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Why Lowering Capital Gains Taxes can Induce Divestment and the Consumption of Capital

Jesse T Richman, Old Dominion University
Howard B Richman
Raymond L Richman, University of Pittsburgh

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Why Lowering Capital Gains Taxes can Induce Divestment and the Consumption of Capital

Jesse T. Richman  
Department of Political Science  
Old Dominion University  
jrichman@odu.edu

Howard B. Richman  
Ideal Taxes Association  
howard@idealtaxes.com

Raymond L. Richman  
Graduate School of Public and International Affairs  
University of Pittsburgh  
richmanpitt@aol.com

Abstract

Although intuition would suggest that lower taxes on capital gains will encourage investment, there are circumstances in which lowering the capital gains tax rate relative to rates on other income has precisely the opposite effect by creating perverse incentives for socially non-optimal divestment and consumption of capital. We study an experiment designed to compare the consequences of three capital gains taxation treatments with respect to individual income and government revenue in just such a context. The alternatives are (1) taxing capital gains when they are realized but at a lower rate; (2) not taxing capital gains at all; and (3) taxing capital gains when they are consumed at the same rate as ordinary income. We examine circumstances in which investors have an incentive to consume their capital, and show that not taxing consumed capital gains can provide a tax incentive to consume future income (capital gains) in the present while producing lower overall social welfare. (JEL H24)

Address correspondence to Dr. Jesse T. Richman, Department of Political Science, Old Dominion University, BAL 7000, Norfolk VA, 23529 757-683-3853, jrichman@odu.edu.
The top capital gains tax rate will be reduced by 25 percent, which will encourage more investment and risk-taking, and that will help in job creation.

- George W Bush (White House, 2003)

Barack Obama and Joe Biden believe that we need to ...eliminate all capital gains taxes on small and start-up businesses to encourage innovation and job creation.

- Barack Obama (Obama Biden 2008)

The belief that low capital gains taxes encourage investment, risk taking, and job creation is well entrenched in the U.S. political system, with presidents and presidential candidates often claiming that capital gains tax cuts will spur economic growth. And in some circumstances the claim may well be accurate. However, there are other circumstances in which it is not. This paper examines how lowering the capital gains tax rate can induce divestment and the destruction of capital.

Some economists are skeptical of the sweeping benefits sometimes claimed for capital gains tax cuts, arguing that lowering capital gains taxes has failed to spur investment (Lee 1995), and that reduced capital gains tax rates are unlikely to increase national saving or investment (Burman 1999, p. 66). Instead of the surge in investment George W. Bush predicted when he cut capital gains tax rates in 2003, the United States entered a period of extraordinarily low savings rates. From 2004 through 2007, America’s 500 largest corporations earned $2,505 billion and redistributed all but $84 billion to investors through $1,578 billion in buybacks and $853 billion in dividends. The risk-taking Bush sought to incentivize did materialize, however: risks incurred by firms that depleted reserves in order to generate “capital gains” through stock buybacks may have helped destabilize the financial system.¹

We focus on circumstances in which low capital gains tax rates (relative to taxes on capital income) lead to less investment, less risk taking, and more consumption of capital. At a theoretical level, some economists have long argued that low capital gains tax rates are inappropriate when the capital gain is consumed as ordinary income (Smith 1968) and there is a long debate concerning whether consumed capital gains in particular deserve low rates (Johnson 2009). We find empirical evidence to substantiate the argument that low taxes on consumed gains can leave less rather than more capital available for investment. Given the tendency for presidents (and perhaps their economic advisors) to assert that cutting capital gains tax rates will spur investment, and job creation, the conditions highlighted in this study provide a useful and economically significant corrective.

The purpose of this study is to experimentally investigate conditions that can lead to the consumption of capital and to examine whether alternative capital gains taxation treatments encourage or discourage that consumption. Several previous studies have used similar techniques in order to analyze investor decision making behavior.

Vernon L. Smith and his colleagues (Smith, Suchanek & Williams, 1988; Caginalp, Porter & Smith, 2000) produced asset bubbles in the laboratory during experiments where subjects bought and sold shares of stock whose average return, and thus fundamental value, could be directly calculated. These laboratory-produced bubbles proved to be robust under a wide-variety of experimental conditions so long as subjects have not participated in previous experimental sessions involving bubbles, and they can
be accounted for by some behavioral models of investor decision making (e.g. Caginalp, Porter and Smith 2000).

A few experimental studies have examined investor response to tax conditions. Lei, Noussair, and Plott (2002) found, in a working paper, that the bubbles occurred in two of the three experimental runs with a 50 percent capital gains tax on realized gains. In another study, Meade (1990) compared five tax treatments (1) accrual, (2) realization at normal rates, (3) realization at reduced rates, (4) rollover, and (5) a compromise between realization and accrual (realization with interest payments charged on capital that is kept invested). Mead’s subjects were 65 experienced investors. Each participated in a computerized investment game in which subjects allocated points between a locked-in investment and a new risky investment. The different tax treatments were simulated by the way management fees were assessed in the game. Each subject played all conditions (5 conditions with two tax rates). She found:

1. Taxing capital gains at realization (she called this “deferral”) locks-in capital and prevents it from being made available to risky investments.
2. Lowering capital gains tax rates mitigates the lock-in effect for the realization treatment and results in more capital being made available to risky investments.
3. Both the accrual and the rollover tax treatments reduce the lock-in effect as compared to the realization method.
4. The rollover tax treatment reduced the lock-in effect more than the other treatments and also made capital more readily available to risky investments.

Meade had hypothesized that the rollover tax treatment would be superior to all of the other treatments for making capital available to risky investments, and her results supported those expectations.

**Capital Gains Taxation**

Under rational expectations, capital value is present discounted value of the future income expected by the investor from his ownership of the asset, i.e.:

\[
\text{Capital value} = C_0 + Y_1/(1 + r)^1 + \ldots + Y_n / (1 + r)^n \tag{1}
\]

In Equation 1, \(C_0\) is a constant representing that part of value which is irrespective of the income stream, \(Y_1\) is the expected profit the year following the purchase of the asset, \(Y_n\) is the expected return in future years, and \(r\) is the discount factor representing what the market considers an adequate reward for interest and risk. The value of capital or property according to this equation is largely the capitalized or discounted value of its expected returns.

A capital gain or loss is the change in the capital value of an asset due to a change in its expected future income stream. The change must be unexpected, because future earnings that are expected are discounted in Equation 1. The value of a capital gain therefore is the present discounted value of all unexpected changes in income:

\[
\text{Capital gain} = dY_1/(1 + r)^1 + \ldots + dY_n / (1 + r)^n \tag{2}
\]

Thus \(dY_1\) is the unexpected increase in the expected return in the first year and \(dY_n\), the unexpected increase in expected returns in year \(n\). (A capital loss similarly is the capitalized or discounted value of an unexpected decrease in expected returns.)² The example below illustrates this concept.
Suppose an investor buys an existing business for $100,000, the price based on an expected average return of $10,000 per year. As a result of superior management decisions or happenstance, he or she achieves a return of $15,000 during the first year, which is expected to continue. As a result, the value of his or her business increases, say, to $150,000 at the beginning of the second year. He or she has an accrued gain of $50,000, the present value of the $5,000 increase in annual return.

At this point the investor can choose whether to sell the business and consume the capital gain, sell the business and reinvest the capital gain, or continue with the present investment. How the investor behaves is likely to be influenced by the tax treatment accorded to the capital gain. The three tax treatments we examine diverge at this point. The question is whether any of the capital gains in the example above are taxable income, and in what circumstances.

**Zero Capital Gains Tax Treatment: Capital Gains Are Never Income**

In the definition of income used by the Bureau of Economic Analysis in the National Income and Product Accounts, capital gains are not considered to be income. Robert E. Hall and Alvin Rabushka (1983, 2007), advocates of the “Flat Tax,” popularized the notion that capital gains should not be taxed. In their system, personal taxpayers would pay no capital gains tax on sales of stocks, bonds or homes. In their 2007 book about the Flat Tax, they wrote:

> The market value of the stock is the capitalization of its future earnings. Because the owners of the stock will receive their earnings after the corporation has paid the business tax, the market capitalizes after-tax earnings. A capital gain occurs when the market perceives that prospects for after-tax earnings have risen. When the higher earnings materialize in the future, they will be correspondingly taxed. In a system like the current one, with both an income tax and a capital gains tax, there is double taxation. (p. 111-112)

Unfortunately, reducing or eliminating taxes on capital gains creates a perverse tax loophole when the capital gain is consumed and the future income it represents is therefore never realized.

Suppose that the investor in our example, whose business grew in value from $100,000 to $150,000, sells the business to another investor for $150,000, and consumes the $50,000 capital gain tax free. If both investors were previously earning a ten percent return on their investments and paying income taxes at a 25 percent rate, then expected government tax revenue per year from income taxation before the sale and consumption of the gain would be $7,500. After the sale and consumption of the gain, however, government revenue would be only $6,250.

By consuming the capital gain, our hypothetical investor has created a situation in which the additional income reflected in the capital gain never occurred. No tax was paid on this income, and no tax will ever be paid. Because the expected income was realized in advance and consumed, the flat tax will not tax it at all. Because this creates a tax
incentive to consume expected income in advance, reducing capital gains taxes can produce an incentive to consume capital.

**Accrual Treatment: All Capital Gains Are Income**

The Haig-Simons definition of income (Simons, 1938) includes the capital gain or loss in the annual calculation of income. According to this definition, personal income is the amount a person can consume during a period of time without being worse off at the end of the period than he was at the beginning. R. M. Haig wrote in 1921 (as quoted by Simons, 1938, p. 61), “Income is the money value of the net accretion to one’s economic power between two points in time.”

As a result of the difficulties inherent with implementing a pure accrual regime, Simons (1938, p. 47) advocated that accrued capital gains only be taxed when they are realized. He claimed that realization is “indispensable to a feasible income-tax system.” But taxing accrued gains when they are realized results in a tax upon capital whenever realized gains are reinvested, and this tax may either discouragement reinvestment (the lock in effect) or discourage investment to begin with:

Suppose that the investor of our example plans to reinvest his or her capital gain. He or she sells the business for $150,000 resulting in a realized gain of $50,000. If the realized gain were to be taxed at a 25 percent rate, the investor would have $137,500 to reinvest. Since the purchaser of the asset invested $150,000, $12,500 of financial capital has disappeared into the government’s hands as a $12,500 tax upon capital not income.

With some notable exceptions (e.g., retirement accounts and home sales), the U.S. tax code is based upon the accrual method of taxation, though accrual is only taxed when it is realized. For much of recent U.S. history, however, taxes on capital gains have been lower than taxes on other income, so our accrual taxation condition mirrors that policy.

**Rollover Treatment: Only Consumed Capital Gains are Present Income**

The rollover treatment of capital gains (Clark 1958, 1959; Richman et al., 2008) only views, capital gains as income when their owner decides to consume the capital instead of continuing to invest it. Richman (1957) argued that if capital gains are only taxed when they are consumed, changes in capital gains tax rates do not affect the income stream and, thus, do not affect the fundamental value of assets or the decision of whether or not to invest in new assets. When the capital gain is realized and consumed it is no longer part of any future stream of income. It has become present income and should be taxed at prevailing rates. Capital gains that are not consumed remain capital and should not be taxed as income. This “rollover” treatment thus avoids both taxation of capital and under-taxation of consumed gains.

The “rollover” treatment for portfolio income was most precisely specified by Reuben Clark (1958, 1959). At the end of the year, the deferred capital gain from all of the sales would be proportionally attached to all of the stock purchases of that year. There would be no tax liability so long as the purchases that year equaled or exceeded the sales. The entire capital gain would be liable to taxation if there were sales, but no purchases. Partial reinvestment would result in partial taxation. The rollover treatment was also implemented for home sales in the United States from 1951 through 1997.
Some may note the similarity between the rollover treatment for capital gains and the treatments of capital gains provided by traditional IRAs and by consumption taxes, such as cash-flow, value-added or sales taxes. The difference is that under a consumption tax, invested income is left untaxed and all capital is taxed when consumed, not just the capital gain part of the consumed capital. Consumption taxes aim for equal taxation of all consumption whereas the rollover treatment aims for equal taxation of all income by avoiding the double-taxation of reinvested capital gains in the accrual treatment and the non-taxation of consumed capital gains in the no capital gains tax treatment.

Method

We conducted two separate experimental runs, each involving a different group of students who were compensated through class credit proportional to their total net worth (consumption plus asset value) at the end of the experiment. The runs were played over the internet by introductory-level economics students. In these experimental runs we examined a situation in which: (1) investment returns (i.e., interest rates) were lower than individual discount rates, (2) there was no new money flowing into the system, (3) most investments had substantial unrealized accrued capital gains associated with them, and (4) dividend income was taxed at a 25% rate. Within this situation, we compared the three different capital gains tax treatments summarized in Table I and described above. (Insert Table I about here)

We hypothesized the following:
1. The No Capital Gains Tax Treatment would lead to the greatest consumption of capital because it provides the strongest tax advantages for present consumption of capital.
2. The Rollover Treatment would lead to the least consumption of capital because investors would have a greater incentive to reinvest capital.
3. The Taxing Accrual at Realization Treatment would lead to the greatest lock-in effect because investors would have to pay capital gains tax whenever they shifted their capital from one investment to another.
4. The No Tax Treatment would lead to the lowest total taxes paid because no capital gains tax would be collected and dividend income would be reduced due to the consumption of capital.
5. The No Tax Treatment would lead to the lowest total social value (asset value, plus consumption, plus taxes paid) because it would create non-optimal incentives for the consumption of capital (see Appendix 2 for logical proof).

Subjects

   The subjects of the first run were the 29 students and one former student (a relative of the authors who was not informed about the hypotheses) in an introductory level macroeconomics class during the 2008-2009 school year. The subjects of the second run were 44 students in the same class during the 2010-2011 school year. Subjects were randomly assigned to the three treatments. Subjects received class credit in proportion to their net worth (including consumption) at the end of the game.
Task

First the subjects read the game rules and answered short-answer questions to assess comprehension. After a practice game to further familiarize subjects with the mechanics of buying and selling stocks, the experiment occurred over a two week period. Each weekday for nine days subjects made moves.

Each move, subjects decided whether to make any of the following changes in their investment position.

1. Consumption. Subjects were told that this was a “savings” account. Their net worth (and final payout) would include the total amount they consumed, including all dividends from their mutual funds and stocks and any consumption transfers from their investments. The interest on consumption was 10% income tax free, compounded each turn, corresponding to a personal discount rate that prefers current consumption to future consumption. This was better than the post tax income they could earn after taxes from their mutual fund (9%). Once consumed, money could not be reinvested.

2. Buy/Sell Mutual Fund. Subjects were told that their net worth would include the value of their mutual fund. Unlike stocks, their mutual fund is a very safe investment. Unless they took money out or put money in, its value would not change. The mutual fund would pay 12% dividends, which was 9% percent after taxes. (Income taxes were 25%). They could sell shares and consume the proceeds, or use them to buy stock. When they sold stock they could choose to put the proceeds into their mutual fund or put them into savings. Asset sales were potentially subject to capital gains taxation, depending upon the tax condition.

3. Buy/Sell Stock. Subjects were told that their net worth would include the value of their stocks. Normally, the price (in terms of price/dividend ratio) would be set by the game’s stock market, but at the end of the game, each stock would be valued at exactly 25 times dividend. At the beginning of the game, they owned 10 different growth stocks, each paying $40 in dividends. On average those dividends will go up by about 5.8% per turn, but there was considerable variability. During the game, they could buy or sell stock by placing "asks" or "bids". A "bid" was an offer to buy a stock at that price or less. An "ask" was an offer to sell a stock at that price or more. Each night, the computer compared bids and asks and set the price for stock at the equilibrium price so that there would be maximum sales without anyone paying more than they bid or anyone receiving less than their "ask".

Stocks were a risky investment. They were sold according to their price/dividend ratio. That ratio would change randomly according to the following schedule:

- 1% chance of a drop to 5% of its former value.
- 50% chance of a drop to 75% of its former value
- 5% chance of no change
- 11% chance that it would rise by 25%
- 33% chance that it would rise by 50%

All stocks shared the same price in terms of their price per dividend received.

Thus if the dividend of a stock fell, its price and value fell.
Results

The overall results of the experiments are shown in average investment positions at the end of the game in Table II. The no tax group had a lower total net worth than the rollover group in both experimental runs (p<.05). This reflects higher consumption and less investment in stocks, which would have provided a higher return.

(Insert Table II about here)

Consumption of Investments

In this experiment, the No Capital Gains Tax group paid no penalty when they sold their mutual funds or stocks and consumed the proceeds, while the Accrual Taxed at Realization group paid a 15% penalty on the capital gains portion of their consumption and the Rollover group paid a 25% penalty on the capital gains portion of their consumption whenever they consumed their capital. The difference in final net worth between groups was largely due to the fact that many subjects in the No Capital Gains Tax condition consumed their capital stock. They did so because their discount rate for consumption was 10% and the post-tax rate of return for mutual funds was just 9%. Because the total return (including taxes) of the mutual fund was 12 percent, consumption also made society as a whole worse off.

Written protocols made clear that they were paying attention to this difference. For example, one student in the No Capital Gains Tax group wrote: “My theory is that the average increase in stock isn’t worth the risk and that the 10% in savings is worth the slower pace.” Another wrote: “I am selling these stocks and putting them in my savings account now so they will earn more throughout the game on the interest that I get for keeping that money in the savings account [SIC].”

Students in the other treatments were less inclined to do this because of the substantial capital gains tax penalty that they would pay if they sold their investments and consumed the proceeds. One student in the Accrual Taxed at Realization group wrote: “Found out that I lost 431 for putting money in savings. This round I will not put in money in savings yet.” Similarly a student in the Rollover group wrote: “I want to base my strategy on not putting much money into my savings [SIC] account since it will be taxed, and instead focus on collecting stock.” The rollover condition placed the highest penalty on consumption of investments, and investors in this condition consumed significantly less than those in the other tax groups.

(Insert Table III about here.)

Lock in Effect

Table IV examines stock purchases by each treatment group. Contrary to expectation, we found no evidence that a lock-in effect discouraged stock purchases under the Accrual as Realized condition. During the second run, the Accrual as Realized group was the most willing to buy risky investments. During the first run the Rollover group was the most willing. In both cases, however, there were no statistically significant differences between groups. Apparently the context of this experiment was
one in which the lock-in effect did not play a substantial role in investor decision-making. Quite possibly a higher capital gains tax rate in the Accrual as Realized Treatment would have created more lock-in.

(Insert Table IV about here)

Tax Revenue

Table V summarizes tax revenue in each experimental treatment. The no tax treatment was associated with significantly lower revenue than the other treatments, but revenue in the other two tax treatments did not differ substantially. Completely eliminating the capital gains tax altogether, as in the No Capital Gains Tax Treatment, eliminates all capital gains tax revenue and encourages consumption of capital that reduces subsequent capital income. The Rollover Treatment causes investors to keep their capital invested, resulting in additional income tax revenue that offsets the decrease in capital gains tax revenue.

(Insert Table V about here.)

Total Social Welfare

As a rough measure of total social welfare we sum investor total net worth and taxes paid. The resulting totals suggest that the no tax treatment produces lower social welfare than the rollover treatment. Table VI shows that in both runs total social welfare was lowest under the no tax condition, with a significant overall difference between the no tax and rollover groups (t=2.17, p < .035 pooled).

(Insert Table VI about here.)

IV. Conclusion

As we hypothesized, we found that not taxing capital gains encouraged investors to consume future income in the present instead of leaving it invested. By not taxing the consumption of capital, the No Capital Gains Tax Treatment led to a significantly lower asset value held by investors by the end of the experiment. Rather than encouraging investment, it appears to have encouraged divestment. Investors in the rollover condition, by contrast, consumed the least capital, and had the largest net asset totals at the end of the experiment. Total social welfare also suffered in the no-tax group with the combination of consumption, asset value, and tax revenue significantly lower for this group than for the others. Four of our five hypotheses were supported:

1. The No Capital Gains Tax Treatment led to the greatest consumption of capital because it gave investors an incentive to consume their capital.
2. The Rollover Treatment led to the least consumption of capital because investors would have a greater incentive to reinvest capital.
3. The No Tax Treatment led to the lowest total taxes paid because no capital gains tax was collected and dividend income was reduced due to the consumption of capital.
4. The No Tax Treatment led to the lowest total social welfare because investors consumed more of their capital, leaving less available for investment and taxation.
One of our hypotheses was not supported. We did not find that the *Taxing Accrual at Realization* condition led to a greater lock-in effect than the other treatments. This may reflect the reduced lock-in effect resulting from the preferential tax rate we offered investors in this treatment.

Our findings only imply that investors will non-optimally consume their capital when: (1) investment returns after taxes are lower than individual discount rates, (2) there is no new money flowing into the system,\(^4\) (3) most investments have a substantial unrealized accrued capital gain associated with them, and (4) capital income is taxed at a rate higher than the capital gains tax rate.

Our analysis shows that sometimes lowering capital gains tax rates will not induce investment because doing so gives investors an incentive to consume their capital. In contrast, the rollover condition avoids the taxation of reinvested capital without providing a perverse incentive for investors to consume their capital. In the specific conditions of this experiment, not only did the *No Capital Gains Tax Group* consume more capital, but it also earned less income and paid less tax revenue. Clearly low capital gains tax rates are not the investment incentive some politicians wish they were.
References


<table>
<thead>
<tr>
<th>Tax Treatment</th>
<th>Tax on Dividend Income</th>
<th>Tax on Capital Gain if Capital Reinvested</th>
<th>Tax on Capital Gain if Capital Consumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accrual Tax when Realized.</td>
<td>25%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>No Capital Gains Tax</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Rollover Treatment</td>
<td>25%</td>
<td>0%</td>
<td>25%</td>
</tr>
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</table>
Table II
Investment Position at the End of the Experiment

<table>
<thead>
<tr>
<th>Mean Value</th>
<th>Investment Position – Run 1</th>
<th>Investment Position – Run 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Capital Gains Tax Treatment</td>
<td>Accrual Taxed when Realized Treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>24,777</td>
<td>20,628</td>
</tr>
<tr>
<td>Mutual Fund Balance</td>
<td>3,119</td>
<td>5,691</td>
</tr>
<tr>
<td>Stock Value</td>
<td>12,525</td>
<td>15,744</td>
</tr>
<tr>
<td>Total Net Worth</td>
<td>40,422</td>
<td>42,063</td>
</tr>
<tr>
<td>T-statistic for stock and mutual fund portfolio value (difference from no-tax group)</td>
<td>1.32</td>
<td>2.08*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investment Position – Run 2</td>
<td>Investment Position – Run 2</td>
</tr>
<tr>
<td></td>
<td>No Capital Gains Tax Treatment</td>
<td>Accrual Taxed when Realized Treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>22,005</td>
<td>21,373</td>
</tr>
<tr>
<td>Mutual Fund Balance</td>
<td>6,749</td>
<td>5,282</td>
</tr>
<tr>
<td>Stock Value</td>
<td>10,447</td>
<td>18,121</td>
</tr>
<tr>
<td>Total Net Worth</td>
<td>39,201</td>
<td>44,777</td>
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<tr>
<td>T-statistic for stock and mutual fund portfolio value (difference from no-tax group)</td>
<td>1.50+</td>
<td>3.43*</td>
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</table>

* p<0.05
Table III
Extent to which the Participants Consumed their Investments

<table>
<thead>
<tr>
<th>Mean Value</th>
<th>No Capital Gains Tax Treatment</th>
<th>Accrual Taxed when Realized Treatment</th>
<th>Rollover Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Mutual Funds</td>
<td>2,672</td>
<td>2,561</td>
<td>240</td>
</tr>
<tr>
<td>From Sale of Stock</td>
<td>1,122</td>
<td>1,097</td>
<td>209</td>
</tr>
<tr>
<td>Total Consumption of Investments</td>
<td>3,795</td>
<td>3,658</td>
<td>449</td>
</tr>
<tr>
<td>t-statistic (difference from accrual taxed when realized treatment.)</td>
<td>0.08</td>
<td></td>
<td>-2.26*</td>
</tr>
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</table>

Consumed Investments Run 2

<table>
<thead>
<tr>
<th>Mean Value</th>
<th>No Capital Gains Tax Treatment</th>
<th>Accrual Taxed when Realized Treatment</th>
<th>Rollover Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Mutual Funds</td>
<td>214</td>
<td>820</td>
<td>0</td>
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<tr>
<td>From Sale of Stock</td>
<td>1,001</td>
<td>1,124</td>
<td>0</td>
</tr>
<tr>
<td>Total Consumption of Investments</td>
<td>1,215</td>
<td>1,944</td>
<td>0</td>
</tr>
<tr>
<td>t-statistic (difference from accrual taxed when realized treatment.)</td>
<td>-0.69</td>
<td></td>
<td>-2.47*</td>
</tr>
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* p<0.05
Table IV
Extent of Stock Purchases

<table>
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<tr>
<th>Mean Value</th>
<th>No Capital Gains Tax Treatment</th>
<th>Accrual Taxed when Realized Treatment</th>
<th>Rollover Treatment</th>
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</thead>
<tbody>
<tr>
<td>Stock Purchases</td>
<td>1465.4</td>
<td>1501.34</td>
<td>2451.91</td>
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<tr>
<td>t-stat (difference from accrual when realized group.)</td>
<td>-0.05</td>
<td></td>
<td>0.95</td>
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<table>
<thead>
<tr>
<th>Mean Value</th>
<th>No Capital Gains Tax Treatment</th>
<th>Accrual Taxed when Realized Treatment</th>
<th>Rollover Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock Purchases</td>
<td>1,270</td>
<td>2,741</td>
<td>1,197</td>
</tr>
<tr>
<td>t-stat (difference from accrual as realized group.)</td>
<td>-1.40</td>
<td></td>
<td>-1.36</td>
</tr>
</tbody>
</table>
## Table V
### Tax Revenue

<table>
<thead>
<tr>
<th>Mean Value</th>
<th>No Capital Gains Tax Treatment</th>
<th>Accrual Taxed when Realized Treatment</th>
<th>Rollover Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Tax</td>
<td>2709.77</td>
<td>3397.43</td>
<td>3573.89</td>
</tr>
<tr>
<td>Capital Gains Tax</td>
<td>0</td>
<td>363.21</td>
<td>184.01</td>
</tr>
<tr>
<td>Total Tax Paid</td>
<td>2709.77</td>
<td>3760.64</td>
<td>3757.91</td>
</tr>
<tr>
<td>t-stat (difference from accrual taxed when realized group)</td>
<td>-3.10**</td>
<td>-0.02</td>
<td></td>
</tr>
</tbody>
</table>

### Taxes Paid Run 2

<table>
<thead>
<tr>
<th>Mean Value</th>
<th>No Capital Gains Tax Treatment</th>
<th>Accrual Taxed when Realized Treatment</th>
<th>Rollover Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Tax</td>
<td>3,185</td>
<td>3,405</td>
<td>3,777</td>
</tr>
<tr>
<td>Capital Gains Tax</td>
<td>0</td>
<td>447</td>
<td>0</td>
</tr>
<tr>
<td>Total Tax Paid</td>
<td>3,185</td>
<td>3,852</td>
<td>3,777</td>
</tr>
<tr>
<td>t-stat (difference from accrual taxed when realized group)</td>
<td>-2.49*</td>
<td>-0.47</td>
<td></td>
</tr>
</tbody>
</table>

* p<0.05, ** p<0.01
| Table VI  
| Total Social Welfare |
|---|---|---|
| **Taxes Paid Run 1** |  |  |
|  | No Capital Gains Tax Treatment | Accrual Taxed when Realized Treatment | Rollover Treatment |
| Consumption plus assets plus taxes paid | 42,696.67 | 47,507.07 | 46,515.14 |
| t-stat (difference from no tax group) | 0.82 | 1.32 |  |
| **Taxes Paid Run 2** |  |  |
|  | No Capital Gains Tax Treatment | Accrual Taxed when Realized Treatment | Rollover Treatment |
| Consumption plus assets plus taxes paid | 42,386.12 | 48,629.46 | 46,033.61 |
| t-stat (difference from accrual taxed when realized group) | 1.76 | 1.70 |  |
| Pooled t-statistic (both runs) | 1.96 | 2.17* |  |

* p<0.05
Appendix I

Here are the game rules as they appeared to the participants during the second run of the game. (They were edited for clarity between the first and second runs):

**Capital Gains Game**

Click here to submit your move  
Click Here to see the Current Position  
Click Here for Previous Position  

SPECIAL RULE: This game is an experiment which only works if the participants independently make their own decisions. Don't talk to anyone in the current class or in past classes about the game until after it is over.

There will be a one turn practice game followed by a nine turn game. Each day you will make one move. Each night I will turn over the game board which will produce a new game position and you'll be able to see the result of your move.

In this game, you will be an investor trying to make money. You will get points in the standings depending upon your net worth at the end of the game, 1 point for every $2000 in net worth. Thus, if your net worth at the end of the game is $30,000, you will get 15 points. If it is $60,000, you will get 30 points.

The most challenging part of the game is the stock market. This will be a market with many different stocks, but there is one very unusual aspect of this stock market. Every stock has the exact same prospects for growth as every other stock. So, instead of referring to stocks by name, you will refer to stocks by the dividend that they paid during the most recent turn.

For example, you might have a stock that paid $20 dividend last turn and another that paid $200. When you buy stocks or sell stocks you will price them in terms of the amount you are willing to pay per dollar dividend (the Price/Dividend ratio). When you offer a stock for sale or bid on a stock, you will be expressing your asking price or bidding price as the price/dividend ratio that you are willing to play. If you are willing to pay 10 times the dividend, then you would pay $200 for a stock that pays a $20 dividend and $2000 for a stock that pays a $200 dividend. The following table shows how much a stock is worth if the price/dividend ratio is 10:

<table>
<thead>
<tr>
<th>Dividend</th>
<th>Price/Dividend</th>
<th>Value of Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>10</td>
<td>$200</td>
</tr>
<tr>
<td>40</td>
<td>10</td>
<td>$400</td>
</tr>
<tr>
<td>80</td>
<td>10</td>
<td>$800</td>
</tr>
<tr>
<td>120</td>
<td>10</td>
<td>$1,200</td>
</tr>
<tr>
<td>200</td>
<td>10</td>
<td>$2,000</td>
</tr>
</tbody>
</table>

However, dividends for each stock either grow or shrink each turn. The average growth is almost 6%, but you might buy a stock that pays $40 dividend at the beginning of the turn, but by the end of the turn, it might pay 50% more ($60) or 5% of its former value ($5). When the dividend of a stock goes up, that stock immediately increases in value. When the dividend goes down, that stock immediately decreases in value. Whether a dividend goes up or down depends upon chance, according to the following table:

<table>
<thead>
<tr>
<th>Chance</th>
<th>Percent Change</th>
<th>$40 dividend would change to:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Chance</th>
<th>Percent Change</th>
<th>$40 dividend would change to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In this game, whenever the dividend of a stock goes up, the entire stock goes up, because the amount that your fellow investors are willing to pay you for a stock is a multiple of its dividend. Whenever the dividend of a stock goes down, the value of your stock goes down, and vice versa. At the end of the game, the bank will value your stock for 25 times dividend, which is the maximum amount that a stock that is growing by about 6% is worth given the rate that mutual funds pay in this game. So, be aware that stock prices will probably end up very close to 25 on the last turn!

You won't just buy and sell stocks in this game and earn dividends (which go into your savings account), but you'll also have a safe mutual fund and a safe savings account that don't jump around in value. The savings account pays 10%, compounded and tax free, while the mutual fund only pays 9% after taxes.

One of the unique aspects of the game is the way that capital gains are taxed. Depending upon your tax group, you sometimes have to pay a capital gains tax when you transfer money from one account to another. But, no matter what your tax group, you can never transfer money out of your savings account. Once in your savings account, money stays in your savings account, earning interest.

In general, your decisions in this game have to do with transferring your money between your accounts and buying and selling stock with your fellow students. Your capital gains tax liability will depend upon what you do. If you are in the "No Tax" group, you won't ever pay capital gains taxes. If you are in the "Normal" group, you will pay capital gains taxes almost every time you take money out of your savings account, money stays in your savings account, earning interest.

The following describes these accounts in more detail:

4. **Savings Account.** Your net worth includes the total amount you have in your savings account. At first you will have nothing in the account, but the amount will grow as you earn dividends from your mutual funds and your stocks. It will also increase if you sell mutual fund or stock shares and put the proceeds into this account. The interest on this account is 10% income tax free, compounded each turn, which is better than you could earn after taxes from your mutual fund (9%). The only trouble is that money in this account can't ever be taken out. Also, if you are in the "Normal" or "Rollover" tax groups, you usually pay capital gains tax when you sell mutual funds or stocks and put the proceeds in this account.

5. **Mutual Fund.** Your net worth will include the value of your mutual fund. Unlike stocks, your mutual fund is a very safe investment. Unless you take money out or put money in, its value doesn't change. Your mutual fund pays 12%, which is 9% percent after taxes. (Income taxes are
25%). You can sell shares and put the proceeds into your savings account, or use them to buy stock. When you sell stock you can put the proceeds into your mutual fund or put them into savings.

6. Stock. Your net worth will include the value of your stocks. Normally, the price (in terms of price/dividend ratio) is set by the game's stock market, but at the end of the game, each stock will be valued at exactly 25 times dividend. At the beginning of the game, you will own 10 different growth stocks, each paying $40 in dividends. On average those dividends will go up by about 5.8% per turn, but there is considerable variability. During the game, you can buy or sell stock to your fellow students by placing "asks" or "bids" when you make your moves. A "bid" is an offer to buy a stock at that price or less. An "ask" is an offer to sell a stock at that price or more. The computer will compare bids and asks and set the price for stock to maximize sales at a single price. Nobody will pay more than they bid and nobody will get less than they "ask".

Capital Gains Tax Conditions
You will be assigned to one of the three capital gains tax conditions:

1. No Tax Group. You will never pay capital gains taxes.
2. Normal Group. You will pay 15% capital gains tax whenever you sell stocks or mutual funds. (When you sell a stock for a lower price than you paid, you will get a tax credit which will count against future capital gains taxes.)
3. Rollover Group. You will not pay capital gains taxes when you move money between stocks and mutual funds (instead your capital gains tax liability will be "rolled over"), but you will pay a 25% capital gains tax whenever you put the proceeds of a sale into savings. (When you sell a stock for a lower price than you paid and put the proceeds into savings, you will get a tax credit which will count against future capital gains taxes.)

Decisions Each Turn
You don't have to make a move each turn. Basically, when you move you are changing your investment position. Here are the things that you could do if you do move:

1. Cash in Mutual Fund Shares. You can sell your mutual fund shares and put the proceeds into your savings account. Since your savings accounts pay 10% after taxes, compared to 9% for your mutual fund, this could be advantageous. But once in savings, you can no longer use the money to buy stocks. Also, if you are in the normal or rollover groups, you have to pay capital gains taxes when you transfer from your mutual fund to savings.
2. Offer to sell stocks. If you want, you can offer to sell one or more of your stocks. You would specify the following: (a) which stock or stocks you want to sell, (b) the minimum price/dividend ratio that you are asking, and (c) whether you want to put the proceeds of the sale into your mutual fund account or into your savings account. If you are in the rollover group, you only pay capital gains taxes when you transfer to savings.
3. Offer to buy stocks. If you want, you can offer to buy stocks, paying out of your mutual fund. You would specify the following: (a) the amount of dividend you want to receive, and (b) the maximum price/dividend ratio you are bidding. If you are in the normal group, you have to pay capital gains taxes when you sell mutual fund shares to buy stocks. (The rollover group only pays capital gains taxes during transfers to savings.)

Be sure to check out the response from the Internet right after you make a move. If you don't like what you read, you can redo your move at any time until the game board is advanced at 9pm. The response could give you very helpful information, for example:
- If your ask is lower than your bid, the computer will cancel your ask.
- If you don't have enough money in your mutual fund to pay for your bid then the computer will cancel your bid.
- If you are in one of the two conditions that pay capital gains taxes, the computer will tell you what the capital gains tax consequences would be of your move.

One more thing. Each move, you will be asked to write down why you decided to do what you did. I plan to write an economics paper about the results of this game. Your comments could help me figure out what you were thinking when you made your move. I'll explain everything at the end, and tell you the results.
Appendix 2. Tax Conditions for the non-Optimal Consumption of Capital

Changes in the tax regime effect not only decisions to invest new capital, but decisions to continue to invest current capital. Our focus is on the decision to continue to invest (or to consume) capital that was invested prior to implementation of one or another tax regime change.

Suppose that an investor holds an asset as a capital gain that generates a stream of income, say one dollar per year. Of this dollar of income, 25 percent is taken by the government in income tax revenue. Therefore, the present discounted value of the capital gain for the investor and the government are as follows

\[
\text{Investor Utility} = \frac{.75}{1 - \theta}
\]

\[
\text{Government Utility} = \frac{.25}{1 - \theta}
\]

\[
\text{Total Utility} = \frac{1}{1 - \theta}
\]

Now suppose that the investor must decide whether to sell the asset and consume the associated capital or continue to hold the asset. Suppose that the sales offer for the asset will vary between the investor utility and the total utility.

If consumed capital gains are taxed at the same rate as ordinary income, then it is obvious that the investor will not consume the capital gain unless the selling price is equal to total utility, since otherwise investor utility is lower with an asset sale.

If capital gains are not taxed, however, the investor will have a much earlier incentive to sell and consume. This produces a non-optimal decline in total utility.

Suppose, for instance that the investor sells for a price of \( \frac{1}{1 - \theta} \). Since the consumed capital will produce no future income to be taxed, total utility will consequently drop to \( \frac{.75}{1 - \theta} \) from \( \frac{1}{1 - \theta} \).

It is easy to show that the investor will always make divestment choices that maximize total utility only if the capital gains tax rate paid when the capital is sold and consumed is equal to the income tax rate on investment income that would otherwise be earned.
For example from the first quarter of 2007 through the second quarter of 2008, AIG lost $7.0 billion dollars, paid out $3.0 billion in dividends, and paid out $7.0 billion in stock buybacks (Committee on Oversight and Government Reform, 2008).

This isn’t to say that investors cannot anticipate increases in the value of their assets that will occur in the future. A growth stock returning $1 in year 1, $2 in year two, and so forth to $\text{n}$ in year $\text{n}$ will be worth more when sold in year 5 than it cost in year 1 even if prevailing rates of return are unchanged.

If individual investors’ discount rate is below the currently available post-tax rate of return on investments then in the absence of capital gains taxation, rational investors immediately consume their capital and capital gains.

In these experiments, we did not examine the decision of investors about whether to invest new money. It may well be, as Richman (1957) argued, that since capital gains tax rates do not affect the income stream, they do not affect the fundamental value of assets or the decision of whether or not to invest in new assets. Or, alternatively, it may be that lower capital gains taxation rates tend to make more new capital available for investment.