Top Marginal Tax Rates and the Pre-Tax Distribution of Income

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Abstract

This paper looks at the paradoxical effect of top tax rates on the growth of pretax income of the bottom 90%–those not subject to the top rates. About half of those at the top of the income distribution work as executives in either non-financial or financial firms. These executives are in a position in which their decisions impact not only their own earnings, but the earnings of the workers in the companies they lead. This paper presents a model in which executives have two activities through which they can increase firm profitability. One is to increase the firm's level of technology while the other is to increase profitability through decreasing labor costs. In the model, a higher marginal tax rate on executive income induces them to work less (or less intensively) and can reduce *pre-tax* inequality by increasing the average income growth of workers (and decreasing that of executives). This hypothesis is tested by looking at the effect of top marginal tax rates on the income growth of the bottom 90% both through and independent of private-sector unionization over a 79 year period in the United States. Evidence from OLS and a FIML SEM model on long-run macroeconomic data provides strong support for the hypothesis that higher top marginal tax rates positively affect workers' income growth and little support for the hypothesis that top marginal tax rates negatively affect the economy's growth rate through lower productivity.
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1 Introduction

What do executives do? Are they engines of economic growth who will shrug off their responsibilities if they are taxed too heavily? Or are they robber barons getting rich off the backs of their laborers? This paper will be specifically interested in the macroeconomic effects of changing the top marginal tax rate that many of these executives face. Economic theory suggests that high marginal tax rates may induce people to substitute leisure for labor. If that is the case for highly-paid executives, that could potentially have either negative or positive macroeconomic effects depending on the main effect of their work. In particular, if higher top tax rates induce executives to focus less on increasing firms' profits by lowering the cost of labor, it could be that higher top marginal tax rates lead to higher wage rates for non-executive labor.

In the United States over the post-WWII period, there has been a strong negative correlation between the top marginal tax rate and the pre-tax share of income of the top 1% or 0.01%. According to data from Piketty and Saez (2003, updated online), the (non-capital gains) income share of the top 1% has grown from a low of 7.7% in 1973 to a pre-recession high of 18.3% in 2007. The top 0.01% has seen even more significant gains going from just under 0.5% in 1973 to 3.6% in 2007. Over the same period the top federal marginal income tax rate fell from 70% to 35% (although those just in the top 1% faced a 50% marginal tax rate in 1973).

As Piketty, Saez, and Stantcheva (2011) note this negative correlation between top income shares and top marginal tax rates could be the result of three elasticities. It could be the result of those at the top working less (or less intensively) as they reach income levels that were subjected to federal marginal income tax rates above 90% in the 1940s and 1950s and 70% or above in the 1960s and 1970s. It could also be the result of high earners putting more effort into income hiding and tax avoidance. What is less clear is why the average income of the bottom 90%, the income of those well below being affected by the top marginal tax rate, would show a strong (positive) correlation with the top marginal tax rate. The income

share of the bottom 90% was 68.1% of income in 1973 and had fallen to less than 55% in 2007. But more importantly for those outside the top decile, between 1950 and 1973, average real income growth was about 2.4% per year. Between 1974 and 2010 it has barely been above zero while average incomes of the top 1% and 0.01% grew at an annual rate of over 3% and over 6% respectively. Piketty et al hypothesize that this could be a "compensation bargaining" elasticity in which executives work harder to reduce the compensation of labor in order to increase their own income.

Who is in the top 1% and top 0.01%? Why would the tax rate faced by those at the top affect those at the bottom? If these are just successful musicians, athletes, hedge-fund managers, and trust funders, then we wouldn't really expect any relationship between the marginal rate faced by this group and the average incomes of the bottom 90%. Bakija, Cole, and Heim (2010) show that in 2005 non-finance executives, managers, and supervisors made up 31% of the top 1% and 42.5% of the top 0.1%[1]. These are mostly salaried executives or executives of a closely-held business. That is, a large percent of those at the top (especially the very top) are at the head of firms employing workers. In addition they show that non-finance executives in the top 0.1% (followed by non-finance supervisors) have seen their real income grow relatively faster than any other occupation group in that top one thousandth.

Typically models that focus on the effects of increasing the top marginal tax rate focus on the effects of those who earn the top incomes and/or on the effects of after-tax income redistribution. Slemrod (2000) provides a summary of both the relevant questions on how raising the top marginal tax rate may affect the rich and the various lines of research. One important question is whether those at the top of the income distribution will work less when marginal tax rates are increased. Moffitt and Wilhelm (2000) use the 1986 Tax Reform Act and Survey of Consumer Finances to look for effects in changes of the marginal tax rate on both adjusted gross income and hours worked. Consistent with Feldstein (1995), they find that reported income increases as marginal tax rates decrease. However, they find little

[1]Financial professionals, including management, added 13.9% and 18.0% respectively.

effect of changes in marginal tax rates on the number of hours worked, possibly due to the fact that high-income workers already put in very high hours. In response, Taber (2000) points out that the increase in reported income due to low marginal rates may be due to a change in the type of work, rather than the quantity (and may not be due to tax avoidance).

In their survey of tax elasticities, Saez, Slemrod, and Giertz (2012), also point out that while hours worked do not seem to be sensitive to tax rates, taxable income is. They also discuss the possibility of externalities in response to changes in tax rates such as charitable giving and mortgage-financed housing purchases. Saez et. al. mention the possibility that executives may work to increase their pay when faced with lower marginal tax rates at the expense of shareholders as discussed in Bebchuck and Fried (2004). They do not mention the possibility that executives may do the same thing with respect to workers' wages.

But what do CEOs actually do? Classical economic theory says that they are hired by shareholders to maximize the firm's long-term profits. This relationship has been analyzed as a principal-agent problem in which the goals of the CEO may differ from those of shareholders. But less has been said about the mechanics through which CEOs are meant to increase profits. Gabaix and Landier (2006) propose a model in which executives have different talent levels which interact with firm size to justify the fact that while profit levels explain only a small fraction of CEO pay, firm size explains a lot (Tosi et al, 2000). A hint of one CEO task comes from both Banning and Chiles (2007) and Gomez and Tzioumis (2011) which both find that CEOs of non-union firms earn more than CEOs in union firms. If we think of a firm that takes inputs (labor, capital, technology, executive skill) and is able to create positive economic profits (or rents), then those profits need to be distributed among its inputs. How they get distributed will depend on a number of factors which will reflect the relative bargaining power of each group. In addition, Bluestone and Bluestone (1992) note that union workers tend to earn 15-20 percent than non-union workers.

In the 1970s and 1980s, union-management relations became more contentious. Kochan et al (1986) believe this was due to increased competitive pressure from lower-cost labor

abroad and non-union workers in the United States. They note that of the two million jobs lost in manufacturing in the early 1980s, half were union jobs. Walton et al (1994) claim that along with increasing managerial flexibility and increased worker productivity, management sought to reduce pay and benefits, either in absolute terms or relative to their previous growth rates. Bluestone and Bluestone (1992) note that as profits firms enjoyed in the two decades after WWII declined one route that firms took was to "aggressively challenge the wage demands of their employees" (p.67).

This paper presents a model in which executives split their work time between improving the firm's level of technology and reducing the firm's wage bill. The model predicts that a higher marginal tax on executive income will lead to lower overall GDP growth but a higher average income for workers. Evidence from the United States between 1929 and 2008 supports the second hypothesis but not the first. That is, higher top marginal tax rates are associated with faster income growth for the bottom 90%, mainly through unionization levels and the relationship between unionization and imports.

Contra the second hypothesis generated by the model, a higher top marginal tax rate is not associated with lower growth in overall GDP. Rather, the data imply that a higher marginal tax rate has no effect or a slightly positive effect on economic growth. This suggests that there may be aggregate demand effects explored only indirectly in the model in which higher labor earnings lead to higher aggregate demand and more production. Where the data is clear is in a higher tax rate's effect on average incomes at the top of the earnings distribution. An increase in the top marginal tax rate leads to a significant reduction in the pre-tax share of (at least reported) income at the very top.

The following section presents the model in which executives choose between leisure and work and decide on how to split their time between the two types of work. Section 3 does some comparative statics in the model to generate macroeconomic hypotheses of the effect of a change in the top marginal tax rate. Section four tests these hypotheses with a time series data set for the United States. Section five concludes and offers steps for further research.

2 Model

In order to focus on the labor effects of top marginal tax rates, I assume that each firm j produces using only labor:

$$y_j = A_j F(L_j) \tag{1}$$

Where A represents the firm's level of technology (or the Solow residual in macroeconomic terms) and the production function is assumed to be increasing and concave ($F'(L) > 0, F''(L) < 0$). With the price of the consumption good normalized to one, profits are simply:

$$\pi_j = A_j F(L_j) - \omega_j L_j \tag{2}$$

Where ω_j is the wage paid to workers in firm j and L_j is the amount of labor used. The model assumes some market power by firms both in the employment of labor, so that the wage may be less than a worker's marginal product, and in the output market, so that profits may be positive.

The focus of this model is the role of the head of the firm, the chief executive officer (CEO). While CEOs can have a number of incentives (minimizing risk, increasing tenure, building reputation, etc.), this paper assumes that the CEO's goal is the same as that of shareholders: maximizing profits. In this model, profits increase with the level of technology (A) and decrease with the wage rate paid to workers (ω). CEOs can split their time (e) between encouraging the firm to improve the level of technology (e_A) or by decreasing the wage rate (e_ω) (through bargaining, reducing the power of unions, sending production offshore, etc.), or leisure (l). In return, I make the simplifying assumption that CEOs are paid based on some function of the firm's profits[2], $g(\pi_j)$ where $g(\cdot)$ is assumed to be increasing. The remainder of profits, $\pi_j - g(\pi_j)$, are distributed to shareholders who are assumed to be distinct from

[2]This ignores the fact that maximizing short-term profits may not be the same as maximizing long-term profits and instead makes the simplifying assumption that they are the same.

the workers of the firms.

Workers, in the model, are not able to split their time and must either work or not. For the sake of simplicity, I assume that workers are homogenous and have a reservation wage equal to $\omega_R < AF'(L)$. So long as there is demand for their labor and the offered wage is above this reservation wage, workers will supply labor to the firms. In order for workers to be hired in equilibrium the wage must between the workers' reservation wage and each worker's marginal product:

$$\omega_R \leq \omega(e_\omega) \leq AF'(L)$$

I assume that returns to both types of an executive's labor are increasing in terms of profits and (at least weakly) concave:

$$\begin{aligned} A'(e_A) &> 0 \\ A''(e_A) &\leq 0 \\ \omega(e_\omega) &< 0 \\ \omega(e_\omega) &\geq 0 \end{aligned} \tag{3}$$

The CEO has one unit of time available each period so that the time constraint is given by:

$$e_A + e_\omega + l = 1 \tag{4}$$

And must pay a tax rate on income of $\tau_e < 1$. CEOs receive utility from both consumption and leisure. Utility is assumed to be increasing and concave in both arguments. Because there is no savings in this model, consumption is simply equal to after-tax income. I make the simplifying assumption that executive pay is just some fraction, γ, of the firm's profits

$(g(\pi_j) = \gamma\pi_j)$. We can summarize the CEO's problem as:

$$\max_{e_A, e_\omega, l} u(c, l) \tag{5}$$

$$s.t. \qquad (1) \quad c = (1 - \tau_e)\,\gamma\,[A(e_A)F(L) - \omega(e_\omega)L]$$

$$(2) \quad e_A + e_\omega + l = 1$$

The solution to this relatively straightforward problem is given in Appendix A. The CEO chooses each type of labor and leisure so as to equalize the marginal benefits.

$$A'(e_A)F(L) = -\omega'(e_\omega) \tag{6}$$

and

$$(1 - \tau_e)\gamma A'(e_A)F(L) = \frac{u_l}{u_c} \tag{7}$$

Where u_l and u_c are the marginal utility of leisure and consumption, respectively.

3 Implications

There are two pathways through which the marginal tax rate faced by executives can affect macroeconomic variables in the model presented above: the growth rate of technology, A, and the wage rates, ωL. The first argues that if executives work less (or less intensively) due to a higher marginal tax rate then the economy will face a lower growth rate for as long as executives decrease their labor as firms will do less to improve their level of technology and the economy will suffer for it. The second says that a higher top marginal tax rate will increase the average income for non-executive workers as executives do less to reduce labor

costs, but which may in turn reduce the amount of this higher-priced labor employed by profit-maximizing firms.

The final two equations in section 2, combined with the fact that firms will maximize profits by choosing a labor force based on setting the marginal product of labor equal to the wage rate ($A(e_A)F'(L) = \omega(e_\omega)$), allow us to see how a number of variables respond to the tax rate paid by executives, τ_e. From (7) we see that:

$$\frac{\partial \left({}^{u_l}/_{u_c} \right)}{\partial \tau_e} < 0$$

This says that as the tax rate increases, the marginal utility of leisure has to decrease (so that leisure itself increases) and/or the marginal utility of consumption has to increase (so that consumption decreases). This gives us the standard result that as marginal tax rates increase workers substitute leisure for labor. But as executives work less, there are two effects on the firm. First, as e_A decreases, the firm's level of technology will grow more slowly:

$$\frac{\partial A}{\partial \tau_e} < 0 \tag{8}$$

Second, as the CEO reduces e_ω, the wage rate of the workers will increase as the CEO devotes less time to reducing labor costs[3]:

$$\frac{\partial \omega}{\partial \tau_e} > 0 \tag{9}$$

Equation (9) gives us our first testable implication. The wage rate of workers should increase as the tax rate faced by executives increases. Equation (8) implies that the level of technology, or total factor productivity) should grow more slowly as the tax rate on CEO income increases. What is less clear is the effect of a change of the executive tax rate on

[3]In this model, the wage does not depend on the level of technology, whereas in a competitive model the wage is equal to the marginal product of labor: $\omega = AF'(L)$. If the wage is positively related to the level of technology, A, then this will push equation (9) in a negative direction.

total economic growth and labor productivity.

Moving from a microeconomic model to macroeconomic variables, let Y_P be gross domestic product (GDP). Recall that in the model, $Y = A(e_A)F(L)$. Taking the partial derivative of Y with respect to τ_e gives us:

$$\frac{\partial Y_P}{\partial \tau_e} = A(e_A)\frac{\partial F(L)}{\partial \tau_e} + F(L)\frac{\partial A(e_A)}{\partial \tau_e} \tag{10}$$

The second term on the RHS of equation (10) is negative ($F(L) > 0$ and from (8) we know that the derivative of technology with respect to the executive tax rate is negative). The first term of (10) is also negative. To see why, we know that $A(e_A)$ is positive. But from (9) we know that the wage rate goes up as τ_e increases. As the wage rate goes up, firms will hire fewer workers to equate the wage with the marginal product of labor ($\frac{\partial L}{\partial \omega} < 0$). As firms employ fewer workers, $F(L)$ decreases. Thus the effect of an increase in the executive tax rate on total output is negative in the model.

However, this ignores aggregate demand effects. If output is constrained by AD, then an increase in τ_e could lead to an increase in ωL, depending on the relative elasticities with respect to ω and L. This, in turn, could increase total production Y, pushing (10) in a more positive direction. While this is not a general equilibrium model, we can see some of these potential effects. If we allow Y_I to be gross domestic income, we can write:

$$Y_I = \omega L + \Pi + E \tag{11}$$

Where E is total executive compensation in the economy (the sum of $g(\pi_j)$ across all firms) and Π is the economy wide share of *post-executive compensation* profits (the sum of $\pi_j - g(\pi_j)$ across all firms)[4]. The effect of τ_e on Y_I is more ambiguous than its effect on Y_P. Differentiating (11) with respect to τ_e we get:

[4]Some of executive compensation, of course, is paid in the form of long-term compensation such as stock options, which would be related to π_j in the model. In the empirical section below, I focus on the shares and growth of average income without capital gains in order to hopefully compare apples to apples.

$$\frac{\partial Y_I}{\partial \tau_e} = \omega \frac{\partial L}{\partial \tau_e} + \frac{\partial \omega}{\partial \tau_e} L + \frac{\partial \Pi}{\partial \tau_e} + \frac{\partial E}{\partial \tau_e} \tag{12}$$

As discussed above, the first term on the RHS of (12) is negative while the second is positive. The net effect on labor income depends on the relative elasticities. While the model assumes that the marginal effect of executive tax rates on pre-executive pay profits is negative, it is unclear what the effect will be on profits after the executives are paid. This, presumably, will depend on the relative bargaining power of executives vs. shareholders. What is clear from the model is that the last term in (12), the effect of executive tax rates on executive pay, should be negative. How all the terms in (12) net out is left to the empirical results in the next section.

Furthermore, if we divide (11) through by Y_I we get shares of GDI:

$$1 = \frac{\omega L}{Y_I} + \frac{\Pi}{Y_I} + \frac{E}{Y_I} \tag{13}$$

Differentiating through with respect to τ_e shows that the sum of the effects has to balance out:

$$0 = \frac{\partial {}^{\omega L}/_{Y_I}}{\partial \tau_e} + \frac{\partial {}^{\Pi}/_{Y_I}}{\partial \tau_e} + \frac{\partial {}^{E}/_{Y_I}}{\partial \tau_e} \tag{14}$$

If the last term in (14) is strongly negative (as we would expect), then the other two terms are more likely to be positive.

The effect of τ_e on labor productivity is ambiguous. The average product of labor is generally defined as:

$$APL = \frac{Y}{L} = \frac{AF(L)}{L} \tag{15}$$

so that the derivative of the APL with respect to the executive tax rate is:

$$\frac{\partial APL}{\partial \tau_e} = \left(\frac{\partial Y}{\partial \tau_e} L - Y \frac{\partial L}{\partial \tau_e} \right) / L^2 \tag{16}$$

Given that Y and L are both positive, we've shown that the second term in the numerator of (11) is negative (so that its negative is positive) while from equation (10) the first term is negative. Because we have a number that is negative minus a negative number, equation (16) could be either positive or negative.

4 Empirical tests

4.1 Model Predictions

The previous section showed that the model has two effects through which changes in the top marginal tax rate, that faced by many CEOs, can effect macroeconomic variables. The first is through changes in the growth rate of technology, A. If executives are instrumental in driving the growth of a firm's level of technology (and a higher tax rate induces them to work less), then a higher tax rate will lead to lower economic growth and (potentially) lower growth in labor productivity. The second is through changes in the cost of labor. If CEOs are able to reduce labor costs with increased work, then a higher tax rate will lead to a higher growth rate in the average income of workers. Because these effects interact, and because firms will use less labor when wages are higher, the effect of a higher tax rate on the labor income share, and even profit share is ambiguous, depending on the relative strength of the wage and labor elasticities as well as aggregate demand effects. We would predict, however, that total executive pay will decrease as their marginal tax rate increases. These effects are summarized in Table 1.

Table 1: Model Predicted Effects of an Increase in the Top Tax Rate on Macroeconomic Variables

Macro Variable	Technology: $A(e)$	Labor Cost: $\omega(e)$	Total Effect
GDP per capita growth	(-)	(-) through lower L	(-)
GDI Growth	NA	(+/-)	(+/-)
Labor Productivity Growth	(-)	(+) through lower L	(+/-)
Average Wage (bottom 90%) Growth	NA	(+)	(+)
Labor Share (bottom 90%) of Income	NA	(+/-)	(+/-)
Corporate/Profit Share of Income	NA	(+/-)	(+/-)
Executive Share (top 0.01%) of Income	NA	(-)	(-)

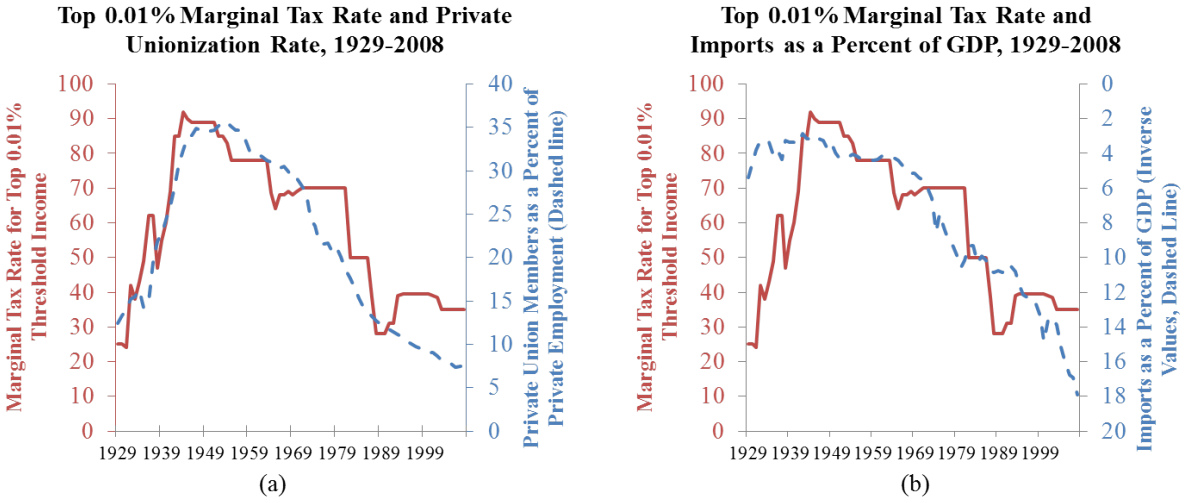
4.2 Data

The data set used in this section is a combination of U.S. tax data (Piketty and Saez, 2003 (updated online) and Tax Policy Center, 2010), macroeconomic variables (BEA), and data on the political composition of the U.S. House of Representatives, Senate, and Presidency. The main explanatory variable is the federal marginal income tax rate faced by those just in the top 1% and/or the federal marginal income tax rate faced by those just in the top 0.01%[5]. There has been substantial variation in the tax rates faced by these two groups, and as noted above, the concentration of executives increases as we move up the income distribution.

The mechanism in the model through which executives are able to reduce average wage growth is left somewhat unexplained (as it is in Piketty et al, 2011). A lower marginal tax rate induces executives to work more (or more intensively), splitting their time between increasing the firm's level of technology (and productivity) and decreasing the workers wages. Two areas in which executives may focus their efforts in reducing labor costs include reducing the influence of unions and increasing the use of offshoring. This implies that a decrease in the top marginal tax rate should lead to lower private union membership which in turn should lead to lower wage growth for workers. Figure 1(a) plots the marginal tax rate for those just in the top 0.01% and private union membership from Hirsch (2007). As you

[5]This is based on gross income minus government transfers. Each household will face a different marginal rate depending on how deductions affect AGI.

Figure 1: Marginal Tax Rates, Unionization, and Imports



can see, there is an extremely strong correlation ($\rho = 0.92$). Figure 1(b) plots the top marginal tax rate against (the inverse of) imports as a percentage of GDP. This relationship is somewhat weaker, but there is still a significant correlation ($\rho = -0.65$).

Because the total labor share of income will include much of the compensation paid to CEOs and other executives, I will use the the average income growth and income share of the bottom 90% as a stand in for average wage growth and labor share of income. Similarly, because total executive pay is not available, I will use the share of the top 0.01% as a measure of this income group. In order to focus on long-term trends rather than business cycle effects, I have smoothed the annual data of all growth rates using a Hodrick-Prescott filter. Summary statistics are presented in Table 2.

In addition to the total time period (1930-2008), I also provide a breakdown for what is considered the high growth period (1948-1973) and the more recent period of low growth (1974-2008) (see, for example, Cowen, 2011). What is perhaps striking is that while the real average income growth of the bottom 90% did fall precipitously from 2.43% per year to 0.07% per year, average annual growth in real GDP per capita fell by only 12 basis points (from 2.06% to 1.94%). The biggest changes from these two time periods are private-sector unionization (32% vs 13%), imports (11.7% vs. 4.6%) and especially the marginal tax rate

Table 2: Summary Statistics, 1930-2008

	1930-2008				1948-1973		1974-2008	
Variable	Mean	St. Dev.	Min	Max	Mean	St. Dev.	Mean	St. Dev.
Endogenous Variables								
Bottom 90% Average Income Growth*	1.75	2.35	-2.00	8.13	2.43	0.71	0.07	0.48
Real GDP Growth per capita*	2.47	1.49	0.35	7.15	2.06	0.69	1.94	0.25
Private Union Membership	21.64	9.78	7.40	35.70	32.05	2.95	13.25	5.06
Imports/GDP	7.49	4.22	2.84	17.89	4.55	0.70	11.72	2.63
Profits/GDP*	9.01	1.72	4.62	11.00	10.46	0.61	8.65	0.90
Bottom 90% Income Share	63.25	5.20	53.70	68.62	67.90	0.68	61.69	4.56
Top 0.01% Income Share	1.36	0.83	0.53	3.55	0.65	0.11	1.73	0.92
Top 0.01% Marginal Tax Rate	59.49	20.31	24.0	92.0	76.75	7.76	45.67	14.68
Exogenous Variables								
Top 1% Marginal Tax Rate	35.98	13.33	3.0	54.0	42.29	4.72	39.83	8.71
Exports/GDP	6.83	2.73	2.01	12.92	5.08	0.62	9.55	1.39
Percent Democrat House	57.42	8.13	37.70	76.78	57.26	5.75	56.14	7.11
Percent Democrat Senate	59.91	8.87	40.63	79.17	57.44	6.97	51.26	5.83
Democratic President	0.51	0.50	0	1	0.50	0.51	0.34	0.48

*: Business-cycle component removed with H-P filter

for the top 0.01% (76.75% vs. 45.67%).

I focus on the top 0.01% because of the likelihood that this groups includes the greatest number of executives with influence over the greatest number of employees. For example, Piketty & Saez (2003) note that in 2006 the average pay of the top 100 CEOs (including salary, bonus, and exercised stock options) was over $55 million, putting them comfortably in the top 0.01%. In addition, the tax data shows that there is a significant difference between the threshold income level of the top 1% and the top 0.01%. In nominal dollars, and not including capital gains, the 1973 thresholds respectively were $45,500 and $242,900 (or a ratio of 5.34). By 2007 these thresholds had increased to $347,600 and $6,886,000 (or a ratio of 19.8). There has also been much less variation in the marginal tax rate for those just in the top 1% in the post-WWII period (a range of 28-54% with a standard deviation of 7.2) as opposed to the top 0.01% (ranging from 28 to 89% with a standard deviation of 20.1).

4.3 Structural Equation Model Estimation

While the model offers a straightforward explanation of how the marginal tax rates faced by executives influences wage and productivity growth, in reality the picture must be much more muddied. While the top marginal tax rates may affect growth in per capita RGDP, growth will certainly influence the growth rate in the average income of the bottom 90%. Similarly, if executives work to reduce the influence of unions, unions will certainly work to reduce the influence of executives, perhaps by working for higher top marginal tax rates. Similarly, increased purchasing power by the bottom 90% could lead firms to produce more, increasing growth in per capita RGDP and corporate profits. On the other hand, a larger presence of private unions in the economy may reduce economic growth by making firms less flexible.

In order to control for this endogeneity, and at least suggest the causal direction of the endogenous variables, I use a full-information maximum likelihood structural equation model:

$$
\begin{aligned}
g_{\omega t} &= \alpha + F\left(\tau_{et}, g_{yt}, union_t, imp_t, Z_t^i\right) + G\left({}^{\Pi_t}/_{Y_t}, {}^{\omega_t L_t}/_{Y_t}, {}^{E_t}/_{Y_t}, \bar{Z}_t^i\right) && \text{(i)}\\
g_{yt} &= \alpha + F\left(\tau_{et}, union_t, {}^{\Pi_t}/_{Y_t}, {}^{\omega_t L_t}/_{Y_t}, Z_t^{ii}\right) + G\left(g_{\omega t}, {}^{E_t}/_{Y_t}, imp_t, \bar{Z}_t^{ii}\right) && \text{(ii)}\\
union_t &= \alpha + F\left(\tau_{et}, g_{\omega t}, imp_t, Z_t^{iii}\right) + G\left(g_{yt}, {}^{\omega_t L_t}/_{Y_t}, {}^{E_t}/_{Y_t}, \bar{Z}_t^{iii}\right) && \text{(iii)}\\
imp_t &= \alpha + F\left(\tau_{et}, union_t, {}^{\omega_t L_t}/_{Y_t}, Z_t^{iv}\right) + G\left(g_{\omega t}, g_{yt}, {}^{\Pi_t}/_{Y_t}, {}^{E_t}/_{Y_t}, \bar{Z}_t^{iv}\right) && \text{(iv)}\\
{}^{\Pi_t}/_{Y_t} &= \alpha + F\left(\tau_{et}, imp_t, union_t, {}^{\omega_t L_t}/_{Y_t}, Z_t^{v}\right) + G\left(g_{\omega t}, g_{yt}, {}^{E_t}/_{Y_t}, \bar{Z}_t^{v}\right) && \text{(v)}\\
{}^{\omega_t L_t}/_{Y_t} &= \alpha + F\left(\tau_{et}, g_{\omega t}, g_{yt}, union_t, Z_t^{vi}\right) + G\left(imp_t, {}^{\Pi_t}/_{Y_t}, {}^{E_t}/_{Y_t}, \bar{Z}_t^{vi}\right) && \text{(vi)}\\
{}^{E_t}/_{Y_t} &= \alpha + F\left(\tau_{et}, g_{yt}, union_t, Z_t^{vii}\right) + G\left(g_{\omega t}, imp_t, {}^{\Pi_t}/_{Y_t}, {}^{E_t}/_{Y_t}, \bar{Z}_t^{vii}\right) && \text{(vii)}\\
\tau_{et} &= \alpha + F\left(union_t, Z_t^{viii}\right) + G\left(g_{\omega t}, g_{yt}, {}^{\Pi_t}/_{Y_t}, {}^{\omega_t L_t}/_{Y_t}, {}^{E_t}/_{Y_t}, imp_t, \bar{Z}_t^{viii}\right) && \text{(viii)}
\end{aligned}
$$

Specifically, the endogenous variables in the model are (i) the average income growth of

the bottom 90%, g_{ω_t}, (ii) real GDP growth per capita, g_{yt}, (iii) private union membership as a percentage of private employees, $union_t$, (iv) imports as a percentage of GDP, imp_t, (v) corporate profits as a percentage of GDP, $^{\Pi_t}/_{Y_t}$, (vi) the bottom 90% share of (non-capital gains) income, $^{\omega_t L_t}/_{Y_t}$, (vii) the share of (non-capital gains) income going to the top 0.01%, $^{E_t}/_{Y_t}$, and (viii) the marginal tax rate for those just in the top 0.01%, τ_e. The exogenous variables in the model (Z_t above) include dummy variables for the Great Depression (1930-1940) and World War II (1941-1945), the marginal tax rate for those with gross income just in the top 1%, lagged per capita RGDP growth, exports as a percentage of GDP, and three political variables: the percent of House and Senate seats held by Democrats and a dummy variable if the president is a Democrat.

The structural models are identified as $\alpha + F(\cdot)$ in (i-viii) while the FIML model also captures the indirect effects, $G(\cdot)$, of non-structural endogenous and non-included exogenous variables, $\bar{Z}_t$. One useful feature of SEM models is that we can see both the direct effect of our variables of interest on the endogenous variables as well as the total effect. For example, we would assume that both high unionization levels and RGDP growth would be associated with higher growth in the average income of the bottom 90%. But if higher unionization is associated with lower RGDP growth (leading to lower growth for the bottom 90%), we can see which effects dominate.

Table 3 provides regression results for the SEM model above. Each of the eight columns represents one of the structural equations and provides coefficient estimates for standard OLS (for comparison) and FIML SEM model (both direct and total effects)[6]. Robust standard errors are provided in parentheses with one, two, and three asterisks representing statistical significance at the 10%, 5%, and 1% level.

The estimated OLS coefficients and direct effects of the FIML SEM model are quite similar in all columns except for the equations on union membership and imports (columns (iii) and (iv)). This lends some credence to the hypothesis that executives will work to

[6]3SLS results are similar in sign to the direct effects reported here although coefficients tend to be larger in absolute value and more likely to be significant.

Table 3: Macroeconomic Effects of Changes to the Top Marginal Tax Rate

	Bottom 90% Real Average Income Growth (i)			Real GDP per capita Growth (ii)			Private Union Membership (%) (iii)		
	OLS	Direct	Total	OLS	Direct	Total	OLS	Direct	Total
Endogenous Variables									
Top 0.01% Marg. Tax Rate	−0.018	−0.015	0.044**	0.017**	0.018***	0.013*	0.221***	0.120***	0.281**
	(0.014)	(0.015)	(0.020)	(0.007)	(0.006)	(0.007)	(0.027)	(0.023)	(0.139)
Bottom 90% Income Gr.			−0.015			−0.087***	0.424***	0.115	0.738***
			(0.040)			(0.010)	(0.159)	(0.236)	(0.181)
Real GDP per capita Gr.	1.133***	1.163***	1.165***			−0.022**			0.110
	(0.050)	(0.058)	(0.058)			(0.009)			(0.079)
Private Union Memb	0.241***	0.225***	0.170***	−0.032	−0.027	0.026			−0.0291
	(0.037)	(0.041)	(0.064)	(0.022)	(0.020)	(0.019)			(0.463)
Imports/GDP	0.265***	0.250***	−0.119**			−0.001	−1.346***	−1.943***	−1.196***
	(0.051)	(0.061)	(0.058)			(0.008)	(0.159)	(0.161)	(0.110)
Profit/GDP			−0.103	−0.057	−0.088	−0.086			−0.010
			(0.099)	(0.099)	(0.085)	(0.083)			(0.009)
Bottom 90% Inc Sh			0.017	0.034	0.025	0.041			−0.316
			(0.053)	(0.043)	(0.038)	(0.039)			(0.329)
Exogenous Variables									
Top 1% Marg Tax Rate			0.014	−0.029***	−0.030***	−0.009**			0.246***
			(0.015)	(0.007)	(0.007)	(0.004)			(0.059)
Lagged RGDPpc Gr			1.134***	0.967***	0.974***	0.952***			0.107
			(0.079)	(0.046)	(0.040)	(0.038)			(0.214)
Exports/GDP			−0.346***			−0.002			−3.492***
			(0.051)			(0.009)			(0.178)
Great Depression	1.581***	1.448***	−0.445	−0.018	−0.221	−0.477***	−8.387***	−12.193***	−9.063***
	(0.384)	(0.475)	(0.593)	(0.751)	(0.650)	(0.161)	(1.509)	(1.286)	(2.665)
WWII	1.639***	1.532***	−0.793*	−0.947***	−1.011***	−0.708***	−6.191***	−5.297***	−8.385***
	(0.309)	(0.343)	(0.433)	(0.328)	(0.293)	(0.199)	(1.316)	(1.525)	(1.721)
House % Democratic			−0.013**			−0.004**			−0.084*
			(0.007)			(0.002)			(0.043)
Senate % Democratic			0.014*			0.004			0.087*
			(0.008)			(0.003)			(0.045)
President Democrat			0.093			0.028			0.593*
			(0.060)			(0.019)			(0.313)
Constant	−7.507***	−7.259***		−0.718	0.016		19.346***	30.852***	
	(0.855)	(1.003)		(3.056)	(2.661)		(2.915)	(2.529)	
R^2 (OLS)	0.897			0.982			0.957		

Robust standard errors in parentheses

*,**,***: statistically significant at the 10%, 5%, and 1% levels

Table 3: Macroeconomic Effects of Changes to the Top Marginal Tax Rate, continued

	Imports/GDP (iv)			Profit/GDP (v)			Bottom 90% Income Share (vi)		
	OLS	Direct	Total	OLS	Direct	Total	OLS	Direct	Total
Endogenous Variables									
Top 0.01% Marg. Tax Rate	0.043***	−0.166	−0.057	0.015	0.016*	0.062***	−0.033	−0.022	0.083*
	(0.014)	(0.110)	(0.058)	(0.010)	(0.009)	(0.0.019)	(0.035)	(0.034)	(0.051)
Bottom 90% Income Gr.			−0.259			0.446***	−2.038***	−2.077***	−1.819***
			(0.057)			(0.076)	(0.202)	(0.201)	(0.176)
Real GDP per capita Gr.			0.022	0.143**	0.195***	0.237***	2.289***	2.362***	−0.046
			(0.033)	(0.057)	(0.053)	(0.057)	(0.256)	(0.242)	(0.213)
Private Union Memb	−0.278***	−0.534	0.219	0.260***	0.259***	0.268***	0.621***	0.615***	0.001
	(0.051)	(0.388)	(0.198)	(0.017)	(0.016)	(0.040)	(0.049)	(0.046)	(0.189)
Imports/GDP			−0.492***	0.348***	0.336***	−0.079			−0.456***
			(0.043)	(0.065)	(0.065)	(0.080)			(0.111)
Profit/GDP			−0.002			−0.021			0.004
			(0.002)			(0.020)			(0.004)
Bottom 90% Inc Sh	−0.111	0.268	0.137	−0.171***	−0.188***	−0.200***			−0.124
	(0.080)	(0.276)	(0.140)	(0.027)	(0.050)	(0.042)			(0.126)
Exogenous Variables									
Top 1% Marg Tax Rate			−0.044**	−0.052***	−0.047***	−0.010	0.105**	0.093*	0.165***
			(0.021)	(0.017)	(0.015)	(0.016)	(0.051)	(0.049)	(0.041)
Lagged RGDPpc Gr			0.021			0.231**			−0.045
			(0.060)			(0.105)			(0.160)
Exports/GDP	0.613***	2.919**	1.483***			−0.232***			−1.330***
	(0.227)	(0.227)	(0.066)			(0.054)			(0.112)
Great Depression	−4.126***	8.151	−0.899	−4.032***	−4.263***	−5.070***	−3.941***	−4.524***	−8.316***
	(1.448)	(6.748)	(0.786)	(0.603)	(0.623)	(0.637)	(1.407)	(1.337)	(1.517)
WWII	−0.893	7.800*	1.682**	−0.720**	−0.914***	−1.739***	0.817	0.519	−4.715***
	(0.984)	(4.671)	(0.680)	(0.335)	(0.354)	(0.551)	(0.953)	(0.892)	(0.901)
House % Democratic			0.017			−0.019*			−0.025*
			(0.011)			(0.010)			(0.013)
Senate % Democratic			−0.018			0.019*			0.026*
			(0.011)			(0.011)			(0.015)
President Democrat			−0.119			0.132*			0.175*
			(0.079)			(0.075)			(0.094)
Constant	14.345**	−32.697		12.851***	13.718		46.380***	46.282***	
	(6.53)	(27.079)		(3.425)	(3.466)		(1.018)	(0.976)	
R^2 (OLS)	0.937			0.946			0.951		

Robust standard errors in parentheses

*,**,***: statistically significant at the 10%, 5%, and 1% levels

Table 3: Macroeconomic Effects of Changes to the Top Marginal Tax Rate, continued

	Top 0.01% Income Share (vii)			Top 0.01% Marginal Tax Rate (viii)		
	OLS	Direct	Total	OLS	Direct	Total
Endogenous Variables						
Top 0.01% Marg. Tax Rate	−0.009	−0.010	−0.028***			0.382**
	(0.007)	(0.007)	(0.010)			(0.189)
Bottom 90% Income Gr.			−0.039***			1.004***
			(0.011)			(0.247)
Real GDP per capita Gr.	−0.071**	−0.078**	−0.083**			0.149
	(0.031)	(0.035)	(0.033)			(0.107)
Private Union Memb	−0.050***	−0.049***	−0.042	1.508***	1.361***	0.965
	(0.013)	(0.013)	(0.029)	(0.061)	(0.080)	(0.627)
Imports/GDP			0.075***			−1.628***
			(0.006)			(0.149)
Profit/GDP			0.007			−0.013
			(0.007)			(0.013)
Bottom 90% Inc Sh			0.017			−0.430
			(0.20)			(0.448)
Exogenous Variables						
Top 1% Marg Tax Rate			−0.024***	0.795***	0.989***	1.323***
			(0.007)	(0.103)	(0.092)	(0.139)
Lagged RGDPpc Gr			−0.081***			0.146
			(0.026)			(0.291)
Exports/GDP			0.218***			−4.751***
			(0.023)			(0.469)
Great Depression	0.570***	0.602***	0.897***	17.576***	24.274***	11.942**
	(0.110)	(0.128)	(0.264)	(4.407)	(3.868)	(6.002)
WWII	0.790***	0.820***	1.267***	12.390***	13.661***	2.252
	(0.123)	(0.145)	(0.176)	(1.998)	(1.897)	(3.234)
House % Democratic			0.008**	−0.142	−0.300***	−0.415**
			(0.004)	(0.119)	(0.113)	(0.167)
Senate % Democratic			−0.009**	0.155	0.310**	0.428**
			(0.004)	(0.120)	(0.134)	(0.187)
President Democrat			−0.059**	2.737***	2.112**	2.919**
			(0.027)	(1.007)	(0.980)	(1.373)
Constant	3.026***	3.054***		−6.709	−10.763*	
	(0.211)	(0.222)		(6.198)	(5.833)	
R^2 (OLS)	0.710			0.946		

Robust standard errors in parentheses

*,**,***: statistically significant at the 10%, 5%, and 1% levels

reduce labor costs by reducing the influence of unions and relying more on outsourcing production, leading the OLS estimates to be biased. When we look at the total effects of these two equations (adding in the indirect effects from other endogenous variables), we can see from these two columns that a lower marginal tax rate on the top 0.01% leads to lower unionization levels. And the effect of lower taxes leading to lower unionization levels is even more significant and almost as large when looking at the effect of changes to the marginal tax rates on the top 1%. Put together, an increase of 1 percentage point on the marginal tax rate of both the top 1% and top 0.01% would lead to union membership levels that are more than half a percentage point higher.

From column (iii) we can see that higher imports leads to lower unionization rates (possibly as unionized firms close up domestic production and move it offshore or perhaps from new firms using overseas labor replacing domestic production). The opposite effect, however, in which higher unionization leads to lower imports is suggested as a direct effect but actually becomes positive when looking at the total effect of unionization on imports (although still statistically insignificant). The coefficient on higher marginal tax rates on the top 0.01% has a negative but insignificant effect on imports in column (iv). However, the effect of the marginal tax rate on the top 1% is also negative and significant at the 5% level. Taken together, these results suggest that imports will increase as top marginal tax rates are reduced.

This leads to the strong support for the model's hypothesis that higher executive tax rates will increase the average wage growth of workers as seen in column (i). We can see that when union membership is included as an independent variable, the direct effect of the marginal tax rate faced by those in the top 0.01% on labor income growth is small and even negative (although not significantly so). However, the total effect, taking into account the top marginal tax rates effects on unionization and imports, is positive. An increase of one percentage point in the top marginal tax rate would add 4.4 basis points to the annual growth in average real income for the bottom 90%. This growth rate averaged 2.43% from

1947 to 1973 but only 0.07% from 1974 to 2008. Meanwhile the average top marginal tax rate in those two period fell over 30 percentage points over that time frame (from 76.75% to 45.67%). The effect of that drop in the tax rate can account for 1.37 percentage points in the fall of average income growth for the bottom 90%, or 58% of the decrease. The total effect of a change in the marginal tax rate for the top 1% is only about 1/3 as large and not statistically significant.

The effect of trade on the real income growth of the bottom 90% is interesting in that the direct effect of higher imports is positive, likely due to the lower prices of imported goods (real wages increase even if nominal wages are flat as the price of goods falls). However, the total effect of imports (and exports) is negative, and both economically and statistically significant. A balanced increase of one percentage point of GDP in both imports and exports leads, through reduced unionization, to a 46.5 basis point decrease in the growth of the average income of the bottom 90%. This is due to the fact that increased trade is associated with significantly lower levels of unionization. The direct effect of a one percentage point increase in the imports/GDP ratio reduces unionization levels by almost two percentage points which, in turn, reduces the income growth of the bottom 90%.

The most confident prediction made in the model, from equation (12) is that the executive share of income in the economy will decrease as the marginal tax rate faced by this group increases. From column (vii) we can see that this is indeed the case, both for the marginal tax rate of the top 0.01% (reducing the share of that group by 2.8 basis points) and the marginal rate for the top 1% (reducing the share of the top 0.01% by 2.4 basis points). The effect of top marginal tax rates on the bottom 90% in column (vi) is only slightly less clear. An increase in the marginal tax rate of the top 0.01% increases the share of the bottom 90% by 8.3bp (significant at the 10% level) while an increase in the marginal rate of the top 1% increases it a further 16.5bp. This implies that the wage elasticity with respect to the executive tax rate is larger than the labor elasticity, so that an increase in the tax rate increases total labor income.

The hypothesis from the model of the effect of top marginal tax rates on corporate profits as a share of GDP was ambiguous. On the one hand, the model predicts that corporate profits before executives are paid should go down when executive tax rates go up. On the other hand, if executives have a stronger bargaining hand than shareholders in determining their pay then measured corporate profits (net of executive pay) could go up when there is an increase in the tax rate. Column (v) shows that both the direct and total effects of an increase in the marginal tax rate of the top 0.01% have a positive effect on corporate profits (with only a small and insignificant effect of the top 1% tax rate). This provides some support for Bebchuk and Fried (2006) who say that powerful CEOs can increase pay at the cost of shareholders when faced with lower marginal tax rates.

The evidence presented so far provides support for the assumption that executives can affect the wage growth of labor. But what of the claim that they affect the growth in a firm's level of technology? The positive effect of tax increases on corporate profits provides some evidence that this assumption may be incorrect. Column (ii) also shows that both the direct and total effects of an increase in the top marginal tax rate on growth are small but positive[7]. The direct effect of the marginal tax rate on the top 1%, however, is negative and significant (with a 1 percentage point increase in the tax rate leading to a decrease of 3bp in growth) although somewhat ameliorated in total effect. This implies that an increase in the marginal tax rate of the top 0.01% (but not the top 1%) would actually be good for growth.

5 Conclusion

The main contribution of this paper is to show that top marginal tax rates can affect the pre-tax distribution of income, not only by reducing the income of those at the very top (as would be suggested by standard economic theory) but also by increasing the growth of income for the bottom 90%. The model presented here suggests that executives will work more (or more intensively) to decrease the labor costs in firms when they face lower marginal

[7]Results using a shorter time frame and output per hour worked yield quite similar results

tax rates, increasing their income and decreasing that of their workers. At the same time, they may work harder to increase firm-level productivity so that lower top marginal tax rates will yield to faster growth.

Taken all together, the results in section 4 imply that while there is support for the assumption that executives have an effect on the firm's wage bill and will work harder to reduce it when they face a lower marginal tax rate, they have little effect on technological growth (although there is a negative effect on growth on the top tax rate for the top 1%). On a macroeconomic level, therefore, while the pre-tax distribution of income seems to be changed significantly over time due to different top marginal tax rates, there is no negative effect on growth in (much) higher tax rates for the very richest. In fact, the data show a positive effect of the top marginal tax rate on overall GDP growth. This implies that there may be an aggregate demand effect of changing the top marginal tax rate in which higher wages for the bottom 90% boost overall demand leading to an increase in supply, higher growth rates, and higher corporate profits.

The full-information maximum likelihood structural equation model results presented above suggest that higher marginal tax rates on the top 0.01% work indirectly on the average income growth of the bottom 90%. First, lower top marginal tax rates are associated with lower levels of private-sector unionization. This, in turn, reduces the income growth of the bottom 90%. In addition, lower top marginal tax rates are related to higher import levels. Higher import levels then lead to lower levels of unionization, again leading to lower income growth for the bottom 90%.

The main caveat to these results is really the same as with any macroeconometric analysis. This is only one time series in one country. It's certainly possible that the driving force was increased global competition from higher trade levels which decreased the power of more expensive union labor and decreased income growth except for those at the top. This would require either a coincidental decrease in top marginal tax rates during the same period or perhaps a misguided policy of reducing tax rates in order to provide incentives for executives

to spur economic growth.

However, a number of developed countries, also competing in the same globalized market, have not seen such large increases in the pre-tax income share of those at the top. As Piketty et al (2011) show that countries such as Germany, France, Sweden, Spain, and Denmark have not seen the same increase in inequality over the last 45-50 years as the United States (and United Kingdom). In addition, a number of countries have changed their top marginal tax rates significantly over this period while a number of others have kept top rates relatively high. They show that there is a strong correlation between changes in the top marginal tax rate and the top 1% income share (and CEO compensation). Expanding their results to focus on the average real income growth of the bottom 90% would provide more evidence for or against the hypothesis that executives work harder to reduce labor costs when top marginal tax rates are lower.

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A Solution to the Model (Not for Publication)

A.1 Executive's Problem

The executive's problem from section 2 is:

$$\max_{e_A, e_\omega, l} u(c, l) \tag{A1}$$

$$s.t. \qquad (1) \quad c = (1 - \tau_e)\,\gamma\,[A(e_A)F(L) - \omega(e_\omega)L]$$

$$(2) \quad e_A + e_\omega + l = 1$$

Because there is no saving in the model and utility is monotonically increasing in consumption, we know that the constraints will bind. With some substitution we can set up the Lagrangian:

$$\mathscr{L} = u\left((1 - \tau_e)\gamma\left[A(e_A)F(L) - \omega(e_\omega)L\right], l\right) - \lambda(l + e_A + e_\omega - 1) \tag{A2}$$

Where the choice variables are e_A, e_ω, and l, and λ is the Lagrangian multiplier. Taking the four first order conditions we get:

$$\frac{\partial \mathscr{L}}{\partial e_A} = u_1\,(1 - \tau_e)\,\gamma\,[A'(e_A)F(L)] - \lambda = 0 \tag{A3}$$

$$\frac{\partial \mathscr{L}}{\partial e_\omega} = -u_1\,(1 - \tau_e)\,\gamma\omega'(e_\omega) - \lambda = 0 \tag{A4}$$

$$\frac{\partial \mathscr{L}}{\partial l} = u_2 - \lambda = 0 \tag{A5}$$

$$\frac{\partial \mathscr{L}}{\partial e_A} = l + e_A + e_\omega - 1 = 0 \tag{A6}$$

Where u_1 and u_2 are the partial derivatives of the utility function with respect to consumption and leisure, respectively, and $A'(e_A)$ and $\omega'(e_\omega)$ are the first derivatives of the technology and wage functions with respect to executive labor. Recall that $A'(e_A) > 0$ and $\omega'(e_\omega) < 0$. Combining (A3) and (A4) we get the expected result that the marginal product of each type of labor should be equal:

$$A'(e_A)F(L) = \omega'(e_\omega) \tag{A7}$$

If we combine (A3) with (A5) we get:

$$(1 - \tau_e)\,\gamma\,[A'(e_A)F(L)] = \frac{u_2}{u_1} \tag{A8}$$

The RHS of (A8) gives the ratio of the marginal utility of leisure to the marginal utility of consumption. Taking the partial derivative of the LHS of (A8) with respect to the tax rate τ_e gives a negative number. So as τ_e increases, the RHS of (A8) has to decrease as well. This means that the executive will increase leisure and reduce consumption (by reducing hours worked) when his tax rate increases.

A.2 Firm's Problem

The firm (and executive) are trying to maximize profits.

$$\pi_j = A_j F(L_j) - \omega_j L_j \tag{A9}$$

The firm will choose the amount of labor such that the marginal product of labor is equal to the wage rate:

$$AF'(L) = \omega \tag{A10}$$

How will the firm respond to an increase in the executive's tax rate? Taking the derivative of (A10) with respect to τ_e gives us:

$$\frac{\partial MPL}{\partial \tau_e} = A(e_A)\frac{\partial F'(L)}{\partial \tau_e} + \frac{\partial A(e_A)}{\partial \tau_e}F'(L) = \frac{\partial \omega}{\tau_e} \tag{A11}$$

$A(e_A)$ and $F'(L)$ are positive and we know (by assumption) that $\frac{\partial \omega}{\partial \tau_e} > 0$ but that $\frac{\partial A}{\partial \tau_e} < 0$. That implies that $\frac{\partial F'(L)}{\partial \tau_e} > 0$ otherwise the LHS of (A11) would be negative. This makes sense because as the wage rate goes up (due to a higher executive tax rate), the firm will reduce the amount of labor used which will increase labor's marginal product. This also implies that $\frac{\partial L}{\partial \tau_e} < 0$ which is tested in section 4.4 with mixed results.