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Abstract

A one percentage point higher personal income taxation of CEOs results in a 1.3 percent lower firm performance, since CEOs reduce their effort as a response to their reduced net pay. There is a trade-off between the desire to tax CEOs more from an equity perspective and the resulting efficiency losses at the firm level. Our empirical results support the shareholder value view on CEO pay, since we show a causal effect of CEO pay on firm performance.

Keywords: Executive Compensation, Personal Income Taxation

JEL classification: H24, M12

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1 Introduction

What is the causal effect of CEO pay on firm performance? This fundamental question is difficult to address due to the highly endogenous determination of CEO pay. In order to optimally incentivize CEOs, CEO contracts typically schedule an increase in CEO pay with increasing firm performance (Lemieux et al., 2009). This makes it impossible to interpret any observed correlation between executive pay and firm outcomes as a causal relationship (Edmans et al., 2017). Instead, we exploit the quasi-experimental variation in CEOs personal income tax rates as exogenous variation in CEO pay. If governments increase personal income tax rates CEOs earn less but the reduction in CEO pay is exogenously determined. Our findings imply that an increase in the personal income tax rate by one percentage point reduces firm performance by 0.13 percent.

This result is important for at least two reasons. The appropriate level of CEO personal income taxation is controversial from a tax policy perspective. Diamond and Saez (2011) ask for a marginal federal income tax rate of up to 76 %. However, as pointed out by Ales and Sleet (2016), their arguments abstract from any positive impact of the efforts of these top income earners on the incomes of other agents or on tax revenues collected from other sources. Based on an assignment model (augmented with an intensive CEO effort margin) they show, that the taxation of CEO incomes affects the equilibrium pricing of CEO effective labor and, hence, spills over and affects firm profits. Based on their benchmark parameterization they conclude that a marginal income tax rate of only 15% is optimal for top income earners - which is in sharp contrast to the 76% optimal income tax rate proposed by Diamond and Saez (2011). Our result points to the importance of taking the impact of CEO effort on firm performance into account when discussing the appropriate level of personal income taxation.

Our result is also important from a pure business perspective: Is the high level of CEO pay necessary for firm performance? According to the shareholder value view the high level of CEO pay is justified, since CEO pay incentivizes managers in the most efficient way in order to maximize shareholder value. The increasing importance of CEO ability for firm success over time explains increasing CEO pay. CEO pay matters for firm performance. On the

contrary, according to the rent extraction view, increasing CEO pay is not justified. CEO pay then should not matter for firm performance. Our findings imply a causal effect of CEO pay on firm performance. Thus, CEO pay is at least partly justified in order to maximize shareholder value.

We provide empirical evidence on how personal income taxation affects firm performance and why the observed effect is plausibly caused by CEOs. Our source of identification is the variation in personal income tax rates across states in the US. Most US states collect a state income tax in addition to the federal income tax currently levied at a top rate of 37%. California has the highest additional top income tax rate of 13% which applies to individuals with an income exceeding $1 million USD. Many states have top income tax rates between 5 % and 10%, some states do not levy an additional income tax at all. Even more important for our identification strategy many states change their income tax rates over our sample period covering the years 1992 to 2017.

We show that firm performance declines by 0.13 percent if the top marginal personal income tax rate increases by one percentage point. This observation is consistent with the assignment model of Ales and Sleet (2016) and the shareholder value view. Firms fix CEO pay in order to win the most productive CEO for the firm and to incentivize this CEO in an optimal way. Any unanticipated income tax change will violate the underlying optimality considerations. An income tax increase should result in CEOs reducing their effort due to their reduced net income or even leaving the firm. As a consequence operating firm performance declines.

This result is confirmed in an stacked event study design. While we do not observe pre-trends, firm operating performance following a top marginal tax rate increase declines for 2 periods. Firms in the long run should then adapt to the new tax environment along many dimensions including the adjustment of CEO contracts. Consistent with this expectation, firm operating performance starts to approach the pre-reform level in period 3 and the following periods.

We provide several empirical tests to show that decreased CEO effort is indeed the driver behind the observed decrease in operating firm performance. First, firms increasingly incentivize their CEOs not only based on stock options, but also using other performance goals

(Bennett et al., 2017) such as earnings, sales or earnings before interest and tax (EBIT). Since the Securities and Exchange Commission (SEC) standardized the disclosure of such performance goals awards after 2006 and such performance goals are observable, we are able to investigate the effect of state level personal income taxation on the percentage of performance goals reached by CEOs. We find that following an increase in the top marginal tax rate by one percentage point, CEOs reach 0.8 percent performance goals less.

Second, if CEOs put less effort in managing their firms, they should put more effort in alternative activities such as assuming external board seats, writing books (Malmendier and Tate, 2009) or playing golf (Biggerstaff et al., 2017). Private activities such as writing books or playing golf are difficult to observe on a large scale. On the contrary, firms disclose their board members and external board membership therefore is observable for many CEOs. We thus focus on board membership as an alternative CEO activity. We find CEOs to increase their activities at external boards following a top marginal tax rate increase. If their top marginal tax rate increases by one percentage point, the likelihood to sit on an additional committee in an outside board increases by 3.5 percent.

Third, powerful CEOs could use their bargaining power to shift any additional personal tax load on their CEO pay to their employers (Bird, 2018). We investigate the variation in CEO pay following state level personal income tax changes. Consistent with the results of Bird (2018) we do not find evidence for CEOs shifting their personal tax load to their employers. In the short to medium run the CEO bears the incidence of increases in state level personal income taxes. This is a necessary condition for any change in CEO behavior in reaction to personal income tax changes as a quasi-natural experiment in order to identify a causal relationship between CEO pay and firm performance.

Fourth, we exploit CEO heterogeneity to identify effects at the CEO level along two dimensions. As the first dimension, CEOs owning a substantial share of wealth in their firms should have stronger incentives to run their firms well regardless of their top marginal tax rate. As the second dimension, CEOs with a larger share of unvested stocks and unvested options relative to their total compensation should have higher stakes in their firms and be less affected by a change in the top marginal tax rate. Along both dimensions we find CEOs with less financial exposure to firm success to react more heavily to changes in their top

marginal tax rate. This identification strategy allows to control for state-year fixed effects absorbing any unobserved shock at the state-year level simultaneously influencing CEO or firm performance as well as tax policy. Further, in all regressions we employ exclusively exogenous top marginal tax rate changes as determined by Giroud and Rauh (2019) to mitigate such endogeneity concerns.

Fifth, changes in state level personal income taxation could in principle affect all workers of a firm. To this end, we control for the average tax rate faced by individuals at the median and the top one percentile of the state income distribution. While the average individual at the top percentile of the income distribution had an income of 545.978 USD in 2018[1], the average executive in our sample earns 4.8 million USD. CEOs should respond to a change in the top marginal tax rate while standard workers should react to changes in effective average tax rates. We find a significant decrease of operating firm performance following an increase in the top marginal tax rate only. This points to CEOs or other well paid employees driving the effect of personal income taxation on operating firm performance.

Our empirical results follow directly as a prediction from incorporating taxes in well-established theoretical models of CEO pay. Assignment models such as Gabaix and Landier (2008) or Terviö (2008) discuss how CEO pay matters for the allocation of CEOs to firms. If taxes are incorporated into these models, large firms residing in high tax states may no longer be able to employ the most productive CEOs. Personal income taxes drive a wedge between gross CEO marginal productivity at the firm level and net income after taxes at the individual CEO level. The sorting of CEOs to firms is distorted resulting in decreasing firm performance following increases in personal income tax rates.

Another type of models (e. g. Gibbons and Murphy (1992) and Holmstrom (1999)) discusses how the level of pay should be determined in order to optimally incentivize CEOs. The principal uses pay and pay structure in order to realize the desired level of CEO effort resulting in an optimal CEO contract. Any unanticipated increase in personal income tax rates will violate the underlying first order conditions. CEO pay in net terms is lower than necessary for the desired CEO effort level. CEOs will decrease effort in order to rebalance the pay-off from effort - net pay - and their cost of providing effort. As a consequence of

[1]See e.g. https://www.irs.gov/statistics/soi-tax-stats-adjusted-gross-income-agi-percentile-data-by-state

reduced CEO effort firm performance will decrease.

Our study is most closely related to other studies investigating the effect of CEO effort on firm performance. Malmendier and Tate (2009) evaluate the impact of CEOs achieving superstar status (award-winning CEOs) on the performance of their firms and on the effor the CEO effort provides which they proxy by the number of external board seats assumed. Ben-Rephael et al. (2021) use minute-by-minute Bloomberg online status data and Bandiera et al. (2020) use CEO diary data to study how the effort provision of top CEOs in corporations affects firm value. Bennedsen et al. (2020) use variation in firms' exposure to their CEOs resulting from hospitalization, and find CEO that hospitalization has a significant effect on profitability and investment. Biggerstaff et al. (2017) use playing golf as a measure of leisure. They show that the firms of CEOs who play a lot of golf have lower operating performance and market values. Armstrong et al. (2019) identify effects of CEO pay on corporate risk taking. Our contribution to this literature is to establish the link between net CEO pay, the subsequent effect on CEO effort and the eventual effect on firm performance. We overcome the inherent endogeneity issues by exploiting the variation in CEO top marginal tax rates at the US state level as a quasi-natural experiment. Our paper also represents an empirical test of the theoretical models developed by Ales and Sleet (2016) and Scheuer and Werning (2017). In line with their predictions we find that higher top marginal tax rates have an effect on CEO effort and subsequently firm performance.

Our study is also related to studies researching the effect of a change in the personal income tax rate on the behavior of other top income earners. Akcigit et al. (2022) show that the productivity of inventors decreases following a change in the top marginal tax rate. A variety of studies have focused on the mobility responses of high-income earners to a change in the top marginal tax rate. Akcigit et al. (2016) discuss the effect of a change in the top marginal tax rate on the international mobility of inventors, Kleven et al. (2013) on football superstars and Moretti and Wilson (2017) on star scientists. Saez et al. (2012) summarize the literature on income earners below the top.

We also contribute to the broad literature on executive compensation as summarized by Edmans et al. (2017). E.g. various papers study the effect of the incentive structure of CEO contracts on different measures of firm performance. Morck et al. (1988), Habib

and Ljungqvist (2005) and Kim and Lu (2011) study the effect on firm value, Bergstresser and Philippon (2006) and Burns and Kedia (2006) the effect on earnings management, Armstrong and Vashishtha (2012) and Gormley et al. (2013) the effect on corporate risk taking. Several studies have also assessed how taxes affect executive compensation. Ohrn (2021) shows that a reduction in corporate taxes increases CEO pay. Frydman and Molloy (2011) find no effect of personal income taxes on the composition and amount of executive compensation while Piketty et al. (2014) find that higher personal income taxes lead to a reduction in the "pay-for-luck" component of executive pay.[2] Bennett et al. (2020) find that changes in the state personal income tax rate lead to a change in the compensation scheme of CEOs three years after the tax change.

The paper is organized as follows. Section II incorporates taxes in theoretical models on CEO assignment to firms and on the optimal CEO contract to derive empirically testable hypothesis. Section III describes the data and the empirical approach. Section IV presents results. Section V concludes.

2 Model

2.1 Assignment of CEOs to firms

We use the sorting model presented by Gabaix and Landier (2008) and Terviö (2008) as summarized by Edmans et al. (2017) to demonstrate how state level personal income taxation affects the efficiency of the equilibrium assignment of workers to firms. For simplicity we consider a market consisting of two firms and two CEOs only. CEO talent increases firm value according to

$$V = S(n) + CS^{\gamma}(n)T(m) \tag{1}$$

2 potential firms and 2 CEOs are matched. Firm $n \in [1, 2]$ has baseline size $S(n)$ and CEO $m \in [1, 2]$ has talent $T(m)$. Low n denotes a larger firm and low m a more talented CEO. Each firm hires a CEO. $\underline{\omega}_n$ is the reservation wage of CEO n. In equilibrium the pay ω_n and the working place of each CEO should be determined such that firms have not incentive to

[2] Piketty et al. (2014) define "pay-for-luck" as the part of compensation outside of the executive's control (e.g. the compensation increase following a change in the oil price).

employ a different CEO and CEOs have no incentive to work at a different firm or to not work at all. The wages

$$\omega_2 = \underline{\omega}_2 \tag{2}$$

$$\omega_1 = \underline{\omega}_2 + CS^{\gamma}(2)[T(1) - T(2)] \tag{3}$$

and the assignment of CEO 1 to firm 1 and CEO 2 to firm 2 define such an equilibrium. Each firm is better of employing the CEO and the CEOs receive a wage above or equal to their reservation price[3]. Firm 2 is not interested in employing the more talented CEO 1, since the additional wage expenses in this case exceed his additional productivity (which is $CS^{\gamma}(2)[T(1) - T(2)]$). Firm 1 is not interested in employing CEO 2 even at his reservation price, since the productivity loss would be as large as the wage savings. The equilibrium is efficient in the sense, that the more talented CEO works for the larger firm, where his talent pays more off in terms of firm value.

Now we introduce a personal income tax in the state of residency of the larger firm 1 only at rate τ. Depending on the level of the tax rate it could now happen that the gross wages

$$\omega_2 = \frac{\underline{\omega}_2}{1-\tau}$$

$$\omega_1 = (1-\tau)\left\{\frac{\underline{\omega}_2}{1-\tau} + CS^{\gamma}(1)[T(1) - T(2)]\right\}$$

and the assignment of CEO 1 to firm 2 and CEO 2 to firm 1 constitute an equilibrium. The larger firm 1 is able to offer the more talented CEO 1 a higher salary in gross terms. But firm 1 is not able to offer CEO 1 a higher salary in net terms than currently paid at firm 2 resident in the state without personal income taxation, since such a salary would be beyond CEO 1's relative contribution to the firm value of firm 1. CEO 1 is no longer interested in working for firm 1 because of the tax. If the tax rate is high enough firm 2 is not interested in hiring CEO 2 at his lower reservation wage, since the wage savings would be below the loss in productivity due to the CEO change $(1-\tau)CS^{\gamma}(1)[T(1) - T(2)] < CS^{\gamma}(1)[T(1) - T(2)]$. If the personal income tax rate is too high, it could even happen that the larger firm 1 is no longer able to offer the less talented CEO 2 his reservation wage in net terms and

[3]In case of CEO 1 by assumption $\underline{\omega}_2 + CS^{\gamma}(2)[T(1) - T(2)] \geq \underline{\omega}_1$

CEO 2 may drop out of the CEO market ($\frac{\omega_2}{1-\tau} > CS^{\gamma}(1)T(2)$). For our empirical analysis we can draw two conclusions: *(1) Non harmonized state level personal income tax rates distort the efficient assignment of CEOs to firms. This should decrease firm value or firm productivity in states with relatively high personal income taxation. (2) Personal income taxation introduces a wedge between the contribution of CEO talent to firm value and the possible payoff to CEOs in net wage terms. High personal income taxation could thus drive CEOs out of the market, since firms are no longer able to offer their reservation wage in net terms.*

2.2 Setting incentives

The firm hires a CEO to run the firm. Firm value $V(a, S)$ is increasing in CEO effort a and firm size S and decreasing in CEO pay $c(V)$ possibly depending on realized firm value (Edmans et al., 2017):

$$V(a) = S + b(S)a - c(V)$$

The function $b(S)$ measures the effect of CEO effort on firm value for a firm of size S. The CEO earns salary c, which increases his utility. On the other hand providing effort a in order to manage the firm reduces his utility by $g(a)$. The higher the CEO's effort, the higher his reduction in utility from providing effort ($g(a)$ is increasing in a and convex; $g'' > 0$). The resulting utility function of the CEO is:

$$U(c, a) = c - g(a)$$

Further, the CEO has reservation utility ω. He is only willing to work for the firm if his utility gain from doing so exceeds his reservation utility (participation constraint):

$$c - g(a) \geq \omega$$

Firm owner's objective is to maximize firm value under the participation constraint

$$max \quad V(a) - c(V(a))$$

$$s.t. \quad c - g(a) \geq \omega$$

In order to simplify the problem we assume the firm owner is able to direct the CEO to exert the desired effort level a. In order to realize a desired effort level a firm owners then only have to pay a wage c high enough to fulfill the CEO's participation constraint. Accordingly, firm owners set the wage exactly at the level to get the CEO work at the desired effort level $a^\star$ and choose wage

$$c = \omega + g(a^\star).$$

Firm owners then maximize firm value taking this wage cost into account in order to choose the first best effort level $a^\star_{fb}$ of the CEO

$$S + b(S)a^\star - \omega - g(a^\star)$$

determining the first best CEO's effort level as

$$g`(a^\star_{fb}) = b(S)$$

Firm owners are willing to increase CEO pay in order to realize higher CEO effort as long as the additional wage cost $g^{'}(a_{fb})$ does not exceed the resulting additional contribution of CEO effort to firm value $b(S)$. This maximizes firm value. Introducing a wage tax at rate τ in this setting will affect the participation constraint resulting in

$$(1 - \tau)c - g(a) \geq \omega$$

As long as firm owners do not adjust CEO pay to the new tax environment, the CEO will provide less effort than before (resulting in lower g(a)) in order to make the participation constraint binding again. *We thus expect in the short run reduced CEO effort following a wage tax rate increase and consequently a reduction in firm value or firm performance.* After some time, firm owners should react to the new tax environment and choose a different CEO pay in order to maximize firm value taking taxes in to account. As before, firm owners set the wage exactly at the level to get the CEO work at the desired effort level $a^\star$. Taking taxes

in to account this is costlier than before since now the participation constraint is

$$(1-\tau)c = \omega + g(a^\star)$$

and consequently the wage necessary to get the CEO work at the desired effort level $a^\star$ is

$$c = \frac{\omega + g(a^\star)}{1-\tau}.$$

Firm owners maximize firm value taking this tax affected wage into account

$$s + b(S)a^\star - \frac{\omega + g(a^\star)}{1-\tau}$$

in order to determine the first best CEO's effort level under tax $a_f b$ as

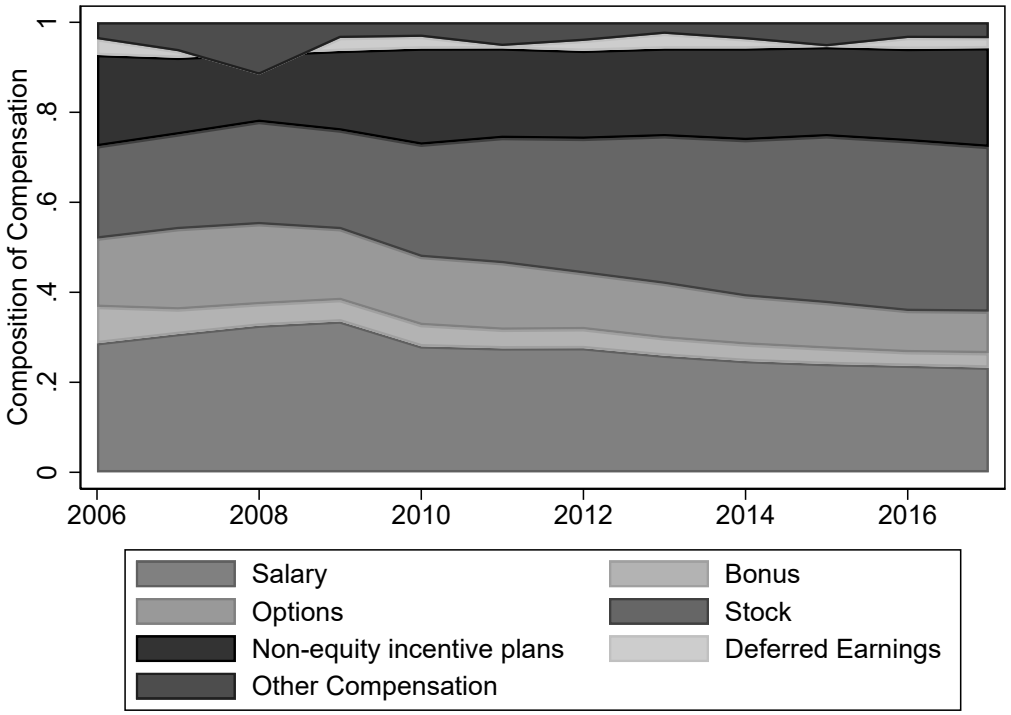
$$g`(a^\star_{fb\tau}) = (1-\tau)b(S).$$

Since $g(a)$ is a convex function, $a^\star_{fb\tau} < a^\star_{fb}$. The income tax on CEO pay introduces a wedge between incentivizing the CEO via pay and the cost for doing so, since the CEO is interested in his net pay after tax, while the cost to the firm is the gross salary. It is now costlier for the firm to incentivize the CEO. Firm owners react in choosing a lower CEO effort level than pre-tax reform. *We expect firm owners in the long run to adjust their incentive structure following the tax rate shock again increasing CEO effort level. However, the resulting CEO effort level will be lower than the effort level before the tax rate increase.* Assuming that the firm owner is able to direct the CEO to exert the desired effort level $a^\star$ is a simplifying assumption. Relaxing this assumption will result in an incentive compatibility constraint as discussed in Edmans et al. (2017). If firm owners cannot direct the CEO to exert the desired effort level, they need to incentivize the CEO using the pay structure. Typically, this is achieved in (partly) paying the CEO dependent on firm value. An unanticipated tax rate increase will then distort the participation constraint as well as the incentive compatibility constraint. Again, CEOs will react with providing less effort in the short run and firm owners will readjust the pay structure in the long run. Given the tax wedge between CEO

incentives in net terms and firm costs in gross terms, in the long run the achieved CEO effort level should be lower than before the tax rate increase also in this case.

3 Data and Estimation Strategy

Figure 1: Composition of Compensation



Notes: Figure 1 shows the evolution of the composition of CEO compensation awarded. Since the way in which stock and options were disclosed changed in 2006 we start our graph in the year 2006. The value of options and stocks is the fair value at grant date.

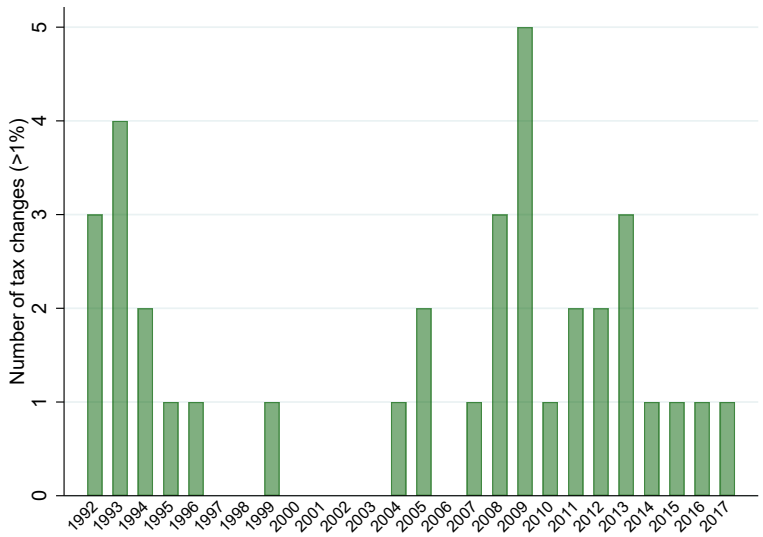
3.1 Data

We combine tax data varying at the US state level from the NBER, data on CEO pay from Excecucomp and firm data from Compustat for our empirical analysis. The resulting sample consists of 34.590 firm-year observations encompassing 2.869 firms and 5.436 CEOs covering the years 1992 - 2017. For additional tests we add data from ISS Incentive Lab on individual CEO performance goals, data on outside board seats from BoardEX and corporate governance indicators.

Tax Data We obtain data on personal income tax rates from NBER TaxSIM. Our main variable of interest is the top marginal tax rate which is computed as the marginal tax rate due on an additional 1,000 USD personal income earned above 1.5 million USD at the US state level.

Figure 2 counts the number of yearly marginal top income tax rate changes larger than one percentage point taking all US states into account. We count 36 large tax changes during our sample period. We use the variation in the top marginal tax rate as shown figure 2 for identifying the economic effects of CEO personal income taxation on firm performance and CEO effort.[4]

Figure 2: Tax Changes over Time



Notes: Figure 2 presents the number of states which experienced a tax change exceeding the absolute value of one percentage point per year over the sample period.

We further restrict our analysis to tax changes which have been classified as exogenous by Giroud and Rauh (2019).[5]

Although CEO compensation usually contains components such as options or stocks, all forms of managerial compensation are taxed at the personal income tax rate. While salaries

[4]Figure 10 shows the evolution of the maximum tax rate for the eight states where most firms are located. Figure 9 shows the geographical distribution of marginal top income tax rates across the US. US states along the West and East coast have the highest marginal top marginal tax rates.

[5]We exclude all states from our sample which experienced a change in the personal income tax rate classified as endogenous over the sample period we consider. Thus we drop observations from Arizona, Connecticut, Hawaii, Maryland, North Dakota, Rhode Island and Vermont. As a robustness check we also run our regressions without dropping these observations see table 12, table 13, table 14 .

and bonuses are taxed at the point in time they are granted, stocks and options are taxed when they are exercised by the CEO.[6] Table 11 in the appendix provides a more detailed overview. Since labor income in the US is primarily taxed in the state of employment, we assume that the CEO pays her taxes in the headquarter state of the company that employs her. The states with the largest number of observations in our sample typically do not have reciprocity agreements with other states.

Execucomp and Compustat Our primary data set is the universe of CEOs in Execucomp. Execucomp contains information on the compensation of all CEOs employed at S&P 1500 firms. Apart from compensation information Execucomp also contains detailed information on an executive's tenure at the firm, age and gender. We drop all CEOs from our data set which have not been flagged as the CEO of the company in the respective year. We combine Execucomp with company's financial statements from Compustat. Our main firm outcome variable is winsorized at the 99% level. Since Compustat only contains information on the latest location of the headquarters we match in historical headquarter location data from SEC 10-k filings. We denote the headquarter state to be the state in which the company records it's principal business activity.[7] Table 1 shows descriptive statistics.

ISS Incentive Lab We complement our core data with data from ISS Incentive Lab. ISS Incentive Lab contains detailed information on compensation contracts of CEOs collected from firm's proxy statements. Information on these contracts is available from 1998 onwards.[8] These performance contracts specify which metrices the executive needs to reach in order to receive a payout of performance-based pay. In our analysis we focus on performance goals tied to accounting metrices.[9] We define a performance goal as reached if the executive manages do hit or exceed the target value of the pre-defined goal. Since the

[6]Compensation reported in Execucomp also includes the monetary value of perquisite compensation such as travel expenses or other forms of non-monetary compensation.

[7]We drop all firms which experienced a headquarter change over the period of observation. Headquarter changes are frequently caused by mergers. We do not want to confound our effect by the effect of mergers on firm performance.

[8]Due to more rigid disclosure requirements the sample increased substantially in 2006.

[9]The accounting metrices traditionally employed are EPS (earnings per share), EBITDA, EBIT, Operating Income, FFO (funds from operations), Sales and Earnings.

grants for reaching a performance goal are typically not paid out immediately but vest over a time period of 15 months we lag the fraction of performance goals reached by one year. Our main outcome variable is the first lag of the fraction of performance goals reached (the number of performance goals reached over the number of performance goals defined for a given year).[10] Overall, we have information on the performance contracts of 1.039 firms and 1.796 CEOs. The average executive in our sample reaches 88 percent of her performance goals each year, while the median executive reaches all her performance goals (see Table 1).

Outside Board Seats Our data on outside board seats comes from the database BoardEX. BoardEX contains detailed information on executive's employment histories. Further, BoardEX also collects information on the composition of the board of directors of every company. We use this information to determine whether an executive also serves as a director to a different company. We match the information from BoardEX to Execucomp using the CIK, CUSIP or stock market ticker and the last name of an executive. We have information on the number of outside board seats and outside committees for a total of 1.378 CEOs and 846 firms.

Additional Variables We further add a number of different variables as control variables and for heterogeneity analyses. We construct measures of corporate governance previously used in the literature (e.g. by Chetty and Saez (2005) and Lilienfeld-Toal and Ruenzi (2014)) from the Gomper's governance index and Thomson Reuter's institutional (13-f) holdings database. We also add information on executive's financial wealth from Coles et al. (2013). Sample statistics can be found in Table 1. A detailed overview of the construction of all control variables can be found in table 15 in the Appendix.

[10] We merge the data from ISS Incentive Lab to data on firm-level variables by Compustat using the SEC's central index key (CIK).

Table 1: Descriptive Statistics

	Mean	Std.Dev.	25thPerc.	Median	75thPerc.	Obs
Compensation						
Total Compensation	4815.58	9122.16	1255.34	2696.89	5670.14	34387
Firm Variables						
Return on Assets	8.28	10.01	3.58	8.05	13.25	34590
Tobin's Q	1.94	1.30	1.14	1.49	2.21	35026
Log of Assets	7.53	1.79	6.26	7.39	8.66	34590
Book to Market Ratio	3.02	3.56	1.42	2.17	3.56	34526
R & D Indicator	0.76	0.43	1.00	1.00	1.00	19146
First lag of log Sale	7.06	1.68	5.96	6.97	8.12	34590
State Variables						
Maximum State Tax	5.82	3.81	3.02	6.07	8.09	34590
Performance Goals Reached	0.89	0.26	1.00	1.00	1.00	7836
Board Seats						
Number of outside boards	2.17	1.47	1.00	2.00	3.00	8649
Number of Committees	3.10	3.31	0.00	2.00	5.00	8181

Note: Table 1 presents the descriptive statistics of the sample. The sample includes firms which have not experienced a headquarter change during the period of observation and are situated in a state without an exogenous state tax change defined by Giroud and Rauh (2019). Total Compensation is the value of compensation awarded to the executive in the respective year. The variable Return on Assets is the ratio of earnings before interest over assets, winsorized at the 99 % level and multiplied with 100. Tobin's Q is defined as the difference between market and book value over assets plus one, winsorized at the 99% level. The variable log of assets denotes the natural logarithm of firm assets. Book to market ratio is the book value per share over the end of year price of shares. The variable R&D indicator takes the value of one if a firm reports positive R&D expenditure. Log of sale is the natural logarithm of firm sales. The top marginal tax rate is the marginal tax rate on an additional 1000 USD of income for a married individual filing jointly and earning 1.5 million USD. Performance Goals Reached is the first lag of the fraction of pre-specified accounting goals the executive manages to reach. Number of outside board seats is the number of board seats the respective CEO sits on in other boards, number of committees is the number of committees the respective executive sits on the board. A detailed definition of variables can be found in the Appendix in Table 15.

3.2 Estimation Strategy

3.2.1 Two-way Fixed Effects

Our baseline regression is based on a difference in differences estimation strategy. We compare the firm performance $Y_{f,i,t}$ of treated firms with the firm performance of untreated firms. Firm f employs CEO i in year t. Firms are treated if the personal income tax rate $MTR_{s(f),t}$ of their CEO changes, where s indicates the state of residency of firm f. To control for unobserved heterogeneity we employ fixed effects for each observed firm CEO combination $\delta_{f\times i}$ as well as time fixed effects δ_t. This results in the following two way fixed effects regression:

$$Y_{f,i,t} = \alpha + \beta \times ln(1 - MTR_{s(f),t}) + \gamma \times X_{f,i,t} + \delta_{f\times i} + \delta_t + \epsilon_{f,i,t} \tag{4}$$

Since the level effect of CEO personal income taxation is absorbed by the firm-CEO fixed effect $\delta_{f\times i}$, the coefficient β relating to the CEO personal income tax rate identifies the treatment effect. Using the CEO personal income tax rate $MTR_{s(f),t}$ instead of a dummy specification allows for varying treatment effects with the size of the tax rate change.

3.2.2 Event Study

To analyze post-treatment effect dynamics and pre-treatment trends in outcome differences between treated and untreated firms, we complement our analysis with an event study design. For every state and year (s,t) and for the three periods $-3 \leq l \leq 3$ surrounding the treatment we define an indicator variable $D^l_{s,t}$ as

$$D^l_{s,t} = \mathbb{1}[\text{period } t \text{ is } l \text{ periods from treatment in period } r \text{ in state } s].$$

We bin[11] all periods 4 or more years before treatment in the dummy $D^{-4}_{s,t}$ and all periods 4 or more years after treatment in the dummy $D^4_{s,t}$. If we observe a tax decrease we multiply $D^l_{s,t}$ with minus one; a positive value of $D^l_{s,t}$ indicates a tax rate increase and a negative value a tax rate decrease.

[11] For $l = -4$ $D^{-4}_{s,t} = \mathbb{1}[\text{period } t \text{ is 4 ore more periods before treatment in period } r \text{ in state } s]$ and for $l = 4$ $D^4_{s,t} = \mathbb{1}[\text{period } t \text{ is 4 or more periods after treatment in period } r \text{ in state } s]$.

We omit $D_{s,t}^{-2}$ for the period before treatment to avoid multicollinearity. This results in the following event study regression:

$$Y_{f,i,t} = \alpha + \sum_{l=-4,...,-2} \beta_t D^l_{s(f),t} + \sum_{l=0,...,4} \beta_t D^l_{s(f),t} + \gamma \times X_{f,i,t} + \delta_{f\times i} + \delta_t + \epsilon_{f,i,t} \qquad (5)$$

3.3 Stacked Event Studies

Our two-way fixed effects regression as well as our event study make use of the staggered changes in personal income taxation across US-states for identification. A broad recent literature, summarized by Baker et al. (2022), points to potential biases resulting from two-way fixed effects regressions. We implement the stacked regression estimator as proposed by Baker et al. (2022) to remove this potential bias.

As a first step we identify all clean treatment states. Clean treatment states are those having a nontrivial[12] change in their state specific personal income tax rate in their reform period r_h but no further nontrivial change in their personal income tax rate in the nine-year panel around r_h $(r_h - 4, ..., r_h, ..., r_h + 4)$. This results in the set H of treatment states. For each treatment state $h \in H$ we identify the set of treated firms T_h resident in h containing all available firm-year observations in the nine-year panel around r_h.

As a second step we identify the set C_h of clean control states for each treated state $h \in H$ as those states, that do not have any nontrivial personal income tax rate change in the eight-year panel around the period of treatment r_h. For each control state $c \in C_h$ we identify the set of control firms F_c containing all available firm-year observations in the eight-year panel around r_h resident in control state c. This results in a treatment-specific data set D_h consisting of all available treated firm-year observations in state h and all available firm-year observations resident in any of the states in the clean control set C_h $(D_h = \bigcup_{c\in C_h} F_c \cup T_h)$. We add a dataset-specific fixed effect δ_h as well as dataset-specific time fixed effects $\delta_{h\times t}$ to each treatment-specific data set D_h. Because we observe H clean treatments, we are able to construct H such data sets D_h. We then stack these H data sets together to arrive at the final regression sample S. The final sample S has more observations

[12] A change is nontrivial if it exceeds 0.5 percentage points in absolute terms.

than the union of the treatment specific sets D_h, since firms serving as controls for several treatments will enter the final sample several times ($|S| > |\bigcup_{h \in H} D_h|$). We then apply the following regression equation on all firm-year observations in S:

$$Y_{f,i,t,h} = \alpha + \sum_{l=-4,\ldots,-2} \beta_t D^l_{s(f),t} + \sum_{l=0,\ldots,4} \beta_t D^l_{s(f),t} + \gamma \times X_{f,i,t} + \delta_t + \delta_{f \times i} + \\ + \delta_h + \delta_{h \times t} + \epsilon_{f,i,t}$$

4 Results

4.1 Two-way Fixed Effects

Table 2 presents the results of our difference in differences regression as specified in equation (4). Our dependent variable is the firm and year specific return on assets. In column (1) we control for CEO-firm fixed effects as well as time fixed effects. The coefficient on our variable of interest is 10.685, which translates[13] into an semi-elasticity of 1.3. A one percentage point increase in the top marginal tax rate results in a decrease in return on oassets of 1.3 %, which is a plausible result. In column (2) we add firm sales as in Pérez-González (2006) in order to control for firm size. We now estimate that a one percent increase in the top marginal tax rate decreases return on assets by 0.15313 percentage points, implying a semi-elasticity of 1.8. In column (3) we add further controls as in Pérez-González (2006), namely last year's firm performance as the deviation from the industry median with respect to return on assets as well as with respect to the market-to-book ratio, an indicator for positive R+D expenses and a control for the quality of firm governance (coefficients shown in the appendix). Our preferred specification in column (4) has the most extensive set of controls. We control for state-specific economic characteristics such as the corporate income tax rate, GDP, the unemployment rate and a dummy for a democratic governor as in Akcigit et al. (2022). We now find that an increase in the top marginal income tax rate by one per-

[13]The mean of the top marginal tax rate is 5.82 (see table 1) resulting in $ln(1-MTR) = ln(1-0.0582) = ln(0.9418) \approx -0.06$. If the top marginal tax rate increases by one percentage point $ln(1-0.0682) \approx -0.07$ and the resulting decrease in $ln(1-MTR)$ is -0.01. Multiplying -0.01 with the coefficient on $ln(1-MTR)$ from table 2 column (1) results in $-0.01 \times 10.685 = -0.10685$. Dividing by the mean of return on assets of 8.28 gives the semi-elasticity of 1.3.

cent decreases return on assets by 0.12604 percentage points, resulting in an elasticity of 1.5.

Table 2: Return on Assets

	(1)	(2)	(3)	(4)
ln(1-MTR)	10.685**	15.313***	14.687***	12.064**
	(4.814)	(4.751)	(4.107)	(4.709)
First lag of log Sale		1.419***	1.171***	1.171***
		(0.255)	(0.248)	(0.251)
R+D Indicator			-2.588***	-2.588***
			(0.840)	(0.829)
Deviation ROA			4.678**	4.680**
			(2.092)	(2.087)
Deviation Market to Book			-0.001*	-0.001*
			(0.001)	(0.001)
Executive x Firm FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Governance Controls			✓	✓
State Controls				✓
Observations	35854	35626	34682	34590
R-squared	0.707	0.709	0.716	0.716

Note: This table reports estimates from a regression following equation (4). The dependent variable is return on assets. In column (1) we employ executive × firm fixed effects as well as year fixed effects. In columns (2) we add the first lag of log of sales. In column (3) we further add a R+D indicator taking the value one if the firm reports positive R+D expenditures and 0 otherwise, the first lag of firm specific deviation from the industry median return on assets, the first lag of firm specific deviation from the industry median market-to-book ratio and governance controls from the Gomper's Index. In column (4) we include state-level control variables, namely the unemployment rate, state GDP, the state-level corporate income tax rate and an indicator which takes the value one if the governor of the state is democratic. For a more detailed definition of all variables see table 15. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2 confirms, that firm performance decreases with increasing CEO personal income taxation. We provide additional empirical tests to show that decreased CEO effort is the driver behind the observed decrease in operating firm performance. As a first test we investigate the number of performance goals a CEO reaches. If a CEO reduces effort following an increase in the top marginal personal income tax rate, this should not only affect firm performance, but also the number of performance goals the CEO reaches. Table 3 shows results of regressions using the percentage of performance goals reached by CEOs as the dependent variable instead of return on assets. In column (1) in table 3 we find that an increase in the top marginal tax rate by one percent reduces the fraction of performance goals reached by 0.00709. Given the 89 % mean of performance goals reached this is equivalent

to a semi-elasticity of 0.8. If the top marginal income tax rate increases, CEOs reach less performance goals. Adding further controls as in table 2 does not have a large impact on the magnitude of our estimates.

Table 3: Fraction of Goals reached

	(1)	(2)	(3)	(4)
ln(1-MTR)	0.709*	0.781**	0.833**	0.746**
	(0.383)	(0.380)	(0.357)	(0.277)
First lag of log Sale		0.038***	0.032**	0.032**
		(0.013)	(0.013)	(0.012)
R+D Indicator			-0.042	-0.040
			(0.039)	(0.041)
Deviation ROA			0.201***	0.198***
			(0.041)	(0.041)
Deviation Market to Book			-0.000	-0.000
			(0.000)	(0.000)
Executive x Firm FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Governance Controls			✓	✓
State Controls				✓
Observations	7985	7970	7869	7836
R-squared	0.503	0.504	0.502	0.502

Note: This table reports estimates from a regression following equation (4). The dependent variable is the first lag of the fraction of performance goals reached. In column (1) we employ executive × firm fixed effects as well as year fixed effects. In columns (2) we add the first lag of log of sales. In column (3) we further add a R+D indicator taking the value one if the firm reports positive R+D expenditures and 0 otherwise, the first lag of firm specific deviation from the industry median return on assets, the first lag of firm specific deviation from the industry median market-to-book ratio and governance controls from the Gomper's Index. In column (4) we include state-level control variables, namely the unemployment rate, state GDP, the state-level corporate income tax rate and an indicator which takes the value one if the governor of the state is democratic. For a more detailed definition of all variables see table 15. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

If CEOs put less effort into managing their firm when the marginal tax rate increases, on what else do they spend their effort instead? Previous studies focused on writing books (Malmendier and Tate, 2009) or playing golf (Biggerstaff et al., 2017). Such private activities are practically impossible to observe for the long time span we explore. Instead we focus on the activities of CEOs on the boards of other firms, which is readily observable. In the US CEOs frequently are members of the board of other firms. They may then there engage in specific activities organised in committees. Table 4 presents results making use of the number of external committees CEOs are engaged in as a dependent variable. Again, controls are employed as in table 2. The estimate in column (1) suggests that a one percent

increase in the marginal tax rate increases committee membership by 0.10942. Given the 3.10 mean of the dependent variable, this is equivalent to a semi-elasticity of 3.5. As a response to an increase in their top marginal personal income tax rate, CEOs spend less effort on managing their firms. Instead they engage more in activities organised in committees of external boards. Including further controls does not substantially change the magnitude and significance of the estimates.

Table 4: Number of Committees

	(1)	(2)	(3)	(4)
ln(1-MTR)	-10.942***	-12.252***	-12.118***	-13.166***
	(2.443)	(2.497)	(2.380)	(2.981)
First lag of log Sale		-0.116	-0.144	-0.117
		(0.156)	(0.144)	(0.139)
R+D Indicator			0.596	0.608
			(0.598)	(0.560)
Deviation ROA			0.099	0.097
			(0.218)	(0.221)
Deviation Market to Book			0.000	0.000
			(0.001)	(0.001)
Executive x Firm FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Governance Controls			✓	✓
State Controls				✓
Observations	8432	8355	8211	8181
R-squared	0.847	0.847	0.855	0.855

Note: This table reports estimates from a regression following equation (4). The dependent variable is the number of committees on external boards the CEO is engaged in. In column (1) we employ executive $\times$ firm fixed effects as well as year fixed effects. In columns (2) we add the first lag of log of sales. In column (3) we further add a R+D indicator taking the value one if the firm reports positive R+D expenditures and 0 otherwise, the first lag of firm specific deviation from the industry median return on assets, the first lag of firm specific deviation from the industry median market-to-book ratio and governance controls from the Gomper's Index. In column (4) we include state-level control variables, namely the unemployment rate, state GDP, the state-level corporate income tax rate and an indicator which takes the value one if the governor of the state is democratic. For a more detailed definition of all variables see table 15. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A reaction of CEOs to increased personal income taxation is more plausible, if their firms do not (fully) compensate them for their additional personal tax load. CEOs - following an increase in their personal income tax - could well use their bargaining power to ask for a compensating increase in their gross pay. Table 5 investigates this hypothesis and regresses the top marginal tax rate on the log of gross CEO compensation granted. We add similar controls as in table 2. 1.591 is the largest point estimate, which we find in

column (4). Taking the standard errors into account, the semi-elasticity is either close to zero or negative. We find no evidence for CEOs using their bargaining power to ask for a compensating increase in their gross pay.

Table 5: Total Compensation Granted

	(1)	(2)	(3)	(4)
ln(1-MTR)	0.434	1.007	1.165	1.591*
	(0.638)	(0.774)	(0.724)	(0.796)
First lag of log Sale		0.212***	0.200***	0.201***
		(0.011)	(0.015)	(0.015)
R+D Indicator			0.227	0.226
			(0.154)	(0.154)
Deviation ROA			0.114***	0.113***
			(0.036)	(0.036)
Deviation Market to Book			0.000	0.000
			(0.000)	(0.000)
Executive x Firm FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Governance Controls			✓	✓
State Controls				✓
Observations	36267	35813	34884	34787
R-squared	0.752	0.756	0.757	0.757

Note: This table reports estimates from a regression following equation (4). The dependent variable is the log of total compensation granted. In column (1) we employ executive × firm fixed effects as well as year fixed effects. In columns (2) we add the first lag of log of sales. In column (3) we further add a R+D indicator taking the value one if the firm reports positive R+D expenditures and 0 otherwise, the first lag of firm specific deviation from the industry median return on assets, the first lag of firm specific deviation from the industry median market-to-book ratio and governance controls from the Gomper's Index. In column (4) we include state-level control variables, namely the unemployment rate, state GDP, the state-level corporate income tax rate and an indicator which takes the value one if the governor of the state is democratic. For a more detailed definition of all variables see table 15. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

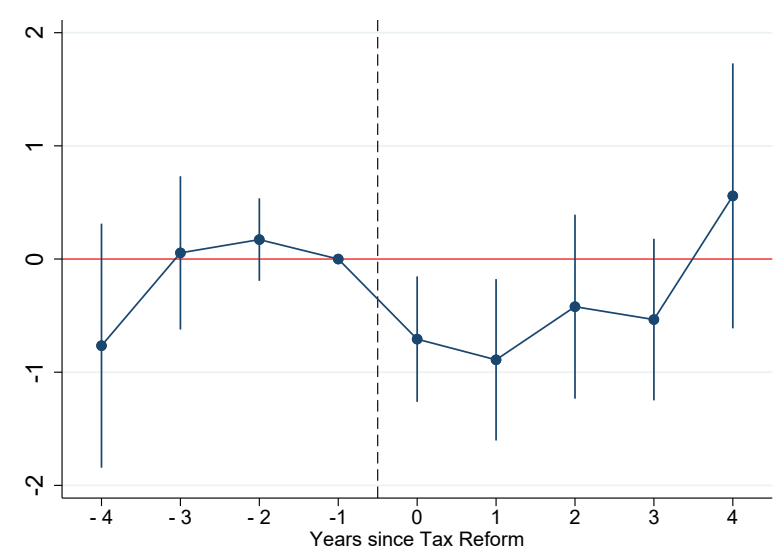
4.2 Stacked Event Studies

Return on assets decreases following an increase in CEO personal income taxation based on the regression results presented in the previous section. The dynamics in return on assets behind this average observed effect in the regression analysis could still be in contradiction to our expectations. The effect could be driven by pre-trends or outliers post-reform. We explore the dynamic effect of the top marginal tax rate on our variables of interest and implement an event study analysis as specified in equation (5) to check the robustness of our results with respect to this concern. We use return on assets, the fractions of goals

reached as well as the number of committees as dependent variables. In all cases the event-study results are robust. We do not observe significant pre-trends and the reform effects are well distributed across the post-reform periods. We present these results in the appendix.

As a further concern our results could be biased as pointed out by Baker et al. (2022), since our identification strategy relies on staggered changes in state specific variables. We implement a stacked regression estimator as described in section 3.3 to remove this potential bias. Again our baseline results are robust. Figure 3 shows the stacked dynamic effects of changes in the top marginal tax rate on return on assets. We observe an immediate and statistically significant decrease in return on assets of around -0.8 following a tax reform. The negative effect remains until three periods after the tax reform. In period four return on assets recovers to it's pre-reform level. However, the effect in period four has large standard errors. Prior to the reform there is no evidence of a pre-trend. The coefficients from three periods before the tax change are close to zero.

Figure 3: Stacked Regression: Return on Assets

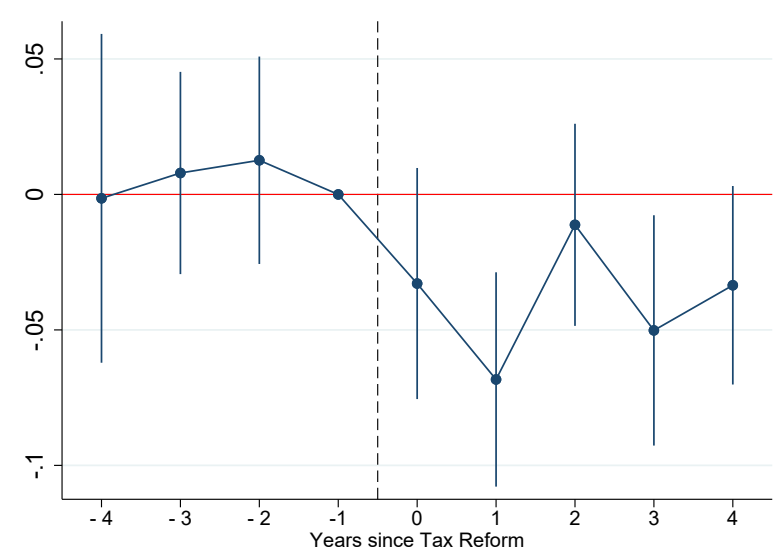


Note: This figure presents results from a stacked event study regression following equation (5). The dependent variable is return on assets. The figure shows the year-specific coefficient on a dummy which takes the value one if the tax change exceeds 0.5 percentage points and -1 if the tax change is below -0.5 percentage points. This dummy replaces ln(1-MTR). Otherwise we use controls as in table 2 column (4). Event year 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be zero. Standard errors are clustered at the state level and confidence intervals are at 95%.

Figure 4 analyzes the effect of tax reforms on the number of performance goals a CEO reaches. Consistent with our results for return on assets, we find that an increase in the top marginal tax rate leads to a decrease in the number of performance goals the CEO reaches.

We find no evidence of a pre-trend prior to the reform. One year after the reform the number of performance goals the CEO reaches drops significantly. The fraction of performance goals a CEO reaches appears to recover two periods after the reform. There is a sustained negative effect three and four periods after the change in the top marginal tax rate.

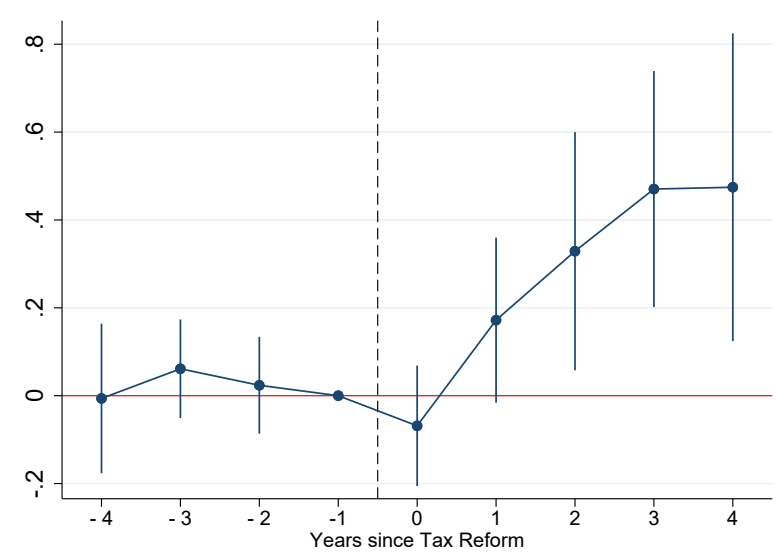
Figure 4: Stacked Regression: Fraction of Performance Goals reached



Note: This figure presents results from a stacked event study regression following equation (5). The dependent variable is the first lag of the fraction of performance goals reached. The figure shows the year-specific coefficient on a dummy which takes the value one if the tax change exceeds 0.5 percentage points and -1 if the tax change is below -0.5 percentage points. This dummy replaces ln(1-MTR). Otherwise we use controls as in table 2 column (4). Event year 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be zero. Standard errors are clustered at the state level and confidence intervals are at 95%.

Figure 5 shows stacked event study results using the activity of a CEO in outside boards as the outcome variable. There is no evidence of a pre-trend prior to the reform whereas we see a significant and gradual increase in the number of committees in outside boards an executive engages in. The effect appears immediately after the tax reform and becomes even stronger over time. Becoming a member of committees is an activity needing some time to be implemented following an increased interest of doing so by the CEO. A one percentage point increase in the top marginal tax rate rate increases the likelihood to take up an additional committee membership by 0.3 percentage points four periods after the tax reform.

Figure 5: Stacked Regression: Number of Committees



Note: This figure presents results from a stacked event study regression following equation (5). The dependent variable is the number of committees on external boards the CEO is engaged in. The figure shows the year-specific coefficient on a dummy which takes the value one if the tax change exceeds 0.5 percentage points and -1 if the tax change is below -0.5 percentage points. This dummy replaces ln(1-MTR). Otherwise we use controls as in table 2 column (4). Event year 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be zero. Standard errors are clustered at the state level and confidence intervals are at 95%.

4.3 CEO Heterogeneity

CEOs may react differently to changes in the personal income tax rate. First, CEOs who own a substantial share of wealth in their firms have stronger incentives to ensure that their firm runs well regardless of their personal income tax rate. Second, CEOs with a larger share of unvested stocks and unvested options relative to their total compensation should have higher stakes in their firms. Such CEOs should be less affected by a change in the marginal top tax rate compared to other CEOs.

We construct a CEO-level measure of affectedness to exploit this heterogeneity. The dummy variable $D_{i,t}$ takes the value one if the CEO is in the bottom tercile of the distribution of CEO firm wealth or alternatively in the bottom tercile of the distribution of unvested stocks and options relative to total compensation in the respective state s and year t. We interact our variable of interest - the log of the retention rate $ln(1 - MTR_{s(f),t})$ - with this dummy variable $D_{i,t}$ indicating that a CEO should be more strongly affected by the change in the top marginal tax rate. Since we then identify the effect of the top marginal tax rate at the CEO level we are able to employ state $\times$ year fixed effects $\delta_{s\times t}$ resulting in the following regression equation:

$$Y_{f,i,t} = \alpha + \beta \times ln(1 - MTR_{s(f),t}) \times D_{i,t} + \gamma \times X_{f,i,t} + \delta_{s\times t} + \delta_{f\times i} + \epsilon_{f,i,t} \tag{6}$$

The pure effect of the top marginal tax rate $\beta \times ln(1 - MTR_{s(f),t})$ as well as all other time-varying state-level controls are dropped from the regression equation, since they are now absorbed by the state-year fixed effect $\delta_{s\times t}$. We otherwise include the same control variables as in table 2 column (4). Our variable of interest $\beta \times MTR_{s,t} \times D_{i,t}$ can now no longer be biased by any unobserved shock at the state-year level simultaneously influencing CEO performance or firm performance as well as tax policy. The state-year fixed effect controls for it. Table 6 shows the results comparing CEOs with low wealth to CEOs with high wealth. We find CEOs with low firm wealth to respond more strongly to tax changes than CEOs with a high level of firm wealth. Following a change in the marginal top tax rate by one percentage point return on assets decreases by 0.14109 more in firms run by low wealth CEOs. The fraction of performance goals reached also decrease more, however

the effect is not statistically significant. We also find that such CEOs take up 0.04693 more memberships in outside committees.

Table 6: Heterogeneous Response: Firm Wealth

	(1) ROA	(2) Performance Goals	(3) Committees
Low Wealth × ln(1-MTR)	14.109**	0.371	-4.693*
	(6.373)	(0.245)	(2.537)
Executive x Firm FE	✓	✓	✓
State x Year FE	✓	✓	✓
Size Controls	✓	✓	✓
ROA, RD controls	✓	✓	✓
Governance Controls	✓	✓	✓
Observations	19694	4272	4769
R-squared	0.779	0.610	0.889

Note: This table presents the coefficients resulting from estimating equation 6. The dependent variabale is return on assets in column (1), the first lag of the fraction of performance goals reached in (2) and the number of committees on external boards the CEO is engaged in in (3). The dummy Low Wealth indicates that the CEO is in the bottom tercile of the firm wealth distribution in her state and year t. All specifications include controls as in table 2 column (4). We can not employ state-level controls, since they are now absorbed by the state × year fixed effects. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7 presents results, where we compare CEOs with a high share of unvested stocks and options in their firm to CEOs with a low share of stocks and options in their firm. In firms where the CEO has a low share of unvested stocks and options return on assets decreases by 0.11310 more following an increase in the marginal top tax rate by one percentage point. We also find a positive and statistically significant differential effect of the log retention rate on the number of committees an executive is engaged in. The differential effect with respect to the number of performance goals reached is not significant.

4.4 Other employees

Other employees apart from the CEO are also affected by the change in the personal income tax rate. Their reaction to an increase in the personal income tax rate could then also affect firm performance. We propose two robustness checks to address this concern. First, we control for the progressivity of the state specific personal income tax system. We do so by adding the average state tax rate of the top one percent income earner as well as the average

Table 7: Heterogeneous Response: Low Share of Unvested Options and Stocks

	(1) ROA	(2) Performance Goals	(3) Committees
Low Unvested × ln(1-MTR)	11.310*	0.083	-2.647**
	(5.910)	(0.228)	(1.171)
Executive x Firm FE	✓	✓	✓
State x Year FE	✓	✓	✓
Size Controls	✓	✓	✓
ROA, RD controls	✓	✓	✓
Governance Controls	✓	✓	✓
Observations	22089	5089	5618
R-squared	0.762	0.576	0.885

Note: This table presents the coefficients resulting from estimating equation 6. The dependent variable is return on assets in column (1), the first lag of the fraction of performance goals reached in (2) and the number of committees on external boards the CEO is engaged in in (3). The dummy Low Unvested indicates that the CEO is in the bottom tercile of the distribution of wealth in unvested stocks and options held in the firm in her state and year t. All specifications include controls as in table 2 column (4). We can not employ state-level controls, since they are now absorbed by the state × year fixed effects. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

state tax rate of the median wage earner to our regressions. These tax rates should capture the tax incentives for all employees earning less than the top one percent income earners. On the contrary, for employees earning even more than the top one percent income earner, the top marginal tax rate should still matter. Table 8 shows results. Adding the average tax rate faced by the median employee as well as the average tax rate faced by the top one percent income earner does not change the estimates of our baseline regression. We still find statistically significant effects of the marginal top tax rate on return on assets, the fraction of performance goals reached and the number of committees an executive is engaged in.

Second, we check if the response to the change in the personal income tax rate differs between firms with many high paid employees in comparison to firms with many low paid employees. If the effect we recover is driven by high paid employees in general and not mainly by the CEO, we should see a stronger reaction for firms having many high paid employees. To this end we construct a firm level dummy of employee pay taking on the value one if the average level of employee pay in the firm is in the top tercile of the state-year specific distribution of employee pay. We estimate a regression similar to the one specified in section 4.3 and interact this dummy variable with the top marginal tax rate. Again this allows to include state × year fixed effects. Table 9 shows results. There is no differential

Table 8: Outcome Variables: Controls for average tax rates

	ROA	Performance Goals	Committees
ln(1-MTR)	12.465**	0.761***	-12.892***
	(4.738)	(0.277)	(2.953)
Avg. Top 1 Tax Rate	-0.004	-0.000	0.001
	(0.006)	(0.000)	(0.002)
Avg. Median Tax Rate	-0.006	-0.000	-0.005***
	(0.006)	(0.000)	(0.001)
Executive x Firm FE	✓	✓	✓
Year FE	✓	✓	✓
Size Controls	✓	✓	✓
ROA, RD controls	✓	✓	✓
Governance Controls	✓	✓	✓
State Controls	✓	✓	✓
Observations	34590	7836	8181
R-squared	0.716	0.503	0.856

This table reports estimates from a regression following equation (4). The dependent variable is return on assets in column (1), the first lag of the fraction of performance goals reached in (2) and the number of committees on external boards the CEO is engaged in in (3). We control for the average income tax rate of the top one percent earner and the median income earner. Otherwise we use controls as in table 2 column (4). Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

effect of the top marginal tax rate comparing firms with many high paid employees and firms with many low paid employees. The results from this regression need to be interpreted with caution since coverage of the variable employee pay is fairly low in Compustat.

Table 9: Outcome Variables: Interaction with Employee Pay

	(1) ROA	(2) Performance Goals	(3) Committees
High Pay × ln(1-MTR)	-14.750	-3.139	-10.705
	(24.325)	(2.635)	(12.158)
Executive x Firm FE	✓	✓	✓
State x Year FE	✓	✓	✓
Size Controls	✓	✓	✓
ROA, RD controls	✓	✓	✓
Governance Controls	✓	✓	✓
Observations	3134	468	727
R-squared	0.869	0.660	0.967

This table reports estimates from a regression following equation (4). The dependent variable is return on assets in column (1), the first lag of the fraction of performance goals reached in (2) and the number of committees on external boards the CEO is engaged in in (3). We control for High Pay × ln(1-MTR). High Pay is a firm level dummy of employee pay taking on the value one if the average level of employee pay in the firm is in the top tercile of the state-year specific distribution of employee pay. Otherwise we use controls as in table 2 column (4). Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.5 Tobin's Q

Another measure indicative of CEO's performance is Tobin's Q. Table 10 shows the effect of an increase in the personal income tax rate on Tobin's Q. Results from estimating our baseline specification can be found in column (1). The 3.983 coefficient on ln(1-MTR) indicates a 1.8 percent decrease in Tobin's Q following a one percentage point increase in the top marginal tax rate. Since Tobin's Q is influenced by the market reaction of the stock market it is difficult to determine at which point in time Tobin's Q should respond to a change in the tax rate. To avoid contamination through differential trends we again exploit CEO heterogeneity as in section 4.3 and include state × year fixed effects in column (2) and (3). Tobin's Q decreases significantly more in firms in which the CEO only has a low fraction of wealth following an increase in the top marginal tax rate. Further, we find top marginal tax rates to have an especially negative impact in firms in which the CEO has a low share of unvested stocks and options.

Table 10: Tobin's Q

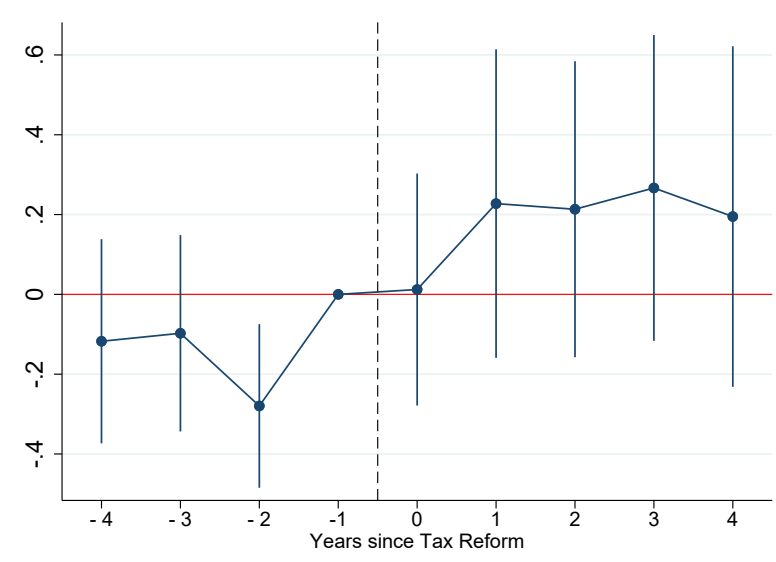
	(1)	(2)	(3)
ln(1-MTR)	3.983***		
	(1.009)		
Low Wealth × ln(1-MTR)		3.035***	
		(0.865)	
Low Unvested × ln(1-MTR)			1.315*
			(0.694)
Executive x Firm FE	✓	✓	✓
State x Year FE		✓	✓
Year FE	✓		
Size Controls	✓	✓	✓
ROA, RD controls	✓	✓	✓
Governance Controls	✓	✓	✓
Observations	35026	19958	22348
R-squared	0.749	0.812	0.796

Note: This table reports estimates from a regression following equation (4) in column (1) and following equation 6 in column (2) and (3). The dependent variable is Tobin's Q. In column (1) we employ controls as in table 2 column (4). The dummy Low Wealth indicates that the CEO is in the bottom tercile of the firm wealth distribution in her state and year t. The dummy Low Unvested indicates that the CEO is in the bottom tercile of the distribution of wealth in unvested stocks and options held in the firm in her state and year t. Otherwise in column (2) and (3) we include controls as in table 2 column (4). We can not employ state-level controls, since they are now absorbed by the state × year fixed effects. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.6 Firm Adjustments

An increase in the personal income tax rate reduces return on assets in the short-run (Table 2). However, these effects are mitigated in the long-run (Figure 3). We explore several explanations why we do not find a significant permanent effect of the marginal top tax rate on CEO and firm performance. First, firms may adjust the executive's compensation contract upon observing the drop in executive performance and provide her with different incentives. While we have shown that firms do not adjust the overall level of compensation the CEO receives (Table 5), firms can readjust incentives by adjusting the composition of CEO pay. Such readjustment of incentives could explain, why performance measures recover in the long-term. Figure 6 shows the effect of the top marginal tax rate on the fair value of stock awards the CEO is granted. Following a change in the top marginal tax rate by more than 0.5 percentage points we find that the fair value of stock awards granted to the executive increases albeit not statistically significant.

Figure 6: Stacked Regression: Fair Value of Stock Awards

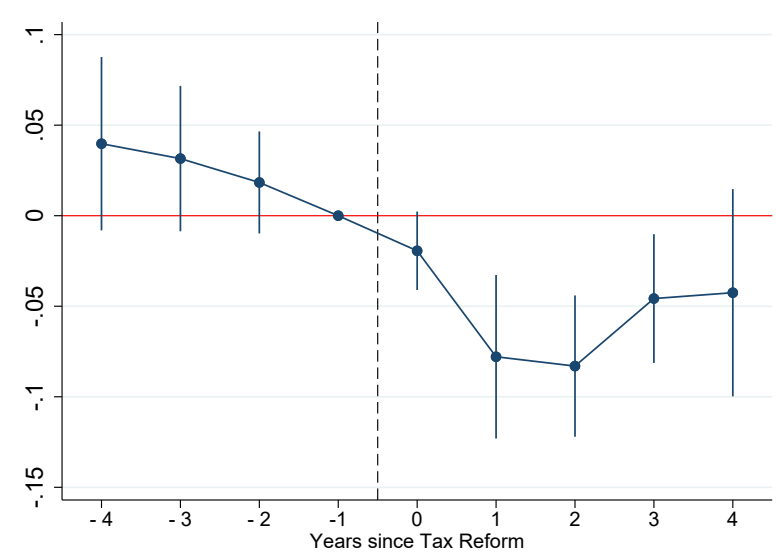


Note: This figure presents results from a stacked event study regression following equation (5). The dependent variable is the logarithm of the fair value of stock awards the CEO receives. The figure shows the year-specific coefficient on a dummy which takes the value one if the tax change exceeds 0.5 percentage points and -1 if the tax change is below -0.5 percentage points. This dummy replaces ln(1-MTR). Otherwise we use controls as in table 2 column (4). Event year 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be zero. Standard errors are clustered at the state level and confidence intervals are at 95%.

Second, a reduction in CEO effort and performance firms could impede the growth of

the CEO's firm. This could explain the observed recovery in return on assets three periods after the tax change. Figure 7 assesses the effect of the top marginal tax rate on capital expenditure. We find a negative and significant effect. A one percentage point increase in the top marginal tax rate leads to a 1 percent decrease in capital expenditure. The effect persists up to four periods after the tax change and then becomes insignificant. The effect is zero in the reform period and is negative only one period after the reform. Investment needs some time to adjust.

Figure 7: Stacked Regression: Capital Expenditure

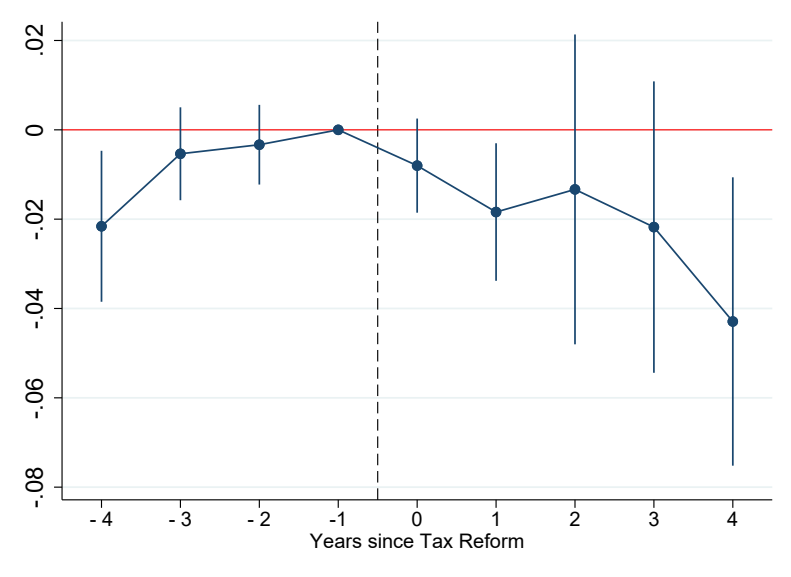


Note: Figure 7 shows the effect of increases and decreases on the logarithm of assets in a stacked event-study setting. The explaining variable is defined as a dummy which takes the value one if the tax change exceeded 0.5 percentage points and -1 if the tax change was below -0.5 percentage points. All regressions include the same controls as the panel regressions in table 2 and column (4): the first lag of log firm size, the first lag of the deviation from industry-level market-to-book ratio, the first lag of the deviation from industry-level return on assets, an indicator for positive R&D and state-level controls. State-level controls include the unemployment rate, the party affiliation of the governor as well as the state corporate tax rate. Event time 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be one. Standard errors are clustered at the state level and confidence intervals are at 95%.

The evolution of total assets over time is another measure for firm growth. In line with the capital expenditure results, the logarithm of total assets decreases following an increase in the top marginal tax rate rate (Figure 8). Changes in the composition of executive compensation and firm-level growth can explain why we do not find any long-term effect of the top marginal tax rate on return on assets. CEOs become better incentivized making them more likely to increase their effort level and firms become smaller which automatically

decreases returns on assets.

Figure 8: Stacked Regression: Log of Assets



Note: Figure 8 shows the effect of increases and decreases in the top marginal tax rate on the logarithm of assets in a stacked event-study setting. The explaining variable is defined as a dummy which takes the value one if the tax change exceeded 0.5 percentage points and -1 if the tax change was below -0.5 percentage points. All regressions include the same controls as the panel regressions in table 2 and column (4): the first lag of log firm size, the first lag of the deviation from industry-level market-to-book ratio, the first lag of the deviation from industry-level return on assets, an indicator for positive R&D and state-level controls. State-level controls include the unemployment rate, the party affiliation of the governor as well as the state corporate tax rate. Event time 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be one. Standard errors are clustered at the state level and confidence intervals are at 95%.

5 Conclusion

The taxation of top income earners in particular CEOs has been a contentious topic over the last years. One very prevalent argument against higher taxes are the strong effects top income earners, in particular CEOs have on the firms they run. In this paper we assess if higher taxes distort the labor supply of CEOs. Using exogenous variation in state level taxes we find that an increase in the state tax leads to a reduction in firm performance, a decrease in the likelihood to reach performance goals and encourages the executive to take up outside engagements in the form of sitting on outside committees. These effects are stronger in firms in which are badly governed. Further, CEOs with a high share of firm wealth do not respond as strongly to state taxes as CEOs with a low share of firm wealth. While the effect on the fraction of performance goals reached as well as the likelihood to engage

in outside committees is negative in long-run, the effect of state taxes on return on assets vanishes. We find that following a tax change the compensation of the executive is adjusted and firms become smaller. In smaller firms CEOs should achieve similar returns with a reduced level of effort. Our findings show that there is no asymmetry in how CEOs respond to tax increases or tax decreases. Overall, our results suggest that the redistributional consequences of higher taxes need to be weighed against labor supply distortions which can have substantial spillover effects in particular among top income earners. Future research should focus on who is most affected by these spillover effects.

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6 Appendix

6.1 Descriptives

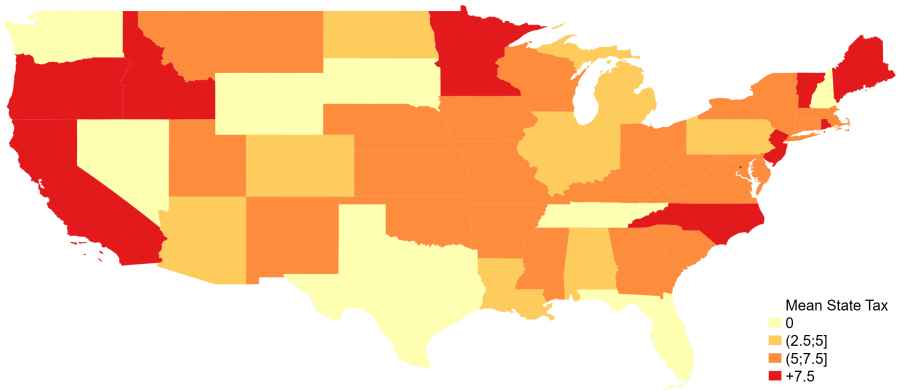
Table 11: Taxation of CEO compensation components

Category	Relevant Tax Rate
Salary	Subject to the Personal Income Tax Rate once awarded
Bonus	Subject to the Personal Income Tax Rate once awarded
Option Awards	Subject to the Personal Income Tax Rate when exercised, not taxable once when awarded [a]
Stock Awards	Similar to Stock Options subject to the Personal Income Tax Rate once they vested
Non-Equity Incentive Plan Compensation	Subject to the Personal Income Tax Rate once awarded
Deferred Compensation	Subject to the Personal Income Tax once granted

Note: For a detailed description see Erickson et al. (2020) table 8.1.

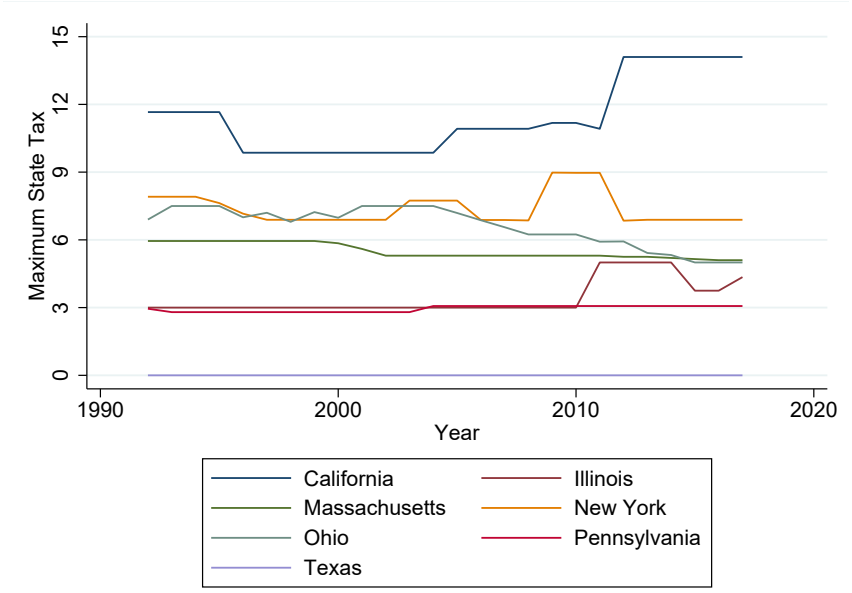
[a] One exception are incentive stock options which are taxed at the capital gains rate. However, incentive stock options are only deductible from the corporate tax bills of the employee up to 100.000 USD.

Figure 9: Mean Level of Taxes



Notes: Figure 9 presents the mean of the top marginal tax rate for each state in the US over our sample period.

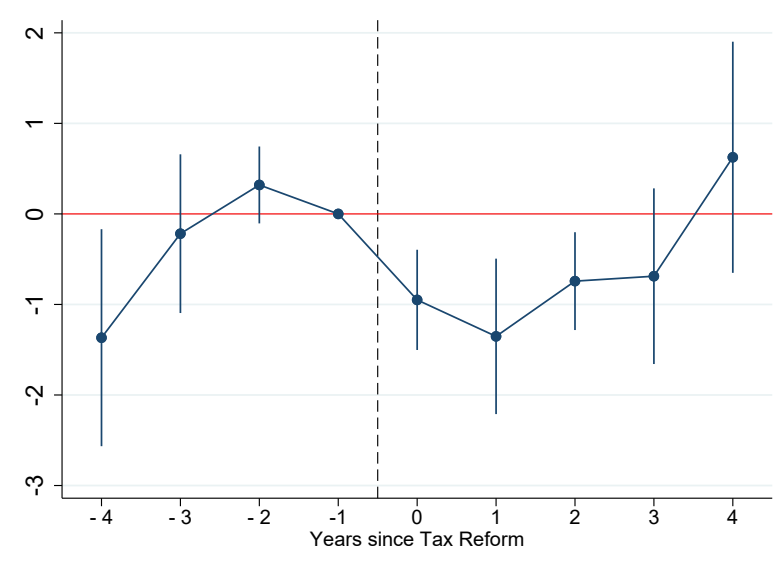
Figure 10: Evolution of taxes in largest states



Notes: Figure 10 presents the evolution of the top marginal tax rates for the states where most firms are located in our sample from 1992 to 2017.

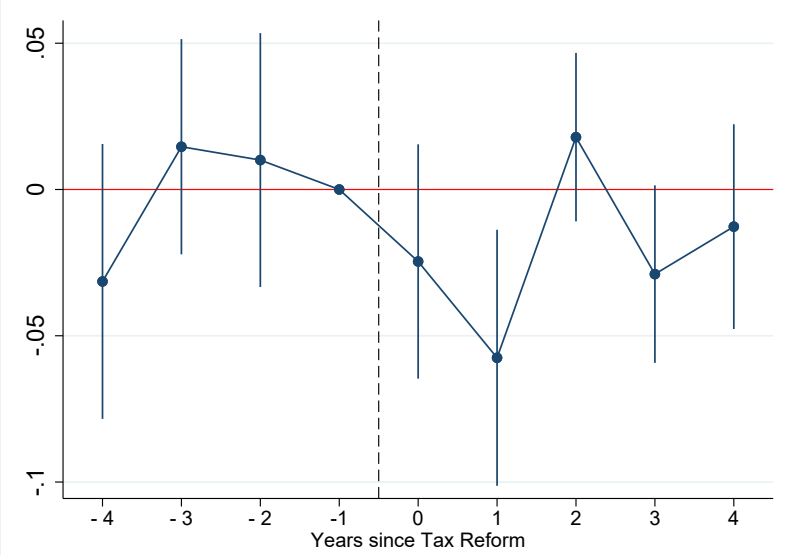
6.2 Stacked Regression: Only Increases

Figure 11: Stacked Regression: Return on Assets (Only Increases)



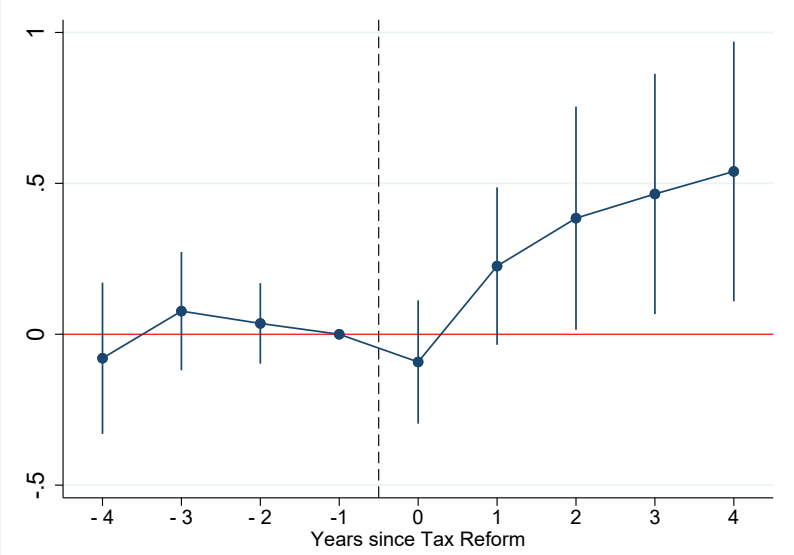
Note: Figure 11 shows the effect of an increase in the top marginal tax rate on the logarithm of assets in a stacked event-study setting. A tax increase is defined as a change in the top marginal tax rate rate above 0.5 percentage points. All regressions include the same controls as the panel regressions: the first lag of log of firm size, the first lag of the deviation from industry-level market-to-book ratio, the first lag of the deviation from industry-level return on assets,and indicator for positive R&D expenses, an indicator for good governance and state-level controls. State-level controls include the unemployment rate, the party affiliation of the governor as well as the state corporate tax rate. Event time 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be zero. Standard errors are clustered at the state level and confidence intervals are at 95%.

Figure 12: Stacked Regression: Fraction of Performance Goals reached (Only Increases)



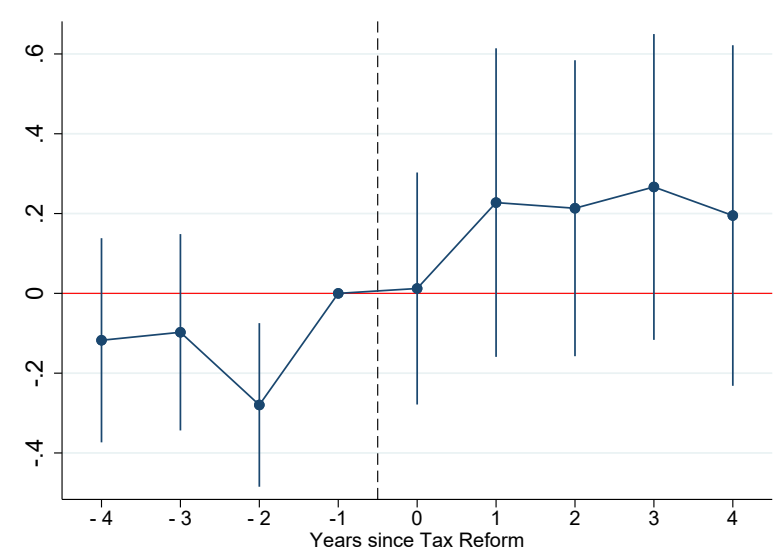
Note: Figure 12 shows the effect of an increase in the top marginal tax rate on the logarithm of assets in a stacked event-study setting. A tax increase is defined as a change in the top marginal tax rate rate above 0.5 percentage points. All regressions include the same controls as the panel regressions: the first lag of log of firm size, the first lag of the deviation from industry-level market-to-book ratio, the first lag of the deviation from industry-level return on assets,and indicator for positive R&D expenses, an indicator for good governance and state-level controls. State-level controls include the unemployment rate, the party affiliation of the governor as well as the state corporate tax rate. Event time 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be zero. Standard errors are clustered at the state level and confidence intervals are at 95%.

Figure 13: Stacked Regression: Number of Committees (Only Increases)



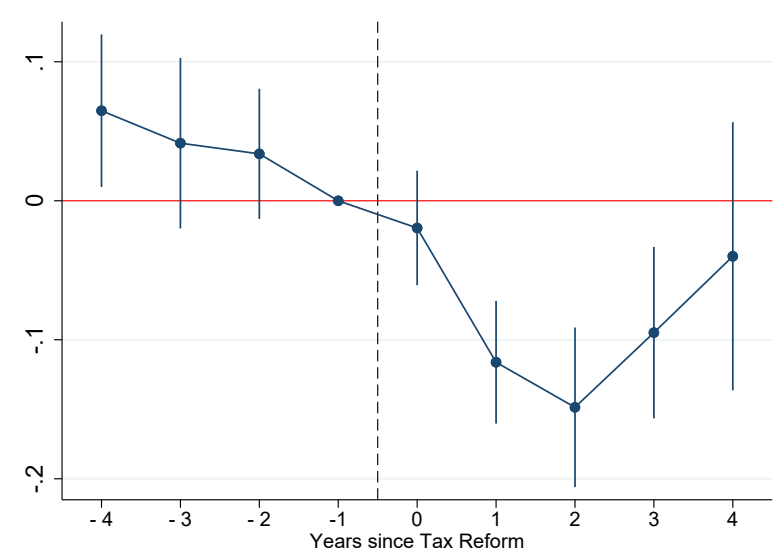
Note: Figure 13 shows the effect of an increase in the top marginal tax rate on the logarithm of assets in a stacked event-study setting. A tax increase is defined as a change in the top marginal tax rate rate above 0.5 percentage points. All regressions include the same controls as the panel regressions: the first lag of log of firm size, the first lag of the deviation from industry-level market-to-book ratio, the first lag of the deviation from industry-level return on assets,and indicator for positive R&D expenses, an indicator for good governance and state-level controls. State-level controls include the unemployment rate, the party affiliation of the governor as well as the state corporate tax rate. Event time 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be zero. Standard errors are clustered at the state level and confidence intervals are at 95%.

Figure 14: Stacked Regression: Fair Value of Stock Awards (Only Increases)



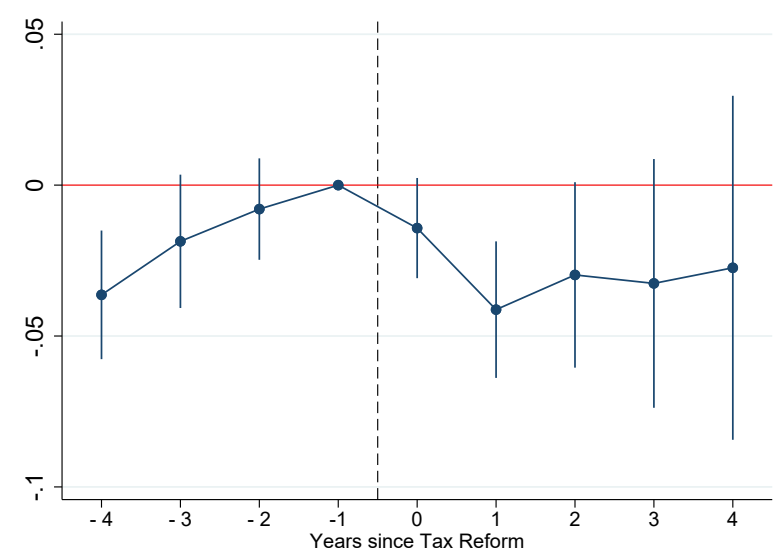
Note: Figure 14 shows the effect of an increase in the top marginal tax rate on the logarithm of assets in a stacked event-study setting. A tax increase is defined as a change in the top marginal tax rate rate above 0.5 percentage points. All regressions include the following controls: the first lag of log firm size, the first lag of the deviation from industry-level market-to-book ratio, the first lag of the deviation from industry-level return on assets, an indicator for positive R&D and state-level controls. State-level controls include the unemployment rate, the party affiliation of the governor as well as the state corporate tax rate. Event time 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be one. Standard errors are clustered at the state level and confidence intervals are at 95%.

Figure 15: Stacked Regression: Capital Expenditure (Only Increases)



Note: Figure 15 shows the effect of an increase in the top marginal tax rate on the logarithm of assets in a stacked event-study setting. A tax increase is defined as a change in the top marginal tax rate rate above 0.5 percentage points. All regressions include the following controls: the first lag of log firm size, the first lag of the deviation from industry-level market-to-book ratio, the first lag of the deviation from industry-level return on assets, an indicator for positive R&D and state-level controls. State-level controls include the unemployment rate, the party affiliation of the governor as well as the state corporate tax rate. Event time 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be one. Standard errors are clustered at the state level and confidence intervals are at 95%.

Figure 16: Stacked Regression: Log of Assets



Note: Figure 16 shows the effect of an increase in the top marginal tax rate on the logarithm of assets in a stacked event-study setting. A tax increase is defined as a change in the top marginal tax rate rate above 0.5 percentage points. All regressions include the following controls: the first lag of log firm size, the first lag of the deviation from industry-level market-to-book ratio, the first lag of the deviation from industry-level return on assets, an indicator for positive R&D and state-level controls. State-level controls include the unemployment rate, the party affiliation of the governor as well as the state corporate tax rate. Event time 0 is the year of the reform. The coefficient one year prior to the reform is normalized to be one. Standard errors are clustered at the state level and confidence intervals are at 95%.

6.3 All Tax Changes

Table 12: Return on Assets

	(1)	(2)	(3)	(4)
ln(1-MTR)	9.437*	13.900***	13.412***	11.547***
	(5.003)	(4.920)	(4.035)	(4.004)
First lag of log Sale		1.533***	1.272***	1.274***
		(0.250)	(0.238)	(0.239)
R+D Indicator			-2.499***	-2.501***
			(0.809)	(0.798)
Deviation ROA			4.827**	4.830**
			(2.149)	(2.144)
Deviation Market to Book			-0.001*	-0.001*
			(0.001)	(0.001)
Executive x Firm FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
State Controls			✓	✓
Governance Controls				✓
Observations	38095	37853	36854	36762
R-squared	0.710	0.712	0.719	0.719

Note: Table 12 presents the coefficients of the estimation of state level taxes. The outcome variable is the fraction of performance goals reached. The sample now also includes states which experienced an endogenous increase in taxes. In columns (2)-(4) control variables for firm size, firm performance and corporate governance are added. The first lag of log of sales controls for firm size, R+D indicator takes the value one if the firm report positive R+D expenditures and 0 if it does not. For firms for which R+D is missing the R+D indicator is set to zero and a dummy indicating that R+D is missing is included. By doing so we follow recommendations by Koh and Reeb (2015) and papers such as Bartram et al. (2012). We control for past firm performance by including the first lag of industry deviation from market-to-book ratio as well as the first lag of industry deviation from return on assets.In column 5 we include values for the Gomper's governance index and also include a separate variable as well as an indicator if the variable is missing. All specifications include executive $\times$ firm fixed effects as well as year fixed effects. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: First lag of fraction of performance goals reached

	(1)	(2)	(3)	(4)
ln(1-MTR)	0.912**	0.988**	1.039**	1.036***
	(0.433)	(0.435)	(0.416)	(0.377)
First lag of log Sale		0.037***	0.032***	0.032***
		(0.012)	(0.012)	(0.012)
R+D Indicator			-0.036	-0.037
			(0.037)	(0.038)
Deviation ROA			0.196***	0.194***
			(0.040)	(0.039)
Deviation Market to Book			-0.000	-0.000
			(0.000)	(0.000)
Executive x Firm FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
State Controls			✓	✓
Governance Controls				✓
Observations	8492	8477	8375	8342
R-squared	0.505	0.506	0.504	0.505

Note: Table 13 presents the coefficients of the estimation of state level taxes. The outcome variable is the fraction of performance goals reached. The sample now also includes states which experienced an endogenous increase in taxes. In columns (2)-(4) control variables for firm size, firm performance and corporate governance are added. The first lag of log of sales controls for firm size, R+D indicator takes the value one if the firm report positive R+D expenditures and 0 if it does not. For firms for which R+D is missing the R+D indicator is set to zero and a dummy indicating that R+D is missing is included. By doing so we follow recommendations by Koh and Reeb (2015) and papers such as Bartram et al. (2012). We control for past firm performance by including the first lag of industry deviation from market-to-book ratio as well as the first lag of industry deviation from return on assets.In column 5 we include values for the Gomper's governance index and also include a separate variable as well as an indicator if the variable is missing. All specifications include executive $\times$ firm fixed effects as well as year fixed effects. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 14: Number of Committees

	(1)	(2)	(3)	(4)
ln(1-MTR)	-9.738***	-10.839***	-10.742***	-11.596***
	(2.388)	(2.432)	(2.361)	(2.960)
First lag of log Sale		-0.090	-0.112	-0.094
		(0.141)	(0.131)	(0.127)
R+D Indicator			0.546	0.552
			(0.529)	(0.499)
Deviation ROA			0.241	0.240
			(0.282)	(0.285)
Deviation Market to Book			0.000	0.000
			(0.000)	(0.000)
Executive x Firm FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
State Controls			✓	✓
Governance Controls				✓
Observations	8939	8860	8709	8679
R-squared	0.845	0.845	0.852	0.853

Note: Table 14 presents the coefficients of the estimation of state level taxes. The outcome variable is the fraction of performance goals reached. The sample now also includes states which experienced an endogenous increase in taxes. In columns (2)-(4) control variables for firm size, firm performance and corporate governance are added. The first lag of log of sales controls for firm size, R+D indicator takes the value one if the firm report positive R+D expenditures and 0 if it does not. For firms for which R+D is missing the R+D indicator is set to zero and a dummy indicating that R+D is missing is included. By doing so we follow recommendations by Koh and Reeb (2015) and papers such as Bartram et al. (2012). We control for past firm performance by including the first lag of industry deviation from market-to-book ratio as well as the first lag of industry deviation from return on assets.In column 5 we include values for the Gomper's governance index and also include a separate variable as well as an indicator if the variable is missing. All specifications include executive $\times$ firm fixed effects as well as year fixed effects. Standard errors are clustered at state level. Significance Levels are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 15: Variable Definition

Variable Name	Calculation	Source
Outcome Variables		
ROA	EBIT over Assets, where EBIT are earnings befor interest and taxes, winsorized at the 99th percent level	Compustat
Fraction of Goals reached	Fraction of number of performance goals reached over the number of performance goals defined. We define a performance goal as reached if the value of the accounting metric exceeds or meets the value of the target metric.	ISS Incentive Lab
Number of Committees	The number of committees in outside boards the respective executive sits on. The maximum value is set at 10.	BoardEX
Tobin's Q	Tobin's Q is defined as 1 + the difference between market value (defined as common shares outstanding times the stock price) and common ordinary equity over assets. The variable is winsorized at the 99% level	Compustat
Firm-level Variables		
R+D indicator	Indicator for positive R+D expenses, if R+D expenses are missing, the indicator takes on the value of zero and an additional dummy denoting that the indicator is missing is included	Compustat
First lag of log Sales	First lag of the log of Sales	Compustat
Deviation ROA	First lag of the deviation of ROA from industry median. Industry is defined by the 2-level digit SIC code.	Compustat
Market-to-Book Ratio	Price at the fiscal year end over book value per share	Compustat
Deviation Market to Book	First lag of the deviation of market to book ratio from industry median. Industry is defined by the 2-digit level SIC code.	Compustat
Gomper's Governance Index	Categorical value for the level of corporate governance in a firm based on takeover laws. Higher values indicate a worse level of governance	Gompers et al. (2003)
Gomper's Dummy	Indicator taking the value of one if the Gomper's Governance Index is below a value of 8	Gompers et al. (2003)

Individual CEO Variables

Low Wealth	Variable which takes a value of one if the CEO is in the lower tercile of the state-level distribution of firm wealth	Data from Coles et al. (2013)
Low Unvested	Variable which takes a value of one if the CEO is in the lower tercile of the state-level distribution of wealth in unvested stocks and options	Coles et al. (2013)

Tax Variables

Top Marginal Tax Rate	State level tax on wages for a married individual filing jointly with an income that exceeds 1.5 million USD	NBER Taxsim
Avg. Top1 Tax Rate	Average tax rate paid by an individual whose income is at the top percentile of the state income distribution based on the state tax schedule. [a]	NBER Taxsim
Avg. Median Tax Rate	Average tax rate paid by an individual whose income is at the 50th percentile of the state income distribution based on the state tax schedule. [b]	NBER Taxsim
Corporate Income Tax Rate	Corporate income tax rate at the state-level collected from Giroud and Rauh (2019) and state tax schedules	Giroud and Rauh (2019)
State GDP	State-level GDP	Bureau of Economic Analysis
Unemployment Rate	State-level unemployment rate	Bureau of Labor Statistics
Governor Dummy	Dummy indicating the affiliation of the state governor, the variable takes on the value one if the governor is a democrat	Carl Klarners (2013) data set on governors and hand-collected data

[a] Based on the tax schedule we calculate the amount of taxes paid by someone with an income at the top percentile of the income distribution and then divide this by the income received.

[b] Based on the tax schedule we calculate the amount of taxes paid by someone with an income at the median of the income distribution and then divide this by the income received.