Capitalization or Lock-In? An Empirical Study of the 2003 Capital Gains Tax Cut

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ABSTRACT

The impact of the capital gains tax cut of 2003 is examined via an equilibrium approach where demand and supply are separately analyzed through two effects known as the capitalization effect (capital gains taxes decrease demand) and the lock-in effect (capital gains taxes decrease supply). Although the effects of the tax on a stock's price are ambiguous, one effect may dominate and cause a change in the price of the stock. Data using the S&P 500 show that any effect on price depends on the stock's ownership characteristics, the stock's dividends, and the time period surrounding the tax cut, thus supporting that equity trading is indeed influenced by capital gains taxation.

I. Introduction

The capital gains tax in the United States has been periodically changed by congress with the intended effect of raising revenue or stimulating investment. The two most recent changes were enacted in 1997 and 2003, each reducing the tax rate. In the finance literature, there is much debate as to the effect of taxes on asset prices. Employing an equilibrium approach, evidence suggests that taxes have an ambiguous effect on prices (e.g., Dai, Maydew, Shackleford, and Zhang 2008).

Two main effects have been observed that are caused by capital gains taxes: (1) capitalization and (2) lock-in (see Figures 1 and 2). The capitalization effect can be described as the demand side effect. The imposition of a capital gains tax reduces the demand for stocks and since any gains are taxed, buyers demand lower prices to make up for that tax payment. Alternatively, the reduction in the capital gains tax may increase the demand for stocks as investors realize a higher after tax rate of return. The lock-in effect is the supply side effect. Because sellers pay taxes on any capital gains, they demand higher prices so that they can still earn the desired return. Supply and demand shift in the same direction and thus, the effect of the tax on price is ambiguous. There is a third effect also suggested by researchers (e.g., Dai et al. 2008). In a "Seller's Strike," those sellers with large capital gains may refuse to sell their stocks until after the effective date of the tax cut (see Figure 3). This drives up prices and reduces trading volume in the week before the effective date of the tax cut.

[Insert Figures 1 and 2 about here.]

In order for the change in tax rate to cause a change in a stock's price, one effect must dominate. For example, if there is a cut in the capital gains tax rate and the capitalization effect dominates the lock-in effect, then price will increase. If the lock-in effect dominates the

capitalization effect, then price will decrease. It is important to note that in either case, the volume of shares traded increases in response to the tax cut.

[Insert Figure 3 about here.]

In analyzing these effects, one must take into account the difference between growth and value stocks. Growth stocks are less likely to pay dividends, and thus are more likely to have embedded capital gains than value stocks. In contrast, value stocks are more likely to pay dividends, and thus the capital gains tax cut is less likely to affect them. The 2003 tax cut makes for an interesting case because the tax rate for dividends was also reduced. For the first time in a long time, capital gains and dividends are taxed at the same rate.

In summary, the primary goal of this study is to empirically test the effect of capital gains taxes on returns and trading volume for the S&P 500, taking into account both capitalization and lock-in effects. In addition, the impact of holding periods, turnover, excess return, small versus large cap stocks, and value versus growth stocks are examined to test the robustness of the initial findings.

II. Literature Review

Historically, there is little empirical research devoted to the joint effects of capitalization and lock-in. To my knowledge, Dai et al. (2008) are the first to explore this issue. The authors focus on the 1997 capital gains tax cut, concluding that in order to determine the effect on stock prices, one must look at the time period in order to determine which effect dominates. Any tax cut must be approved by congress and since bills typically go through much debate, the probability of approval continually changes. Investors are aware of this, and act rationally in their own interest even before the tax cut is passed. Dai et al. (2008) report that the capitalization effect dominates the lock-in effect in the week following an increase in the probability of a tax cut. They also

show that the lock-in effect dominates in the week following the effective date of the tax cut. As expected, trading volume rose in both weeks.

Lang and Shackelford (2000) studied the 1997 tax cut for the capitalization effect. They report that stock prices moved inversely with dividend yields, which means that investors suddenly valued non-dividend paying stocks more than they had previously. This is consistent with the capitalization effect because the taxes paid on capital gains are less and dividend paying stocks are largely unaffected by the tax cut. The effect also appears to occur across industries, thereby being consistent with the tax cut's equal treatment of stocks. The authors note that the lock-in effect appears to not impact stock prices based on returns of the market. However, they also acknowledge that ruling out any lock-in effect is difficult based solely on their data, which did not test the joint effects of capitalization and lock-in in the same manner as Dai et al. (2008).

One reason that Lang and Shackelford (2000) did not find any evidence of lock-in is that they did not account for any embedded capital gains. Klein (1999) created an equilibrium pricing model that takes into account any embedded capital gains, showing that the lock-in effect could dominate the capitalization effect if investors have large embedded capital gains. When the capital gains tax is cut, investors will, if necessary, rebalance their portfolios to achieve optimum performance. This rebalance depends on the investor's embedded capital gains and investment horizon, as well as on the average embedded capital gains and investment horizon of all investors. Under certain circumstances, the downward pressure of the lock-in effect will dominate and prices will go down. Klein's (1999) model is useful, and empirical evidence is necessary to determine which effect dominates.

Zhang, Farrell, and Brown (2008) study the effect of the 2003 tax act on dividends. The 2003 tax cuts include not only tax cuts in capital gains, but also reductions in dividends and the personal income tax rates: e.g., dividends are taxed at the same rate as capital gains, now 15%.

Dividends were previously taxed at the rate of personal income, meaning a large percentage of investors actually paid more than 30% for dividends. After the dividend tax cut, stocks that paid out dividends were thus in higher demand. The combination of tax cuts creates a unique event to study because capitalization effects will compete with a new incentive for investors to rebalance their portfolios towards dividend paying stocks. Zhang et al. (2008) note that after the 2003 tax cuts, more firms started paying out dividends, likely as a result of the increased demand from investors.

III. Methodology

The methodology of the current study is similar to that of Dai et al. (2008). The advantage of using their method is that it jointly tests the effects of capitalization and lock-in. To my knowledge, no such study has been performed focusing on the 2003 tax cuts. The year 2003 provides information that is not applicable to 1997 for two important reasons. First, the dividend tax rate was cut at the same time. This means that investors would not have to give preferential treatment to growth stocks, and stocks that are currently distributing dividends would be in higher demand. Secondly, the economy was booming in 1997. In May 2003, the economy was somewhat weaker, having not fully recovered from the 2001 recession. The majority of stocks in the S&P 500 had embedded capital losses. An investor with large embedded capital losses can actually be hurt by a tax cut. Thus, tax sensitive investors are likely to sell off their stocks with large embedded capital losses before the tax cut goes into effect, pushing prices downward. [See Figures 4 and 5.]

[Insert Figures 4 and 5 about here.]

Similar to Dai et al. (2008), Lang and Shackelford (2000), and others, this study analyzes weekly stock returns to determine and interpret the effects. It is important to define two event windows where the capitalization effects and lock-in effects are expected to dominate. The week

of April 29 to May 5, 2003 is the week that the capitalization effect is expected to dominate (the capitalization week). It was during this period that congress began discussing reducing the tax rate to stimulate the economy. Major combat operations in Iraq were ending, allowing the administration to put its attention towards pursuing the tax cut. During that week, the Chairman of the House of Representatives Ways and Means Committee announced that the capital gains tax cut would be actively pursued; giving new life to a bill that was thought to be dead. The probability of investors realizing the tax cut was greatly increased and thus, investors would try to position themselves to best benefit from the tax cut. By Tuesday, May 6, the House of Representatives Ways and Means Committee had voted to pass the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA). The tax cuts went into effect on May 6, 2003. The week of May 6 to May 12 is the week when the lock-in effect is expected to dominate (the lock-in week).

I obtain daily stock returns, trading volume, and stock prices from the CRSP (Center for Research in Security Prices) database. I estimate the level of tax-sensitive ownership for each stock based on the percentage of institutional ownership of each stock (cf. Ayers, Lefanowicz, and Robinson 2003; Dhaliwal and Li 2006; Dhaliwal, Krull, Li, and Moser 2005). Institutional owners, such as banks, investment firms, college endowments, and "13F" money managers are not taxed for their capital gains. Thus, the level of tax-sensitive ownership for a stock is equal to 1 minus the percentage of institutional ownership. That is, if 75% of a company's shares are held by institutions, then only 25% of its shares are sensitive to the tax. I obtain institutional ownership and dividend information from the *Standard & Poor's Stock and Bond Guide*. The sample consists of all stocks in the S&P 500 with complete information for the years 1998 through 2003 in CRSP, as well as the necessary information in the *Standard and Poor's Stock and Bond Guide*, totaling 448 firms.

A. Data Analysis

To test the effects of the tax cut, I use the following regression equations:

For firms with embedded capital gains:

$$R_{it} = \alpha + \beta_1 WK_C + \beta_2 WK_L + \beta_3 WK_C * Div_{i(t-1)} + \beta_4 WK_L * Gains_{i(t-1)} * TSO_{i(t-1)} + \beta_5 WK_C * Gains_{i(t-1)} * TSO_{i(t-1)} + \beta_6 Beta\_Market_i + \beta 7 Beta\_Momentum_i + \gamma Controls + \varepsilon_{it}$$

For all firms:

$$R_{it} = \alpha + \beta_1 WK_C + \beta_2 WK_L + \beta_3 WK_C * Div_{i(t-1)} + \beta_4 WK_L * Gains_{i(t-1)} * TSO_{i(t-1)} + \beta_5 WK_C * Gains_{i(t-1)} * TSO_{i(t-1)} + \beta_6 WK_L * Loss_{i(t-1)} * TSO_{i(t-1)} + \beta_7 WK_C * Loss_{i(t-1)} * TSO_{i(t-1)} + \beta_8 Beta\_Market_i + \beta_9 Beta\_Momentum_i + \gamma Controls + \varepsilon_{it}$$

Where: R_{it} is firm i's stock return at time t, WK_C is a dummy variable equal to one during the capitalization week, WK_L is a dummy variable equal to one during the lock-in week, $Div_{i(t-1)}$ is a dummy variable equal to one if there was no dividend distribution in the prior year, $Gains_{i(t-1)}$ is the embedded capital gains prior to time t, $TSO_{i(t-1)}$ is the percentage of shares owned by tax sensitive investors at time t-1, $Loss_{i(t-1)}$ is the embedded capital losses prior to time t, $Beta\_Market_i$ and $Beta\_Momentum_i$ are measures of the stock's exposure to the market, and control variables include dummy variables for every month as well as the size of the firm. [See Table I.]

[Insert Table I about here.]

The dependent variable is weekly returns, R_{it}. R_{it} is measured as $\sum \log(r^d_{it}+1)$ where r^d_{it} is the daily returns and goes from Tuesday to the following Monday to stay consistent with the event windows previously described. The Beta_Market and Beta_Momentum variables are created by estimating a multiple regression of the firm's daily return on the excess return on the market and the daily market momentum factor[1]. By regressing the excess return on the market and the momentum factor, I develop key estimates of a firm's exposure to the market**.** Both factors can be retrieved from WRDS or the Kenneth R. French website.

[1] The momentum factor uses six value-weight portfolios formed on size and prior (2-12) returns. The portfolios are the intersections of 2 portfolios formed on size (market equity) and 3 portfolios formed on prior (2-12) returns. Momentum is the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios.

The coefficients of the explanatory variables are the key to understanding how the market is reacting and which effect is dominating. If the coefficient for WK_C is positive ($\beta_1 > 0$), then the capitalization effect is dominating in the capitalization week, and prices are increasing because of the expected tax cut. This was the case in 1997, as investors were now demanding higher prices to make up for the disincentive of selling their stocks under the currently higher tax rate. If the coefficient for WK_L is negative ($\beta_2 < 0$), then the lock-in effect is dominating the capitalization effect during the lock-in week. Again, this was what happened in 1997 as investors could sell their stocks for less and still receive their desired rate of return under the lowered tax rate. Non-dividend paying stocks have 100% of their returns taxed through the capital gains tax. Dividend paying stocks are less likely to have embedded capital gains and thus, non-dividend paying stocks should see a greater price run up during the capitalization week. The interaction term $WK_C*Div_{i(t-1)}$ determines (tests) if this occurred. A positive coefficient for this term indicates that a non-dividend paying firm has a greater return during the capitalization week. If the interaction term $WK_L*Gains_{i(t-1)}*TSO_{i(t-1)}$ has a negative coefficient ($\beta_4 < 0$), then tax sensitive owners are rebalancing their portfolios after the effective date of the tax cut, causing downward pressure on prices and showing the existence of a lock-in effect.

The seller's strike has been suggested as an alternative explanation to the capitalization effect. In this case, tax-sensitive investors with capital gains will refuse to sell their stocks until the tax cut goes into effect or a higher price is offered. If the interaction term $WK_C*Gains_{i(t-1)}*TSO_{i(t-1)}$ is positive, then a seller's strike is taking place, driving up prices. There are also two interaction terms that deal with stocks that have embedded capital losses. Investors should sell their stocks with capital losses before the tax cut goes into effect to reap the benefits from sheltering their losses under a higher tax rate. These stocks would therefore be expected to have a lower return during the capitalization week because of the sudden increase in supply. Thus, the

interaction term $WK_C*Loss_{i(t-1)}*TSO_{i(t-1)}$ should be positive if this is the case. Conversely, we would expect those same stocks to have a greater return after the tax cut goes into effect, which would make the $WK_L*Loss_{i(t-1)}*TSO_{i(t-1)}$ term negative.

Whichever effect is dominating, the volume of stocks traded is expected to increase due to the tax cut, as both supply and demand have increased. In order to measure volume, I first must transform daily volume into weekly volume. Weekly volume v_{it} is defined as $\sum \log (Vol^d_{it})$, where Vol^d_{it} is the daily trading volume of stock i on day t, again with the week running from Tuesday to Monday to line up with the event windows. Volume is measured in both number of shares traded and dollar amount traded that day. Similar to Dhaliwal and Li (2006) and Dai et al. (2008), I compute the excess trading volume as the difference between that week's trading volume (v_{it}) and the average weekly trading volume in the past month, relative to the average trading volume of the previous month. The formula can be written as:

$$\Delta v_{it} = (v_{it} - \tfrac{1}{4} \sum_{j=t-4}^{t-1} v_{ij}) / (\tfrac{1}{4} \sum_{j=t-4}^{t-1} v_{ij}).$$

Volume is again measured in both shares traded and dollars. Similar to returns, the regression equations for volume are:

For firms with embedded capital gains:

$$\begin{aligned}\Delta v_{it} = {} & \alpha + \beta_1 WK_C + \beta_2 WK_L + \beta_3 WK_C*Div_{i(t-1)} \\ & + \beta_4 WK_L*Gains_{i(t-1)}*TSO_{i(t-1)} + \beta_5 WK_C*Gains_{i(t-1)}*TSO_{i(t-1)} \\ & + \gamma Controls + \varepsilon_{it}\end{aligned}$$

For all firms:

$$\begin{aligned}\Delta v_{it} = {} & \alpha + \beta_1 WK_C + \beta_2 WK_L + \beta_3 WK_C*Div_{i(t-1)} \\ & + \beta_4 WK_L*Gains_{i(t-1)}*TSO_{i(t-1)} + \beta_5 WK_C*Gains_{i(t-1)}*TSO_{i(t-1)} \\ & + \beta_6 WK_L*Loss_{i(t-1)}*TSO_{i(t-1)} + \beta_7 WK_C*Loss_{i(t-1)}*TSO_{i(t-1)} \\ & + \gamma Controls + \varepsilon_{it}\end{aligned}$$

Where: the variables above are the same as those in the regression for returns.

IV. Results

A. Sample and Summary Statistics

The sample consists of 448 firms in the S&P 500, with only 117 of those firms having embedded capital gains. The regression model accounted for the years 2001 through 2003 focusing on the weekly returns. The 156 weeks of observation per firm yields a total of 69,888 observations. Table II shows basic summary statistics for the variables used in the analyses. The average logarithmic weekly return is .0033%, with a relatively large standard deviation of 2.7%. Over 27% of the firms in the analysis had not paid a dividend in the previous year. These are the firms that are expected to see a greater price run up than the firms that do distribute dividends. The average level of tax-sensitive ownership was 31.2%, with a standard deviation of 15.6%.

[Insert Table II about here.]

B. Return Tests for Joint Tax Capitalization and Lock-in Effects

Table III reports the results of the regression equations for weekly returns. Similar to Dai et al. (2008), I use a two-year estimation (i.e., the two-year price change) of embedded capital gains to estimate the term coefficients.

[Insert Table III about here.]

The variable Wk_C was not found to be a significant factor, and the direction of the coefficient was actually negative for both the full sample of firms and the positive capital gains subsample. This is not surprising considering the nature of the economy in 2003. When Dai et al. (2008) predicted that prices would rise in the capitalization week, they assumed that the economy would have been healthy over the past several years, and most stocks would have embedded capital gains. The same underlying assumption led them to predict a downturn just after the tax cut went into effect. In 2003, there was an upturn with the tax cut, as shown with a positive value for Wk_L.

This effect was shown to be highly significant. While the capitalization effect did not dominate the lock-in effect the week before the tax cut, there is still a significant capitalization effect taking place ($p<.001$ for the full sample, $p=.051$ for subsample) for non-dividend paying stocks. The interaction term Wk_C*Div shows us that during the capitalization week, non-dividend paying stocks had a greater price run up than dividend paying stocks. This is consistent with observations by Dai et al. (2008) and Lang and Shackelford (2000). Considering that non-dividend paying stocks are less than one-third of the sample, it is not surprising that they were not able to overcome the effects of dividend-paying stocks during the capitalization week.

Although the lock-in effect may not have dominated the market following the tax cut, a significant lock-in effect is found for stocks with capital gains. The interaction term Wk_L*Gains*TSO is in fact negative and significant ($p=.041$) for the full sample. This effect is not significant in the subsample, where all the firms had capital gains. The insignificance of this term tells us that the level of capital gains is less important than simply having capital gains. When the two samples are examined together, we find that stocks with capital gains and a high percentage of tax sensitive ownership experience lower returns than the market after the tax cut goes into effect. Investors act rationally and now are looking to get rid of those stocks at the now lower tax rate, putting a downward pressure on prices.

The alternative explanation of a seller's strike proposed by Dai et al. (2008) does not appear to operate in 2003, just as it did not materialize in 1997. The interaction term Wk_C*Gains*TSO is insignificant, meaning that the data are inconsistent with a seller's strike explanation.

The terms Wk_L*Loss*TSO and Wk_C*Loss*TSO are designed to measure if investors with capital losses are rebalancing their portfolios to take advantage of the tax cut. There is no evidence of this behavior. In fact, contrary to intuition, the stocks with capital losses and tax-sensitive ownership actually experienced a greater return during the capitalization week than the

market. The term Wk_C*Loss*TSO is indeed significant, but the coefficient is in the wrong direction if trading responds to taxes. Rather than strategically rebalance their portfolios, investors in this situation tended to invest more money into these stocks, apparently expecting a larger return in the future compared to the benefits from paying less taxes at the time.

The variables Beta_Market and Beta_Momentum are significant, showing that these stocks are highly correlated with the movement of the market as a whole. The control variable Size is not significant. Although not listed in Table III (for simplicity), the control variables for the calendar effect prove to be very helpful in describing stock behavior. Thirty out of thirty-six months are significant predictors of the market for the full sample, while twenty out of thirty-six months are significant in the subsample.

C. Robustness Tests

Three additional sets of analyses test the robustness of the above findings. The first test uses three separate measures of holding periods. Capital gains taxation generally applies to stocks held for more than one year. Each investor may have a different level of embedded capital gains depending on when they purchased the stock. While studies generally use a two-year estimate of capital gains for research purposes, Table IV reports the results with holding period assumptions of 18 months, 3 years, and 5 years. Wk_L and Wk_C*Div are basically unchanged. The week following the tax cut's effective date show a general upturn for the market. Non-dividend paying stocks experienced greater returns just previous to the effective date of the tax cut. However, the lock-in effect is not significant for stocks with capital gains after the effective date. As shown with the variable Wk_L, the market experienced a strong capitalization effect after the effective date of the tax cut. Interestingly, in the 18 month holding period, there is a significant effect for the Wk_C*Gains*TSO term. The sign of this term is negative, which is the opposite of what we would expect for a seller's strike. It is likely because stock owners with gains over 18 months are

less affected by the tax than owners with capital gains over a longer period, as the total capital gains would be expected to be lower for the shorter period. As with Dai et al. (2008), I still find no evidence of a seller's strike affecting the market prior to the effective date of the tax cut. The control variables Beta_Market and Beta_Momentum are again significant, while size is not. For all three tests, thirty out of thirty-six months are significant in explaining the market.

[Insert Table IV about here.]

The second robustness test is designed to control for turnover of each stock. Turnover is basically the amount of outstanding stock that is actively traded. Turnover in this study is measured as the monthly trading volume divided by the outstanding shares. Dai et al. (2008) show that stocks with high turnover experience lower returns than the market, because they generally have shorter holding periods and thus higher tax costs. Table V reports the results controlling for turnover: all key variables retained their significance. Turnover is not significant in either the full sample or the subsample and thus, it appears that turnover can't account for market activity.

[Insert Table V about here.]

It is possible that control variables Beta_Market and Beta_Momentum can describe the movement of each stock compared to the market. The third robustness test removes those two variables and re-estimates control variables based on the popular and successful three-factor model developed by Fama and French (1993). This model includes the excess return on market, the return of small cap stocks versus large cap stocks, and the return of value stocks versus growth stocks. It contributes to the analysis because value and growth stocks tend to have different sources of returns for investors (i.e., dividends versus capital gains). The results of this regression are reported in Table VI. The magnitude and significance of the key variables remain unchanged. Two of the new control variables are significant: i.e., Beta_MTKRF (excess return

on market) and Beta_HML (high book/price minus low). The term Beta_SMB (small cap minus large cap) is insignificant, which is not surprising as the S&P 500 includes all large cap stocks. However, the impact of small cap minus large cap and resultant conclusions might vary for a different sample of stocks.

[Insert Table VI about here.]

D. Trading Volume Tests

Table VII summarizes trading volume tests. As predicted, trading volume was up during both weeks surrounding the tax cut. The variables Wk_C and Wk_L are highly significant ($p<.001$) across both samples as well as across both estimates of volume. This is consistent with model predictions that during those two weeks, both demand and supply increase. While this ambiguously affects the price, volume unambiguously increases. These findings also provide further evidence that a seller's strike is not evident, as a seller's strike likely would have led to a decrease in trading volume the week prior to the tax cut. None of the interaction terms attain significance because the model predicts an increase in trading volume for all stocks, without regard to ownership or dividend characteristics. This finding is consistent with Lang and Shackelford (2000) in that the tax cut affects the equity market equally without regard to industry type. Just as in the regression model for returns, the variables for each month are generally significant. In each of the four tests for volume, at least 27 of the 36 months are significant predictors of the volume traded in the full sample, while 23 are significant in the subsample.

[Insert Table VII about here.]

V. Conclusions

The current study analyses the effect of capital gains taxes on returns and trading volume, taking into account both capitalization and lock-in effects. This appears to be the first such

empirical endeavor to focus on the 2003 tax cut as its event. I use the S&P 500 as a sample to empirically test the effects of the tax cut on both returns and trading volume. Findings are largely consistent with those of Dai et al. (2008), in that the effect of the tax cut on the stock depends on several characteristics of the stock, including whether dividends are distributed and the level of tax-sensitive ownership. Specifically, non-dividend paying stocks experience a stronger capitalization effect than dividend paying stocks. This occurred in 2003 despite the fact that dividend-paying stocks received a substantial tax cut as well. Also, stocks with a price appreciation over the previous two years and a high percentage of tax-sensitive ownership experience a stronger lock-in effect and exhibit below market returns during the week that the tax cut went into effect. Jointly testing the effects of capitalization and lock-in allows us to see exactly how investors are reacting based on their portfolios.

Trading volume rose sharply during the weeks surrounding the tax cut, serving to confirm the equilibrium model that predicts that supply and demand both increase. Thus, we can expect that as the tax rate is lowered, more trading will ensue. Conversely, as the tax rate is increased, less trading will take place.

As opposed to 1997, I am unable to conclude that the capitalization effect dominated prior to the tax cut, nor can I argue that the lock-in effect dominated after the tax cut. This is likely caused by the general poor performance of the S&P 500 during and after the 2001 recession. That is, the economic situation results in a reverse of the phenomena that Dai et al. (2008) observed in 1997.

Consistent with every test conducted here, the market experienced high returns following the tax cut. Thus, if the purpose of the tax cut was to stimulate investment, it proved largely successful. The S&P 500 showed steady growth over the next few years, reaching record levels in 2007, before falling off again as a leading indicator of the oncoming economic recession. It

would be difficult to give complete credit to the capital gains tax cut for stimulating the economy. For one, JGTRRA cut many different taxes including dividends, income taxes, and the Alternative Minimum Tax. Secondly, many Keynesian economists would argue that the increase in government spending played its part in stimulating the economy. Lastly, the tax cuts and spending may have had very little to do with stimulating the economy and the business cycle was simply ready to have an upswing on its own.

Capital gains tax revenues are much more affected by the state of the economy than the tax rate itself. Figure 6 shows inflation adjusted capital gains tax revenue for the years 1995 to 2007. When viewing this graph, it is easy to see why supply-side side economists argue that the capital gains tax rate can be reduced without significant impact on revenues. The 1997 tax cut seems to have almost no effect on revenues in the following three years, while the 2003 tax cut is followed by four years of growth. It is impossible to know what the tax receipts would have been had the tax rates remained unchanged. If we compare the previous two business cycles however, the revenue from the years 2003 to 2007 is generally less than the previous cycle. Comparing the peak years of 2000 and 2007, the inflation-adjusted revenue is less in 2007. The revenue in 2007 was $122 billion, while in 2000 the revenue is $143 billion, a decline of about 15%. Many factors obviously contribute to this decline. However, if we consider this lower amount to be caused by the tax cut, Laffer Curve proponents have an argument. The tax cut decreased by 25% (from 20% to 15%; (20-15)/20=25%), but revenues shrank by only 15%. This shows that there is a curved relationship between tax rates and revenues, not a linear relationship. This also provides evidence that the static scoring method of estimating future revenues typically used by the Congressional Budget Office is inaccurate. In hindsight, had we known exactly what would have happened if the tax rates were unchanged, it would be easy to determine the most effective policy.

[Insert Figure 6 about here.]

As it stands, views on the success of the tax cuts remain very partisan. The tax cuts expire in 2011 unless Congress acts to extend them. This appears unlikely, and some forecast that the tax rate might increase even sooner than 2011 given the attitude of the current administration.

Further research should analyze the effect of the tax cut on stocks with smaller market capitalization, to see if there is a difference for those firms compared to the S&P 500. It is also critical to determine the effects of the expected tax increase, as most research has focused on a decrease in the tax rate. The data in this study show that returns and trading volume in the stock markets *are* directly affected by taxation of capital gains, challenging a previously common assumption that taxation is irrelevant to pricing. Thus, this study joins Dai et al. (2008) and Klein (2001) among others in the financial literature who argue that capital gains taxation affects equity trading.

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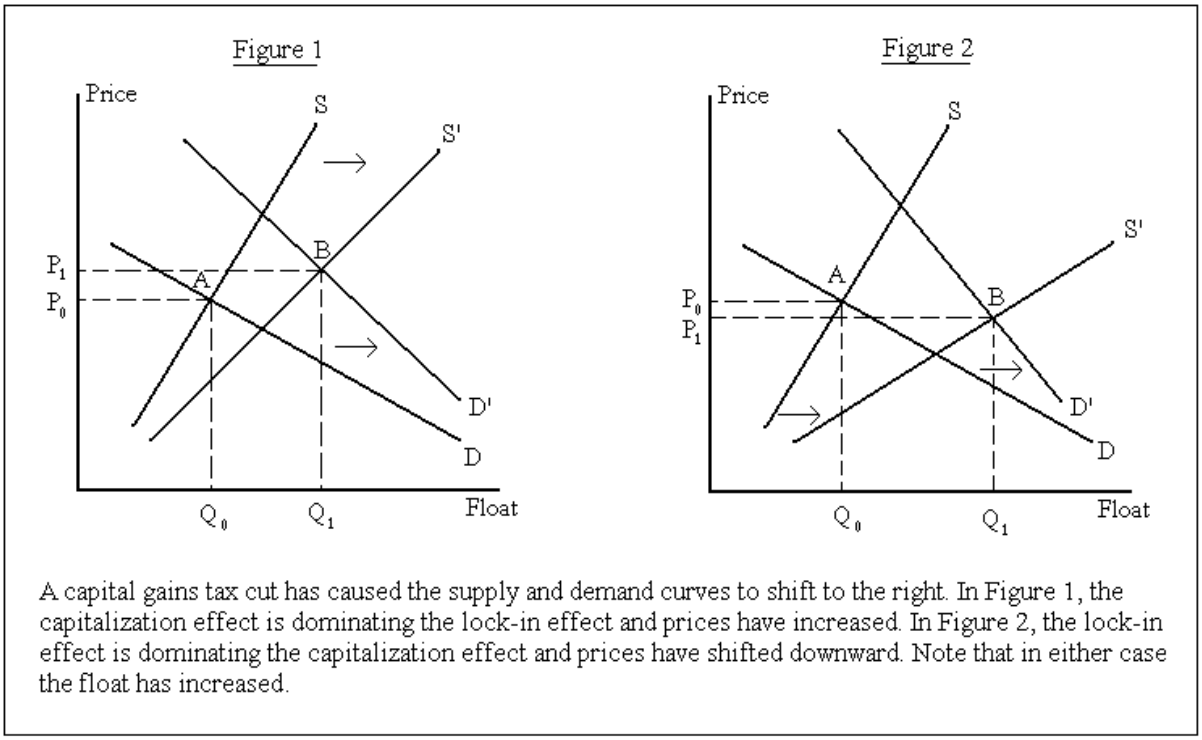
VII. Appendix: Figures and Tables



A capital gains tax cut has caused the supply and demand curves to shift to the right. In Figure 1, the capitalization effect is dominating the lock-in effect and prices have increased. In Figure 2, the lock-in effect is dominating the capitalization effect and prices have shifted downward. Note that in either case the float has increased.

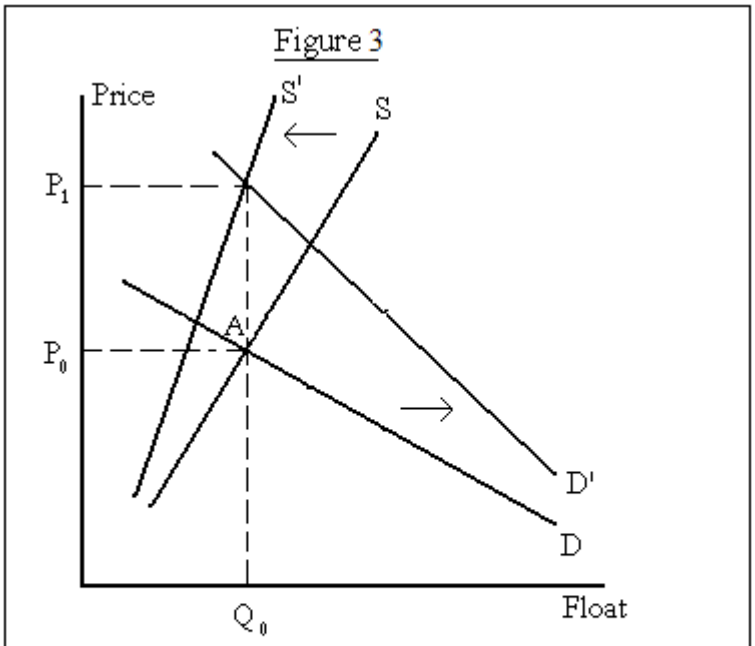
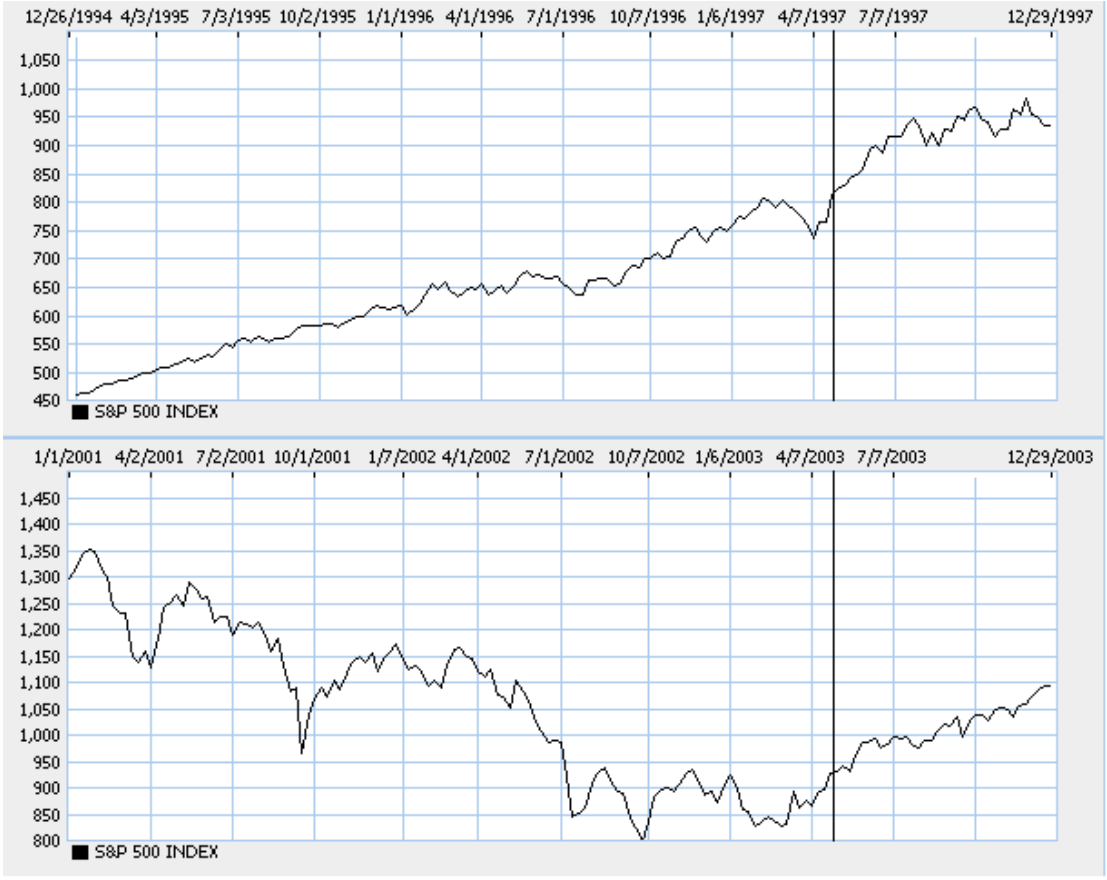


Figure 3. A Seller's Strike has caused supply to decrease in a period when demand is expected to increase. This causes an increase in prices. It is unclear, however, what happens to the float.

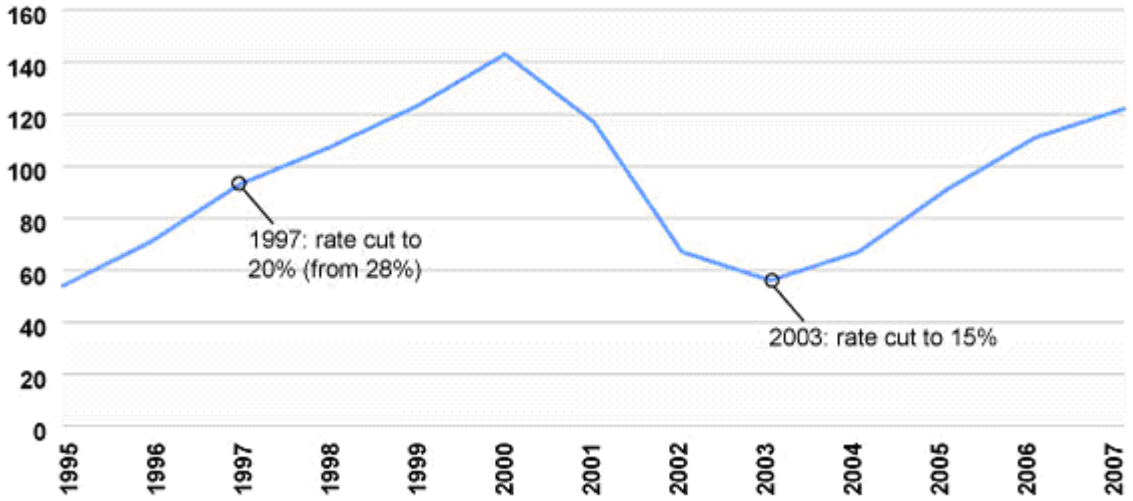
Figures 4 & 5

S&P 500 [1995 – 1997, 2001 - 2003]



Figures 4 and 5: The top graph shows the S&P 500 during the years of 1995 - 1997. The Vertical line indicates the week that the tax cut took place. The bottom graph shows the S&P 500 during the years of 2001-2003. The Vertical line also represents the tax cut that happened that year.

Figure 6. Capital Gains Tax Receipts, In Billions Of 2007 Dollars



SOURCES: CONGRESSIONAL BUDGET OFFICE

TABLE I **Variable Definitions**	
WeekRet	The weekly stock return, calculated $R_{it}= \sum \log(r^{d}_{it}+1)$ where r^{d}_{it} is the daily returns and goes from Tuesday to the following Monday
Size	The logarithm of the market capitalization of the firm in the prior month
Div	A dummy variable equal to one if the company did not pay any dividend in the previous year
TSO	The level of tax-sensitive ownership of a stock measured as 1 – the percentage of institutional ownership of a firm
Beta_Market	Beta estimate of regressing individual returns against the returns of the market
Beta_Momentum	Beta estimate of regressing individual returns against the momentum factor of the market
AdjVol	The difference between the weekly trading volume (v_{it}) and the average weekly trading volume in the past month, relative to the average trading volume of the previous month.
AdjVol$	The difference between that week's trading volume in dollars (v_{it}) and the average weekly trading volume in the past month, relative to the average trading volume of the previous month
Wk_C	A dummy variable equal to one the week prior to the tax cut going into effect
Wk_L	A dummy variable equal to one the week after the tax goes into effect
Gains	The embedded capital gains for that stock, measured as the two year price increase, equal to zero if there are losses
Loss	The embedded capital losses for that stock, measured as the two year price decrease, equal to zero if there are gains
Turnover	The monthly trading volume divided by the outstanding shares

TABLE II
Summary Statistics

Variable	Mean	Median	SD	Min	Max
WeekRet	0.000033	0.000890	0.027235	-0.466181	0.309224
AdjVol	0.004281	0.031387	0.124761	-0.798487	0.506315
AdjVol$	0.004089	0.033567	0.122787	-0.797849	0.468531
Gains 2 Year	1.9768	0.0000	5.2350	0.0000	40.6900
Loss 2 Year	-10.908	-7.825	12.365	-75.500	0.0000
TSO	0.31243	0.29885	0.15571	0.01415	0.99313
Div	0.27232	0.00000	0.44516	0.00000	1.00000
Size	6.8497	6.8280	0.5184	5.2670	8.4044
Beta_Market	0.91297	0.78190	0.49748	-0.20616	2.68672
Beta_Momentum	-0.17610	-0.15325	0.18098	-0.76510	0.25259
Turnover	0.17980	0.13024	0.17728	0.04029	1.80767

TABLE III
Return Tests for Tax Capitalization and Lock-in

	All Firms in Sample		Firms with Capital Gains	
Variable	**Estimate**	***p* value**	**Estimate**	***p* value**
Constant	0.005005	0.002	0.005881	0.048
WKc	-0.003118	0.133	-0.001703	0.607
WKl	0.006943	0.000	0.008119	0.008
Wkc*Div	0.012816	0.000	0.009072	0.051
Wkl*Gains*TSO	-0.0019947	0.042	-0.0014320	0.148
Wkc*Gains*TSO	-0.0005545	0.573	0.0001422	0.886
Wkl*loss*TSO	0.0003152	0.283	-	-
Wkc*loss*TSO	-0.0009235	0.002	-	-
Beta_Market	-0.0010056	0.000	0.0000443	0.921
Beta_Momentum	0.0021971	0.001	0.000088	0.940
Size	0.0000337	0.871	-0.0004418	0.272

TABLE IV

Robustness Test 1: All Firms, Different Holding Periods

	Holding Period = 18 Months		Holding Period = 3 Years		Holding Period = 5 Years	
	Estimate	***p* value**	**Estimate**	***p* value**	**Estimate**	***p* value**
Constant	0.004956	0.002	0.005120	0.001	0.005071	0.001
WKc	-0.000447	0.828	-0.000986	0.604	-0.003507	0.099
WKl	0.006925	0.000	0.005820	0.001	0.005692	0.004
Wkc*Div	0.013203	0.000	0.009668	0.001	0.013348	0.000
Wkl*Gains*TSO	-0.0013692	0.151	-0.0009405	0.102	-0.0011664	0.125
Wkc*Gains*TSO	-0.0019696	0.039	-0.0007563	0.189	-0.0003517	0.644
Wkl*loss*TSO	0.0005850	0.145	-0.0000009	0.993	0.0000344	0.810
Wkc*loss*TSO	-0.0006405	0.112	-0.0003448	0.001	-0.0003999	0.005
Beta_Market	-0.0010055	0.000	-0.0010298	0.000	-0.0010067	0.000
Beta_Momentum	0.0021752	0.001	0.0022284	0.001	0.0022119	0.001
Size	0.0000404	0.845	0.0000209	0.920	0.0000246	0.906

TABLE V
Robustness Test 2: Controlling for Turnover

	All Firms in Sample		Firms with Capital Gains	
Variable	**Estimate**	***p* value**	**Estimate**	***p* value**
Constant	0.004661	0.004	0.006350	0.035
Turnover	0.0007140	0.287	-0.001191	0.294
WKc	-0.003114	0.134	-0.001719	0.604
WKl	0.006942	0.000	0.008115	0.008
Wkc*Div	0.012799	0.000	0.009113	0.050
Wkl*Gains*TSO	-0.0019989	0.042	-0.0014299	0.149
Wkc*Gains*TSO	-0.0005591	0.570	0.0001450	0.884
Wkl*loss*TSO	0.0003143	0.284	-	-
Wkc*loss*TSO	-0.0009243	0.002	-	-
Beta_Market	-0.0011348	0.000	0.0004367	0.453
Beta_Momentum	0.0021633	0.001	0.000196	0.867
Size	0.0000816	0.700	-0.001191	0.294

TABLE VI
Robustness Test 3: Using Alternate Measures of Market Exposure

	All Firms in Sample		Firms with Capital Gains	
Variable	**Estimate**	***p* value**	**Estimate**	***p* value**
Constant	0.005452	0.003	0.002185	0.571
WKc	-0.003095	0.136	-0.001716	0.604
WKl	0.006965	0.000	0.008093	0.008
Wkc*Div	0.012811	0.000	0.009026	0.052
Wkl*Gains*TSO	-0.0019844	0.043	-0.0014193	0.152
Wkc*Gains*TSO	-0.0005443	0.580	0.0001541	0.877
Wkl*loss*TSO	0.0003231	0.271	-	-
Wkc*loss*TSO	-0.0009156	0.002	-	-
Size	-0.0000344	0.888	-0.0000084	0.987
Beta_MTKRF	-0.0012675	0.000	0.0006215	0.349
Beta_SMB	-0.0004722	0.176	0.0002597	0.693
Beta_HML	0.0002933	0.044	0.0003280	0.287

TABLE VII
Volume Tests

	All Firms in Sample		Firms with Capital Gains	
	AdjVol	**AdjVol$**	**AdjVol**	**AdjVol$**
Variables	**Estimate (*p* value)**	**Estimate (*p* value)**	**Estimate (*p* value)**	**Estimate (*p* value)**
Constant	-0.002807 (0.667)	-0.001792 (0.781)	-0.00131 (0.935)	0.00169 (0.915)
WKc	0.088005 (0.000)	0.086946 (0.000)	0.08582 (0.000)	0.08613 (0.000)
WKl	0.085901 (0.000)	0.086465 (0.000)	0.08223 (0.000)	0.08378 (0.000)
Wkc*Div	0.00250 (0.843)	0.00358 (0.772)	0.00225 (0.932)	0.00234 (0.928)
Wkl*Gains*TSO	-0.001699 (0.698)	-0.001774 (0.681)	-0.001061 (0.850)	-0.001052 (0.849)
Wkc*Gains*TSO	-0.001930 (0.660)	-0.001771 (0.682)	-0.001649 (0.769)	-0.001455 (0.793)
Wkl*loss*TSO	0.000238 (0.855	0.000020 (0.02 0.988	-	-
Wkc*loss*TSO	-0.000475 (0.716)	-0.000697 (0.588)	-	-
Size	-0.0000950 (0.912)	-0.000687 (0.594)	-0.000185 (0.933)	-0.000434 (0.842)