

Boundaries on the Long-Run Realization Response to Changes in Capital Gains Taxes

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Mark P. Keightley
Specialist in Economics

Jane G. Gravelle
Senior Specialist in
Economic Policy

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This report analyzes how responsive taxpayers are to changes in capital gains taxes. Capital gains occur when an asset increases in value as measured by the price of the asset minus the basis, which is generally the cost at which the asset was acquired. Capital gains are a form of income and subject to tax, but only when the asset is sold and the gain is realized. Thus, taxpayers have some control over when capital gains taxes are paid and at what rate by choosing when to sell an asset and realize capital gains. All else equal, a decrease in capital gains taxes should encourage taxpayers to sell assets and realize gains. Likewise, an increase in capital gains taxes should discourage taxpayers from selling assets and realizing gains.

How much individuals respond to a decrease or an increase in capital gains taxes can be quantified using the economic concept of an *elasticity*, which in the context of this analysis measures the percentage change in realizations divided by the percentage change in the capital gains tax rate. In theory, the capital gains tax elasticity ranges from negative infinity to zero; the larger the elasticity is (in absolute terms), the more responsive taxpayers will be. In turn, the more (or less) responsive individuals are to capital gains taxes, the lower (or higher) tax rates should be to minimize economic distortions and maximize tax revenue.

The analysis in this report suggests that the *maximum* long-run (or permanent) capital gains elasticity is between -0.29 to -0.45, with an estimate at the midpoint of positive transaction costs of -0.34. At a -0.34 elasticity, the revenue-maximizing tax rate would be 65%. This estimate for the capital gains elasticity assumes that in the absence of taxes and transactions costs all gains would be realized every year. This assumption is almost certainly too high, as there are numerous reasons aside from taxes and trading costs that would cause individuals to retain assets. If instead it is assumed that only 80% of gains would be realized, the maximum elasticity ranges from -0.22 to -0.16 for positive transactions costs, with an estimate at the midpoint of positive transactions costs of -0.19.

A change in the capital gains tax rate may produce smaller revenue effects than would be estimated by simply applying the tax rate change to currently observed realizations. If individuals respond to a tax cut by realizing more gains or to a tax increase by realizing fewer gains, this change in realizations can offset some portion of the static revenue effects (the revenue in the absence of a behavioral response). The share of revenue offset by the realization's response corresponds to the elasticity, which at the midpoint elasticities presented in this report would be between 19% and 34%.

The common statistical approach in the literature for estimating the permanent capital gains elasticity has yielded wide variations in the magnitude of this effect, from -0.22 to -0.98. The major reason that high elasticities were found in some earlier studies is that the elasticity probably reflected in large part the short-run (or transitory) elasticity, which arises when taxpayers time their realizations for periods when their tax rates are lower. Although the variations have narrowed in more recent studies as researchers refined their approaches, these measures indicate that the offset from a tax increase can be as small as 22% and as large as 98%, while the corresponding revenue-maximizing tax rate can be as high as 100% and as low as 22%.

The analysis in this report uses an approach that differs from the common statistical methodology and is based on the simple observation that there is a boundary on the realization response: realizations over time cannot exceed accrued gains. The larger the existing realizations are relative to accruals, the smaller any potential realizations response can be. Estimates of realizations relative to accruals over the period 1987-2023 indicate that realizations are approximately 60% of accruals, although there is some variation owing to uncertainties, primarily the magnitude of noncompliance. These estimates are paired with the estimates of taxes and transactions costs, and the common functional form used for estimating the realizations response, to yield an estimate of the size of realizations in the absence of these taxes and transactions costs.

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Introduction

Capital gains occur when an asset increases in price, but capital gains are only taxed under the income tax when the asset is sold and the gain is realized. A change in the capital gains tax rate may produce smaller revenue effects than would be estimated by simply applying the tax rate change to observed realizations. If individuals respond to a tax cut by realizing more gains or to a tax increase by realizing fewer gains, this change in realizations can offset the static revenue effects. At a certain tax rate, called the revenue-maximizing rate, a tax increase would reduce revenues rather than increase them owing to the increase in realizations. The measure of the realizations responses is an *elasticity*, the percentage change in realizations divided by the percentage change in the tax rate.

Beginning in 1980, a series of statistical studies estimating the realizations response yielded a wide range of behavioral responses, spanning elasticities of -0.27 to -3.80, providing little guidance to the actual revenue gained or lost by a change in the tax rate. These estimates used different approaches, including examining realizations and tax rates over time (time series), comparing individuals with different tax rates and realizations in a single year (cross section), or comparing individuals over time with changes in their tax rates (panel). These studies faced challenges in separating transitory effects (effects of a temporary change in tax rates), short-term effects (where there is a large stock of unrealized gains), and long-term or permanent elasticities (changes in a steady state with a permanent tax change). Some of the large elasticities estimated in these studies likely reflected a measure capturing transitional or short-run elasticities.

In 1991, CRS published a report aimed at measuring the limit to how large the elasticity could be. Because gains cannot exceed accruals in the long term, this study used historical data on gains relative to realizations to estimate this upper limit.¹

Beginning in 1994, a number of additional statistical studies, addressing some previously raised methodological issues, found a narrower range of estimates. However, the estimates still varied widely, indicating that realizations responses could offset between 22% and 98% of the revenue increase.² Studies also had a wide range of revenue-maximizing tax rates, as high as 100% and as low as 24%.³

This report updates CRS's 1991 estimate of the bounds to capital gains realizations elasticities using more recent data.

The Realization-to-Accruals Ratio

In the long run, the amount of capital gains realizations cannot exceed the amount of accruals. In the extreme case, if every asset were sold every year, then realizations would be virtually equal to accruals in each year. If this were currently the case, there could be no increased realizations in response to a capital gains tax cut because there would be no potential source of the response. If, however, some assets are never sold (or held until death, when the tax on gain is forgiven) or if assets are sold less frequently than each year, then realizations will be less than accruals. Realizations can then increase as a result of a tax cut, as individuals sell assets more frequently or

¹ Limits to Capital Gains Feedback Effects, Congressional Research Service Report, Report 91-250 by Jane G. Gravelle, March 15, 1991. This report can be found at <https://www.policyarchive.org/handle/10207/20219>.

² Since the common semi-log functional form resulted in an elasticity that rose with the tax rate, this revenue offset relates to a small change around the 22% tax rate.

³ See CRS Report R41364, *Capital Gains Tax Options: Behavioral Responses and Revenues*, by Jane G. Gravelle for a review of these studies.

sell assets they would otherwise have held until death. This response is still limited by the amount of unrealized accruals. Therefore, data on the ratio of realizations to accruals can provide some bounds on the increase in realizations that might be expected from a capital gains tax cut.

Although realizations cannot exceed accruals on average, there are fluctuations from year to year because the rate of appreciation does not remain constant each year. Therefore, it is important to measure the ratio of realizations to accruals over a fairly long period of time. This report's analysis begins with data on revaluations of all individually held assets from the Federal Reserve's Financial Accounts of the United States (FA)⁴ and capital gains realizations for the period 1987-2023 from tax returns.⁵

The revaluations from the FA include some assets that are not subject to capital gains, or to negligible taxable capital gains. To arrive at accruals, the following assets were eliminated from the FA: owner-occupied housing (structures and land), employer pension plans, life insurance, earnings from individual retirement accounts, education saving accounts, and revaluations that accrue to the nonprofit sector.⁶ Individual retirement accounts are included in other entries in the revaluation data, largely in corporate equities, and the share of those in retirement accounts was estimated using data from the Investment Company Institute.⁷ Revaluations in the nonprofit sector were eliminated based on their share of included assets using FA balance sheets. In addition, the revaluations exclude debt securities, which may have small gains or losses and are relatively unimportant.

After excluding accruals that are not subject to capital gains taxes or subject to negligible capital gains taxes, the ratio of realizations to accruals is 52.17%. An adjustment also needs to be made for noncompliance, since some gains are not reported. Accruals were reduced by 15% to account for noncompliance based on estimates using IRS data.⁸ Reducing accruals by 15% results in a realization ratio of 61.374%.

Measuring Tax Rates and Transactions Costs

Placing boundaries on the long-run realization response requires accounting for federal and state capital gains taxes, as well as transactions costs. Currently, the federal capital gains rate on long-term gains (which constitute most of gains) is 0%, 15%, or 20%, depending on the taxable

⁴ Board of Governors of the Federal Reserve System, "R.101 Change in Net Worth of Households and Nonprofit Organization," Financial Accounts of the United States, <https://www.federalreserve.gov/releases/z1/20240607/html/r101.htm>.

⁵ Realizations from 1987 to 2014 are from U.S. Department of the Treasury, Office of Tax Analysis, "Taxes Paid on Capital Gains for Returns with Positive Net Capital Gains: 1954-2014," <https://home.treasury.gov/policy-issues/tax-policy/office-of-tax-analysis>. Realizations from 2015 on are from Congressional Budget Office (CBO), "Budget and Economic Data, Revenue Projections, by Category," June 18, 2024 (supplement to *An Update to the Budget and Economic Outlook: 2024 to 2034*), <https://www.cbo.gov/data/budget-economic-data#7>.

⁶ Board of Governors of the Federal Reserve System, Financial Accounts of the United States, "B.101.h Balance Sheet of Households," <https://www.federalreserve.gov/releases/z1/preview/html/b101h.htm>, and "B.101.n Balance Sheet of Nonprofit Organizations," <https://www.federalreserve.gov/releases/z1/preview/html/b101n.htm>.

⁷ Investment Company Institute, "Release: Quarterly Retirement Market Data," The US Retirement Market, Table 19, https://www.ici.org/statistical-report/ret_24_q3. The assets in Table 19 outside of money market assets and 75% of the assets in "Other Assets" in Table 9, and adjusted for Section 529 savings plans, are excluded following the methodology in Steven M. Rosenthal and Lydia S. Austin, "The Dwindling Taxable Share Of U.S. Corporate Stock," *Tax Notes*, May 16, 2016, pp. 923-932, <https://www.urban.org/sites/default/files/publication/80621/2000790-The-Dwindling-Taxable-Share-of-U.S.-Corporate-Stock.pdf>.

⁸ Based on data for various years from Internal Revenue Service (IRS), "IRS: The Tax Gap," <https://www.irs.gov/statistics/irs-the-tax-gap>. The tax gap for capital gains varied, but tended to average around 15% for the years available.

income of the taxpayer. Gains on assets held for less than a year are taxed at ordinary income tax rates.⁹ Tax regimes have varied over the time period under consideration.¹⁰ From 1987 through May 6, 1997, long-term capital gains were taxed at ordinary rates, but with a maximum rate of 28%. From May 7, 1997, to May 5, 2003, the maximum rate was 20%. From May 6, 2003, through December 31, 2012, the maximum rate was 15%, and from January 1, 2013, to the present, the maximum rate was 20%. Starting in 2013, high-income taxpayers also became subject to a 3.8% tax on passive investment income, including capital gains, making the maximum rate 23.8%.

The average combined income tax rate computed over the observation period is 23.6% (19.8% federal and 3.8% state). The federal income tax rate is the average tax collected on realizations based on Department of the Treasury and CBO data. It includes the 3.8% tax on net investment income. This rate may be slightly understated because the marginal tax rate is higher than the average tax rate. However, capital gains realizations are heavily concentrated in the top tax rate. The state income tax rate is the maximum rate from the National Bureau of Economic Research TAXSIM model.¹¹

Transactions costs, like capital gains taxes, act as a barrier that makes selling assets more costly and therefore need to be accounted for when estimating the realization response. Transactions costs are relatively small for corporate equities, which are estimated to be 70% of the total realizations.¹² However, they are much larger for buildings (which constitute most noncorporate assets). Because of the variability and uncertainty, several measures of transactions costs are considered: 0.1%, 0.45%, and 1% for corporate stocks and mutual funds, and 3%, 6%, and 9% for noncorporate equity.¹³

Transactions costs are imposed on the entire sales price and not just the gain, so they must be multiplied by the ratio of sales price to gains. These ratios are based on data reported by the IRS

⁹ Carried interests must be held for three years to receive long-term capital gains treatment.

¹⁰ For a concise summary of the rates, see Tax Foundation, “Federal Capital Gains Tax Rates 1988-2011,” https://files.taxfoundation.org/legacy/docs/fed_capgains_taxrates-20100830.pdf. For a narrative history, see CRS Report R47113, *Capital Gains Taxes: An Overview of the Issues*, by Jane G. Gravelle.

¹¹ National Bureau of Economic Research, “Maximum State Income Tax Rates 1977-2024,” TAXSIM, <https://taxsim.nber.org/state-rates/>.

¹² See CRS Report R47113, *Capital Gains Taxes: An Overview of the Issues*, by Jane G. Gravelle, for a discussion of the share of capital gains by asset type.

¹³ These measures include the central tendency as indicated in the following discussions, along with larger and smaller amounts to illustrate the sensitivity. Transactions costs in the stock market vary depending on the size of the trade and the investor status. See Jeffrey A. Busse et al., *Transaction Costs, Portfolio Characteristics, and Mutual Fund Performance*, October 2019, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2350583; Christopher Schwarz et al., *The “Actual Retail Price” of Equity Trades*, July 2023, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4189239; BICCONI Students Investment Club, *Modelling Transaction Costs and Market Impact*, April 16, 2023, <https://bsic.it/modelling-transaction-costs-and-market-impact/>; FREC, “Direct Indexing Transaction Costs,” January 15, 2025, <https://frec.com/resources/blog/direct-indexing-transaction-costs/>; Yuval Taylor, “The Transaction Costs of Trading Stocks: A Primer for Retail Investors,” *Portfolio 123* (blog) September 28, 2022, <https://blog.portfolio123.com/the-transaction-costs-of-trading-stocks-a-primer-for-retail-investors/>; Quick MBA, “Trading Costs,” <http://www.quickmba.com/finance/invest/tradecost/>; Assurance Financial, “How to Estimate Closing Costs and What’s Included,” [https://assurancemortgage.com/what-are-closing-costs/#:~:text=On%20average%2C%20most%20homebuyers%20will,are%20between%20\\$12%2C000%20and%20\\$30%2C000;Ira%20Zlotowitz,“How%20Much%20Are%20Commercial%20Real%20Estate%20Closing%20Costs%20?%20Gparency,December%2026,2023,https://gparency.com/blog/commercial-real-estate-closing-costs/;Taylor%20Wallace,“Fees%20For%20Selling%20a%20Business%20You%20Might%20Not%20be%20Aware%20Of%20Commission%20Rate,“Baton,March%2015,2023,https://www.batonmarket.com/resources/own/fees-for-selling-a-business;BizBuySell,“How%20Much%20Does%20It%20Cost%20to%20Sell%20a%20Business%20?%20https://www.bizbuysell.com/learning-center/article/cost-sell-business/#:~:text=For%20most%20business%20owners%2C%20the,at%20the%20best%20possible%20terms.%E2%80%9999.](https://assurancemortgage.com/what-are-closing-costs/#:~:text=On%20average%2C%20most%20homebuyers%20will,are%20between%20$12%2C000%20and%20$30%2C000;Ira%20Zlotowitz,“How%20Much%20Are%20Commercial%20Real%20Estate%20Closing%20Costs%20?%20Gparency,December%2026,2023,https://gparency.com/blog/commercial-real-estate-closing-costs/;Taylor%20Wallace,“Fees%20For%20Selling%20a%20Business%20You%20Might%20Not%20be%20Aware%20Of%20Commission%20Rate,“Baton,March%2015,2023,https://www.batonmarket.com/resources/own/fees-for-selling-a-business;BizBuySell,“How%20Much%20Does%20It%20Cost%20to%20Sell%20a%20Business%20?%20https://www.bizbuysell.com/learning-center/article/cost-sell-business/#:~:text=For%20most%20business%20owners%2C%20the,at%20the%20best%20possible%20terms.%E2%80%9999.)

for corporate and noncorporate equities: 4.5 for corporate stocks and 3.25 for noncorporate equity.¹⁴

Estimating the Range of Realization Elasticities

The ratio of realizations to accruals and the tax rate can be translated into an elasticity given a functional form of the realizations equation. The analysis in this report uses the semi-log functional form that is used by both JCT and Treasury revenue estimators as well as recent studies, in which econometric studies regress the natural logarithm of realizations on the tax rate. A sensitivity analysis uses another functional form, constant net-of-tax rate elasticity, in which econometric studies regress the logarithm of realizations on the logarithm of the net-of-tax rate (one minus the sum of tax and transactions rates). The results of the sensitivity analysis are reported in **Appendix A**. Both of the functional forms result in the elasticity rising with the tax rate (see **Appendix B**).

Table 1 shows the estimated maximum elasticities evaluated at a 22% federal tax rate with varying assumptions about transactions costs. For positive transactions costs, the estimated maximum elasticity varies from -0.29 to -0.40 with an estimate at the midpoint of positive transaction costs of -0.34. At a -0.34 elasticity, the revenue-maximizing tax rate would be 65%.¹⁵ The share of revenue offset by the realizations response corresponds to the elasticity, 34%. **Table 1** also reports estimates if there are no transactions costs, with a maximum elasticity of -0.45.

Table 1. Maximum Capital Gains Elasticity at a 22% Federal Tax Rate, Assuming 100% of Accruals Are Realized, Various Transactions Costs

		Corporate Stock and Mutual Funds			
		0.0%	0.01%	0.45%	1.0%
Noncorporate Assets	Transactions Costs				
	0.0%	-0.45	-0.45	-0.43	-0.40
	3.0%	-0.40	-0.40	-0.38	-0.36
	6.0%	-0.36	-0.36	-0.34	-0.32
	9.0%	-0.32	-0.32	-0.31	-0.29

Source: CRS calculations.

Notes: Estimates were made using the semi-log functional form. Assumes 15% noncompliance and a realization ratio in the absence of transactions costs and taxes (r^*), of 1. See **Appendix B** for more information.

The elasticities reported in **Table 1** assume that in the absence of transaction costs and taxes, all gains would be realized every year, as investors would prefer to receive income in the present rather than the future. This assumption is almost certainly too high, as there are numerous reasons

¹⁴ Janette Wilson and Christopher Williams, “Sales of Capital Assets Data Reported on Individual Tax Returns, Tax Years 2013-2015,” IRS, Statistics of Income Bulletin, Winter 2022, <https://www.irs.gov/pub/irs-soi/soi-a-soca-id2205.pdf>.

¹⁵ The revenue-maximizing tax rate is 0.22 divided by the absolute value of the elasticity. See **Appendix C**. Note that the revenue-maximizing tax rate measures the rate applied to taxpayers and all gains would be taxed at the same rate. If only the top rate of 20% were increased to maximize revenues, the revenue-maximizing tax rate would be lower because some of the tax is generated at the lower rate of 15% and revenues would not increase for that share of gains. Data from Tim Dowd and Zach Richards, *Contextualizing Elasticities for Policymaking: Capital Gains and Revenue-Maximizing Tax Rates*, February 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3767121, indicate that of gains in the adjusted gross income bracket of \$500,000 or more where most gains are subject to the top rate, 77% are taxed at the 20% rate. This estimate indicates that the revenue-maximizing top rate would be 77% times 65%, or 50%.

aside from costs of trading that would cause individuals to retain assets. There are nonpecuniary costs to trading assets, as such trades require some time and attention by the seller. In addition, individuals are likely to be satisfied with the experienced and anticipated gains made in all or some of their portfolios, perhaps indefinitely. Some assets are part of family businesses and would be retained for those reasons. Even for corporate stock, founders, even of very large corporations, own significant shares of stock and may plan to pass those shares to their descendants. In addition, some individuals donate appreciated assets to charitable organizations (either in life or at death), and those gains would never be realized.

If instead of all gains being realized annually in the absence of taxes and transactions costs, only 80% would be realized (approximately the midpoint of possible responses, given that the observed accrual to realization ratio with tax is 0.64), the maximum elasticity ranges from -0.22 to -0.16 for positive transactions costs, with an estimate at the midpoint of positive transactions costs of -0.19. The revenue-maximizing tax rate at these elasticities would be over 100%.¹⁶ The revenue offset would be 19%. The maximum elasticity with no transactions costs is -0.25.

Table 2. Maximum Capital Gains Elasticity at a 22% Federal Tax Rate, Assuming 80% of Accruals Realized, Various Transactions Costs

		Corporate Stock and Mutual Funds			
Transaction Costs		0.0%	0.01%	0.45%	1.0%
Noncorporate Assets	0.0%	-0.25	-0.24	-0.23	-0.22
	3.0%	-0.22	-0.22	-0.21	-0.19
	6.0%	-0.20	-0.19	-0.19	-0.17
	9.0%	-0.18	-0.17	-0.17	-0.16

Source: CRS calculations.

Notes: Estimates were made using the semi-log functional form. Assumes 15% noncompliance and a realization ratio in the absence of transactions costs and taxes, r^* , of 0.8. See **Appendix B** for more information.

The results presented in **Table 1** and **Table 2** assumed a noncompliance rate of 15%. The degree of noncompliance, however, is challenging to measure. **Table 3** provides a sensitivity analysis that considers the effects of larger (20%) or smaller (10%) noncompliance rates, assuming the midpoint transactions costs. It also reports results at a 0% noncompliance rate. The maximum elasticity with 100% of accruals realized ranges from -0.38 to -0.30. The elasticity assuming a limit of 80% of accruals ranges from -0.23 to -0.14. The elasticity with full compliance is -0.46 and -0.30.

¹⁶ Nothing precludes a revenue-maximizing rate in excess of 100% since saving is the only way to transfer purchasing power across time, regardless of the rate of return. The after-tax real rate of return on savings has been negative in the past.

Table 3. Effects of Varying Noncompliance Rates Assuming the Midpoint Transactions Costs

Noncompliance Rate	Maximum Elasticity with 100% of Accruals Realized	Maximum Elasticity With 80% of Accruals Realized
0%	-0.46	-0.30
10%	-0.38	-0.23
15%	-0.34	-0.19
20%	-0.30	-0.14

Source: CRS calculations.

Notes: Estimates made using semi-log functional form. Assumes corporate stock and mutual funds transactions costs of 0.45% and noncorporate equity transactions costs of 6.0%. See **Appendix A** for more information.

The Relationship of the Limits to Econometric Estimates and Revenue-Estimating Practices

The results of the basic simulations (**Table 1**) indicate that the maximum elasticity ranges from -0.40 to -0.29 at a 22% federal tax rate for the range of positive transactions costs considered; the value at the midpoint of these costs is -0.34. In reality, all accruals are unlikely to be realized in a year, as assumed in that model. Therefore, an elasticity of -0.19 that is based on the assumption of a realization ratio in the absence of transactions costs and taxes equal to 0.8 and at the midpoint of transactions costs might be a more reasonable estimate (**Table 2**). The following examines how the results presented in **Table 1** and **Table 2** compare to those from econometric studies and to estimates used by revenue estimators.

Econometric Estimates

Because of various methodologies, this report focuses on the more recent studies that have been published beginning in the mid-1990s that avoided some of the methodological problems that caused the confounding of transitory, short-term, and permanent elasticities in older studies.¹⁷ It also focuses on panel studies, which follow individuals over a period of time, as these are generally recognized as the best approach to uncovering the permanent elasticity. (Panel studies can be problematic if the panels are too short, however.)

Table 4 lists the panel studies that began in the mid-1990s, arrayed by elasticities from smaller to larger, all evaluated at a 22% tax rate. These studies still reveal a broad range of elasticity estimates (and revenue offset) from a tax rate change, ranging from 22% to 90%. Of the eight studies, five exceed the maximum elasticity at the midpoint of transactions costs and noncompliance estimated in this study (-0.34).

¹⁷ These older studies are discussed in the Appendix to CRS Report R41364, *Capital Gains Tax Options: Behavioral Responses and Revenues*, by Jane G. Gravelle.

Table 4. Recent Panel Estimates of Realizations Response

Study	Coefficient	Elasticity at 22% Rate	Revenue-Maximizing Tax Rate
Burman and Randolph (1994)	1.0*	-0.22	100%
Auerbach and Siegel (2000)	1.36	-0.30	0.73%
Agersnap and Zidar (2020)	1.4	-0.31	71%
Bogart and Gentry (2000)	2.5	-0.55	40%
Bakija and Gentry (2014)	2.91	-0.64	34%
Dowd and McClelland (2024)	3.2	-0.71	31%
Auten and Joulfaian (2004)	3.6	-0.79	28%
Dowd, McClelland, and Muthitacharoen (2015)	4.48	-0.98	22%

Source: For references, see Appendix C. For brief comments on these studies, see CRS Report R41364, *Capital Gains Tax Options: Behavioral Responses and Revenues*, by Jane G. Gravelle.

Notes: An * indicates that the estimate was not statistically significant. The estimates have been adjusted to conform to the 22% tax rate and may be different from those reported by the authors. The coefficient is the fixed estimate from a semi-log function that, multiplied by the tax rate, yields the elasticity. That is, if the regression is of the form: $\log \text{gain} = a + bt + \text{other regressors}$, and t is the tax rate, the coefficient is b . It is expected to be negative but is reported as an absolute value. Note that the Agersnap-Zidar basic regression was in a $\log \text{gains} = a + b \log(1-t) + \text{other regressors}$, but they also reported results with a semi-log function. A long-term estimate was not provided, but an estimate of b of 3.05 for years 6-8 and 2.39 for years 6-10 indicates an estimate of 1.4 for years 9 and 10. At a 22% rate, their elasticity was -0.19 with their preferred functional form. As noted in the text, Dowd and McClelland (2024) in a subsequent paper corrected an error in the code used in Dowd, McClelland, and Muthitacharoen (2015) which resulted in a revised elasticity of -0.78 compared to -0.72 reported in the original 2015 study. It is the revised results that are reported in Table 4 for Dowd, McClelland, and Muthitacharoen (2015).

Why do these studies often find elasticities that appear larger than the maximum feasible elasticity presented in this report? One possibility, of course, is that the functional form used in this analysis does not track the pattern of realizations. However, it is notable that the other functional form sometimes used, the net-of-tax elasticity, produces similar estimates of the maximum rate (-0.42 as compared to -0.34 for the semi-log form) for the midpoint of positive transactions cost (see **Appendix A**).

It is more likely that studies with higher elasticities are capturing the transitory elasticity. These effects occur when individuals time their realizations to occur when their tax rates are temporarily low. Notably, the first two studies that found lower elasticities than the estimated maximum relied on variation in state tax rates to identify the permanent elasticity. The Agersnap and Zidar study used total tax rates with year-fixed effects to control for the federal tax rate.¹⁸ All three studies used tax data. The Agersnap and Zidar study also has a fairly long measure of response (covering up to 10 years), and the elasticity fell over time. The next two studies, which found elasticities of

¹⁸ Using year-fixed effects does not solely rely on state tax rates, but controls for changes in federal tax rates through tax changes over time. It does not control for variations in tax rate for an observation when tax rates are not changing through legislation.

-0.55 and -0.64, did not have direct access to tax data, but they used the state tax variation by including year-fixed effects.

The last two studies with the highest elasticities used federal tax rates and generally had short lags, which suggests it is difficult to isolate the permanent elasticity. Also, when the Auerbach and Siegel study added a variable in an alternative specification that included the federal rate, the elasticity was five times larger. That result suggests that while the state variation reflects permanent differences, the variation in realizations with the federal rate reflects transitory effects. And while transitory or very short-run effects can have some policy relevance—for instance, if evaluating the potential ramifications of a temporary capital gains tax decrease to mitigate a severe economic shock—the long-run elasticity is typically of interest to policymakers when considering permanent changes.

Subsequent to the Dowd, McClelland, and Muthitacharoen study, McClelland and Dowd returned to their data source and provided some estimates with additional lags and additional years.¹⁹ Adding lags and years reduced the estimated elasticity, but the elasticities still exceeded the maximum elasticity estimated in this study for positive transactions costs.

Some econometric studies use time series estimation, which estimates how realizations changed with the tax rate over time. These estimates largely pick up short-run responses, which are generally expected to be larger than permanent responses. These short-run responses can be asymmetric as well, since larger short-run effects are more likely to be associated with reductions in tax rates than with increases, where there is an accumulated stock of unrealized gains. Time series studies also face the challenges of controlling for other variables in the economy that affect realizations, such as stock market prices, business cycles, and real estate prices. Such studies, however, have not produced the large elasticities associated with pre-1994 panel and cross section studies that could not control for transitory effects, and time series studies have exhibited similar ranges of elasticities (between -0.27 and -0.89) from the initial studies to present day, although all have not used the semi-log functional form or were evaluated at the same tax rate. Those recent studies have had a range of elasticities from -0.47 to -0.75.²⁰

Revenue-Estimating Practices

The official revenue estimator for tax legislation, the Joint Committee on Taxation (JCT), has used a coefficient of 3.1 for the permanent elasticity, corresponding to a -0.68 elasticity at a 22% rate for estimates of capital gains revenue effects.²¹ This estimate is well above the maximum elasticities estimated in this study and above all but two of the recent panel studies shown in **Table 4**. The Department of the Treasury uses a slightly higher estimate of 0.72.²² The elasticities

¹⁹ See Tim Dowd and Robert McClelland, *The Sensitivity of the Tax Elasticity of Capital Gains to Lagged Tax Rates and Migration*, Tax Policy Center, May 2024, https://taxpolicycenter.org/sites/default/files/publication/165863/the_sensitivity_of_the_tax_elasticity_of_capital_gains_to_lagged_tax_rates_and_migration.pdf. These estimates reflect three different effects: adding lags, using a data set with more years which would raise the mean tax rate, probably by about 3%. However, the reported elasticity without lags was 0.75 so adjusting for both would result in a rate at a 22% tax rate of 0.87. So the lowest rate they estimated with three lags would be -0.50.

²⁰ See CRS Report R41364, *Capital Gains Tax Options: Behavioral Responses and Revenues*, by Jane G. Gravelle for a review.

²¹ The Joint Committee on Taxation does not regularly report its elasticities in general, and the coefficient was supplied by the committee and used in CRS Report R41364, *Capital Gains Tax Options: Behavioral Responses and Revenues*, by Jane G. Gravelle.

²² CRS Report R41364, *Capital Gains Tax Options: Behavioral Responses and Revenues*, by Jane G. Gravelle. This elasticity was supplied to the author by the Treasury Department.

reported in 1990 were -0.76 for JCT and -0.98 for Treasury, although at an unspecified tax rate.²³ These elasticities were chosen at a time when panel and cross section studies were reporting widely varying estimates, ranging from -0.55 to -3.8. The original JCT estimate was based on the time series studies and was approximately in the middle of the studies.²⁴ Also, at that time, the top tax rate was higher than in subsequent years.

CBO uses elasticities for forecasting rather than revenue estimating and relies on time series. Its current elasticity is -0.46.²⁵

The bounds on the capital gains realization response based on the observed ratios of realizations to accruals and tax rates indicate a smaller response than that estimated in some statistical studies and smaller than that used in recent estimates of the capital gains response.

²³ These are elasticities before portfolio responses, and are reported in CRS Report 90-161 RCO, *Can a Capital Gains Tax Cut Pay For Itself?* by Jane G. Gravelle, March 23, 1990, available to congressional clients on request.

²⁴ See JCT, *Explanation of Methodology Used To Estimate proposals Affecting the Taxation of Income From Capital Gains*, Joint Committee Print, March 27, 1990, <https://www.jct.gov/publications/1990/jcs-12-90>.

²⁵ Based on conversations with CBO and adjusted by CRS to conform to a 22% tax rate.

Appendix A. Sensitivity Analysis

This appendix reports a sensitivity analysis, which considers the choice of functional form and other modeling assumptions by seeing how the results change when alternatives are selected.

A Constant Net-Of-Tax Elasticity

Table A-1 reports the results of using the alternative functional form, a constant elasticity with respect to the net-of-tax return (see **Appendix B**). Both functions have similar shapes with realizations first declining slowly and then more quickly (so that the elasticity rises with the tax rate) before rising dramatically at very high tax rates. The semi-log approach seems more realistic because, unlike the constant net-of-tax-elasticity, the elasticity does not approach infinity and realizations do not approach zero as the tax rate approaches 100%. People would still sell assets with a 100% tax rate (just as they sell assets with losses), and people save when the real interest rate is negative due to inflation because since the only way to use current resources for future consumption is to save, even if the return is negative.²⁶

The elasticity with positive transactions costs ranges from -0.48 to -0.36 with an estimate at the midpoint of transaction costs of -0.42. The revenue-maximizing tax rate for this elasticity is lower than using a semi-log functional form, 40%.²⁷ The revenue offset is 42%.

Table A-1. Maximum Capital Gains Elasticity at a 22% Federal Tax Rate, Assuming 100% of Accruals Are Realized, Various Transactions Costs, Constant Net-of-Tax Elasticity

Noncorporate	Corporate Stock and Mutual Funds			
Transactions Costs:	0.0%	0.01%	0.45%	1.0%
0.0%	-0.54	-0.53	-0.51	-0.48
3.0%	-0.48	-0.48	-0.46	-0.44
6.0%	-0.44	-0.43	-0.42	-0.40
9.0%	-0.40	-0.40	-0.38	-0.36

Source: CRS calculations.

Notes: Noncorporate transactions costs are listed in the first column, rows two through five, and corporate stock and mutual funds transactions costs are listed in the first row, columns two through five. Estimates are made using semi-log functional form. Assumes 15% noncompliance and a realization ratio in the absence of transactions costs and taxes, r^* , of 1.0. See **Appendix B** for more information.

²⁶ Two other functional forms were used in earlier studies, but each presents difficulties in the pattern of realizations. A linear form crosses the y and x axis. Thus, for example, it can cause realizations to become negative at some higher tax rate. Because a constant elasticity with respect to the tax rate asymptotically approaches infinity on the y axis and zero on the x axis, it can cause realizations to continue well beyond a 100% tax rate.

²⁷ The revenue-maximizing tax rate is $[(1-t_s)*0.22]/(.22 + E*(1-t_s-0.22))$ where t_s is the state tax rate and E is the estimated elasticity.

Table A-2 shows the same elasticities under the assumption that maximum realizations will be 80% of accruals. The elasticities range from -0.26 to -0.20, with an estimate at the midpoint of transactions costs of -0.23. The revenue-maximizing tax rate at the midpoint is 54%.

Table A-2. Maximum Capital Gains Elasticity at a 22% Federal Tax Rate, Assuming 80% of Accruals Are Realized, Various Transactions Costs, Constant Net-of-Tax Elasticity

Noncorporate		Corporate Stock and Mutual Funds			
Transactions Costs:	0.0%	0.01%	0.45%	1.0%	
0.0%	-0.29	-0.29	-0.28	-0.26	
3.0%	-0.26	-0.26	-0.25	-0.24	
6.0%	-0.24	-0.24	-0.23	-0.21	
9.0%	-0.22	-0.22	-0.21	-0.20	

Source: CRS calculations.

Notes: Noncorporate transactions costs are listed in the first column, rows two through five, and corporate stock and mutual funds transactions costs are listed in the first row, columns two through five. Estimates are made using semi-log functional form. Assumes 15% noncompliance and a realization ratio in the absence of transactions costs and taxes, r^* , of 0.8. See **Appendix B** for more information.

Table A-3 shows the effects of different assumptions about compliance costs. The maximum elasticity ranges from -0.47 to -0.37. The elasticity with a maximum realization of 80% of accruals ranges from -0.28 to -0.18.

Table A-3. Effects of Varying Noncompliance Rates Assuming the Midpoint Transactions Costs, Constant Net-of-Tax Elasticity

Noncompliance Rate	Elasticity with 100% of Accruals Realized	Elasticity With 80% of Accruals Realized
0%	-0.56	-0.37
10%	-0.47	-0.28
15%	-0.42	-0.23
20%	-0.37	-0.18

Source: CRS calculations.

Notes: Assumes corporate stock and mutual funds transactions costs of 0.45% and noncorporate equity transactions costs of 6.0%. See **Appendix B** for more information.

Alternative Limits on Maximum Realizations, Basic (Semi-log) Equation

Table A-4 shows how elasticities vary depending on the assumption of the maximum realizations as a percentage of accruals for the lowest, midpoint, and highest transactions costs. This assumption has the largest effect on the elasticity.

Table A-4. Elasticities by Maximum Realizations As a Percentage of Accruals

Limit on Realizations	Low Transactions Costs	Midpoint Transactions Costs	High Transactions Costs
70%	-0.11	-0.09	-0.08
80%	-0.22	-0.19	-0.16
90%	-0.31	-0.27	-0.23
100%	-0.40	-0.34	-0.29

Source: CRS calculations.

Notes: Assumes 15% noncompliance and a realization ratio of 1.0 in the absence of transactions costs and taxes. See **Appendix B** for more information.

Appendix B. Derivation and Estimation of Tax Elasticities

Semi-Log Functional Form

The semi-log functional form used to calculate the feedback effect of a capital gains tax reduction is:

$$R = Be^{-bk} \quad (1)$$

where:

- R is the amount of realizations;
- B and b are constants;
- k is the sum of transactions costs (c) and *combined* state capital gains tax (t_s) and federal capital gains tax (t_f), or $k = c + t(1 - c)$ where $t = t_s + t_f$, and
- e is the mathematical constant.

Thus, the semi-log functional form can be expressed as:

$$R = Be^{-b(c+t(1-c))} \quad (2)$$

This can be used to determine the formula for the elasticity of realizations with respect to the federal capital gains tax rate, which is the percentage change in realizations over the percentage change in the capital gains tax rate. Start by computing the differential of R in equations (2):

$$dR = -Bb(1 - c)e^{-b(c+t(1-c))}dt_f \quad (3)$$

Dividing (3) by (2) gives the percentage change in realizations (R) as:

$$\frac{dR}{R} = -b(1 - c)dt_f \quad (4)$$

To obtain the elasticity with respect to t_f , multiply the right-hand side of (4) by t_f over t_f .

$$\frac{dR}{R} = -b(1 - c)dt_f \frac{t_f}{t_f} \quad (5)$$

Rearranging to get the percentage change in R over the percentage change in t produces the elasticity of realizations with respect to t_f :

$$\varepsilon_{t_f} = b(1 - c)t_f \quad (6)$$

Using this formula requires determining values for b and c . Transactions costs (c) are difficult to pin down, so the analysis presented in this report assumed a range of values as discussed in **Appendix D**. The constant b can be expressed as a function of estimated and assumed values by noting that realizations can also be expressed as a fraction of accruals:

$$R = rA \quad (7)$$

where r is the ratio of realizations to accruals and A is accruals.

Let r^* be defined as the ratio of realizations to accruals when the capital gains tax and transactions costs are zero (i.e., $k = 0$). Using this definition along with (1) and (2) allows the ratio r/r^* to be expressed as:

$$\frac{r}{r^*} = e^{-bk} \quad (8)$$

This equation can be solved for the constant b by taking the natural logarithm of both sides:

$$b = -\frac{1}{k} \ln\left(\frac{r}{r^*}\right) \quad (9)$$

The ratio of realization to accruals (r) was estimated from the data as explained below. The ratio of realizations to accruals (r^*) when the capital gains tax and transactions costs are zero is bounded between r and 1.0. The analysis in this report allowed r^* to vary by a tenth of a percent within those bounds. The sum of transactions costs and state and federal capital gains tax rates (k) was set partly by assumption and partly by using estimates from the data as explained below.

Constant Net-of-Tax Elasticity Functional Form

The constant net-of-tax elasticity functional form used to calculate the feedback effect of a capital gains tax reduction is:

$$R = B(1 - k)^b \quad (10)$$

where:

- R is the amount of realizations;
- B and b are constants;
- k is the sum of transactions costs (c) and combined state capital gains tax (t_s) and federal capital gains tax (t_f), or $k = c + t(1 - c)$ where $t = t_s + t_f$.

Following the same steps explained above for the semi-log elasticity produces the elasticity:

$$\varepsilon_{t_f} = -\frac{bt_f}{(1 - t)} \quad (11)$$

where b is given by:

$$b = \frac{1}{\ln(1 - k)} \ln\left(\frac{r}{r^*}\right) \quad (12)$$

Appendix C. Revenue-Maximizing Tax Rates

The revenue-maximizing capital gains tax rate can be estimated using the functional forms reviewed in **Appendix B**.

Semi-Log Functional Form

Federal capital gains tax revenues ($TaxRev$) are equal to the federal capital gains tax rate (t_f) multiplied by realizations (R). Using equation (2), this can be written as:

$$TaxRev = t_f B e^{-b(c+t(1-c))} \quad (13)$$

where t is the combined federal capital gains tax (t_f) and state capital gains tax (t_s).

Taking the natural log and differentiating with respect to t_f produces:

$$\frac{d \ln(TaxRev)}{dt_f} = \frac{1}{t_f} - b(1 - c) \quad (14)$$

Setting (14) equal to zero and denoting the revenue-maximizing tax rate as t_f^* gives:

$$t_f^* = \frac{1}{b(1 - c)} \quad (15)$$

Multiplying the right-hand side by t_f over t_f and using equation (6) allows the revenue-maximizing tax rate to be expressed as a function of the tax elasticity ε_t

$$t_f^* = \frac{t_f}{\varepsilon_{t_f}} \quad (16)$$

Constant Net-of-Tax Elasticity Functional Form

Using equation (10) and substituting in $k = c + t(1 - c)$, federal capital gains tax revenues can be written as:

$$TaxRev = t_f B [1 - (c + t(1 - c))]^b \quad (17)$$

where, again, t is the combined federal capital gains tax (t_f) and state capital gains tax (t_s).

Differentiating with respect to t_f produces:

$$\frac{dTaxRev}{dt_f} = B [1 - (c + t(1 - c))]^b - t_f b B (1 - c) [1 - (c + t(1 - c))]^{b-1} \quad (18)$$

Setting (18) equal to zero and denoting the federal revenue-maximizing tax rate as t_f^* gives:

$$t_f^* = \frac{1 - t_s}{1 + b} \quad (19)$$

Solving equation (11) for b and substituting into equation (19) allows the revenue-maximizing tax rate to be expressed as a function of the tax elasticity:

$$t_f^* = \frac{(1 - t_s)t_f}{t_f - \varepsilon_{t_f}(1 - t_s - t_f)} \quad (20)$$

Appendix D. Data Sources

The period of study in this report was 1987 to 2023. Accrued capital gains were obtained from the Board of Governors of the Federal Reserve System, Financial Accounts, R.101 Change in Net Worth of Households and Nonprofit Organizations.²⁸ These data were adjusted to isolate household equities and mutual funds using B.101.h Balance Sheet of Households and B.101.n Balance Sheet of Nonprofit Organizations.²⁹ Education saving accounts (e.g., 529s) were removed using data on such accounts listed in the memo to B.10.1. Individual retirement accounts were removed using estimates from the Investment Company Institute.³⁰

Realized capital gains from 1987 to 1994 were obtained from Treasury, Office of Tax Analysis.³¹ Realized capital gains from 1995 to 2023 were obtained from the Congressional Budget Office (CBO).³²

Federal capital gains tax rates were computed as capital gains tax receipts over realizations as reported by Treasury and CBO. State capital gains tax rates were obtained from the NBER TAXSIM.³³ An average effective combined capital gains tax rate was computed by weighting federal and state taxes by realizations.

Tax noncompliance impacts the potential response to a capital gains tax reduction. This analysis assumed four different rates of noncompliance: 0%, 10%, 15%, and 20%.³⁴

Estimates of transactions costs vary across studies and depend on how costs are measured. Due to the variation in the literature, this analysis assumed a range of transactions costs for corporate and noncorporate equity separately.

Transactions costs are generally measured as a share of the total asset's sales price. The above cost figures were increased by a multiple to reflect costs as a share of the realized gain. The multiple for corporate equity was 4.5 and the multiple for noncorporate equity was 3.25, as determined using IRS Statistics of Income data on gain over sales price.³⁵ Noncorporate equity

²⁸ Board of Governors of the Federal Reserve System, "R.101 Change in Net Worth of Households and Nonprofit Organizations," Financial Accounts of the United States, <https://www.federalreserve.gov/releases/z1/20240607/html/r101.htm>.

²⁹ Board of Governors of the Federal Reserve System, "B.101.h Balance Sheet of Households," Financial Accounts of the United States, <https://www.federalreserve.gov/releases/z1/preview/html/b101h.htm>, and "B.101.n Balance Sheet of Nonprofit Organizations," <https://www.federalreserve.gov/releases/z1/preview/html/b101n.htm>.

³⁰ Investment Company Institute, "Release: Quarterly Retirement Market Data," The US Retirement Market, Table 19, https://www.ici.org/statistical-report/ret_24_q3. The assets in Table 19 outside of money market assets and 75% of the assets in "Other Assets" in Table 9, and adjusted for Section 529 savings plans, are excluded following the methodology in Steven M. Rosenthal and Lydia S. Austin, "The Dwindling Taxable Share Of U.S. Corporate Stock," *Tax Notes*, May 16, 2016, pp. 923-932, <https://www.urban.org/sites/default/files/publication/80621/2000790-The-Dwindling-Taxable-Share-of-U.S.-Corporate-Stock.pdf>.

³¹ U.S. Department of the Treasury, Office of Tax Analysis, "Taxes Paid on Capital Gains for Returns with Positive Net Capital Gains: 1954-2014," <https://home.treasury.gov/policy-issues/tax-policy/office-of-tax-analysis>.

³² CBO, "Budget and Economic Data, Revenue Projections, by Category," June 18, 2024 (supplement to *An Update to the Budget and Economic Outlook: 2024 to 2034*), <https://www.cbo.gov/data/budget-economic-data#7>.

³³ National Bureau of Economic Research, "Maximum State Income Tax Rates 1977-2024," TAXSIM, <https://taxsim.nber.org/state-rates/>.

³⁴ Based on data for various years from IRS, "IRS: The Tax Gap," <https://www.irs.gov/statistics/irs-the-tax-gap>. The tax gap varied, but tended to average around 15% for the years available.

³⁵ Janette Wilson and Christopher Williams, *Sales of Capital Assets Data Reported on Individual Tax Returns, Tax Years 2013-2015*, IRS, Statistics of Income Bulletin, Winter 2022, Table 1A, <https://www.irs.gov/pub/irs-soi/soi-a-soca-id2205.pdf>.

includes residential rental property, depreciable business real property, farmland, and other land. A previous CRS study found that corporate stock accounted for 67.9% of long-term capital gains (associated with stocks held directly and indirectly through pass-throughs). The analysis presented in this report assumed corporate equity accounts for 70% of long-term capital gains, in line with the previous finding.

The data sources summarized above produced the parameter estimates shown in **Table D-1**.

Table D-1. Elasticity Model Parameter Inputs

Parameter	Value
Realization ratio (r)	0.614
Federal capital gains tax rate (t^f)	0.1918
State capital gains tax rate (t^s)	0.0380
Transactions costs:	
Corporate equity	0.0, 0.0010, 0.0045, 0.010
Noncorporate equity	0.0, 0.03, 0.06, 0.09
Transactions cost multiple:	
Corporate equity	4.5
Noncorporate equity	3.25
Share of long-term gains attributable to corporate stock	0.70
Noncompliance rate	0.0, 0.10, 0.15, 0.20

Appendix E. References to Empirical Studies in Table 4

- Agersnap, Ole and Owen Zidar, “The Tax Elasticity of Capital Gains and Revenue-Maximizing Rates,” *American Economic Review: Insights*, vol. 3. no. 4 (December 2021), pp. 399-416.
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Author Information

Mark P. Keightley
Specialist in Economics

Jane G. Gravelle
Senior Specialist in Economic Policy

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