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Examining the Relationship Between Effective Income Tax Rates & Capital Gains Realizations

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EXAMINING THE RELATIONSHIP BETWEEN EFFECTIVE INCOME TAX RATES & CAPITAL GAINS REALIZATIONS

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I. INTRODUCTION

The relationship between capital gains realizations and the effective income tax rate is one that has been thoroughly explored by economists in recent years to better understand how to enact effective policy. Capital gains are commonly defined as profits from the sale of property or investments and are realized when they are sold for either a profit or a loss. Realization does not account for any fluctuating asset prices between the time that the asset was acquired and when it was sold, it only entails the value of the asset at the time of sale. When capital gains are sold for a net profit, they are taxed as individual income and generate tax revenue, making them a policy variable of considerable interest. Policymakers have long since speculated that raising the effective income tax rate could result in individuals holding their assets for a longer period of time, rather than realizing gains on their assets. This assumption has led to the exploration of the relationship between capital gains realizations and the effective income tax rate, with hopes of establishing better tax policy at both the state and the federal levels. In this experiment, I suggest that policymakers can increase tax revenue by lowering the effective capital gains tax rate rather than raising it. Based on previous literature, raising the income tax rate can lead to individuals holding on to capital longer rather than realizing their gains.

While the results from previous studies have yielded similar conclusions, the exploration of the relationship between the tax rate and capital gains realizations is a relatively new area of study in econometrics. Previous studies have shown that an inverse relationship exists between the effective income tax rate and capital gains realizations, meaning that as the tax rate is increased, the amount of capital gains that are realized as personal income decreases. The primary literature upon which this experiment is based, measured the elasticity of capital gains realizations to the effective income tax rate. Economists and professors at Williams College, Jon M. Bakija and William M. Gentry, in their work, "Capital Gains Taxes and Realizations: Evidence from a long panel of state-level data", collected a panel series of data across the fifty states in the U.S. over a time span of fifty years. Their primary dependent variable of interest was the natural logarithm of the average value of a realized capital gain among federal income tax filers and their primary independent variable of interest was the combined federal and state income tax rate, expressed in decimal terms (Gentry and Bakija, 2014). Some control variables that were used in their study included: a college variable which indicated the college graduates as a share of state residents over 25, percent of homeowners, the share of people that are 65 years of age or older in the state, and the state unemployment rate (Bakija and Gentry, 2014). Bakija and Gentry controlled for state fixed effects and year fixed effects in their study by running a two-way fixed effects model. The fifty-year panel data in this study allowed for their regressions to observe long-term variation among state income tax rates. Their findings suggested that capital gains realizations are sensitive to changes in the income tax rate and that a negative relationship exists between the two. Elasticities of -0.66 and -0.65 were primarily reported in Bakija and Gentry's study which was consistent with the previous literature by which they referenced to in conducting their study (Bakija and Gentry, 2014).

Another Primary source for this study was conducted by William M. Gentry and William T. Bogart, President of Maryville College. The purpose of Gentry and Bogarts' study was to further examine the relationship between capital gains realizations and the effective income tax

rate. Their primary dependent variable of interest was the natural logarithm of capital gains realizations per tax return, and their primary independent variables of interest included: the natural logarithm of wages per capita, the fraction of state population aged 65 years or older, fraction of the state population that owns a home, median home value in a state, stock ownership, and the federal and state marginal tax rate for high income households (Gentry and Bogart, 1993). Their findings produced similar results to those of the study conducted by Bakija and Gentry, showing an elasticity of realizations with respect to the tax rate of -0.67 (Bogart and Gentry,1993). Bogart and Gentry found the elasticity to be even larger, in absolute value, at -1.00 at the 2% level of significance, which was indicative of a strong negative relationship between capital gains realizations and the effective income tax rate (Bogart and Gentry, 1993). Both of the primary research papers that were used to conduct this study reflected only the direct revenue consequences of the capital gains taxes, instead of addressing any other arguments that advocate for or against cutting the capital gains tax rate (Gentry and Bogart, 1993).

Another study related to capital gains was conducted by the Congressional Budget Office (CBO), Tim Dowd, Robert McClelland, and Athiphat Muthitacharoen, in 2012 that sought to explore the relationship between capital gains realizations in the long-run and persistent transitory tax changes (Dowd et. al 2012). Their study compared the amount that an individual decides to realize based on the tax rate, not just whether or not an individual realizes at all (Dowd et. al 2012). Their findings suggest that the decision of how much to realize is more sensitive to changes in rates of taxation than the decision to realize a gain (Dowd, et. al 2012). The elasticities in this study ranged from roughly -0.58 to -1.0 and panel data was collected from 2006 through 2012 across all 50 states in the U.S. The CBO study was unique from other studies that were explored because this study did not seek to measure the elasticity of capital gains realizations with respect to the income tax rate. By comparison, this study sought to estimate the percent change in the number of capital gains realizations reported as income given a one percentage point increase in the highest marginal state income tax rates. The control variables used varied slightly from those in previous studies because they included state unemployment rates, state population estimates, a dummy variable for political party association (whether a legislative chamber held a majority in a state in a given year), and the state's lowest income tax rate. The regressions that were run included: pooled OLS, one-way entity fixed effects, and two-way time and entity fixed effects. The results did not show a statistically significant relationship between the highest state income tax rate and the number of realizations that were reported as income. However, the results were reasonably sensible; the coefficient on the highest state income tax rate was negative in 3 out of the 5 regressions that were run. The CBO findings are congruent with previous literature, which has suggested that a negative relationship exists between the highest income tax rate and the amount of capital gains realizations.

II. DATA

Data for the present study was collected from a wide variety of sources. Population data for each state between the years of 2006-2012 was accessed through the U.S. Census Bureau. The data for the unemployment rate for each state over the same period was accessed via the U.S. Bureau for Labor Statistics. The capital gains revenue data was accessed through a variety of different sources including: the IRS, the Tax Policy Center, and the Tax Foundation. The primary dependent variable of interest in this study is the natural logarithm of the amount of capital gains, which reflects the amount of capital gains that individuals will realize based on changes to the independent variables. The data for the state level income tax rates was accessed

via the Tax Policy Center. Finally, the data concerning the state legislature composition was gathered via the National Conference of State Legislatures. In addition to collecting this data, a number of relevant tax policy articles were consulted, which provided a better understanding of how capital gains are taxed as personal income, and reasons for variations in individual income across different states for different time periods. The data sources consulted for this study provided information for the years included here, 2006 through 2012.

The two-way fixed effects regression model is:

$$Y_{it} = \beta_1 X_{it} + \alpha_i + \lambda_t + u_{it},$$

and in this study the primary variables for the two-way fixed effects model were:

$$\ln AmountofCapitalGains_{it} = \beta_1 Highincometax_{it} + \alpha_I + \lambda_t + u_{it},$$

where the Highincometax reflects the policy variable of interest, and the natural logarithm of the amount of capital gains is the dependent variable of interest. The linear regression model with only the primary policy variable of interest as an independent variable would be:

$$\ln Amountofcapitalgains_i = \beta_0 + \beta_1 Highincometax_i + u_i ,$$

and the multiple regression model in this study that includes added control variables would be:

$$\ln Amountofcapitalgains_i = \beta_0 + \beta_1 Highincometax_i + \beta_2 Unemployment_i + \beta_3 Population_i + \beta_4 Lowincometax_i + \beta_5 Politicalparty_i + u_i .$$

Figure 1, which provides summary statistics, can be found in the empirical results section of this paper, along with the correlations of selected variables in Figures 2 and 3. The population variable was expressed in 10,000's in order to provide more workable data. The dummy variable for political party association was coded 0 if the state legislature was held by a majority of democratic representatives and was coded 1 if the state legislature was held by a majority of republican representatives. The unemployment rate, as well as the tax rates, were expressed as integers, thus their coefficients could be interpreted as a one-unit increase, or in this case, a one percentage point increase.

III. EMPIRICAL RESULTS & INTERPRETATION

Figure 1: Summary Statistics

Variable Name |	Obs	Mean	Std. Dev.	Min	Max
AmountofCapitalGains |	350	465481	520605.7	40952	3209841
Highincometax |	350	5.597314	2.840116	0	11
Unemployment |	269	6.555019	2.469852	2.4	13.8
Population |	350	6120251	6746522	515004	3.80e+07
Lowincometax |	350	2.397209	1.760214	0	6
Politicalparty |	343	.3702624	.4835803	0	1

Figure 1 displays the summary statistics. (Note: a few missing values were recorded for the variables: political party and unemployment.) The population variable within Figure 1 includes the population mean, standard deviation, minimum, and maximum values prior to the addition of the population variable in thousands. The amount of capital gains is the actual number of net positive capital gains that were reported as individual income, which includes stocks and housing sales (assets). This variable was logged in the regressions, but in Figure 1, these values reflect the real value prior to applying the natural logarithm ahead of the coefficient later in the study. The high-income tax and low-income tax variables each have minimum values

of zero because of states that do not impose an income tax. Finally, the unemployment values are reflected by peaks and troughs in the business cycle, which accounts for the relatively large difference in the minimum and maximum values. As the economy began a recession in December of 2007, the unemployment rate increased dramatically. The unemployment rate reflects state level unemployment rates from the years 2006 through 2012.

Figure 2: Correlation of Capital Gains and Unemployment

LogAmountofCapitalGains |	1.0000	
Unemployment |	0.1308	1.0000

Figure 3: Correlation of Capital Gains and High-Income Tax

LogAmountofCapitalGains |	1.0000	
HighIncomeTax |	0.0043	1.0000

Figure 2 displays the correlation between the natural logarithm of capital gains and the unemployment rate. Correlation assesses the linear relationship on a scale of 0 to 1 in absolute value, 1 being a perfectly linear relationship. The state unemployment rate has a relatively weak correlation with the natural logarithm of capital gains. However, its correlation coefficient makes intuitive sense because one can reasonably expect there to be a positive linear relationship between the amount of capital gains that are realized and the unemployment rate. For example, the unemployment rate is a variable that is commonly used as an indication of how well the economy is doing. If the unemployment rate increases, then one can suspect that the current state of the economy is trending toward a recession, or away from an expansion. Therefore, it is likely that an individual would be inclined to sell their assets at a time of economic instability or downturn. The correlation between the high-income tax rate and the natural logarithm of capital gains reflects a weak positive correlation. However, in the regression table below, Table 1, it can be seen that by controlling for other variables, the high-income tax reflected a negative relationship with the natural logarithm of capital gains in the pooled OLS regression

Table 1: Regression Results

	(OLS)	(Pooled OLS)	(State FE)	(2-Way FE)
High Income Tax	0.002	-0.027	-0.025	-0.002
	(0.025)	(0.014)	(0.023)	(0.004)
Population		0.000		
		(0.0001)**		
Political Party		0.180		
		(0.077)*		
Unemployment		-0.027		
		(0.013)*		
Low Income Tax		0.170		
		(0.021)**		
State FE		No	Yes	Yes
Time FE	No	No	No	Yes
	No			
cons	12.539	11.688	12.685	12.696
	(0.156)**	(0.131)**	(0.127)**	(0.021)**
R^2	0.00	0.76	0.01	0.96

* $p<0.05$; ** $p<0.01$

Table 1 provides a set of four different regression results, the first being a simple regression of the natural logarithm of capital gains on the high-income tax rate. The results are not statistically significant, and the coefficient suggests that a positive relationship between the high-income tax rate and number of capital gains realized exists. The second regression is a pooled OLS regression that contains a set of control variables. Population, political party, unemployment, and low-income tax were statistically significant in the second regression, and their results make some intuitive sense. For the population variable, one can expect that as the population increases, an increased amount of capital gains realizations will occur. The political party variable is also reasonably sensible, because states with a Republican majority state legislature are more likely to enact lower income tax policies, encouraging an increased amount of capital gains realizations. In this case, Republican majority state legislatures are associated with 18% more capital gains realizations. As discussed earlier, with an increase in the unemployment rate, one can expect the amount of capital gains realizations to decrease. The low-income tax rate variable is a bit more puzzling in its interpretation. As the low-income tax rate increases, the amount of capital gains realizations increased by 17%. The third regression is a one-way state fixed effects model that displays a negative relationship between the natural logarithm and the high-income tax rate. While this result appeared more sensible, it was not statistically significant. The interpretation of the coefficient in the one-way state fixed effects model is that as the high-income tax rate increases by one unit (or

one percentage point) the amount of capital gains realizations decreases by 2.5%. Finally, the fourth regression in Table 1 presents a two-way fixed effects model for time and state fixed effects, which suggests that if the high-income tax rate increases by one unit, (or one percentage point) then a decrease in -0.2% in capital gains realizations will occur; however, this result was not statistically significant.

Figure 4: Regression Results Extended

	(2-Way FE)
Variable:	
Highincometax	
	-0.002
	(0.35)
Lowincometax	
	0.008
	(1.08)
Politicalparty	
	-0.018
	(4.75)**
Unemployment	
	-0.002
	(0.82)
lnpopulation	
	0.784
	(4.14)**
_cons	2.656
	(1.08)
R2	0.96
N	262

Figure 4 displays the regression results that occurred from re-running the two-way fixed effects model and adding the additional independent variables, the control variables. This regression produced a much higher value for R^2; however, the interpretation of the coefficients makes less intuitive sense. The primary independent variable of interest was not statistically significant even in the fifth and final two-way fixed effects model. The relationship between high-income tax rates and capital gains realizations is negative, based on the coefficient. This is suggestive of the idea that if the high-income tax is increased by one percentage point, then the amount of capital gains realized as personal income is expected to decrease by 0.2%. The coefficient on low-income remained positive in the two-way fixed effects model, and the coefficient on the state unemployment rate remained negative. In the final regression, a coefficient for the natural logarithm of the population was added and produced statistically significant results. The results indicated that if the population increased by 1% then the amount

of capital gains realizations that would occur would increase by roughly 78%. This coefficient estimate is more than likely overstated and could potentially be indicative of omitted variable bias. Potential threats to validity in this study include the relatively small sample size, which in turn could produce an internal threat to validity. Since the high-income tax rate was not found to be statistically significant, this would create threats to external validity, as it would be difficult to apply the conclusions drawn from this study elsewhere.

IV. DISCUSSION & CONCLUSION

Widespread proponents of economic equality advocate for higher tax rates on those that earn the highest income. The exploration of the relationship between the rate of taxation amongst the highest-income taxpayers and the amount of capital gains realizations that will be reported is an area of policymaking that is in need of further investigation. The results from this study would suggest that a negative relationship exists between the highest rate of income taxation and the amount of capital gains that will be realized, and in turn, reported as individual income. Previous studies have produced similar results, suggesting that the elasticity of capital gains realizations with respect to the highest income tax rate is around -0.66, which indicates that the amount of capital gains that are realized are sensitive to a change in the highest marginal rate of income taxation.

There are many reasons to exhibit caution while interpreting both the results from this study and those from other studies on this topic. Regarding this study, the primary independent variable of interest did not produce statistically significant results; therefore, these findings should be taken lightly. Based on the coefficient estimates of the independent variables in the study, it is likely that omitted variable bias was a problem in the regressions that were run. In the future, it will be advantageous to add more independent variables to these models in order to reduce the likelihood that omitted variable bias is playing a significant role in the results. Finally, the panel study could be extended over a longer span of time in order to capture a wider range of data and potentially explain the short-term and long-term effects of adjusting the highest income rate of taxation.

In summary, the relationship between capital gains realizations and the rate of income taxation is an important area of exploration for policymakers, as it is associated with fundamental economic variables, such as the generation of tax revenue. In the future, more causal findings could equip policymakers with better evidence to make effective decisions when it comes to setting the income tax rates. An experiment that can determine a causal relationship between capital gains realizations and the income tax rates would allow policymakers to potentially increase tax revenue, as policymakers would be able to predict at what point individuals would stop recognizing capital gains as the tax rate increased.

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Data Appendix

The state unemployment rates were provided via the link in the references above from the Bureau of Labor Statistics and were recorded as integers in this study. The real amount of net capital gains was provided via the link above from the IRS. These figures display the amount of real net positive capital gains reported as income across states from the years 2006 through 2012. The tax rates were provided via the Tax Policy Center article "Income Tax Paid at Each Tax Rate, 1958-2009". This article displays both the highest rates of income taxation and the lowest rates of income taxation across states for the time periods of this study, 2006 through 2012. The state legislature composition can be accessed via the article listed above on the composition of state legislatures, which included data for all of the years in this study (2006-2012). A dummy variable was used to create the variable "political party" where values of 0 were assigned to state legislatures the held a democratic majority in the state legislature and values of 1 were assigned to state legislatures that held a republican majority in the state legislature. Further, the regression commands have been attached to the back of this study in order to understand how the corresponding output for the regressions in Table 1 and Figure 4 were generated.