2021) is one recent example of work that does this.

[13] Eichner and Sinai (2000) also point to the rise of equity held through mutual funds as one mechanism for lower elasticities.There may also be other risk-sharing or other non-tax motivations for forming these legal forms that might limit the elasticity as well.

While it is quite challenging to quantify this share empirically, suppose that half of capital gains are not easily timeable in response to tax changes. If, for the sake of argument, 50% of gains are indeed untimeable, then for $e = -0.7$ to be the right average elasticity across all gains, then the remaining 50% of timeable capital gains that are elastic to the tax rate should have an elasticity of close to -1.4.

Said another way, if 50% of capital gains are not sensitive to the tax environment, then no matter how large the "timeable" elasticity is, doubling rates to top ordinary income levels will still raise substantial revenues. Even if the timeable realizations shrink to zero, there remains a large stock of gains that will be taxed regularly at new, higher rates. Moreover, the appropriate elasticity for bigger changes should put more weight on the elasticity of the less timeable portion. The elasticities used by scorekeepers are averages across different asset types. But the weights are not static: when there is a substantial change in the tax environment, the weights of the different asset classes that comprise the capital gains tax base shift, and so too does the elasticity of the overall tax base. When capital gains tax rates are low (or, when taxpayers predict that rates may rise in the near future), a large share of realizations are in more-easily-timeable equities. This dynamism appears missing from existing revenue estimates.

Work by Dowd, McClelland and Muthitacharoen (2015) confirms that different types of assets exhibit different realization elasticities, finding for example that pass-through distributions exhibit a higher sensitivity to rate changes than other types of assets, while mutual fund distributions exhibit a much lower sensitivity. However, their data runs from 1999 through 2008, so may not reflect the current composition of gains. In addition, they find the elasticity of directly-owned capital gains varies over different time periods and is lower in recent years. Further research incorporating the growth of carried interest and the quantitative importance of different types of gains and their varied elasticities would be useful for improving assessments of the revenue potential of capital gains tax reform.

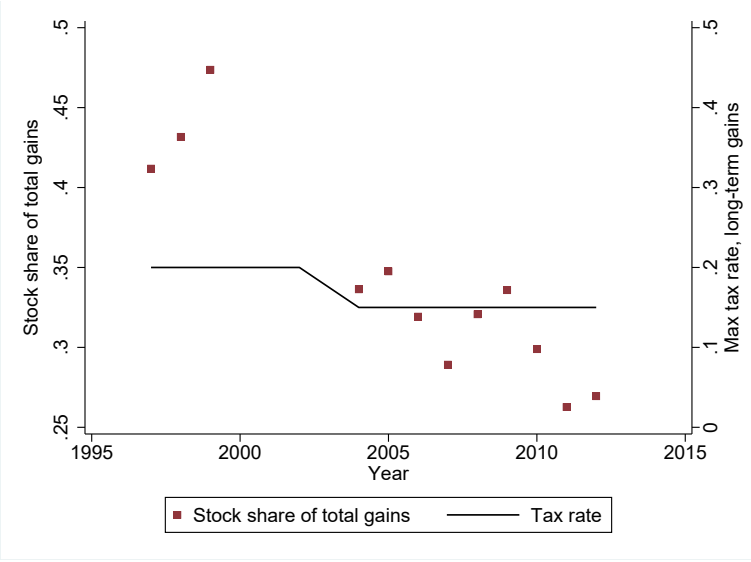
4 Realization Responses Generate Fiscal Spillovers

4.1 Capital gains tax changes affect tax collections beyond realization responses

Elasticity estimates from the literature tend to focus on the narrow question of how the capital gains tax base evolves in response to rate changes, but this approach offers an incomplete answer to the question of total revenue effects. While scorekeepers may already be modeling such spillovers, we are unaware of the approach, the assumed magnitudes, and the empirical basis for these assumptions.

Consider a few examples of how changes in the capital gains tax might affect other tax bases. First, incentives to mischaracterize labor income and profits as capital gains to take advantage of lower tax rates can also affect revenues (Smith, Yagan, Zidar and Zwick, 2019). The existence of preferential tax treatment encourages avoidance in the form of misclassification of wage income for fund managers through the carried interest loophole, discussed above. Similarly, the tax code favors employee stock options, which, when held for long enough, qualify for capital gains treatment. Second, different treatment of capital gains and dividends affects the relative attractiveness of distributing corporate profits via share buybacks versus dividends. Third,

Figure 6: Stock Share of Gains



Notes: Points represent the corporate stock share of total capital gains realized in a given year. These are plotted alongside the maximum federal long-term capital gains rate. Data from the IRS SOCA.

capital gains tax preferences can affect the allocation of capital across industries and locations, due to sheltering opportunities such as like-kind exchanges in real estate and oil and gas, investments in Opportunity Zones, and incomplete recapture of depreciation deductions following asset sales. Reforming capital gains taxation will thus also reduce wasteful effort by taxpayers and their planners to devote resources to circumventing tax liabilities by exploiting preferential capital gains rates and sheltering opportunities.

4.2 Capital gains tax changes and investment behavior

One reason to be skeptical of the revenue potential of capital gains tax increases is that tax increases might impact economic growth. Many critics of capital income taxes argue that low rates induce business creation by allowing investors to reap a larger share of the gains they create (Feldstein, 2006).

Indeed in the Bush Administration, one rationale for cutting capital gains rates was incentivizing entrepreneurship. According to the 1990 Economic Report of the President, "[m]uch of the return to entrepreneurs... comes through increasing the value of the business. Reducing the tax rate on capital gains will provide a climate that encourages businesses to invest in new technologies and products" (President and CEA, 1990). If large, such investment and entrepreneurship effects would amplify realization elasticities by shrinking the future corporate tax base in the case of a capital gains tax increase.[14]

But the case for large investment effects of lower capital gains rates appears overstated. First, preferential capital gains treatment incentivizes some income sheltering that may cause misallocation and prevent capital from being employed in its most productive use. Second, the majority of venture capital comes from large

[14] Another reason why considering dynamics and longer horizons would be valuable is that longer horizons are needed to detect and quantify these effects.

institutions like pension funds, endowments of universities, charitable foundations, and sovereign wealth funds, which are already tax-exempt.[15] Third, it is hard to imagine entrepreneurs making decisions about investment and risk on the basis of the capital gains tax regime: Mark Zuckerberg was not focusing on the capital gains tax when he was in his dorm room coding up Facebook. Bell, Chetty, Jaravel, Petkova and Van Reenen (2019) reach the same conclusion based on comprehensive data on U.S. inventors, arguing that tax cuts do not produce more Einsteins. Finally, in a related context, empirical evidence suggests that dividend tax cuts that decrease firms' cost of capital in similar ways to the capital gains tax do not affect investment (Yagan, 2015).[16]

5 Implications for Scorekeeping and Revenue Estimates

5.1 Illustrative revenue estimates under different assumptions

Table 3 shows our realization and revenue estimates for capital gains tax rate increases of 2% and 20%.[17] The first column presents CBO's projections for realizations from 2021 to 2030. While the amount of realizations itself is endogenous, the CBO projections of approximately $1 trillion of realizations per year over the next decade provide a useful starting point. At a 20% tax rate, the table shows that the baseline capital tax revenues amount to around $200 billion a year. To simplify the discussion, we apply different elasticities to this baseline level of realizations and revenues every year over a ten-year period.[18]

We consider two tax changes. The first is a 2 percentage point increase in the rate, which allows us to compare our approach to published scores from JCT.[19] Table 3 shows how much realizations shrink under different elasticity assumptions. When $e = 0$, realizations remain at their baseline level. For $e = -0.3$ and $e = -0.7$, values on the lower and upper end of the realization elasticities estimated by prior work, the baseline realizations shrink by 3% and 7% respectively.[20] Applying the new 22% tax rate to the smaller realization levels results in less revenue than the additional $20B per year that would result if there were no behavioral response. With $e = -0.3$ and $e = -0.7$, the annual gains are about $15 billion and $5 billion, respectively.

The JCT scores capital gains hikes of 2 percentage points as generating around $70 billion over the ten-year budget window, which is roughly in the same ballpark as our ten-year estimate using the crude elasticity ap-

[15] This was a point made by early work by Poterba (1989) and is even more true today.

[16] In contrast, Moon (2020) presents evidence that a capital gains tax reform in South Korea had substantial effects on corporate investment.

[17] We also provide revenue tables for a 10 p.p. rate increase from 20% to 30% in the Appendix. Note that CBO's baseline has capital gains as a share of GDP falling slightly, which is why the table shows a relatively stable base of realizations despite higher nominal GDP. If the capital gains share of GDP is stable, then the revenue potential is even greater than the estimates we present.

[18] As we emphasize earlier in the paper, investors likely alter the timing of realizations within the budget window but we abstract from this aspect of the discussion in this crude calculation here. Instead, we focus on the role of different elasticities and the implied reductions in the tax base and tax revenues over the ten-year budget window.

[19] Note that the CBO cites the JCT as the source for the table of revenue effects. https://www.cbo.gov/budget-options/2018/54788.

[20] Specifically, we take $e = -0.3$ from Agersnap and Zidar (2020) discussed above (and pick the lower end of their range to reflect an elasticity that may be consistent with eliminating stepped-up basis and including other base broadeners); $e = -0.7$ is the midpoint of the current JCT and Treasury elasticity estimates of -.68 and -.72, which we believe may be based in part on the headline estimate of -0.72 in Dowd, McClelland and Muthitacharoen (2015). We calculate change in realizations by multiplying the net-of-tax elasticity by percent change in the net-of-tax rate (calculated relative to the initial net-of-tax rate). We assume that tax elasticities apply at a tax rate of 20%, and so convert from tax elasticities to net-of-tax elasticities by multiplying by a factor of $\frac{1-0.2}{0.2}$. Thus, the change in realizations for $e = -0.3$ is $0.3 \times \frac{1-0.2}{0.2} \times \frac{0.02}{0.8} = 0.03$.

proach with $e = -0.7$ of \$51 billion.[21] We suspect some of this difference may reflect more careful consideration of other components that our crude elasticity-based approach misses, but we view it as somewhat validating that the crude approach is on the same order of magnitude as this public JCT score.

The second tax change of interest is doubling the rate from 20% to 40%, which would raise the capital gains rate to top ordinary income levels. This change requires much more extrapolation from observed variation in the data. Especially given that the elasticity estimates we use are derived by observing responses to much smaller tax changes, a thorough exploration of such a large tax increase would involve more elaborate methods to model behavioral responses. Nonetheless, it is striking to see how much elasticity assumptions affect revenue estimates. Using an elasticity of $e = -0.3$, raising the tax rate to 40% would raise nearly \$900 billion over ten years.[22] Figure 8 shows the sensitivity of revenue estimates to a range of elasticities from zero to one. Adjusting our preferred elasticity toward zero (e.g., if rate hikes are coupled with base-broadening reforms like the elimination of step-up in basis or death as a realization event) produces estimates approaching \$2 trillion.

Comparing this figure to the case of $e = -0.7$ illustrates the striking behavioral adjustments that are implied by such an elasticity. Simply applying $e = -0.7$ to the CBO's projections for realized gains implies a revenue *loss* of nearly \$900 billion over ten years, compared to the gains of the same magnitude implied by our estimate using $e > -0.4$.[23] Furthermore, in the Auerbach (1989) model, we can relate behavioral responses to changes in the frequency of realization and the extent of deferral until death or via charitable contribution. In the Appendix, we find that with $e = -0.7$, if the effect on the capital gains tax base is driven solely by an increase in deferred realizations, the share of unrealized gains would have to rise from 50% to nearly 70%. If the effect is driven by an increase in turnover, then turnover would decrease from once every three years (CBO and JCT, 2016) to once every 13 years, increasing by a factor of four.

For the case of $e = -0.3$, the impact on unrealized gains would be half as large. The impact on turnover would also be about half as large, as turnover rises from once every three years to once every seven years. Thus, the change in underlying investor behavior predicted by applying $e = -0.7$ is significantly more dramatic than in the case of $e = -0.3$. More explicit modeling of turnover behavior and the distribution of unrealized gains would help provide discipline when modeling large tax changes.[24]

These calculations are far from a final word on the tax revenue at stake from these reforms. Moreover, we suspect that, for a large change in tax rates, scorekeepers have developed more elaborate revenue models than our stylized approach implies. Our objective is to illustrate that if, due to the many issues we raise above, the capital gains tax base overall is less elastic than previously understood, the impact on official revenue estimates could be substantial.

[21] Using our approach, we precisely match the \$70 billion estimate when we use an elasticity of $e = -0.623$. We provide tables with this elasticity as well in the Appendix.

[22] The mechanical revenue of a 40% rate on a \$1 trillion base is about \$440 billion in annual revenue, or an additional \$220 billion in revenue per year.

[23] Using $e = -0.7$, the \$1 trillion baseline realizations shrink by 70% $\left(\text{which is } -0.7 \times \frac{1-.2}{0.2} \times \frac{20}{80}\right)$ to \$300 billion per year. With only \$300 billion in realizations, a 40% tax rate would raise \$120 billion per year, or \$100 billion less than the baseline annual revenues of \$220 billion.

[24] This calculation abstracts from reductions in the overall base due to real responses, which can also contribute to the change in gains and place less burden on turnover in accounting for the total response.

Revenue estimates from scorekeeping community. To our knowledge, there are no recent official JCT estimates available for raising capital gains rates to ordinary income levels. Estimates offered during this election cycle from unofficial scorekeepers (see Table 4) suggest that large increases in capital gains rates can raise significant revenue. The general consensus appears to be that an increase in capital gains rates of the size we contemplate is likely to raise hundreds of billions of dollars in the coming decade.[25] Collectively, the US Treasury scored reforms to the taxation of capital income in the American Families plan—taxing capital income for high-income earners at ordinary rates and treating transfers of appreciated property by gift or on death as realization events—as raising $322 billion from 2022-2031.[26]

5.2 Elasticity depends on broader capital gains context

Unique features of capital gains taxation make the tax base more sensitive to rate changes than other types of taxes (Dowd and Richards, 2021). Most obviously, the existence of a step-up in basis upon the death of the taxpayer dissuades holders of unappreciated assets from realizing their gains in a high-rate environment, in the absence of consumption needs or a desire to diversify. Eliminating stepped-up basis would diminish incentives to lock-in gains, which would substantially increase the revenue potential of any hike in capital gains taxes.[27] Making death a realization event for capital gains tax collection would likely raise even more, because the value of deferral, especially in a low-rate environment, would be minimal if taxes were sure to be collected at death (abstracting away from policy risk that such a change would be rolled back by future policymakers).

In the current code, deferring gains until death is not the only capital gains avoidance tactic. When an individual donates an asset to charity (e.g., share of stock) that has appreciated in value, capital gains on that asset go untaxed, and the individual receives a credit equivalent to the full value of the gift, despite not paying any taxes on the gain. Further, investors can place existing assets with accumulated gains into Opportunity Zones (meant to spur investment in economically distressed communities) to defer payment of capital gains; or can avoid taxation all together, for example through the use of like-kind exchanges for real estate transactions. On top of this, investing in small businesses can mean up to $10 million in gains is excluded from capital gains taxation. Broadening the capital gains tax base by limiting these preferences raises the revenue potential of capital gains reform efforts. Conversely, while significant sheltering opportunities exist, there is a legitimate concern that raising the capital gains rate will result in taxpayers relying more on existing tools to shield gains from taxation, thus limiting the potential of reform.

The elasticities that we use are based on the current capital taxation regime, including a step-up in basis at death, which amplifies the incentive to respond to capital gains tax changes. A broader overhaul of capital gains

[25] One difference between our back-of-the-envelope calculation and these scores is the size of the tax base. These scores focus on a proposal to raise rates only for those whose AGI exceeds one million, who collectively account for around 70% of all taxable realizations based on 2019 SCF data. Applying our approach to this group would result in 70% of the revenue inTable 3 from raising rates across the board or $620 billion at $e = -0.3$ and $310 billion at $e = -0.4$.

[26] For plan details, see p. 61. For the revenue estimate, see the table of revenue estimates p.105 of "General Explanations of the Administration's Fiscal Year 2022 Revenue Proposals" https://home.treasury.gov/system/files/131/General-Explanations-FY2022.pdf.

[27] For context, the JCT estimates that stepped-up basis elimination at current rates would raise $105 billion over a decade (CBO, 2018). An alternative, crude approach from the Penn-Wharton Budget Model scales the realization elasticity down by 20% from -0.65 to -0.52 (https://budgetmodel.wharton.upenn.edu/issues/2020/9/14/biden-2020-analysis).

taxation—which raises rates while also eliminating sheltering opportunities—could result in a lower realization elasticity, and thus even more revenue potential, than our estimates suggest.[28]

5.3 Transparency would improve policy analysis of alternative reforms

Transparency on how dynamic adjustments are made in official scores would be valuable for several reasons. First, this transparency will facilitate discussion between professional scorekeepers and outside experts about the extent to which models can be improved and new data collected. Second, it will facilitate comparison of estimates across a broader set of proposals with confidence that consistent scorekeeping practices are applied. Ensuring comparability across scores produced for different proposals is essential to informing the policy process. And comparability depends on transparency of the assumptions that underlie these estimates.

A few examples are illustrative. Mark-to-market capital gains proposals have yet to be officially scored. But some available estimates of the likely revenue potential suggest that nearly $200 billion annually could be raised (Gravelle, 2019; Batchelder and Kamin, 2019). By way of comparison, JCT estimates that taxing capital gains at death would yield about $40 billion annually (absent any behavioral changes).[29] It is unclear how to get from this realization-at-death score to a mark-to-market estimate of nearly 5 times that amount: In a low rate environment, the value of deferral is negligible, so the two approaches should yield similar revenue.

Another example concerns the score for eliminating the carried interest loophole. The JCT approach to scoring this provision seems to assume even larger shifting responses than in the case of capital gains tax increases, presumably because they model such a change in the absence of other changes to taxing gains. Essentially, the assumption is that fund managers will devise alternative contractual arrangements to reconstruct the status quo, so that revenues ultimately rise very little. It is unclear (to us) whether there is an empirical basis for this assumption.

5.4 A process suggestion

Transparency is a double-edged sword. Given the importance of official scores to legislative decision-making, making the assumptions underlying scorekeepers' estimation publicly available will invite greater lobbying around those assumptions by supporters and critics of different reforms.

Our proposal is not to open the floodgates with respect to scorekeeping writ large. A natural structure is in place: CBO already has a panel of advisers who provide input on economic issues. This group or a related subgroup of experts can be convened to advise JCT, as well as CBO and the Treasury Office of Tax Analysis. It will be important for diverse views to be represented in this body, and it will be valuable to work with the full set of scorekeepers to select a panel who is thoughtful and likely to be taken seriously by the revenue estimating community. Short of such a formal gathering, promoting informal conversations and collaborations between scorekeepers and academics would facilitate advancing the research frontier in the most useful directions.

[28] Incorporating estate taxation and the taxation of intervivos transfers in this broader overhaul would be worth considering.
[29] From the JCT's 2019 tax expenditure estimates: https://www.jct.gov/publications/2019/jcx-55-19/.

6 Conclusion

The appropriate tax treatment of capital gains is a major issue. Historically, the consensus of scorekeepers has been that very sizable behavioral effects diminish the revenue-raising potential of rate hikes, because they encourage taxpayers to lock-in gains and avoid taxation, potentially indefinitely. We believe this conclusion is worth revisiting in light of recent research, an improved understanding of dynamic responses via medium-run investor behavior, and the recent evolution in the composition of capital gains.

Indeed, we argue the revenue potential from substantially increasing tax rates on capital gains may be greater than previously understood. Crude estimates suggest that raising capital gains rates to ordinary income levels could raise vastly more revenue than what is implied by applying conventional elasticities. The striking difference suggests there is much to be gained from refining the approach to scoring capital gains tax reforms.

Our call to action is borne from a position of enormous respect and admiration for the integrity and seriousness of the scorekeepers. The ultimate goal is to continue to advance our understanding of taxpayer behavior and the revenue potential of capital gains (and other) tax reform efforts to inform the policymaking process.

For example, it would be valuable for scorekeepers to explicitly model the consequences of capital gains tax changes on turnover, taking into account the large stock of yet unrealized gains, how it varies across types of gains, and how it may evolve. We're optimistic that focusing on turnover is one avenue towards potentially improving revenue estimates and the analysis of capital gains taxation.

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Figure 7: Evolution of Wealth and Capital Gains Tax Rates

(a) Fixed income assets



(b) Pass-through equity wealth

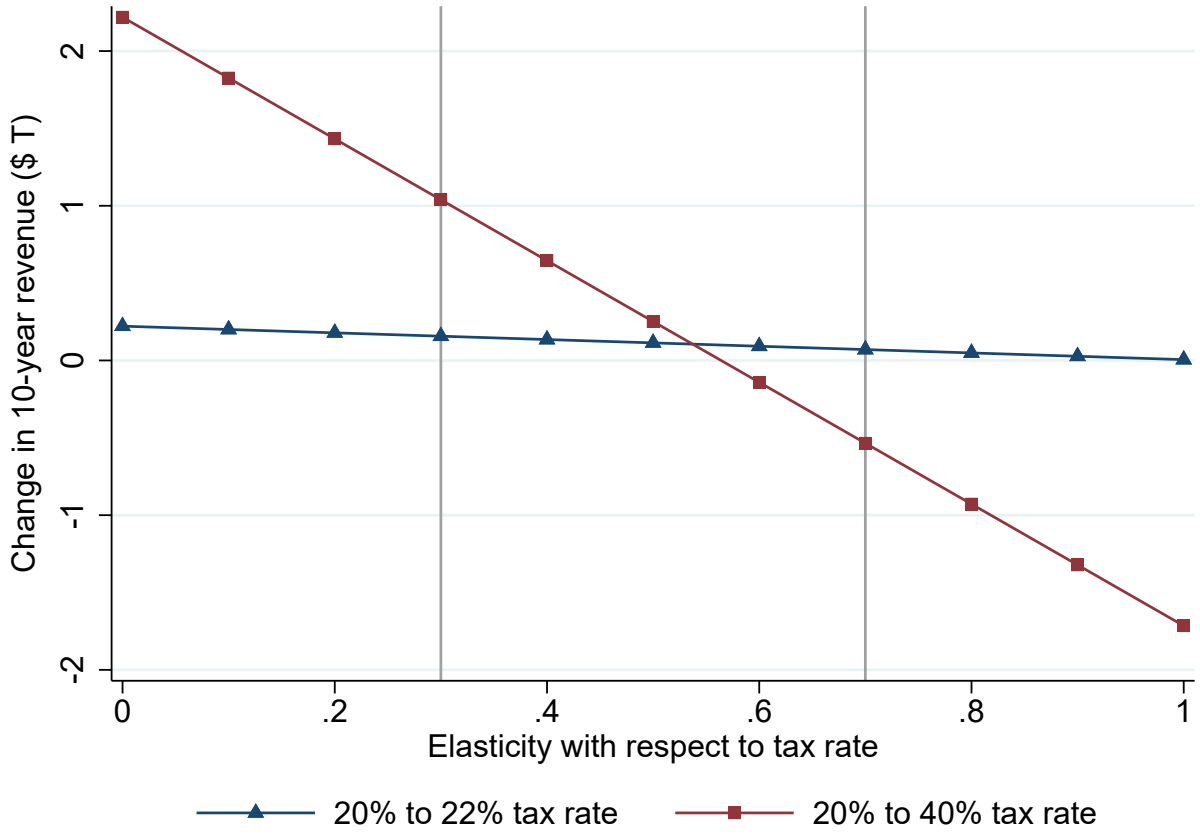


(c) Equity and fixed income wealth



Notes: These graphs plot fixed income assets, pass-through equity wealth, total equity and fixed income wealth, and the maximum long-term capital gains tax rates between 1960 and 2014 as a share of GDP. In panel (a), fixed income assets include taxable and non-taxable fixed income assets, in addition to non-interest bearing deposits. In panel (b), pass-through wealth includes assets from partnerships, sole-proprietorships, and S-corporations. In panel (c), equity includes C-corporation and pass-through assets. Data on wealth from Smith, Zidar, and Zwick (2020). Data on tax rates from the U.S. Treasury (https://www.treasury.gov/resource-center/tax-policy/tax-analysis/Documents/Taxes-Paid-on-Capital-Gains-for-Returns-with-Positive-Net-Capital-Gains.pdf) and the Tax Foundation (https://taxfoundation.org/federal-capital-gains-tax-collections-1954-2009/). GDP data from the World Bank (https://data.worldbank.org/indicator/NY.GDP.MKTP.CD).

Figure 8: Illustrative Revenue Estimates for Different Elasticities



Notes: We base our estimates on CBO projections of capital gains realizations from 2020 to 2029 (accessible at https://www.cbo.gov/data/budget-economic-data under "Revenue projections, by category"). See Table 3 for underlying CBO projections and realizations estimates corresponding to $e = -.3$, $e = -.4$, and $e = -0.7$. We assume a starting tax rate of 20%. When multiplied by $-\frac{1-0.2}{0.2}$, tax rate elasticities at a tax rate of 20% become net-of-tax rate elasticities.

Table 3: Realization and Revenue Estimates for 2 p.p. and 20 p.p. Tax Increases, $e \in \{0, -0.3, -0.4, -0.7\}$

				t = 22%								t = 40%							
				Realizations				Revenue				Realizations				Revenue			
	CBO Projections		e_{tax}:	0	-0.3	-0.4	-0.7	0	-0.3	-0.4	-0.7	0	-0.3	-0.4	-0.7	0	-0.3	-0.4	-0.7
	Realiz.	Rev.	e_{NTR}:	0	1.2	1.6	2.8	0	1.2	1.6	2.8	0	1.2	1.6	2.8	0	1.2	1.6	2.8
2021	1,192	238		1,192	1,156	1,144	1,109	262	254	252	244	1,192	834	715	358	477	334	286	143
2022	1,208	242		1,208	1,172	1,160	1,123	266	258	255	247	1,208	846	725	362	483	338	290	145
2023	1,116	223		1,116	1,083	1,071	1,038	246	238	236	228	1,116	781	670	335	446	312	268	134
2024	1,071	214		1,071	1,039	1,028	996	236	229	226	219	1,071	750	643	321	428	300	257	129
2025	1,055	211		1,055	1,023	1,013	981	232	225	223	216	1,055	739	633	317	422	295	253	127
2026	1,053	211		1,053	1,021	1,011	979	232	225	222	215	1,053	737	632	316	421	295	253	126
2027	1,063	213		1,063	1,031	1,020	989	234	227	225	217	1,063	744	638	319	425	298	255	128
2028	1,084	217		1,084	1,051	1,041	1,008	238	231	229	222	1,084	759	650	325	434	304	260	130
2029	1,111	222		1,111	1,078	1,067	1,033	244	237	235	227	1,111	778	667	333	444	311	267	133
2030	1,143	229		1,143	1,109	1,097	1,063	251	244	241	234	1,143	800	686	343	457	320	274	137
SUM	11,096	2,219		11,096	10,763	10,652	10,319	2,441	2,368	2,343	2,270	11,096	7,767	6,658	3,329	4,438	3,107	2,663	1,332
	Δfrom baseline			0	-333	-444	-777	222	149	124	51	0	-3,329	-4,438	-7,767	2,219	888	444	-888

Notes: All values are presented in billions of dollars. CG base taken from January 2020 CBO predictions for capital gains realizations over the next ten years (accessible at https://www.cbo.gov/data/budget-economic-data under "Revenue projections, by category"). We assume a starting tax rate of 20% to compute baseline total revenues. We calculate that percent change in realizations is equal to the product of the net-of-tax rate elasticity and the percent change in the net-of-tax rate (change in rate divided by initial net-of-tax rate). An analagous method using tax elasticities instead of net-of-tax rate elasticities yields identical results.

Table 4: Unofficial estimates of revenue potential from taxing capital gains at ordinary income levels

Source	**Revenue estimate ($B)**	**Elasticities**	**Notes**
Penn Wharton Budget Model	382	With step-up in basis: -0.66 Eliminating step-up in basis: -0.53	Reported estimate includes $178B from taxing capital gains and dividends at ordinary rates, and $204B from repealing step-up in basis
Tax Foundation	469	Long-run: -0.79 Transitory: -1.2 (year 1) and -1.0 (year 2)	Tax capital gains and dividends at the same rate as ordinary income for those with income $1M+ and repeal step-up in basis
Tax Policy Center	373	With step-up in basis: -0.7 Eliminating step-up in basis: -0.4	Tax capital gains and dividends at the same rate as ordinary income for those with income $1M+ and tax unrealized gains at death

Notes: All rows present 10 year revenue estimates for raising the tax on capital gains and dividends to ordinary rates (39.6%) for income above $1 million and eliminating the step-up in basis at death.

Penn Wharton Budget Model revenue and elasticity estimates can be found at https://budgetmodel.wharton.upenn.edu/issues/2020/3/10/the-biden-tax-plan-updated and https://budgetmodel.wharton.upenn.edu/issues/2019/12/4/the-revenue-maximizing-capital-gains-tax-rate-with-and-without-stepped-up-basis-at-death.

Tax Foundation revenue and elasticity estimates are available at https://taxfoundation.org/joe-biden-tax-plan-2020/ and https://taxfoundation.org/2020-capital-gains-tax-proposals/.

Estimates from the Tax Policy Center can be found at https://www.taxpolicycenter.org/model-estimates/updated-analysis-former-vice-president-bidens-tax-plan-october-2020/t20-0246-former and https://www.taxpolicycenter.org/sites/default/files/publication/158624/An_Analysis_of_Former_Vice_President_Bidens_Tax_Proposals_1_2.pdf.

Appendix For Online Publication

A Appendix Tables

Table A.1: Realization and Revenue Estimates for 2 p.p. and 20 p.p. Tax Increases, $e \in \{0, -0.5, -0.6, -0.62\}$

				t = 22%								t = 40%							
				Realizations				Revenue				Realizations				Revenue			
	CBO Projections		e_{tax}:	0	-0.5	-0.6	-0.62	0	-0.5	-0.6	-0.62	0	-0.5	-0.6	-0.62	0	-0.5	-0.6	-0.62
	Realiz.	Rev.	e_{NTR}:	0	2	2.4	2.5	0	2	2.4	2.5	0	2	2.4	2.5	0	2	2.4	2.5
2021	1,192	238		1,192	1,132	1,120	1,118	262	249	247	246	1,192	596	477	449	477	238	191	180
2022	1,208	242		1,208	1,148	1,136	1,133	266	252	250	249	1,208	604	483	455	483	242	193	182
2023	1,116	223		1,116	1,060	1,049	1,046	246	233	231	230	1,116	558	446	421	446	223	179	168
2024	1,071	214		1,071	1,017	1,007	1,004	236	224	221	221	1,071	536	428	404	428	214	171	162
2025	1,055	211		1,055	1,002	992	989	232	220	218	218	1,055	528	422	398	422	211	169	159
2026	1,053	211		1,053	1,000	990	987	232	220	218	217	1,053	527	421	397	421	211	168	159
2027	1,063	213		1,063	1,010	999	997	234	222	220	219	1,063	532	425	401	425	213	170	160
2028	1,084	217		1,084	1,030	1,019	1,016	238	227	224	224	1,084	542	434	409	434	217	173	163
2029	1,111	222		1,111	1,055	1,044	1,042	244	232	230	229	1,111	556	444	419	444	222	178	168
2030	1,143	229		1,143	1,086	1,074	1,072	251	239	236	236	1,143	572	457	431	457	229	183	172
SUM	11,096	2,219		11,096	10,541	10,430	10,405	2,441	2,319	2,295	2,289	11,096	5,548	4,438	4,183	4,438	2,219	1,775	1,673
	Δfrom baseline			0	-555	-666	-691	222	100	75	70	0	-5,548	-6,658	-6,913	2,219	0	-444	-546

Notes: All values are presented in billions of dollars. CG base taken from January 2020 CBO predictions for capital gains realizations over the next ten years (accessible at https://www.cbo.gov/data/budget-economic-data under "Revenue projections, by category"). We assume a starting tax rate of 20% to compute baseline total revenues. We calculate that percent change in realizations is equal to the product of the net-of-tax rate elasticity and the percent change in the net-of-tax rate (change in rate divided by initial net-of-tax rate). An analagous method using tax elasticities instead of net-of-tax rate elasticities yields identical results.

Table A.2: Realization and Revenue Estimates for 2 p.p. and 10 p.p. Tax Increases, $e \in \{0, -0.3, -0.4, -0.7\}$

				t = 22%								t = 30%							
				Realizations				Revenue				Realizations				Revenue			
	CBO Projections		e_{tax}:	0	-0.3	-0.4	-0.7	0	-0.3	-0.4	-0.7	0	-0.3	-0.4	-0.7	0	-0.3	-0.4	-0.7
	Realiz.	Rev.	e_{NTR}:	0	1.2	1.6	2.8	0	1.2	1.6	2.8	0	1.2	1.6	2.8	0	1.2	1.6	2.8
2021	1,192	238		1,192	1,156	1,144	1,109	262	254	252	244	1,192	1,013	954	775	358	304	286	232
2022	1,208	242		1,208	1,172	1,160	1,123	266	258	255	247	1,208	1,027	966	785	362	308	290	236
2023	1,116	223		1,116	1,083	1,071	1,038	246	238	236	228	1,116	949	893	725	335	285	268	218
2024	1,071	214		1,071	1,039	1,028	996	236	229	226	219	1,071	910	857	696	321	273	257	209
2025	1,055	211		1,055	1,023	1,013	981	232	225	223	216	1,055	897	844	686	317	269	253	206
2026	1,053	211		1,053	1,021	1,011	979	232	225	222	215	1,053	895	842	684	316	269	253	205
2027	1,063	213		1,063	1,031	1,020	989	234	227	225	217	1,063	904	850	691	319	271	255	207
2028	1,084	217		1,084	1,051	1,041	1,008	238	231	229	222	1,084	921	867	705	325	276	260	211
2029	1,111	222		1,111	1,078	1,067	1,033	244	237	235	227	1,111	944	889	722	333	283	267	217
2030	1,143	229		1,143	1,109	1,097	1,063	251	244	241	234	1,143	972	914	743	343	291	274	223
SUM	11,096	2,219		11,096	10,763	10,652	10,319	2,441	2,368	2,343	2,270	11,096	9,432	8,877	7,212	3,329	2,829	2,663	2,164
	Δfrom baseline			0	-333	-444	-777	222	149	124	51	0	-1,664	-2,219	-3,884	1,110	610	444	-55

Notes: All values are presented in billions of dollars. CG base taken from January 2020 CBO predictions for capital gains realizations over the next ten years (accessible at https://www.cbo.gov/data/budget-economic-data under "Revenue projections, by category"). We assume a starting tax rate of 20% to compute baseline total revenues. We calculate that percent change in realizations is equal to the product of the net-of-tax rate elasticity and the percent change in the net-of-tax rate (change in rate divided by initial net-of-tax rate). An analagous method using tax elasticities instead of net-of-tax rate elasticities yields identical results.

Table A.3: Realization and Revenue Estimates for 2 p.p. and 10 p.p. Tax Increases, $e \in \{0, -0.5, -0.5, -0.62\}$

				t = 22%								t = 30%							
				Realizations				Revenue				Realizations				Revenue			
	CBO Projections		e_{tax}:	0	-0.5	-0.6	-0.62	0	-0.5	-0.6	-0.62	0	-0.5	-0.6	-0.62	0	-0.5	-0.6	-0.62
	Realiz.	Rev.	e_{NTR}:	0	2	2.4	2.5	0	2	2.4	2.5	0	2	2.4	2.5	0	2	2.4	2.5
2021	1,192	238		1,192	1,132	1,120	1,118	262	249	247	246	1,192	894	834	821	358	268	250	246
2022	1,208	242		1,208	1,148	1,136	1,133	266	252	250	249	1,208	906	846	832	362	272	254	250
2023	1,116	223		1,116	1,060	1,049	1,046	246	233	231	230	1,116	837	781	768	335	251	234	231
2024	1,071	214		1,071	1,017	1,007	1,004	236	224	221	221	1,071	803	750	737	321	241	225	221
2025	1,055	211		1,055	1,002	992	989	232	220	218	218	1,055	791	739	726	317	237	222	218
2026	1,053	211		1,053	1,000	990	987	232	220	218	217	1,053	790	737	725	316	237	221	217
2027	1,063	213		1,063	1,010	999	997	234	222	220	219	1,063	797	744	732	319	239	223	220
2028	1,084	217		1,084	1,030	1,019	1,016	238	227	224	224	1,084	813	759	746	325	244	228	224
2029	1,111	222		1,111	1,055	1,044	1,042	244	232	230	229	1,111	833	778	765	333	250	233	229
2030	1,143	229		1,143	1,086	1,074	1,072	251	239	236	236	1,143	857	800	787	343	257	240	236
SUM	11,096	2,219		11,096	10,541	10,430	10,405	2,441	2,319	2,295	2,289	11,096	8,322	7,767	7,640	3,329	2,497	2,330	2,292
	Δfrom baseline			0	-555	-666	-691	222	100	75	70	0	-2,774	-3,329	-3,456	1,110	277	111	73

Notes: All values are presented in billions of dollars. CG base taken from January 2020 CBO predictions for capital gains realizations over the next ten years (accessible at https://www.cbo.gov/data/budget-economic-data under "Revenue projections, by category"). We assume a starting tax rate of 20% to compute baseline total revenues. Although we report estimates by elasticity, our calculations use net-of-tax rate elasticities. More precisely, we calculate that the percent change in realizations is equal to the product of the net-of-tax-rate elasticity and the percent change in the net-of-tax rate (change in rate divided by initial net-of-tax rate).

B A model of capital gains realizations

This appendix describes and updates the asset turnover model in Auerbach (1989), which we use to relate capital gains elasticities to changes in investor behavior. The two key parameters are f, which is the fraction of assets that never face capital gains, and δ, which is the fraction of assets that face capital gains and are sold every year. The main idea is that a given change in capital gains realizations can be related to changes in these two parameters, which represent investors holding assets until death and asset turnover frequency.

We need to define a few more variables to relate capital gains realizations G_t in to these two key parameters. The nominal value of assets sold in year t is denoted a_t, and g is the annual growth rate of asset value (and output growth). With these components, we can express capital gains realizations G_t as the sum of accumulated gains from assets held at different durations:

$$G_t = g\delta a_{t-1} + [(1+g)^2 - 1]\delta(1-\delta)a_{t-2} + [(1+g)^3 - 1]\delta(1-\delta)^2 a_{t-3} + ... \tag{1}$$

Auerbach (1989) shows that one can express the steady-state ratio of realizations to sales at each date:

$$\frac{G}{a} = \frac{g}{g+\delta}. \tag{2}$$

As Auerbach argues, the total value of assets ever sold S is sum of those last realized one year ago, at current value, $(1+g)a_{t-1}$ plus those two years ago, at current value, $(1+g)^2(1-\delta)a_{t-2}$, plus those three years ago, at current value, $(1+g)^3(1-\delta)^2 a_{t-3}$, etc. Given the steady state condition that $a_t = (1+g)a_{t-1}$, the sum $S = a_t + (1-\delta)a_{t-1} + (1-\delta)^2 a_{t-2} + ... = \frac{a_t}{\delta}$. Since a fraction f of all assets are never realized, this result (i.e., $A = (1-f)\frac{a_t}{\delta}$) and equation 2 imply that the ratio of gains to assets each year is:

$$\frac{G}{A} = (1-f)\frac{g\delta}{g+\delta} \tag{3}$$

Thus, the ratio of realized gains to the total value of assets that are ever sold is a function of our two main parameters f and δ, as well as the rate of growth g. We cannot observe f and g directly, but we can re-arrange these expressions to estimate them using nominal rates of return, the ratio of gains to sales, and the ratio of gains to assets. Specifically, we can rewrite equation 2 and 3:

$$\delta = \frac{g(1-\frac{G}{a})}{\frac{G}{a}} \tag{4}$$

$$f = 1 - \frac{\frac{G}{A}(g+\delta)}{g\delta} \tag{5}$$

Auerbach (1989) sets $g = .1$ and estimates that $\frac{G}{A} = 0.033$ and $\frac{G}{a} = 0.303$. The resulting estimates using inputs from the late 1970s and early 1980s give $\delta = 0.23$ and $f = 0.526$, suggesting that half of assets never face capital gains, and those that do turn over roughly every four years.

Updating the inputs to this calculation gives slightly higher estimates of δ and similar estimate of f. If we set $g = .06$ based on nominal annual wealth growth since 1990, $\frac{G}{A} = .0257$, and $\frac{G}{a} = 0.158$, then we get updated estimates $\hat{\delta} = .32$ and $\hat{f} = .49$.[30]

2.1 Using model to quantify implications of elasticity estimates for δ and f

Taking log differences of 3, gives an expression for log changes in the realizations in terms of parameters:

$$\Delta \ln G = \Delta \ln(1-f) + \Delta \ln\left(\frac{g\delta}{g+\delta}\right) + \Delta \ln A \tag{6}$$

We can use this expression to relate our parameters to capital gains realization elasticities, (i.e., $e = \frac{\Delta \ln G}{\Delta \ln \tau}$) with respect to capital gains tax rates τ. For a change in tax rates and a given elasticity, the change in realizations

[30] Note that $\frac{G}{A} = .0257$ is the ratio of realized gains divided by household public and private equity holdings plus real estate wealth less housing wealth. For $\frac{G}{a} = 0.158$, we use the ratio of net gains to sales price in Table 1C, which has long term gains in 2010. https://www.irs.gov/pub/irs-soi/soi-a-inca-id1604.pdf

is $\Delta \ln G = e \times \Delta \ln \tau$. Using this expression allows us to go from an elasticity value and a tax change to see how much f and δ might have to change.

$$e \times \Delta \ln \tau = \Delta \ln(1-f) + \Delta \ln \left(\frac{g\delta}{g+\delta} \right) + \Delta \ln A \tag{7}$$

Quantitatively, we can start with the updated calibration values described above: $f_0 = .49$ and $\delta_0 = .32$, $g = .06$ as a baseline. Consider a capital gains tax rate increase that increases rates from $\tau_0 = .22$ to $\tau_1 = .396$, so $\Delta \ln \tau \approx 60\%$.[31] With an elasticity of -.7, the left-hand-side is $e = -0.7 \times .6 = -.42$, which means that gains would fall by 42%. Applying equation 7, we can obtain this decline by 42% through changes in f, δ, or some combination (assuming, for simplicity, that $\Delta \ln A = 0$). Using only changes in f, we'd need $\Delta \ln(1-f) = -.42 \Rightarrow f_1 = .66$. In other words, if all the response to the tax increase came from changes f, the share of gains that are held until death would have to increase by 17 percentage points from an initial level of $f_0 = .49$. Using only changes in δ, we'd get $\delta_1 = .075$, which is a substantial decline in asset turnover frequency relative to an initial value of $\delta_0 = .32$. With an elasticity of $e = -0.3$, the percentage point increase in f would be half as large (i.e., the increase would be 8.5 p.p.), and the value of $\delta_1 = .15$ would be twice as high.

[31] Note that this stylized calculation abstracts from state capital gains tax rates as well as other tax interactions.