CRS Report for Congress

Limits to Capital Gains Feedback Effects

Jane G. Gravelle
Senior Specialist in Economic Policy

March 15, 1991

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LIMITS TO CAPITAL GAINS FEEDBACK EFFECTS

SUMMARY

The Administration's proposal for FY1992 to allow up to a thirty percent exclusion of capital gains from income taxes is estimated by the Joint Committee on Taxation (JCT) to lose $10.6 billion over the period 1991-1996. Treasury estimates, by contrast, predict a gain of $9.5 billion over the same period. The "static" revenue loss -- the loss that would arise if taxpayers did not change their behavior and realized the same capital gains as under current law -- is in the neighborhood of $90 billion. Thus, both estimates include a substantial offset to the static revenue loss arising from increased realizations induced by the tax cut; the Treasury's predicted response is larger. The magnitude of this realization offset is highly uncertain because of the substantial variation in econometric study estimates of the response.

This study uses a previously unexploited approach to place some boundaries on the long run realizations response. The values in this paper are not "statistically" estimated in the same way as the econometric studies which influenced the responses assumed by the Treasury and JCT. Rather, this study examines the historical relationship between realizations and accruals. Since realizations cannot exceed accruals in the long run, these data can be used to set an upper limit to the long run realizations response. That is, the values in this study are simply calculated from historical data on capital gains; they are not statistically inferred from correlations between tax rates and realizations. The study is, therefore, an independent "reality check" on the estimates derived from statistical inference.

Based on these data, the range of potential responses appear to be considerably smaller than those used by either the Treasury or the Joint Committee on Taxation. The responses are typically expressed in the form of an elasticity, which is the percentage change in realizations divided by the percentage change in taxes. Based on the calculations in this study, the elasticity (which is negative) should be smaller than .53, and is likely to be well below this value. The Joint Committee's long run elasticity of -.76 and the Treasury's measure of -.98 are both in excess of the upper limit estimated from the historical realizations and accruals rates.

This study also suggests that the recent micro-data studies of tax returns have produced estimates that are inconsistent with historical data. These micro-data estimates, which influenced the Treasury, incorrectly predict realizations, absent taxes, which are many times the level of accruals. Time series estimates are more consistent, although most of them also tend to over predict the calculated upper limit to the realizations response. This over-prediction is not surprising since time series studies may be capturing, in part, short term responses. Some of this over-prediction may reflect a failure to include data on capital gains accruals in the model that is estimated.

It appears that realizations responses can only offset a small part of the original revenue loss from a capital gains tax cut.

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I thank Ron Boster, Len Burman, Joe Cordes, Al Davis, David Joulfaian, Don Kiefer, John O'Hare, Larry Ozanne, and Harvey Rosen for helpful discussions and comments.

LIMITS TO CAPITAL GAINS FEEDBACK EFFECTS

INTRODUCTION

A major dispute in the controversy over capital gains taxes is whether a capital gains tax cut pays for itself as taxpayers respond by realizing more gains (.i.e. by selling assets more frequently or selling assets whose gains would otherwise become tax free at death). The Joint Committee on Taxation (JCT), for example, has estimated that the Administration's proposal to exclude 30 percent of gains will cost $10.6 billion over FY 1991-1996; the Treasury has estimated that the proposal will gain $9.5 billion. Both estimates assume a substantial increase in realizations, since the cost of this tax cut, absent a change in taxpayer behavior, is in the neighborhood of $90 billion.

The JCT and Treasury revenue estimates depend critically on the assumed "realizations elasticity" -- the percentage change in realizations given a percentage change in tax rates. If this realizations elasticity is close to one or above it, the capital gains tax cut would raise money; if it is below one, it will lose money. This difference in assumed realizations elasticities is a major reason for the difference in revenue estimates between the JCT and the Treasury.

The JCT and Treasury have chosen their elasticities after reviewing a variety of econometric studies. These studies are statistical studies which attempt to infer, based on observations of gains and tax rates (either across time or across individuals), the responsiveness of gains to changes in tax rates. Unfortunately, this type of analysis is very difficult to perform and the statistical studies have produced widely varying results.

Some studies have found no evidence of any response, or have found quite small effects; others have found very large ones. Some of the micro-data studies (which rely on comparisons across individuals) have found elasticities in excess of 3 in absolute value. Were these larger elasticities correct, one could cut capital gains tax rates deeply and still gain revenues. For example, even in a flat rate tax system, an elasticity of -2 would yield a gain in revenue equal to a third of the original static loss for a 30 percent exclusion. Realizations would increase by so much as to make up the original revenue loss and actually add additional revenues. On the other hand, if the elasticity were -.25, while some of the loss would be made up in realizations, there would still be a revenue loss

equal to 80 percent of the original static loss. At an elasticity of one, there would be approximately no revenue effect.[1]

Much of the debate on a capital gains tax cut has centered around the validity of these statistical estimates. For example, last year the Administration appealed to recent micro-data studies to suggest that their long run elasticity of approximately -.98 was conservative. The Joint Tax Committee chose a somewhat lower long run elasticity of around -.76 based on time series studies, which they argued were more valid.[2]

This study appeals to a different source of information that can be used to ascertain a realistic range for the long run response to a capital gains tax cut. In the long run, annual capital gains realizations cannot persistently exceed annual accruals (changes in asset values). While gains can rise above accruals occasionally, they cannot persist in this pattern and must be offset by lower realizations in other years; persistently realizing gains in excess of accruals is impossible. Since there are data on accruals which can be compared to realizations, an upper bound on the realizations elasticity can be determined, and the elasticity must fall between zero and this upper bound. This upper limit elasticity is not a likely estimate; rather it is the upper limit to elasticities which are even possible.

The values in this paper are not "statistically" estimated in the same way as the JCT or Treasury elasticities. They are not statistically inferred from correlations between tax rates and realizations. Rather, they are calculated from data. They thus provide an independent "reality check", since a revenue

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[1] This statement is precisely true for a small tax change in a proportional system. The term "elasticity" becomes less precise when large discrete changes are considered, since it can be measured in a number of different ways. (A rough rule of thumb is to examine the elasticity with reference to a small change at the midpoint between the current and proposed tax rate). In addition, an equation which yields a unitary elasticity for the economy as a whole may nevertheless expand taxable realizations for higher income individuals while lowering them for lower income individuals. In a progressive tax rate system, this shift in income would lead to higher overall taxes. This effect of progressive taxation is probably not very important in today's tax structure where tax rates are relatively flat and most gain is concentrated at the 28 percent tax rate.

[2] These elasticities were the ones used to reflect more frequent sales of assets. Both Treasury and the JCT also included portfolio effects in their estimates which were implemented as a reduction in the elasticity. While the effects of tax changes on investments and the level of accruals is an interesting and possibly important issue, it is not the subject of this analysis; therefore all elasticities discussed have to do only with the phenomenon of more frequent sales of assets. The elasticities are evaluated at an approximately 22 percent tax rate, this being the midpoint of the old and new rates with a thirty percent exclusion. Both the JCT and the Treasury use higher initial elasticities to reflect a larger short run response.

estimating equation is unreliable if it predicts that a tax cut could cause realizations to exceed accruals.

The results which follow suggest that the long run realizations elasticity, evaluated at a 22 percent tax rate, falls between zero and -.53. These results suggest that any capital gains tax cut will lose revenue in the long run, probably in significant amounts. These results also indicate that both the Administration and the Joint Tax Committee choices of long run elasticity are above the feasible range. Moreover, these data clearly place the recent micro-data estimates outside the range of plausibility.

THE REALIZATIONS TO ACCRUALS RATIO

In the long run, the amount of 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, then we could have no increased realizations in response to a capital gains tax cut because there would be no potential source of the response.[3] If, however, some assets are never sold (or held until death where 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 sell assets they would otherwise have held until death. This response, while possible, is still limited by the amount of unrealized accruals. Therefore, data on the magnitude of this potential response can provide some bounds on the increase in realizations we might expect from a capital gains tax cut.

While realizations cannot exceed accruals on average, there are fluctuations from year to year, since 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. We begin with data on revaluations of all individually held assets from the Flow of Funds Accounts (FOFA) and capital gains realizations for the period 1949-1987 from tax returns.[4] The revaluations from the FOFA include owner occupied housing (structures and land), corporate equities held in the household sector, residential structures held in the noncorporate sector, noncorporate plant and equipment, and land. These are the assets which would be expected to generate individual capital gains. The realizations data add to realizations reported on individual tax returns amounts

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[3] Accruals might change through shifts in the composition of investment, but this type of response is not the focus of this analysis. The realizations response referred to here is in more frequent sale of existing assets, a response which derives from tax barriers to switching assets.

[4] These data, and the capital gains series, were tabulated by David Joulfaian. Joulfaian's capital gains realizations series includes imputations for fiduciaries, non-compliance, and transactions costs.

representing realizations on fiduciary tax returns, amounts realized but not reported, and transactions costs, which are part of realizations but are deductible for tax purposes.

The ratio of the 1949 to 1989 sum of realizations to accruals from these data is approximately .3. That is, on average about 30 percent of accruals are realized as gains. Because the tax rate series that we must use begins in 1954, we calculate the ratio for 1954-1989, which is also .3.

The nature of these data are to include a substantial amount of accruals which are not potentially taxable. The most important of these is accruals on owner occupied housing. This source of gain is largely free from tax liability because of rules allowing deferral of gain if another house is purchased and allowing exclusion of certain amounts of gain for those over 55. According to recent data, only 3 percent of gain reported on owner occupied housing is actually taxed.[5] Fifty one percent of gain is eliminated through deferral and forty six percent through the exclusion. These rules were not, however, consistently applied during the entire time period. While deferral was available throughout the period under consideration, the exclusion provisions were not allowed until 1964 and were allowed at much less generous levels from the period 1964 to 1977 than after 1977. We adjust the data accordingly.

The FOFA also includes in the household sector stock held by nonprofit organizations. Data provided in a recent study by the Federal Reserve Board indicate that slightly over 17 percent of the corporate stock reported in the household sector are held by nonprofits, such as foundations and universities.[6]

The revaluations from the FOFA data also rely on National Income and Product Accounts definitions of depreciation, rather than tax depreciation. We also make an adjustment for this factor as discussed below, which again is relatively negligible.

Another potential problem with using the accruals data for considering potential capital gains realizations levels is the absence of FOFA accruals on certain kinds of assets. There are two kinds of assets where gains are not included. The first is changes in the value of purely financial assets. For example, fixed yield bond prices fall when interest rates rise, and rise when interest rates fall. This omission does not seem serious, since both gains and losses should occur on these types of assets, which represent no underlying

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[5] See Dan Holik, Susan Hostetter, and John Labate, 1985 Sales of Capital Assets.

[6] See Financial Characteristics of High Income Families, Federal Reserve Bulletin, March 1986, p.174. Joulfaian also expresses concerns that some of the assets of closely held corporations are not captured in the FOFA. Discussions with staff of the Federal Reserve Board indicate that the value of such stock is included in the estimates.

physical assets.[7] Moreover, these assets are relatively unimportant as a fraction of capital gains realizations.

Secondly, the FOFA does not include changes in the value of certain kinds of assets which are expected to produce gains but are not counted. These assets include livestock, timber growing, and collectibles, such as art objects. An explicit adjustment for timber and livestock, as discussed below, is negligible. Collectibles are of little importance in the aggregate.[8]

Based on the considerations discussed above, we derive the following ratio of realizations to accruals:

(1) The ratio calculated before adjustments, of .3046, was increased to .4268 by eliminating fractions of the accruals on owner occupied housing. From the period 1978-1987 the fraction eliminated was 97 percent. The fraction eliminated for the period 1954 to 1963, when only deferral through rollover was available, was 51 percent. The ratio during the period 1964-1977, when a less generous exclusion was allowed, was 62 percent. [9]

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[7] Indeed, during most of the period under consideration, interest rates were either stable or rising, and failing to include changes in the market value of gains would increase aggregate accruals, decrease the observed historical ratio, and overstate the potential upper limit of the realization elasticity. A related issue involves the fact that FOFA revaluations of reproducible physical assets are made on the basis of replacement cost rather than market value. As in the case of financial assets, the divergence between replacement costs and market value is likely to be a temporary phenomenon, with both gains and losses occurring.

[8] In 1985, the entire miscellaneous category accounted for only 2 percent of capital gains. See Dan Holik, Susan Hostetter and John Labate, 1985 Sales of Capital Assets, August 1989. This category includes, in addition to assets such as collectibles, many financial assets such as mortgages, nonbusiness bad debts, and foreign currency conversions.

[9] The 62 percent figure is based on a comparison of the tax expenditure budget estimates before and after the liberalization of the exclusion. Adjusting the overall series by eliminating parts of accruals might overstate the ratio of realizations to potential accruals if the remaining accruals are more likely to be subject to tax than those accruals already realized. At the same time, the inclusion of accruals from periods when tax benefits were less generous might tend to understate the ratio for purposes of estimating current potential realizations, since these past accruals are now eligible for relief. An alternative way of making this adjustment is to eliminate accruals of owner occupied housing entirely and adjust the capital gains realizations series, to reflect only gains outside of owner occupied housing. This approach, assuming that gains on owner occupied housing accounts for about 20 percent of the total before accounting for deferral and exclusion, yielded a very similar, and slightly larger

(2) The new ratio of .4268 was increased to .4281 by correcting for tax depreciation by adding back to accruals the annual change in the capital consumption adjustment. This change was negative for owner occupied housing (where no tax depreciation is allowed), and varied over time for other assets.

(3) The ratio of .4281 was increased to .4634 by eliminating 17.4 percent of the corporate stock accruals assumed to accrue to nonprofit organizations.

(4) The ratio of .4634 was reduced to .4579 when gains were reduced by the fraction of gains accounted for by timber and livestock.

(5) The ratio of .4579 was increased to .4646 to account for a slightly higher measure of the transactions costs.

These calculations suggest, therefore, that realizations are about 46 percent of accruals.

MEASURING TAX RATES

The historical income tax rate on capital gains is 18.4 percent, based on the series reported by the Congressional Budget Office.[10]

Our calculations also need to account for transactions costs. Transactions costs, like capital gains taxes, act as a barrier to make selling and switching of assets more costly. None of the econometric studies have accounted for transactions costs.[11]

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measure, of .4466

[10] See Congressional Budget Office, How Capital Gains Tax Rates Affect Revenues: The Historical Evidence. March 1988. This series went only until 1985. The rate for 1986 was set to that for 1985 and the rate for 1987-89 was set to .257, the estimated current marginal tax rate on capital gains according to the Treasury Department. (This rate was reported by Assistant Secretary Kenneth Gideon in testimony before the Senate Finance Committee on March 6, 1990). The average tax rate over the period was calculated by adding the rates and dividing by the number of years and alternatively by weighting the rates by capital gains. Both approaches yielded similar numbers: 18.9 percent for the former and 18.4 percent for the latter.

[11] It would also be appropriate to incorporate State and local capital gains taxes. Some simple calculations showed that these taxes would have little effect on the measured elasticities because they are deductible and relatively small, as long as the capital gains tax rate is changing via an exclusion and the States also allow the exclusion. For this reason and because of the difficulties of

Transactions costs are typically assessed relative to the total sales value of an asset. As a fraction of realizations, they are much higher than as fraction of sales. The Statistics of Income (SOI) data from the 1981 Sales of Capital Assets provides measures of the overall ratio of gain to sales value for different types of assets.[12] Kiefer reports that commissions on the sale of stock are approximately 1.5 percent of the sales price before brokerage commissions were deregulated and .73 percent for non-institutional sales after 1975.[13] Transactions costs of selling real property are much larger, since they must include realtors' commissions, legal costs of the sale and placement of financing, and transfer taxes. They fall in the neighborhood of at least 6 to 7 percent of sales costs.[14] Using a 6 percent cost for real assets and both the 1.5 percent and the .73 percent costs for financial assets, the estimated transactions tax as a percent of realizations, based on the SOI data, was 12.8 percent and 11.6 percent respectively. We use the 11.6 percent estimate.[15]

ESTIMATING THE RANGE OF REALIZATIONS 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. We use the functional form which is used by both JCT and Treasury revenue estimators

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calculating an historical series of these taxes, they were omitted. (The elasticity calculated below would be smaller if the policy change under consideration were a reduction in Federal tax rates as opposed to an increase in the exclusion ratio).

[12] Bobby Clark and David Paris. Sales of Capital Assets 1981 and 1982. Statistics of Income Bulletin, Department of Treasury, Internal Revenue Service, Volume 5, No. 3, Winter 1985-86.

[13] Donald W. Kiefer, The Securities Transactions Tax: an Overview of the Issues, Congressional Research Service, Library of Congress, Report 90-350 RCO, July 25, 1990.

[14] These estimates are based on consultations with housing experts in the Congressional Research Service, who suggest that costs of this magnitude may be conservative. Sales commissions of 6 percent are common for housing, and transactions taxes may be one or two percent of sales costs. Of course, some kinds of real estate may be eligible for smaller sales commissions and there are discount realtors. Hence we use the lower number of 6 percent. Note that these costs may also be understated because they do not include the costs to the seller in gathering information, making decisions, and in the case of real property, assisting with the sale. Nor do these costs include any fixing up expenses which would not have otherwise been undertaken if the property were not sold.

[15] Joulfaian's imputations to the realizations data assumes that transactions costs are approximately 10 percent of realizations, a very similar measure.

and which is probably the most commonly used for econometric estimates. The realizations elasticity (E) is:

(1) $E = b(1-c)t$

The value of the coefficient b is calculated from the historical ratio of realizations to accruals, the historical tax rates, and the assumed value of the ratio of realizations to accruals in the absence of taxes. The latter, which we denote s*, can be no higher than 1. This derivation is shown in Appendix II (Part 1). The term c refers to transactions costs and the term t the capital gains tax rate.

The value s* can fall into the range of .4646 to 1. The choice of a tax rate, t, depends on the tax proposal to be evaluated; we use the value of .2184 to correspond to the midpoint of the old and new tax rates for a thirty percent exclusion, the current proposal in the President's budget.

Table 1 reports the elasticity values logically implied for a range of potential values of s*. It also reports the fixed coefficient of t in equation (1). This fixed coefficient (b multiplied by (1-c)) is the coefficient which would be expected to be estimated in an econometric exercise. The elasticity is valued at a .2184 tax rate; the elasticity rises and falls proportionally with the tax rate. Although this analysis does not tell us where the estimate falls in the range, it does establish the range of plausible elasticity estimates.

One could certainly rule out the very highest end of the range. The assumption that s* is close to 1 is the assumption that in the absence of transactions costs every asset would be sold very frequently (once a year or less). Yet, it only takes a moment of reflection to recognize that many assets would not be sold at all or would be sold very infrequently. Assets whose rate of return is satisfactory, and which are not needed for consumption would not be sold. Moreover, many assets have a particular value to the individual. We would not expect individuals to sell the family farm or the family business every year even if there were no capital gains taxes or sales costs. Indeed, such assets might well be passed on to heirs at death. Similarly, shares in closely held corporations or controlling shares in public corporations would be unlikely to be sold merely because there are no direct costs of doing so. Finally, individuals purchasing corporate shares even in small amounts may be advised to hold shares for a long period of time to avoid the vicissitudes of the market.

Table 1: The Feasible Range of Realizations Elasticities

Value of s*	Coefficient* b(1-c)	Elasticity*
0.4646	-0.00	-0.00
0.50	-0.24	-0.05
0.60	-0.83	-0.18
0.70	-1.32	-0.28
0.80	-1.76	-0.38
0.90	-2.14	-0.46
1.00	-2.48	-0.53

Source: Congressional Research Service. The elasticity is evaluated at a .2184 percent tax rate.

For that matter, there is evidence that pension funds, whose transactions costs are very small and income taxes non-existent, nevertheless have historically had turnover rates not very different from the market as a whole.[16] This observation suggests that their ratio of realizations to accruals even in the absence of taxes was well below one. Again, this behavior may simply reflect that fact that there is no reason to sell assets if they are performing reasonably well, and is suggestive of a choice of an s* value and therefore a corresponding elasticity closer to the bottom of the range in Table 1.

There is another perspective on reasonable values of s*. There are two underlying reasons that realizations fall below accruals. The first is that assets are not sold every year; the longer the holding period the lower the realizations to accrual ratio. The second reason is that gain on some assets is never realized because when assets are passed on at death, the basis in the hands of the heir is stepped up to the fair market value. It would appear that the latter phenomenon is primarily responsible for the difference between realizations and accruals. We might, however, expect the former behavior is more likely to change. That is, individuals are probably more likely to sell currently traded assets more frequently, than to sell assets they otherwise planned to pass on to their heirs.

SOI data suggest that the average gain as a percent of sales for assets actually sold is a little over a third. These ratios in turn suggest slightly under half of accruals are associated with assets which are held until death and passed on to heirs, thereby escaping taxation.[17] If the total response to a cut in the capital gains tax were to increase the frequency with which existing assets are sold with little effect on inducing individuals to sell assets which they might otherwise hold until death, the elasticity would be that associated with an upper limit for s* of about .57 -- an elasticity of no more than -.14.

The results in Table 1 are sensitive to variations in the observed realizations to accruals ratio and historical tax rates. Appendix I provides estimates of the sensitivity of the results to variations in these measures, and also discusses sensitivity to alternative functional forms of the gains and tax rate relationship. None of these calculations suggest that elasticities are large enough for a capital gains tax cut to increase revenues. And, although there are functional forms which can yield higher elasticities, these functional forms do not appear to be reasonable at higher tax rates.

Note also that the estimates presented in this section only bound the long run elasticity. The short run elasticity may be larger, as the some of existing stock of assets are sold. Thus, over the years immediately following a

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[16] See Donald W. Kiefer, A Stock Transfer Tax to Lengthen Business Planning Horizons, mimeo. Both turnover rates climbed beginning around 1979, although pension fund turnover rates moved up slightly more.

[17] The derivation of these relationships is shown in the Appendix, Part II.

tax cut there could be a larger increase in realizations which would then dissipate. Yet, it does not seem likely that this short run response could be very pronounced. If such a pronounced short term unlocking occurs, it would have already taken place during the end of the seventies and the early eighties, when tax rates were lowered (and indeed were lower than both current and prospective rates). Thus, we cannot expect an unlocking of assets accumulated before 1987. Thus, while a larger short run response would normally be expected, it is unlikely to be important under current conditions. More importantly, however, if there is a very small long run response, there will also be a small short run response. There was clearly no indication of a massive unlocking of gains in the 1979-1986 period.

THE RELATIONSHIP OF THE LIMITS TO ECONOMETRIC RESULTS

Elasticities for revenue estimates have been chosen in light of econometric studies, which use statistical inference to estimate elasticities either by examining changes in tax rates and gains over time (time series) or comparing the behavior of different individuals (micro-data or cross section). Both of these types of statistical studies have a number of shortcomings, which have been reviewed in other studies.[18]

One point of disagreement between the Administration and the Joint Committee on Taxation has been over what kinds of econometric studies are relevant. The Joint Committee on Taxation has maintained that time series studies are more reliable and has chosen its elasticity based on a time series study.[19] The realizations elasticity used by the Joint Committee falls within the range of time series studies, and would be considered a quite reasonable choice in reference to the body of time series research. The Administration has

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[18] The problems of these studies have been reviewed in a number of articles. See, for example, Congressional Budget Office, How Capital Gains Tax Rates Affect Revenues: The Historical Evidence, March 1988; Gerald E. Auten, Leonard E. Burman, and William C. Randolph, "Estimation and Interpretation of Capital Gains Realization Behavior: Evidence from Panel Data, National Tax Journal, September 1989, pp. 353-374; Alan Auerbach, Capital Gains Taxation and Tax Reform, National Tax Journal, September 1989, pp. 353-374; Jane G. Gravelle, Can a Capital Gains Tax Cut Pay for Itself?, Congressional Research Service, Library of Congress, March 23, 1990, Report No. 90-161 RCO; Leonard Burman, Why Capital Gains Tax Cuts (Probably) Don't Pay for Themselves, Tax Notes, April 2, 1990, pp. 109-110.

[19] A discussion of this view and the reasons for it can be found in U.S. Congress, Joint Committee on Taxation, Explanation of Methodology Used to Estimate Proposals Affecting the Taxation of Income from Capital Gains, Joint Committee Print, Washington, D.C., U.S. Government Printing Office, March 27, 1990.

chosen an elasticity which it terms quite conservative, but which tends to be above the time series results. The Administration's elasticity is, however, below some of the micro-data results. Administration spokesmen have criticized the Joint Committee and others for dismissing the micro-data evidence and have argued that micro-data results are highly relevant. For example, Michael Boskin, Chairman of the Council of Economic Advisors, in a letter dated March 6, 1990, has stated in reference to the econometric studies:

> "Among these studies, those released last year by the Treasury are the best available. These studies do not seem to have been taken into account by JCT."

Similarly, Kenneth Gideon, Assistant Secretary of the Treasury for Tax Policy, in written testimony before the Senate Finance Committee on March 28, criticized both the Joint Committee on Taxation and a Congressional Research Service Report by the author:

> "...the Joint Tax Committee has been quite selective in its use of the statistical evidence. For example, in its review of the econometric studies, the Joint Committee rejects the use of cross sectional data sets.."

> "...In contrast to the JCT and Gravelle, the Treasury's evaluation of the econometric evidence takes seriously the results of both cross sectional and time series studies. The cross sectional methodology is a standard procedure widely used in econometrics to analyze a variety of phenomena. To discount the results of such studies seems inappropriate.."

While cross section analysis is a standard technique, the critics of these studies have been struck by their generally very high elasticities.[20] Consider the two micro-data studies released by the Treasury in 1989 and referred to in the above quotations. Both of the recent studies produce elasticities which are substantially above the upper limits derived earlier in this paper.

One of these studies, by Gillingham, Greenlees, and Zeischang[21] reports an elasticity of 3.8. The statistical estimates from this study are inconsistent with historical data on realizations and accruals. To make this point clearly, based on their results, the realizations/accruals ratio would be no greater than

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[20] The term cross section is used to refer to studies we have characterized as micro-data studies. Some of these studies are pure cross section studies which compare individuals in a single time frame. Others are panel studies which trace individuals over a few years.

[21] Gillingham, Robert, John S. Greenlees, and Kimberly D. Zieschang, "New Estimates of Capital Gains Realization Behavior: Evidence from Pooled Cross-Section Data." U. S. Department of Treasury, OTA Paper 66, May 1989.

.0012 during the period of their study.[22] Or to put it another way, an equation with an elasticity of this magnitude would predict that realizations in 1989, which were $189 billion, would have increased to more than $158 trillion in the absence of taxes and transactions costs! This value is over thirty times GNP in that year, and thus the implied parameters in their study are completely out of the question.

The other recent micro-data study, by Auten, Burman, and Randolph[23] appears to have an elasticity of around 3.2. It was run in a slightly different functional form, but again, such results are inconsistent with history. They would suggest a maximum realizations to accruals ratio of .008 during the period of their study. Or, again to put it another way, an equation of their particular functional form with a 3.2 elasticity would result in predicted realizations for 1988 of $24 trillion in the absence of taxes and transactions costs. Both of these recent studies would lead to predictions of realizations (in the absence of taxes) which are far above the potential unrealized gains and are inconsistent with history.

The remaining micro-data studies are run in functional forms which are quite different from those in this study, and thus it is not possible to do explicit calculations. The Treasury (1985) study[24] and the earliest study by Feldstein, Slemrod, and Yitzhaki (1978)[25] respectively reported elasticities of 1.3 and 3.75. These, too, appear to be out of the range of a plausible response. The two remaining studies include one by Minarik, which produces results more

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[22] This calculation is shown in Appendix II, Part III.

[23] Auten, Gerald E. , Leonard E. Burman, and William C. Randolph. "Estimation and Interpretation of Capital Gains Realization Behavior: Evidence from Panel Data." National Tax Journal, September 1989, pp. 353-374. (This study was also released by the U.S. Department of Treasury. OTA Paper 67, May 1989). The authors only reported elasticities with respect to exclusion ratios and not the tax rates relevant to this analysis; the elasticity of around 3.2 is based on reported simulation exercises. The authors do express some doubts about the policy relevance of their results. This point was elaborated on by Leonard Burman, Why Capital Gains Tax Cuts (Probably) Don't Pay for Themselves, Tax Notes, April 2, 1990, pp. 109-110.

[24] U.S. Department of Treasury. Office of Tax Analysis. Report to the Congress on the Capital Gains Tax Reductions of 1978. September 1985.

[25] Feldstein, Martin, Joel Slemrod and Shlomo Yitzhaki. The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains. Quarterly Journal of Economics, June 1980, pp. 777-91.

consistent with the range estimated in this study (the elasticity was .62).[26] Auten and Clotfelter ran several regressions, some of which might be implausible, some plausible, and some of which produced insignificant coefficients (thus suggesting a very small response).[27]

As a body of research, the micro-data studies tend to vary widely and in more cases than not produce implausible results. Why these micro-data results are so severely flawed is unclear, although there has been considerable speculation on this point.[28] Although some of the earlier findings are consistent with a small response, clearly one must be reluctant to rely upon the micro-data studies because of their inconsistent and seemingly unreasonable results.

Time series estimates tend, on the whole, to be lower and less variable than micro-data estimates, ranging from equations where there is no statistically significant relationship to elasticities around 1.[29] They do tend to fall at the high end or above the upper limits of the elasticities as estimated in this study. There are, however, several plausible reasons for these results.[30] First, most

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[26] Minarik, Joseph. The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains: Comment. Quarterly Journal of Economics, February, 1984. p. 93-110.

[27] Auten, Gerald E., and Charles Clotfelter. Permanent vs. Transitory Effects and the Realization of Capital Gains. Quarterly Journal of Economics, November 1982, pp. 613-632.

[28] Among the potential shortcomings of these studies are inability to account for transitory effects, presence of individual specific effects, endogeneity of the tax rate, correlation between tax rate and income and wealth variables in a progressive tax system which makes separation of price and income effects difficult, lack of a wealth measure or, more importantly a measure of accrued gains. While some of the these problems have been carefully attended to in an econometric sense in some of these studies, there remain some serious potential flaws in the data set.

[29] These studies are reviewed in Jane G. Gravelle, Can A Capital Gains Tax Cut Pay for Itself? Congressional Research Service, Library of Congress, Report 90-161 RCO, March 23, 1990.

[30] Time series studies, like micro-data studies, have flaws. Perhaps the most serious of these is the limited number of observations and limited variability in tax rates. The problems (other than individual specific effects) noted with micro-data studies also occur with time series studies. Some of those problems, such as endogeneity of the tax rate and correlation with income are much less serious, however. For example, the tax rate over time is not so closely correlated with income and wealth because there is a lot of variation in tax rates due to

of the time series regressions did not include a variable to account for accruals; one run by the Congressional Budget Office which included such a variable found an elasticity of .45, but the tax rate coefficient was not statistically significant.[31] This type of finding is suggestive of a weak response and is consistent with the results suggested in this study.

Even if time series estimates fell into the range of estimates discussed in this paper, it is not clear that they can be relied upon to produce point estimates. For example, all of the time series equations show an increase in realizations in the eighties which occurred at the same time as the change in the tax rate. But there was also an increase in accruals at the same time. Moreover, even though the overall turnover rate in the stock market increased during this period, it also increased for pension funds which did not benefit from the income tax changes. These increased turnover rates might simply reflect increased trading in a rising market, but that type of phenomenon is not included in the time series modeling of capital gains realizations.

It also seems quite possible that these times series estimates may be picking up a short run, rather than a long, run response. Indeed, what these studies may be suggesting is that the short run response, often argued to be quite large, may be modest as well.

In sum, the time series estimates do not seem to be too far out of the range of the possible estimates and there are reasons to expect these estimates to overstate the permanent elasticity. Thus, on the whole, these econometric results are relatively consistent with the results obtained from the data on realizations and accruals.

CONCLUSION

Since econometric evidence cannot be relied upon to estimate the realizations response with precision, this study has presented an alternative way of assessing the likely range of realizations elasticities. Such estimates necessarily depend on the accuracy of the estimation of accruals, realizations, taxes, and the assumption of a reasonable functional form. These boundaries

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policy changes. Similar, endogeneity of the tax rate is less of a problem, because the tax rate varies due to policy. Wealth and accruals can be directly measured, although it may be difficult to obtain precise measures. Time series estimates, however, also have some problems due to the need to aggregate individuals and tax rates which do not occur with micro-data studies.

[31] Congressional Budget Office. How Capital Gains Tax Rates Affect Revenues: The Historical Evidence. March 1988.

do suggest that the responses assumed in current revenue estimates both by the Administration and in the Congress are overstated. That, in turn, suggests that a capital gains tax cut could lose a considerably more revenue than projected by the JCT.

APPENDIX I: SENSITIVITY ANALYSIS

The estimates are, of course, dependent on the accuracy of the estimation of accruals, realizations, taxes, and the assumed functional form.

Aside from general errors in measurement which can affect the realizations to accruals ratio, there are several specific issues that are difficult to resolve. Our capital gains series includes unreported, but realized, gains which account for about ten percent of gains, due to non-compliance. If these unreported gains reflect an attempt to avoid the capital gains tax and if such behavior is responsive to lower tax rates, then additional gains might be realized from this source and the realizations to accruals ratio might be overstated. If unreported gains are from returns which are generally failing to report income, because activities are in the underground economy, then such a response is unlikely. And if gains are unreported because of inadvertent overlooking of transactions, potential gains to be realized may be smaller.

Accounting for depreciation is also difficult, not only because of the imprecision of measurement, but also because some depreciation is recaptured and reported as ordinary income, causing the realized gains relative to accruals to be understated.

Our measure of transactions costs is also only a rough measure, particularly in the case of real estate. It seems most likely that the measure of transactions costs is understated, largely because it does not account for the value of time and direct outlays on the part of the seller. We also do not account for transactions costs to the buyer of purchasing financial assets, which increase basis and reduce capital gains in the future. Errors can also occur in the measurement of the capital gains tax rate, although large errors in this measure seem unlikely.

To test the results for the sensitivity of measurement, we consider the implied elasticities when each of these measures is varied by twenty percent in either direction. Rather than repeat the entire range of s* values, we report two central values. The first is the elasticity assuming that one half of currently unrealized gains would be realized in the absence of taxes. The second is the midpoint of the range of elasticities. (Doubling this latter value will provide the feasible upper limit.)

Another issue has to do with the functional form of the equation, which was a semi-log form. (This functional form is explained in Appendix II). This form is used for revenue estimating purposes by both the JCT and the Treasury, and is probably the most commonly used functional form in the econometric literature. In this type of equation, the elasticity rises proportionally with the tax rate.

An alternative functional form which has been used recently is the constant elasticity with respect to after tax shares equation. One characteristic of this form is that realizations become zero when the tax rate becomes 100 percent. (In the semi-log form, realizations with a 100 percent tax are about 6 percent of accruals, with an s* of 1). It is not necessarily to be expected, however, that realizations would cease entirely when the tax rate on gains becomes 100 percent. For many types of assets, capital gains are only a small part of the return (real assets earn most of their return in rents). Realizations could continue to occur as long as the tax did not exceed sales price and gain is typically only about a third of the sales price. Nevertheless, this functional form has the advantage of anchoring the function to a low realizations response when tax rates become very large, even when s* is assumed to be relatively low.

Table A-1 reports the results from varying the three basic measures, and from the alternative functional form. None of these changes have large effects on the elasticity and none permit an upper limit elasticity above one. One can, by combining all conditions favorable to a high elasticity (lowering the realizations to accruals rate and all tax rates by twenty percent, choosing the alternative functional form, and assuming that every asset would be sold constantly in the absence of taxes) obtain an elasticity of -1.08. But such an elasticity is not reasonable, in part because an error of this magnitude in the income tax rate is highly unlikely, but more importantly because the upper limit is not a plausible elasticity.

There are other functional forms which can be used, and indeed have been used in the past. For example, many early econometric studies used a linear form, although this form has largely been abandoned. With a linear form, the upper limit of the elasticity is -.91, considerably above the -.53 upper limit reported in Table 1 and above the -.66 with the constant after tax shares functional form. But such a functional form implies that realizations would disappear entirely at a capital gains tax rate of about 45 percent. Indeed, the implausibility of the realizations response as tax rates rose was one of the criticisms of the earlier Feldstein, Slemrod, and Yitzhaki study which found such a high elasticity with this functional form. The linear form could be calibrated to produce zero realizations when the tax rate is 100 percent; that would require an s* of less than 1 and would produce an elasticity of -.28.[32]

One response to the criticisms of the feasibility of the high elasticities found in some of the micro-data studies is that these elasticities are only local approximations within the range of tax rates studied. That is, the response could be very large in this range, but could have a different pattern at very low (or very high) tax rates. Yet, even if we permit such an assumption to explain the incompatibility of these results with the feasible amount of realizations, these studies would produce implausible results within the range of tax rates

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[32] We do not consider the functional form using a constant elasticity with respect to the tax rate itself, which does not appear to be a reasonable form, since realizations become very large at low tax rates and are undefined at a tax rate of zero.

Table A1: Realizations Elasticities: Variations in Assumptions

	Elasticity at Midpoint of Potential Increased Gains	Elasticity at Midpoint of Range
Base Case	-0.32	-0.27
Level of s:		
20% higher	-0.23	-0.20
20% lower	-0.42	-0.34
Level of c:		
20% higher	-0.29	-0.24
20% lower	-0.35	-0.29
Level of historical t:		
20% higher	-0.28	-0.24
20% lower	-0.35	-0.30
Constant Elastic Shares Functional Form	-0.39	-0.33

Source: Congressional Research Service. The elasticity is evaluated at a .2184 percent tax rate.

studied. For example, assuming the semi-log form, to assume an elasticity of 3.8 would imply that realizations would fall by over 90 percent as a result of the increased tax rates in the Tax Reform Act. Or, alternatively, these results imply that if we were to return to the lower tax rates which prevailed in 1986, realizations would increase by a factor of ten. This range of tax rates clearly appeared in the micro-data files, but we have obviously seen nothing of this magnitude of response in the observed level of realizations. The more likely explanation of these results is simply that the data are too flawed to permit a reasonable estimation of the elasticity.

APPENDIX II: DERIVATION OF THE RESULTS

Part I. Derivation of Elasticities

The semi-log estimating equation used to calculate the feedback effect of a capital gains tax cut is of the form:

(A1) $R = Be^{-bk}$

where R is the amount of realizations, B and b are constant terms, and k is the sum of transactions costs and capital gains taxes, and e is the base of the natural logarithm.

We can also write the current realizations as a fraction of accruals:

(A2) $R = sA$

where s is the ratio of realizations to accruals (s is endogenous) and A is accruals.

Finally, we define s* as the ratio of realizations to accruals when the tax rate is set to zero:

(A3) $s^*A = B$

By combining these equations we obtain:

(A4) $(s/s^*) = e^{-bk}$

By taking the natural logarithm of both sides, this formula can be used to solve for the constant b:

(A5) $$b = \frac{\ln(s/s^*)}{k}$$

We can also write k as:

(A6) $k = c + t(1- c)$

where c is transactions costs and t is the capital gains tax rate. For purposes of finding the fixed value of b, we use the historical tax rate, .184. Thus, given a value of c of .116, k is set to .2787. The value of s is set to .4646, and the value of s* ranges from .4646 to 1.

It is now possible to determine the point elasticity of changing the income tax rate at any tax rate, t, since:

(A7) $R = Be^{b(c+t(1-c)}$

and the differential of that equation with respect to t is:

(A8) $dR/R = b(1-c)dt$

And, therefore, the elasticity (the percentage change in R divided by a percentage change in t) for a small change is:

(A9) $E = b(1-c)t$

A similar method can be used for other functional forms. For example, we would rewrite equation (A1) in the following form for the constant elasticity with respect to after tax shares which is considered in the sensitivity analysis in Appendix I:

(A10) $R = B(1-k)^b$

And the linear form would be:

(A11) $R = B-bk$

II. Derivation of Realizations Response Arising From More Frequent Sales of Assets Already Sold

If all assets were sold, the realizations response would involve speeding up the realizations of gains. This phenomenon would lead to a permanently higher level of realizations, but its magnitude is determined by the original holding period and appreciation rate. We employ a relatively simple model of this process, which assumes that assets are held for a certain number of years and then sold.

To illustrate the derivation of this relationship, consider a simple annual case where every asset is sold at the end of the year. If the asset appreciates at rate r, then the asset's value per original dollar of cost at the end of the year will be (1+r). Gain, which is equal to sales price less original cost, is equal to (1+r) -1, or r. Accruals will also be equal to r. In that case, the ratio of realizations to accruals will be one.

Suppose, however, that an asset is sold only at the end of two years. An asset purchased two years ago will have a value of $(1+r)^2$ and gain will be $(1+r)^2-1$. The accruals will be equal to the rate of return on the asset being sold whose value at the beginning of the year is (1+r), plus the return on the asset purchased only at the beginning of this year, whose value is also equal to (1+r).

Thus the ratio of realizations to accruals is $((1+r)^2-1)(2r(1+r)$. If assets are sold only every three years, the ratio will be $((1+r)^3-1)(3r(1+r)^2$.

Since assets tend to be sold all during the year, we wish to convert this formula to continuous time and express it in general form:

(A12) $(e^{rT}-1)/(rTe^{rT})$

where T is the holding period. Note that as T infinitely large, the value in A10 approaches zero; when T approaches zero the value in A10 approaches 1.

Note that the value $(e^{rT}-1)/(e^{rT})$ is the ratio of gain to sales price which SOI data indicates is approximately. 35.[33] Thus, if we know this ratio, we can then determine the value of rT, since rT equals the negative of the natural logarithm of the ratio of basis to sales price. Based on this ratio, the value of rT is .43 and the value of (A12) is .813. This number implies in turn that these assets already sold account for 57 percent of accruals, and evaluating the elasticity as s* equals .57 yields a result of -.14.

Part III. Interpreting the Econometric Studies

Equation A(9) can be used to interpret the elasticity of the Gillingham, Greenlees, and Zeischang study. Since the regressions were run without accounting for transactions taxes, an elasticity of 3.8 implies that b(1-c) is equal to 3.8/t, where t can be taken as the mean tax rate in the study. Since the authors do not report this number, we assume it is the same as the other Treasury study covering about the same time period, .178. Thus, b(1-c) is equal to -21.34, and b is equal to -24.15 with c set at .116. To determine the ratio of realizations to accruals implied by this elasticity, we use:

(A11) $s = e^{(-24.15*(.116+(1-.116)*.184))}$

which produces a value of.001195, as the maximum ratio of realizations to accruals possible. In 1989, realizations were estimated at $189 billion. Even ignoring the higher tax rate which occurred with these realizations, this measure indicates that s equals at most .001195, or well under one percent of accruals. Our data, of course, indicated this value was about 46 percent. While the realizations to accruals data indicate that capital gains can do no more than double, in this case realizations would increase by 837 times (1/.001195) if taxes and transfer costs were eliminated. Thus, this equation would predict realizations to rise to $158 trillion, or over thirty times the level of GNP.

A similar approach is used to measure the effects of the Auten, Burman, and Randolph study which used the constant elasticity with respect to after tax shares.

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[33] This ratio is calculated from data presented by Dan Holik, Susan Hostetter, and John Labate, 1985 Sales of Capital Assets, August 1989.