Income taxes and managerial incentives: Evidence from hedge funds

Abstract

This study examines whether increases in the personal income tax rate disincentivize hedge fund managers to exert effort. Using plausible exogenous variations in federal and state statutory tax rates, we find that increases in fund managers' marginal income tax rates are negatively associated with fund performance. Following a tax hike, fund managers hold stocks with lower information asymmetry, suggesting decline in managerial effort as a potential mechanism. We further find that higher incentives from compensation contracts help to mitigate tax-induced effort shirking. Our study sheds light on the externalities of taxing the affluent and informs the debate on tax system design.

Keywords: hedge funds; taxation; performance; incentives; effort
JEL: G12, G20, H20, H24

"Raising taxes on the top 2% of Americans is tantamount to killing the goose that lays the golden eggs." – MarketWatch August 2010[1]

1. Introduction

According to the Congressional Budget Office, the top 1% of the most affluent American households collected 16.7% of aggregate income and paid 26.6% of aggregate federal personal income tax in 2014.[2] Therefore, not surprisingly, how much and how to tax high-income individuals are among the most controversial questions for the design of tax policy. Concerns about rising inequality have led to the support for progressive tax codes. However, high-income individuals may possess skills that are valuable for the performance of the economy. At the center of the debate is whether wealthy individuals' economic activities have positive (or negative) externalities and how they respond to attempts to tax them. However, there has been surprisingly little hard evidence uncovered on the impact of taxes on the behavior of the rich, perhaps due to paucity of data on this population (Slemrod, 1998).

We study whether changes in the personal income tax rate of affluent individuals impact their incentives to exert effort. We examine this research question through the behavior of hedge fund managers. Hedge fund managers are among the most affluent segment of the population and are subject to the highest marginal federal and state personal income taxes under the current tax code. According to Institutional Investor, the average compensation of a hedge fund manager was $1.4 million in 2018 (Whyte, 2018). Furthermore, a substantial portion of their compensation is taxed as ordinary income.[3] Hedge funds offer a nice setting to study the impact of taxes on the

[1] https://www.marketwatch.com/story/killing-geese-that-lay-golden-eggs-2010-08-10.
[2] https://www.cbo.gov/publication/53597.
[3] Hedge fund managers' compensation consists of management and incentive fees, with the former constituting a large portion of their compensation. For instance, Yin and Zhang (2019) document that management fees, on average,

affluent as it allows us to gauge how taxes affect fund managers' effort in terms of fund performance and portfolio management decisions.[4] Since fund managers act as delegated agents for investors and actively exploit mispricing opportunities, the economic behavior of fund managers in response to changes in personal income tax rates may have important implications for pricing efficiency of financial markets.

Economic theories predict two opposing effects of taxes on hedge fund managers' work incentives. On the one hand, an increase in tax rate lowers the after-tax income for a manager, reducing the marginal benefit to a manager's effort. This reduced benefit could lead to a lower level of exerted effort since other uses of time, such as leisure, may offer relatively higher utility. In a principal-agent relation, the disincentivizing effect of personal income tax on a fund manager also imposes a cost on the principals (fund investors) in the form of inferior fund performance. On the other hand, tax increases can also increase labor input through an income effect—more effort needs to be exerted to make up for the loss of income and maintain current levels of consumption.[5] Therefore, ultimately how taxes affect managers' incentives to exert effort is an empirical question.

Using plausible exogenous variations in top federal and state statutory tax rates from 1994 to 2017, we examine the relation between personal income tax rate and hedge fund performance.

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account for more than 70% of a manager's compensation across a broad sample of funds. Similarly, Lan, Wang, and Yang (2013) show that management fees represent the majority of total compensation to fund managers. Management fees are taxed as ordinary income. However, the incentive fee (fund manager's share of investment profits) can be taxed at a lower capital gains tax rate, but only if the investment is held for more than one year prior to 2018 and more than three years after passage of the Tax Cuts and Jobs Act of 2017. Otherwise, the incentive fee is also treated as ordinary income for tax purposes. Hedge funds typically hold their positions for less than a year (Davis 2019; Picker 2017). Thus, a fund manager's compensation through incentive fees is often taxed using ordinary income rates.

[4] Although one can also observe the performance of mutual fund managers, there is no data on their compensation except the structure (Ma, Tang, and Gómez, 2019). Also, they increasingly work in teams (Chen et al., 2004; Massa, Reuter, and Zitzewitz, 2010; Bär, Kempf, and Ruenzi, 2011) which makes it challenging to ascertain individual manager's compensation.

[5] One counter argument for why the income effect may not be applicable for affluent people is that they do not need to work to cover the costs of their essential needs as perhaps the rank-and-file employees. However, McClelland and Mok (2012) finds little compelling evidence that high-income taxpayers have substantially greater elasticities of labor supply compared to other taxpayers.

Following prior literature that examines CEOs (e.g., Armstrong, Glaeser, Huang, and Taylor, 2019; Yost 2018), we assume that fund managers pay personal income tax in the state where their funds are located.[6] We further assume that fund managers face the highest marginal personal ordinary income tax rates. We find that the hedge fund managers' personal income tax rate is negatively associated with fund performance after controlling for a host of fund characteristics, time-varying macro-economic factors, time fixed effects to capture unobserved macro-economic trends, and fund fixed effects that absorb the effect of unobserved time-invariant factors such as managerial skill, all of which can impact fund performance.[7] Specifically, a one standard deviation increase in the tax rate is associated with a 2.1 percentage point decrease in the annual alpha from the Fung and Hsieh (2004) seven-factor model augmented with an emerging market factor. This effect is economically large as it is 1.75 times of the average annual alpha of 1.2 percentage points.

To sharpen our identification of a causal relation between tax rates and hedge fund performance, we zoom in on all major state tax changes (100 basis points or more). Specifically, we employ difference-in-differences (DID) analyses within a five-year [−2, +2] window around these changes to examine changes in fund performance. Further, to filter out the effect of economic conditions that can simultaneously drive changes in both tax rates and fund performance, we isolate exogenous tax rate changes following the procedure in Giroud and Rauh (2019), and repeat the DID analysis for only these changes.[8] Under both specifications (all and only exogenous tax changes), we find that tax increases are associated with a decrease in fund performance. In contrast,

[6] A fund manager is likely to be located in the same state as his/her fund. There can be significant costs associated with a manager's location being different from his/her fund. For instance, in an industry where there is limited disclosure and regulation, investors may prefer managers to work from the fund's location to allow for due diligence and mitigate operational risk.

[7] Fund fixed effects also subsume state fixed effects as location of funds do not change over time.

[8] We thank Josh Rauh for generously sharing the data on exogenous state tax changes for the period prior to 2012. We extend his data by hand collecting observations after 2012 until 2017.

major tax cuts do not significantly affect fund performance, perhaps because of convexity in the cost of effort that precludes the managers from exerting more effort. These findings alleviate endogeneity concerns related to unobserved factors driving both tax changes and fund performance, and lend a plausible causal interpretation of the effect of taxes on fund performance.

Since the key job function of a hedge fund manager is to make investment decisions on behalf of fund investors, we next explore direct evidence of tax hikes on effort shirking by examining hedge fund managers' portfolio management decisions. If portfolio managers shirk their effort after an increase in their personal income tax rates, they may opt to reduce investment in stocks with greater information asymmetry. Such stocks require more time and effort to gather and process information. Consistent with the prediction of tax-induced effort shirking, we find that higher tax rates are associated with hedge fund managers holding stocks of firms with less information asymmetry. Specifically, an increase in personal tax rates is associated with a greater proportion of stocks held in firms that are larger in market capitalization and lower in R&D intensity as well as firms that have greater analyst following and higher liquidity.

Next, we examine whether incentives from hedge fund managers' compensation contracts at least partially offset the disincentive effect of higher taxes. Economic theory suggests that compensation contracts can be designed to incentivize portfolio managers to exert effort in information collection and processing (Stoughton, 1993). Therefore, we examine whether managerial incentives, captured through a manager's pay-performance sensitivity (or delta) and coinvestment in the fund, could potentially mitigate the adverse consequences of higher personal taxes on fund performance. We find that worse fund performance following tax increases is concentrated in low-delta and low-managerial ownership funds. In contrast, high delta and managerial ownership helps offset the disincentives from tax increases. We also examine whether fund investors could influence the design of compensation contracts to mitigate the negative impact of tax increases. Since hedge fund fees are set at the inception date and rarely change over time, we investigate the relation between incentive fee and the personal tax rate at fund's inception, after controlling for fund characteristics and fixed effects for both investment company and state.[9] We find a positive association between incentive fee and tax rate, suggesting that a higher incentive fee in managerial compensation contracts helps mitigate potential effort shirking from higher taxes.

Our results continue to hold after accounting for the responses of fund investors and fund managers to tax changes. To begin with, in all our empirical tests, we control for fund flows to take into account any changes in investors' capital allocation in response to tax changes. Additionally, hedge fund managers may adopt trading strategies that are more tax efficient subsequent to an increase in tax rates. Such tax-efficient portfolio management may lead to lower pre-tax fund returns. To allow for this possibility, we include a measure of tax efficient management as an additional control in our empirical specification. We continue to find a negative and significant impact of managerial personal income tax on fund performance. Moreover, it is conceivable that managers may avoid setting up their funds in states with higher taxes. This, in turn, can reduce the competition among funds within a state, and affect fund performance, although in a direction opposite to that in our findings.[10] Nonetheless, we further control for competition intensity in our empirical tests, and continue to find a negative relation between tax changes and fund performance.

Our study contributes to the empirical literature on the effects of personal tax rate on labor input. In prior studies, labor input is usually measured in terms of labor quantity, i.e., labor

[9] Agarwal and Ray (2012) find that only 8% of funds change their fee structure over time.
[10] While existing funds can move out and relocate to states with lower tax rates, there can be significant costs including moving the entire fund team and loss of key employees and investors. As such, it is rare that funds relocate.

participation or hours worked using survey data, or as income reported in tax returns (McClelland and Mok, 2012). These quantity measures suffer from several limitations. For example, labor participation and hours worked does not capture the quality (i.e., intensity) of work and career changes. In contrast, in our setting of the hedge fund industry, we measure labor input using the output of labor, i.e., fund performance, which captures the combined effect of both the quality and quantity of labor input. This is analogous to using patent activity as a measure of innovation to capture both quantity and quality of innovation inputs instead of just the quantity of inputs as in the case of R&D (Agarwal, Vashishtha, and Venkatachalam, 2018).[11] In addition, we can measure managers' effort through their portfolio choices. Furthermore, the characteristics of fund managers' compensation contracts allows us to examine whether greater incentive alignment can mitigate the disincentives to exert effort after an increase in the personal tax rate.

Perhaps due to paucity of data, there have been only a few studies examining the impact of the tax system on the behavior of the very affluent, or on the contribution of the affluent to overall economic performance. Goolsbee (2000) examines the responsiveness of taxable income to changes in marginal tax rates using executive compensation data from 1991 to 1995. He documents a large short-run response, but almost entirely from a temporary shift in the timing of compensation (i.e., the exercise of stock options). There are also mixed results on the relation between CEO's personal tax rates and corporate risk-taking behavior. While Armstrong, Glaeser, Huang, and Taylor (2019) find this relation to be positive, Yost (2018) documents a negative relation. Compared to the corporate setting in which firm performance can be driven by various stakeholders and decision makers, the hedge fund setting offers an advantage in that fund

[11] Prior research finds a positive relation between trading (a proxy for effort) and fund performance among mutual funds (e.g., Pástor et al. 2017). If fund performance poorly captures manager effort, then it should bias us against finding significant results as greater noise in the measure would inflate the standard errors in our statistical tests.

performance is primarily driven by the actions of its managers and therefore can be better attributed to managerial effort. Moreover, using the setting of hedge funds in a principal-agent relation, our study uncovers a negative consequence of taxing the rich: lower returns for fund investors. Our results also imply a potentially negative externality of taxes on market efficiency, since hedge fund managers play an important role in discovering and reducing mispricing (Cao, Liang, Lo, and Petrasek, 2017; Cao, Chen, Goetzmann, and Liang, 2018) and informed monitoring (Brav, Jiang, Partnoy, and Thomas, 2008). In a related study, Blouin, Bushee, and Sikes (2017) classify institutional investors as tax sensitive based on whether they engage in tax-loss-selling around calendar year-ends and show that tax sensitive institutional investors are associated with lower portfolio returns. Our study differs from Blouin, Bushee, and Sikes (2017) in that we focus on establishing a causal link between tax changes and hedge fund performance. Furthermore, we do not restrict our analysis to only tax sensitive hedge funds and analyze a broad population of funds.[12]

Our study also contributes to the literature on delegated portfolio management. Prior studies investigate the effect of incentive fees, high watermark provisions, and managerial ownership on hedge fund performance (Agarwal, Daniel, Naik, 2009; Elton, Gruber, and Blake, 2003) and risk-taking behavior (Aragon and Nanda, 2011). To the best of our knowledge, our study is the first to examine the incentive effect of personal tax rate changes on managers' effort and fund performance. Moreover, our study adds to the literature that investigates tax implications in delegated portfolio management. Prior studies examine whether mutual fund managers adopt investment strategies that are tax-efficient for fund investors (Sialm and Starks, 2012; Sialm and Zhang, 2018), how mutual fund investors respond to after-tax returns (Bergstresser and Poterba, 2002), and the effect of tax-motivated trading by mutual funds on asset prices (Gibson, Safieddine,

[12] Our results do not change when we further control for tax sensitivity as later discussed in the robustness section.

and Titman, 2000). In contrast, we investigate how personal tax rate changes affect fund performance and fund managers' portfolio choices.

2. Data and Summary Statistics

2.1 Data

We use several sources of data in our analyses. The first datasets are on the various tax rates and macroeconomic variables used in this paper. We obtain data on the combined federal and state income tax rates from the NBER TAXSIM database. Corporate tax rates are from the University of Michigan Tax Database for 1994–2000 and from the Tax Foundation for the years 2000–2017. Interstate data on GDP and income growth come from the Bureau of Economic Analysis. Hedge fund data are from the Lipper/TASS database which has been widely used in prior hedge fund studies (e.g., Sadka, 2010; Teo, 2011). TASS provides monthly fund returns and assets under management, a snapshot of fund characteristics, and information on the management companies/investment advisors. Both live and dead funds are included in the analysis to mitigate survivorship bias. Because data on defunct funds are not available before 1994, the return observations before 1994 introduce a survivorship bias and are thus removed from the sample. In addition, funds often report return data prior to their listing date in the database. Because well-performing funds have stronger incentives to list, for example, after the incubation period, the backfilled returns are usually higher than the non-backfilled returns. To mitigate the backfill and incubation biases, we remove the backfilled return data, and keep only the returns after the listing date of each fund in the database. In addition, a fund must have non-missing fund characteristics, including management fee, incentive fee, fund size, and the use of high watermark, or a lockup period to be included in the sample. Using these filters, we have 3,088 funds (1,672 investment companies) in the final sample between January 1994 and December 2017.[13]

We also use Thomson-Reuters Institutional (13f) Holdings data set which provides quarterly holdings by asset management companies that are obligated to file Form 13F with the Securities and Exchange Commission (SEC). Form 13F is filed at the level of the asset management company (AMC) or fund sponsor. Each AMC can manage multiple hedge funds or portfolios (henceforth, "hedge funds"). To identify AMCs that operate hedge funds, we first compile a list of company names using the "Companies" file in the TASS data. We then manually match these company names with those in the Thomson-Reuters Institutional (13f) Holdings data set. This procedure yields a total of 512 AMCs that manage hedge funds. Subsequently, we match the hedge fund holding data with firm, equity, and analyst characteristics using Compustat, CRSP, and I/B/E/S Estimates, respectively.

2.2 Summary statistics

In Figure 1, we report the country-wide geography of hedge funds, by state, over our sample period from 1994 to 2017. As shown in the figure, the number of funds across states ranges from 0 to 1,182. Not surprisingly, the top five states with the most funds are New York, California, Connecticut, Massachusetts, and Illinois. Ten states in our sample have no hedge funds. These states include Louisiana, Maine, Mississippi, Montana, Nebraska, New Hampshire, North Dakota, South Dakota, West Virginia, and Wyoming.

Figures 2 and 3 report the variation in state level income tax rates. Figure 2 reports the variation, by state, in average maximum state tax rates. California has the highest rate at 11.4%

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[13] Note that we exclude funds of hedge funds throughout our analyses because we investigate the actions of fund managers in terms of security selection to determine changes in their effort. Funds of hedge funds invest in other hedge funds rather than directly in the primary security markets.

while several states including Florida, Nevada, New Hampshire, Pennsylvania, Washington, Wyoming, South Dakota, Tennessee, and Texas have 0% state income tax. Figure 3 reports the variation in state tax rates across time for states in which at least one fund is located. States such as California and New York have substantial changes while others such as Tennessee and Texas have maximum income tax rates that have remain unchanged during our sample period. Overall, these figures show that there exists substantial variation in maximum income tax rates across states and over time.

Table I reports the descriptive statistics. Panel A presents the statistics of top federal and state ordinary income tax rates. Panel B reports the statistics of hedge fund performance and characteristics. Hedge fund performance is measured at the fund-month level using raw returns and alphas from an eight-factor model, i.e., Fung and Hsieh (2004) seven-factor model augmented with an emerging market factor (*8-Factor Alpha*). As reported in Panel B of Table I, the average alpha is 0.1% monthly and the standard deviation is 3.4%. Additional fund characteristics at the fund-month level include fund assets under management (*Assets*) measured in millions of dollars, fund flow (*Flow*), fund age (*Age*), pay-performance sensitivity (total delta and option delta) measured in thousands of dollars, and ownership as a percent of assets under management. The appendix provides detailed definitions of these variables.

An average fund manages $226.13 million, has 0.4% monthly (or 4.8% annualized) flows, and is 84.25 months or about 7 years old. The average option and total delta of the funds in our sample are $180,185 and $324,131, respectively. Furthermore, the average percent ownership that managers hold in their fund is 9.3%. We also report fund characteristics that remains time-invariant at the fund level. These variables are incentive fees (*IncentiveFee*), management fees (*ManagementFee*), highwater mark (*HighwaterMark*), and whether the fund has a lockup period

(*Lockup*). The average management fee and incentive fee are 1.4% and 18.8%, respectively. Among the hedge funds in our sample, 72.9% use a highwater mark provision. Furthermore, 46.1% of the funds in our sample have a lockup period. Panel C shows the summary statistics of stocks held by hedge fund managers at the fund-stock-quarter level. *HFownership* is measured by the shares of the stock owned by a hedge fund manager divided by the total shares outstanding. The average ownership in a stock is 0.7%. Other stock characteristics for which descriptive statistics are reported include firm size (*LnFirmSize*), analyst coverage (*LnAnalyst*), firm age (*LnFirmAge*), stock illiquidity (*Illiquidity*), idiosyncratic return volatility (*IdioVolatility*), R&D expenditures (*R&D*), market-to-book ratio (*MB*), stock price (*LnPrice*), stock momentum (*Momentum*), dividend yield (*D/P*), price-to-sales ratio (*P/S*), and equity beta (*Beta*). Panel D provides summary statistics for the macroeconomic variables used in this study. The average corporate tax rate is 42.4%. Average state GDP growth rate and income growth rate are 2.0% and 4.1%, respectively.

< INSERT TABLE I >

3. The impact of tax rate on hedge fund performance

To examine whether an increase in personal tax rate affects a fund manager's effort, we first use fund performance to capture managerial effort. Since fund performance should reflect both a fund manager's skill and effort, we carefully control for skill using fund fixed effects. We further control for time-varying macroeconomic factors and a host of fund characteristics that can affect fund performance as shown in the prior literature (e.g., Agarwal, Daniel, and Naik, 2009).

A manager's personal tax rate can affect manager's effort through two channels. The *substitution hypothesis* predicts a lower effort level when the tax rate is higher. This is because a tax increase lowers the after-tax income for a manager and reduces the marginal benefit from a manager's effort. This reduced net benefit could lead to a lower level of exerted effort since other uses of time, such as leisure, may become relatively more attractive. In contrast, the *income hypothesis* suggests that tax hikes can increase managerial effort. When higher taxes reduce a manager's net after-tax income, the manager may exert more effort to make up for the lost income and maintain current levels of consumption. Therefore, the effect of a tax increase on manager's effort is an empirical question. In the following subsections, we examine the effect of personal tax rates on fund performance using difference-in-differences analyses.

3.1 Difference-in-differences (DID) estimation using fixed-effects panel regressions

In our first set of empirical tests, we examine the effect of fund managers' personal income tax rates on fund performance using a DID estimation in the form of fixed-effects panel regressions:

$$Performance_{i,t} = \quad \alpha_0 + \alpha_1 Manager\ Tax_{i,t} + \sum \alpha_j Controls_{i,} + \varepsilon_{i,t} \tag{1}$$

$Performance_{i,t}$ is the return of hedge fund i in month t. We measure fund performance using raw returns and alphas from an eight-factor model. We estimate eight-factor alphas by regressing monthly raw returns of a fund on the seven factors in the Fung and Hsieh (2004) model augmented with an emerging market factor over a 36-month rolling window. We require a minimum of 18 non-missing monthly returns in each estimation window to estimate alphas. The eight-factor model controls for returns on equity market, term and credit spreads, and trends following factors in bonds, currencies, and commodities, all of which can be influenced by changes in tax rates.

$Manager\_Tax_{i,t}$ is the maximum combined federal and state income tax rate of a manager i in month t. We assume that hedge fund managers face the highest marginal personal income tax rate. The maximum federal and state income tax rate is calculated by Dan Feenberg of the National Bureau of Economic Research (NBER) and his collaborators using the TAXSIM model, assuming a married couple filing jointly with an income of \$1,500,000, property tax deductions of \$150,000, and the reciprocal deductibility of federal and state income taxes where applicable. We further assume that fund managers pay personal income tax in the state where their funds are located, given that every state taxes income earned in the state for both residents and non-residents (Armstrong, Glaeser, Huang, and Taylor, 2019).

Following prior literature (e.g., Agarwal, Daniel, and Naik, 2009), we control for fund characteristics including the logarithm of assets under management (*LnAsset*), fund flows (*Flow*), and logarithm of fund age (*LnAge*). All fund characteristic variables used as controls are lagged by one month. To account for time-varying macroeconomic factors that may simultaneously impact fund performance, we further include corporate tax rate (*Corporate_Tax*), state-level GDP growth rate (*StateGDPGrowth*), and state-level income growth rate (*StateIncomeGrowth*). To account for unobservable fund manager skill, we include fund fixed effects.[14] Time fixed effects are included to account for unobserved economy-wide factors that could drive both tax policy and fund performance.[15] Throughout the paper, we adjust the standard errors for heteroscedasticity and cluster them at the state level unless stated otherwise.

As shown in Table II, the coefficient on $Manager\_Tax_{i,t}$ is negative and statistically significant across all columns. The results are robust to the use of different performance measures including raw returns and 8-factor alphas, and to the use of both net-of-fee (models 1 and 2) and gross-of-fee performance (models 3 and 4). These results indicate that a higher personal tax rate of the fund manager is associated with a lower fund performance. The economic magnitude is also significant. For example, column (2) in Table II shows that a one standard deviation increase in

[14] The inclusion of fund fixed effects also subsumes state fixed effects as fund location does not vary over time in our sample.

[15] We obtain similar results when we include only fund fixed effects. The results are not significant if we do not include fund fixed effects. This is because fund fixed effects allow us to control for both manager skill and location effects. For example, if managers with higher skills choose to locate in states with higher taxes (e.g., New York) because the state offers more opportunities for obtaining private information, we cannot capture the effect of tax without controlling for manager skill. Prior research has shown that location and managerial skill affect fund performance (Christoffersen and Sarkissian, 2009). Therefore, it is important to control for fund fixed effects.

personal tax rate is associated with a 2.1 (= 0.053×0.034×12) percentage point decrease in annual alpha, which is 1.75 times of the annual average alpha of 1.2%. With respect to the control variables, fund size is negatively associated with fund performance, consistent with the prior work suggesting a decreasing returns-to-scale in the hedge fund industry (e.g., Getmansky, 2012; Yin, 2016). Overall, these results suggest that the substitution effect dominates the income effect. That is, when personal income tax rates increase, fund managers reduce effort because rewards to effort (after-tax income) become lower.

< INSERT TABLE II >

3.2 DID analyses using major state tax changes

We next employ a DID analysis on major state tax change events. Specifically, we examine a five-year [−2, +2] window around tax changes after restricting the window to exclude multiple treatments and treatment reversals. Following Giroud and Rauh (2019), we define a major tax increase (decrease) as an increase (decrease) of at least 100 basis points, or 1%. Since major state-level tax increases and decreases can overlap across different states, a fund can serve as both a treatment and control observation. Our model follows equation (1) but substitutes *Manager_Tax* for *Treatment*, where *Treatment* is set to one if a fund manager is in a state that experiences a large increase or decrease in state personal income taxes (at least 100 basis points) and zero, otherwise.

Table III Panel A presents the results. For the sake of brevity, hereon we only report the findings using net-of-fee performance measures. We observe that the estimated slope coefficient on *Treatment* is negative and statistically significant for both raw returns and 8-factor alpha in columns (1) and (3), confirming our previous findings in Table II that tax increases are associated with worse fund performance. Based on estimates in column (4), the 8-factor alpha declines on average by 0.4% per month for hedge funds in states with a large tax increase. In contrast, we do not observe a significant change in fund performance in response to major tax cuts. Columns (5) and (7) show an insignificant coefficient on *Treatment*. These findings suggest an asymmetric effect of tax changes that was not obvious from earlier findings in Table II. One potential reason why a tax cut may not induce greater effort, and therefore better fund performance, is because it may be more costly for managers to exert greater effort (i.e., the cost of exerting effort is convex).[16]

We also examine the dynamic response of fund performance to major tax increases. Columns (2) and (4) show that the decline in fund performance starts in the year of the major tax increase (i.e., year 0) and continues for the next two years (i.e., years +1 and +2). For instance, the monthly 8-factor alpha goes down by 0.3% during year 0, and further decreases by 0.3% and 0.4% in the subsequent two years. Moreover, there is no significant decrease in fund performance in the year prior to the tax increase events (i.e., year −1), satisfying the parallel trend assumption for validity of the DID test. Not surprisingly, there is not much evidence of a dynamic response in fund performance to major tax cuts in columns (6) and (8). Together, this time-series pattern of performance provides further evidence on the causal effect of tax increases on fund performance.

Since tax policy changes can be driven by economic conditions in the state which can simultaneously affect fund performance, we next identify exogenous tax changes following Giroud and Rauh (2019). Our results continue to hold for both major increases and decreases in state taxes. For example, as shown in column (3) in Panel B of Table III, the coefficient on exogenous tax increases is again negative and statistically significant (coefficient = −0.004; *t*-stats = −3.42). This result indicates a decline of 0.4% in monthly alpha due to large increases in state taxes. The use of exogenous tax changes in addition to controlling for time fixed effects and state-level

[16] For instance, say that a fund manager was working 60 hours per week prior to experiencing a tax cut. While the manager may retain greater income after a tax cut, increasing the working hours to 70 per week may come with a cost of adverse consequences for the manager's health and well-being.

macroeconomic conditions further helps mitigate concerns about unobserved economic factors driving both the tax changes and fund performance.

In Panel C, we use the actual magnitude of the tax change as a treatment variable to replace its indicator form in panels A and B. We continue to find a significant negative coefficient for the continuous treatment variable with the strongest results when the tax increase is exogenous as shown in columns (3) and (4). In other words, there is a greater deterioration in fund performance when the magnitude of the tax increase is larger. The coefficient on the continuous treatment variable in column (4) is −0.108 and significant (*t*-stats = −7.97). This result suggests that for a one standard deviation exogenous increase in tax rates, fund performance, as measured by 8-factor alpha, decreases by 4.4% (= 0.108×0.034×12) annually.

< INSERT TABLE III >

4. Tax rate and stock selection

One major advantage of using hedge funds to examine the relation between tax and effort is that fund managers' actions are readily observable through their stock selection. This setting allows us to explore evidence of effort shirking by examining the security selection decisions of fund managers. One of the primary job functions of portfolio managers is to acquire and process private information about security prices to manage the portfolios for their investors (e.g., Stoughton, 1993). Hedge fund managers may shirk by exerting less effort in acquiring and processing private information of stocks with greater information asymmetry. Following the prior literature (e.g., Chari, Jagannanthan, and Ofer, 1988; Glosten and Milgrom, 1985; Brennan and Subrahmanyam, 1995; Aboody and Lev, 2000), we use several proxies for information asymmetry: firm size, analyst coverage, firm age, stock illiquidity, R&D expenditure, and idiosyncratic volatility of stock returns. We then examine the relation between the personal tax rate of fund managers and the extent of information asymmetry of the stocks held in their portfolios.

Specifically, we estimate the following regression model at the stock-quarter level, which allows us to control various firm and stock characteristics:

$$
\begin{aligned}
HFownership_{i,j,t} = \quad & \gamma_0 + \gamma_1 InformationAsymmetry_{i,t-1} \times Manager\_Tax_{i,t} \\
& + \gamma_2 InformationAsymmetry_{i,t-1} + \gamma_3 Manager\_Tax_{i,t} \qquad (2) \\
& + \sum \gamma_j Controls_{i,} + \varepsilon_{i,j,t}
\end{aligned}
$$

$HFownership_{i,j,t}$ is the total number of shares of a stock i owned by a hedge fund j divided by the total number of shares outstanding in quarter t. $InformationAsymmetry_{i,t-1}$ are proxies of information asymmetry of stock i during quarter t-1. These proxies include firm size (*LnFirmSize*), analyst coverage (*LnAnalyst*), illiquidity (*Illiquidity*), R&D expenditures (*R&D*) and stock idiosyncratic volatility (*IdioVolatility*). Detailed variable definitions are in the Appendix. Fund-level controls include lagged fund size (*LnAssets*), fund flow (*Flow*), and fund age (*LnAge*). In addition, we control for several stock characteristics including market-to-book ratio (*MB*), stock price (*LnPrice*), momentum (*Momentum*), dividend yield (*D/P*), and market beta (*Beta*). We include fund, stock, and year fixed effects to account for unobserved manager skill, stock characteristics, and macroeconomic shocks, respectively.

The results of the security selection analyses are presented in Table IV. The coefficient on *Manager_Tax* is negative and statistically significant across all specifications, suggesting that, on average, fund managers take on less concentrated positions after increases in personal tax rate. Since Bushee and Goodman (2007) show that changes in institutional ownership with large positions in a firm are indicative of informed trading, this result is supportive of the view that hedge fund managers shirk effort in their search for private information when they experience an increase in personal income tax. The coefficients on the interaction terms between tax and different measures of information asymmetry are statistically significant and carry signs that are consistent with our expectations. These results indicate that hedge fund managers disproportionally increase their equity holdings of firms that are larger, have lower R&D expenditures, have greater analyst following, and hold stocks with greater liquidity and lower idiosyncratic volatility, after an increase in tax rate. Overall, these cross-sectional analyses suggest that fund managers increase their holdings of stocks with lower information asymmetry when personal tax rates are higher. Also, these results provide supportive evidence that hedge fund managers shirk effort in gathering private information when they face disincentives from a higher personal tax rate.

< INSERT TABLE IV >

5. Managerial incentives

So far, we have shown that an increase in personal tax rates can lead to a deterioration in fund performance. In this section, we explore how managerial incentives can influence the relation between personal tax rates and fund performance. Specifically, we predict that the negative impact of higher taxes on fund returns is less severe when managerial incentives from their compensation contracts and ownership are greater. To measure managerial incentives, we follow Agarwal, Daniel, and Naik (2009) and estimate total delta on both outside investors' capital and manager's own capital in the fund. Total delta is defined as the overall pay-performance sensitivity of a hedge fund manager's compensation. Specifically, it is the total expected dollar increase in the manager's compensation for a 1% increase in the fund's returns. We also consider option delta related to only investors' capital and manager ownership within their fund scaled by the assets under management. Agarwal, Daniel, and Naik (2009) show that higher option delta and managerial ownership are also associated with better future performance.

Table V presents the results for two subsamples split on total delta (*TotalDelta*L and *TotalDelta*H), option delta (*OptionDelta*L and *OptionDelta*H), and managerial ownership (*Ownership*L and *Ownership*H). The subsamples are split based on the median values for each month-year. Panel A presents the results using raw returns to measure performance while Panel B presents the results using 8-factor alphas as the performance measure. The coefficient on *Manager_Tax*, our main variable of interest, is negative and statistically significant for the subsamples in which the total delta (*TotalDelta*L), option delta (*OptionDelta*L), and ownership (*Ownership*L) are below the median. In contrast, this coefficient is not statistically significant for the subsamples above the median, as shown in columns (2), (4), and (6). Although the differences in the two subsamples are generally not significant, these results suggest that the effect of tax rate hikes on effort shirking seem to be restricted to instances when managerial incentives are low.

< INSERT TABLE V >

6. Tax rate and incentive fee

Since our results suggest that there is a negative effect of personal tax on a hedge fund manager's effort level, we investigate if fund investors recognize and attempt to mitigate the disincentive effect of a tax change. Economic theory suggests that fund investors (principals) can design a compensation contract to incentivize delegated portfolio managers (agents) to exert greater effort (Stoughton, 1993). Therefore, provisions in fund managers' compensation contracts can be used to offset the disincentive effect on effort due to a tax increase. Specifically, we examine the relation between personal tax rate and incentive fees. Managers get to keep a greater portion of fund profits and should have a greater incentive to exert effort when the incentive fee is higher. Therefore, investors may set a higher incentive fee to induce managers' effort when they face higher taxes. Since hedge fund fees are set at the inception date and rarely change over time, we investigate the relation between incentive fee and the personal tax rate at the inception date of a fund through the following cross-sectional regression:

$$\text{Log}(1+IncentiveFee_{i,t}) = \delta_0 + \delta_1 Manager\_Tax_{i,t} + \sum \delta_j Controls_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

$IncentiveFee_{i,t}$ is the incentive fee received by hedge fund manager i at a fund's inception month t. $Manager\_Tax_{i,t}$ is the maximum combined federal and state income tax rate of fund manager i at a fund's inception month t. We include a set of variables that control for characteristics of the investment company to which a fund belongs. First, we include *HighwaterMark*, an indicator set to one for the presence of a highwater mark and zero, otherwise. We further include an indicator, *Lockup*, to control for the presence of a lockup period. We also include management fees (*ManagementFee*) since management and incentive fees are often determined jointly at the fund's inception. As before, we include a set of macroeconomic variables (*Corporate_Tax*, *StateIncomeGrowth*, and *StateGDPGrowth*). We control for investment company fixed effects to capture unobserved time-invariant factors that can impact the incentive fee such as the reputation of the investment company.[17] We also control for state fixed effects to account for unobservable state-specific factors that can influence incentive fee.

The results are presented in Table VI. Column (1) presents the results excluding both investment company and state fixed effects while the model estimated in column (2) includes investment company fixed effects. The specification in column (3) includes both investment company and state fixed effects. As shown in Table VI, we find a positive relation between incentive fee and personal tax rate across all specifications. For instance, the coefficient in column (3) is 0.235 and is statistically significant at the 5% level (t-stats = 2.49). This result indicates that a one standard deviation increase in personal tax rate is associated with a 0.68% (= 0.235 x 0.029)

[17] We do not include time fixed effects since observations correspond to only the inception year of each hedge fund.

increase in the incentive fee. Overall, our results suggest that investors offer a higher incentive fee to funds that are launched in states with higher tax rates to mitigate the disincentives from greater taxation.

< INSERT TABLE VI >

7. **Alternative explanations**

Hedge fund managers may adjust their trading behavior in anticipation of the changes in tax law. Specifically, managers may become more tax efficient. This increase in tax efficiency may be associated with the observed decline in pretax fund performance. To examine this alternative explanation, we include a measure of tax efficiency management as an additional control in our main model specified in equation (1). We capture tax efficiency management through *TaxBurden*, measured as the tax liability of an investment firm divided by the market value of its stock holdings (Sialm and Zhang, 2018; Sialm and Starks, 2012). Tax liability is computed as the realized long-term and short-term capital gains (net of losses), and dividends multiplied by their respective tax rates. As an alternative measure for tax management, we also use *TaxSensitivity*, which is an indicator variable set to one if the fund is tax sensitive and engages in tax-motivated trading as defined in Blouin, Bushee, and Sikes (2017). All other control variables remain the same as those used in equation (1).

Table VII presents the results of the analyses. Columns (1) and (2) provide the results for raw returns and 8-factor alphas when *TaxBurden* is included as an additional control for tax management. Columns (3) and (4) present analyses using similar specifications, but with *TaxSensitivity* as an alternative control for tax management. Note that the number of observations decreases substantially compared to the sample used for the analyses in Table II when we include *TaxBurden* or *TaxSensitivity* as an additional covariate. The reason is because the tax management measures can only be determined at the annual level. Therefore, we use firm-year observations for this analysis. Despite the potential loss of statistical power, we continue to find a negative and statistically significant coefficient for *Manager_Tax* across all four specifications. Overall, these results mitigate concerns that tax efficient management could be driving the negative relation between personal tax rates and fund performance.

< INSERT TABLE VII >

Hedge fund competition within a particular state may also change in anticipation of a change in tax rates. Specifically, more new funds may be created in states that reduce taxes while funds may close or move out (a rare occurrence in the industry) of states that increase taxes. If this were to be true, fund competition may weaken in states with higher tax rates, which would predict *better*, and not worse, performance for funds domiciled in those states. Therefore, a priori changes in hedge fund competition biases us against finding worse performance after tax increases. Nonetheless, we examine this alternative explanation by including a measure of fund competition as an additional control in our main specification in equation (1).

We use two alternative measures to capture hedge fund competition. The first measure, *HHI_State*, is the Herfindahl index of assets under management across all hedge funds domiciled in a state. Our second measure, *LnNofunds_State*, is the natural logarithm of the number of funds in a state. Table VIII presents the results of this analysis. Columns (1) and (2) present results using raw returns as a measure of fund performance while columns (3) and (4) use 8-factor alphas. As shown in the table, *Manager_Tax* continues to have a negative and statistically significant coefficient across all specifications, suggesting that potential changes in fund competition from changes in tax rates are not driving the changes in fund performance.

< INSERT TABLE VIII >

8. Additional Robustness Tests

We further examine the subset of 13F filers among hedge funds and reanalyze the relation between changes in personal tax rates and fund performance. In Section 4, we examine how personal tax rates can influence the stock selection decisions of a fund manager based on their holdings listed in 13F filings. In this section, we verify whether the negative relation between tax rates and fund performance continues to hold for this subsample of 13F filers. Table IX presents the results of this analysis. The model for these analyses follows equation (1). Column (1) presents results using raw returns while column (2) presents 8-factor alpha regression estimates. As shown in the table, we continue to find a negative association between *Manager_Tax* and fund performance across both specifications.

< INSERT TABLE IX >

9. Concluding remarks

At the center of the debate on having a progressive tax code is the amount of deadweight loss created by such laws. The revenue from increasing taxes on the wealthy can be substantial. However, the cost of diverting the wealth and talents of the affluent into socially unproductive activities can also be significant. We overcome data limitations on the behavior of the affluent by studying these issues in the setting of hedge funds. Our unique setting allows us to capture effort shirking using fund performance and the characteristics of the stocks selected by the fund managers. We find that an increase in personal tax rates is associated with more effort shirking by hedge fund managers, as reflected by worse fund performance and selection of stocks with lower information asymmetry. Moreover, the effect of taxes on fund performance is asymmetric as tax cuts are not associated with managers exerting more effort to improve fund performance. We further show that higher incentives arising from the compensation contracts and coinvestment of hedge fund managers help to mitigate the disincentive effect induced by higher taxes on fund performance. Our findings are robust to controlling for managers' and investors' responses to tax changes that can affect inflows and outflows from funds, deployment of tax efficient management tools by managers, and the industry competitive landscape. Overall, our findings suggest that there exists a negative externality of taxing hedge fund managers. Higher taxes can make fund managers shirk effort and deliver worse performance, which in turn affects fund investors.

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Figure 1
Geography of Hedge Funds

This figure presents the number of hedge funds by state across our sample between 1994 and 2017.

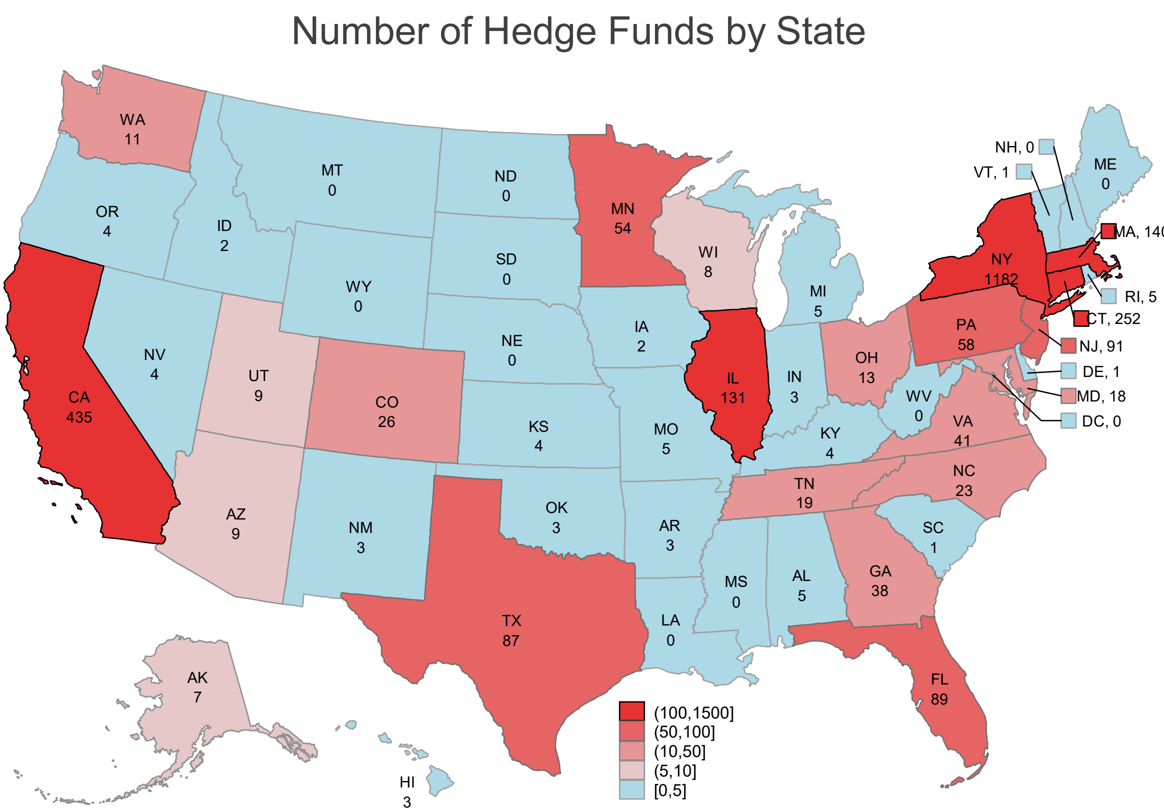

Figure 2
Average Maximum State Tax Rates

This figure presents the average maximum state tax rates from 1994 to 2017. The average maximum tax rates displayed are the highest state income tax rates, assuming that the manager works in the state where the fund is located and is in the top income bracket at the state level.

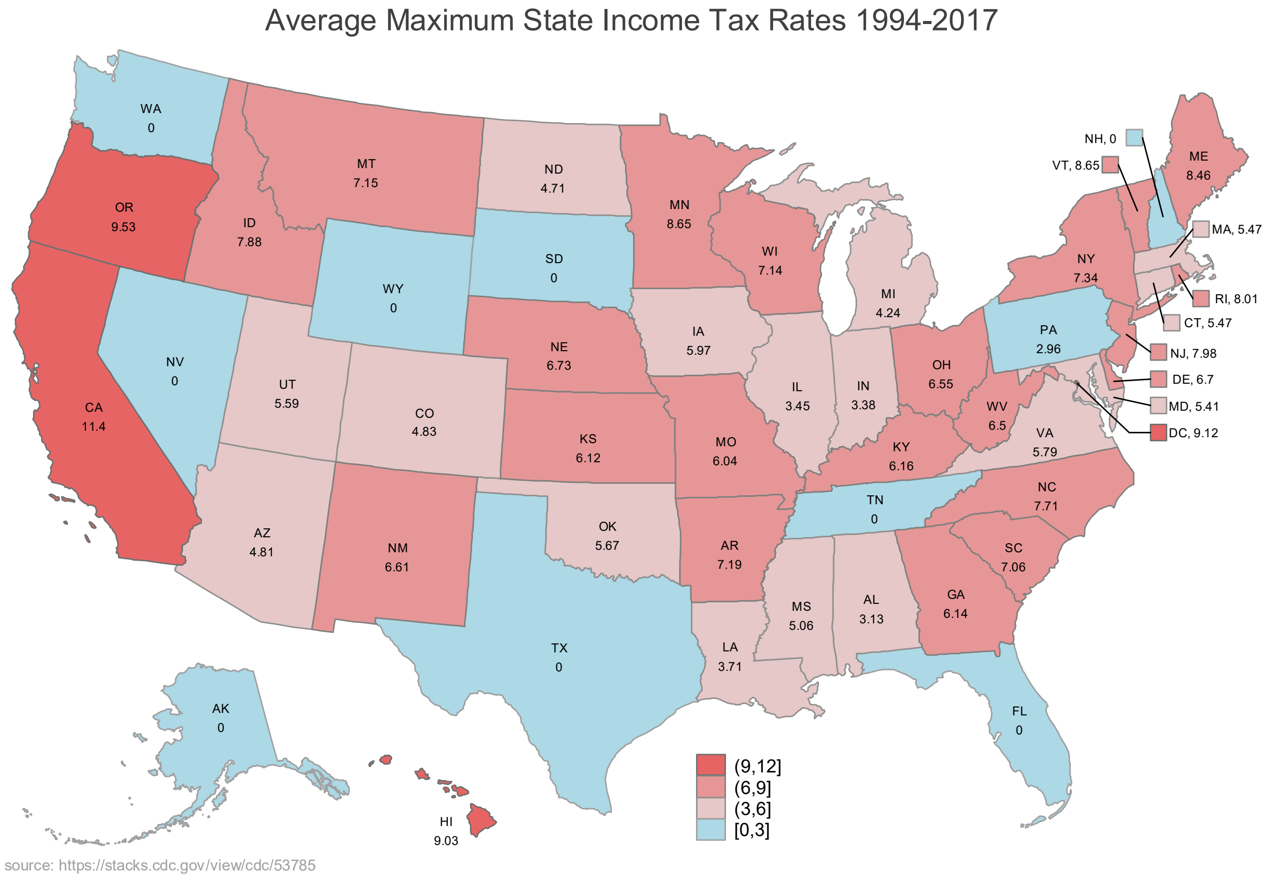

Figure 3
Variation in State Tax Rates

This figure presents the variation in maximum state tax rates between 1994 and 2017 for states where at least one hedge fund is located.

Table I: Summary Statistics

This table reports descriptive statistics of our key variables. Our main sample includes hedge funds that report returns in U.S. dollars and have a U.S. office address. The sample period is from 1994 to 2017. Summary statistics include sample size (*N*), mean, median, standard deviation (*Std Dev*), 25th percentile (*P25*), and 75th percentile (*P75*). Panel A of the table presents the summary statistics of top ordinary income tax rates (federal and state). Panel B reports the summary statistics of hedge fund performance and characteristics. Hedge fund performance is measured at the fund-month level using raw returns and alphas from the Fung and Hsieh (2004) 7-factor model augmented with the emerging market factor (*8-Factor Alpha*). Additional fund characteristics at the fund-month level include fund assets under management (*Asset*) measured in millions of US dollars, fund flow (*Flow*), fund age (*Age*) measured in months, option and total delta (*OptionDelta* and *TotalDelta*) measured in thousands of US dollars, and manager's co-investment in the fund (*Ownership*) measured in percentage. We also report fund characteristics that remains time-invariant at the fund level. These variables are incentive fees (*IncentiveFee*), management fees (*ManagementFee*), percent of funds with a highwater mark (*HighwaterMark*), and whether the fund has a lockup period (*Lockup*). Panel C shows the summary statistics of stocks held by hedge fund managers at the fund-stock-quarter level. *HFownership* is measured by the total number of shares of a stock owned by hedge funds divided by the total shares outstanding of the stock. Other stock characteristics are firm size (*LnFirmSize*), analyst coverage (*LnAnalyst*), firm age (*LnFirmAge*), stock illiquidity (*Illiquidity*), idiosyncratic return volatility (*IdioVolatility*), R&D expenditures (*R&D*), market-to-book ratio (*MB*), stock price (*LnPrice*), stock momentum (*Momentum*), dividend yield (*D/P*), price-to-sales ratio (*P/S*), and equity beta (*Beta*). Panel D reports the summary statistics for the macroeconomic variables. Detailed variable definitions are provided in the Appendix. All variables are winsorized at the 1st and 99th percentiles.

Panel A: Ordinary Income Tax Rates

	N	Mean	Median	Std Dev	P25	P75
Federal	136,180	0.348	0.337	0.026	0.329	0.372
State	136,180	0.069	0.069	0.030	0.053	0.090
Manager_Tax	136,180	0.416	0.411	0.029	0.398	0.440

Panel B: Hedge Fund Performance and Characteristics

	N	Mean	Median	Std Dev	P25	P75
Fund-month Observations						
Raw Return	136,180	0.005	0.006	0.039	-0.009	0.021
8-Factor Alpha	97,518	0.001	0.002	0.034	-0.013	0.016
Assets ($ Million)	136,180	226.128	46.454	911.047	13.600	150.257
Flow	136,180	0.004	0.000	0.091	-0.009	0.014
Age (Months)	136,180	84.252	70.000	61.469	37.000	117.000
Option Delta ($ Thousand)	103,778	180.185	28.524	443.539	3.647	127.541
Total Delta ($ Thousand)	103,778	324.131	63.022	758.660	13.716	247.071
Ownership (% of Assets)	105,193	0.093	0.032	0.173	0.007	0.092
Fund Level Observations						
Management Fee	3,115	0.014	0.015	0.005	0.010	0.018
Incentive Fee	3,115	0.188	0.200	0.046	0.200	0.200
Highwater Mark	3,115	0.729	1.000	0.444	0.000	1.000
Lockup period (Years)	3,115	0.461	0.000	0.632	0.000	1.000

Panel C: Stock Holding Characteristics

	N	Mean	Median	Std Dev	P25	P75
Fund-stock-quarter Observations						
HFownership	1,464,017	0.007	0.001	0.016	0.000	0.006
LnFirmSize	1,464,017	7.435	7.303	1.901	6.096	8.625
LnAnalyst	1,464,017	2.708	2.773	0.819	2.197	3.332
LnFirmAge	1,464,017	2.828	2.773	0.778	2.303	3.497
Iliquidity	1,464,017	0.083	0.032	0.153	0.015	0.080
IdioVolatility	1,464,017	0.139	0.123	0.066	0.089	0.174
R&D	1,464,017	0.046	0.004	0.081	0.000	0.064
MB	1,464,017	2.215	1.664	1.956	1.240	2.502
LnPrice	1,464,017	2.997	3.063	1.002	2.431	3.595
Momentum	1,464,017	0.219	0.113	0.622	−0.146	0.425
D/P	1,464,017	3.264	0.000	8.946	0.000	1.225
P/S	1,464,017	0.259	0.017	1.853	0.005	0.051
Beta	1,464,017	1.129	1.088	0.583	0.746	1.476

Panel D: Macroeconomic Variables

	N	Mean	Median	Std Dev	P25	P75
Corporate_Tax	136,180	0.424	0.425	0.020	0.421	0.438
StateGDPGrowth	136,180	0.020	0.022	0.023	0.003	0.038
StateIncomeGrowth	136,180	0.041	0.043	0.028	0.021	0.061

Table II: Personal Income Tax and Hedge fund Performance: Panel Regression with fixed effects

This table reports the results of panel regressions with fixed effects on the relation between a hedge fund manager's personal income tax rate and fund performance. Our sample includes hedge funds that report returns in U.S. dollars and have a U.S. office address. The sample period is from 1994 to 2017. Coefficients are estimated based on the model presented in Equation (1). The dependent variables are *Raw Return* in columns (1) and (3), and *8-Factor Alpha* in columns (2) and (4). Columns (1) and (2) use net-of-fee returns and alphas. Columns (3) and (4) report the results with gross-of-fee returns and alphas. Hedge fund manager's tax rate (*Manager_Tax*) is measured as the top federal and state combined ordinary income tax rate based on the fund manager's office address. Other fund-specific variables include *LnAsset, Flow*, and *LnAge*. *LnAsset* is the logarithm of fund assets under management. *Flow* is the flows of fund. *LnAge* is the logarithm of fund age. Macroeconomic factors included are *Corporate_Tax*, *StateGDPGrowth*, and *StateIncomeGrowth*. *Corporate_Tax* is the combined federal and state top marginal corporate tax rate. *StateGDPGrowth* is the annual growth rate in gross state domestic product. *StateIncomeGrowth* is the annual growth rate in state personal income. Fund and time fixed effects are included. Detailed variable definitions are described in the Appendix. Standard errors are adjusted for heteroskedasticity and clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Net-of-fee returns		Gross-of-fee returns	
	(1)	(2)	(3)	(4)
VARIABLES	*Raw Returns*	*8-Factor Alpha*	*Raw Returns*	*8-Factor Alpha*
$Manager\_Tax_t$	−0.088**	−0.053**	−0.104**	−0.048*
	(−2.14)	(−2.09)	(−2.16)	(−1.69)
$LnAsset_{t-1}$	−0.003***	−0.003***	−0.004***	−0.003***
	(−14.71)	(−7.42)	(−8.62)	(−8.05)
$Flow_{t-1}$	0.000	0.000	0.003**	0.001
	(0.30)	(0.25)	(2.16)	(0.78)
$LnAge_{t-1}$	−0.002***	−0.001	−0.002	−0.001
	(−2.73)	(−0.68)	(−1.52)	(−0.74)
$Corporate\_Tax_t$	0.004	0.016	−0.026	0.030
	(0.11)	(0.37)	(−0.47)	(0.60)
$StateGDPGrowth_t$	0.014*	0.026***	0.023**	0.023**
	(1.77)	(2.89)	(2.31)	(2.25)
$StateIncomeGrowth_t$	0.028***	0.016*	0.044***	0.018
	(2.72)	(1.98)	(3.40)	(1.47)
Fund FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	136,180	97,518	103,783	71,024
Adj. R-squared	0.207	0.066	0.194	0.072

Table III: Personal Income Tax and Hedge fund Performance: Difference-in-Differences (DID) Analyses on Major State Tax Changes

This table reports the results from DID analyses at the state level for the relation between a fund manager's personal income tax rate and fund performance. The treatment group (*Treatment*) are the funds domiciled in states that experience a large tax change of 100 basis points or more. The sample consists of observations within a five-year window [–2, +2] around a large tax change. The dependent variable is raw returns in columns (1) and (2) for large tax increases, and columns (5) and (6) for large tax decreases. The dependent variable is 8-Factor alpha in columns (3) and (4) for large tax increases, and columns (7) and (8) for large tax decreases. Panel A reports the results for all major tax changes. Panel B include only exogenous tax changes. Panel C incorporates the magnitude of tax changes into the analyses. Detailed variable definitions are in the Appendix. Standard errors are adjusted for heteroskedasticity and clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. All major state tax changes (increases and decreases)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Raw Returns$_t$		8-Factor Alpha$_t$		Raw Returns$_t$		8-Factor Alpha$_t$	
	Large State Tax Increases (change >=0.01)				Large State Tax Cuts (change <= -0.01)			
Treatment	−0.002**		−0.004***		−0.001		−0.003	
	(−2.30)		(−4.91)		(−0.08)		(−0.30)	
Treatment (−1)		−0.001		0.000		0.002		0.009
		(−0.81)		(0.21)		(0.29)		(1.00)
Treatment (0)		−0.004		−0.003**		0.000		0.006
		(−1.83)		(−2.57)		(0.02)		(0.79)
Treatment (+1)		−0.002***		−0.003***		0.010		0.013
		(−4.24)		(−4.03)		(0.77)		(0.92)
Treatment (+2)		−0.001**		−0.004***		0.007		0.020
		(−3.28)		(−9.87)		(0.38)		(0.93)
LnAsset$_{t-1}$	−0.003***	−0.003***	−0.003***	−0.003**	−0.004***	−0.004***	−0.003***	−0.003***
	(−4.66)	(−4.63)	(−3.36)	(−3.29)	(−12.56)	(−12.47)	(−6.60)	(−6.75)
Flow$_{t-1}$	−0.003*	−0.003*	−0.002	−0.002	−0.002	−0.002	−0.003	−0.003
	(−2.27)	(−2.27)	(−0.63)	(−0.63)	(−0.74)	(−0.73)	(−1.85)	(−1.83)
LnAge$_{t-1}$	−0.003*	−0.002*	−0.006**	−0.006**	−0.000	−0.000	−0.000	−0.000
	(−2.14)	(−2.19)	(−2.55)	(−2.49)	(−1.13)	(−1.06)	(−0.01)	(−0.00)
StateCorporateTax$_t$	0.000	0.000	0.001***	0.001***	−0.002	0.002	−0.003	0.008
	(0.92)	(0.91)	(5.38)	(3.56)	(−0.49)	(0.20)	(−0.62)	(0.72)
StateGDPGrowth$_t$	0.056***	0.064***	0.030***	0.025***	0.131	0.295	0.129	0.263
	(5.04)	(3.70)	(3.40)	(3.46)	(0.85)	(1.33)	(0.50)	(0.70)
StateIncomeGrowth$_t$	0.004	0.014	−0.078**	−0.078**	0.055	0.106	−0.154	−0.037
	(0.16)	(0.67)	(−2.98)	(−2.80)	(1.33)	(0.59)	(−1.09)	(−0.14)
Fund and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,324	41,324	31,723	31,723	22,208	22,208	17,527	17,527
Adj. R-squared	0.243	0.243	0.079	0.079	0.241	0.241	0.085	0.085

Panel B. Exogenous state tax changes

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Raw $Returns_t$		8-Factor $Alpha_t$		Raw $Returns_t$		8-Factor $Alpha_t$	
	Large State Tax Increases (change >=0.01)				Large State Tax Cuts (change <= -0.01)			
Treatment	−0.006		−0.004**		0.008		0.006	
	(−1.66)		(−3.42)		(0.57)		(0.38)	
Treatment (−1)		−0.005		−0.002		−0.010		0.002
		(−1.83)		(−1.73)		(−0.92)		(0.40)
Treatment (0)		−0.011***		−0.007***		−0.014		0.006
		(−5.48)		(−4.58)		(−1.25)		(0.34)
Treatment (+1)		−0.010***		−0.006**		−0.011		0.008
		(−11.07)		(−2.79)		(−0.91)		(0.44)
Treatment (+2)		−0.010***		−0.009***		−0.029		0.005
		(−9.21)		(−3.74)		(−1.13)		(0.31)
$LnAsset_{t-1}$	−0.004***	−0.005***	−0.004***	−0.004***	−0.004***	−0.004***	−0.003***	−0.003***
	(−34.13)	(−29.53)	(−7.87)	(−8.20)	(−12.48)	(−12.53)	(−5.97)	(−5.93)
$Flow_{t-1}$	−0.002	−0.001	−0.003	−0.003	−0.001	−0.001	−0.003	−0.003
	(−1.11)	(−1.02)	(−0.95)	(−0.94)	(−0.49)	(−0.49)	(−1.77)	(−1.76)
$LnAge_{t-1}$	−0.004***	−0.004***	−0.006	−0.007	−0.000	−0.000	0.000	0.000
	(−5.60)	(−4.80)	(−1.62)	(−1.66)	(−0.51)	(−1.22)	(0.17)	(0.16)
$StateCorporateTax_t$	0.001	−0.000	0.001***	0.001*	0.003	−0.016	0.002	0.006
	(0.62)	(−0.05)	(4.67)	(2.32)	(0.41)	(−1.24)	(0.26)	(0.30)
$StateGDPGrowth_t$	0.083*	0.157	0.040*	0.035	0.027	0.269	0.052	0.155
	(2.11)	(1.70)	(2.00)	(0.88)	(0.25)	(1.22)	(0.29)	(0.75)
$StateIncomeGrowth_t$	0.063	0.125	−0.112*	−0.012	0.071	−0.237	−0.137	−0.224
	(0.52)	(1.50)	(−1.97)	(−0.24)	(1.75)	(−0.85)	(−1.09)	(−1.24)
Fund and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,850	27,850	21,642	21,642	22,013	22,013	17,400	17,400
Adj. R-squared	0.082	0.083	0.083	0.083	0.243	0.243	0.085	0.085

Panel C. Continuous variable for tax changes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Raw Returns$_t$	8-Factor Alpha$_t$	Raw Returns$_t$	8-Factor Alpha$_t$	Raw Returns$_t$	8-Factor Alpha$_t$	Raw Returns$_t$	8-Factor Alpha$_t$
	Large State Tax Increases (change >=0.01)		Exogenous Large State Tax Increases (change >=0.01)		Large State Tax Cuts (change <= -0.01)		Exogenous Large State Tax Cuts (change <= -0.01)	
Treatment_ΔManager_Tax	−0.100	−0.076*	−0.157**	−0.108***	0.189	0.072	0.161	0.002
	(−1.25)	(−2.09)	(−2.61)	(−7.97)	(1.60)	(0.41)	(1.34)	(0.01)
LnAsset$_{t-1}$	−0.003***	−0.003**	−0.004***	−0.004***	−0.005***	−0.003***	−0.005***	−0.003***
	(−4.13)	(−3.23)	(−35.14)	(−8.06)	(−12.34)	(−6.89)	(−13.94)	(−6.11)
Flow$_{t-1}$	−0.001	−0.002	−0.001	−0.003	0.001	−0.003	0.001	−0.003
	(−1.24)	(−0.69)	(−1.10)	(−0.94)	(0.29)	(−1.87)	(0.26)	(−1.78)
LnAge$_{t-1}$	−0.003*	−0.006**	−0.004***	−0.007	−0.001	0.000	−0.001	0.000
	(−2.13)	(−2.93)	(−5.73)	(−1.64)	(−1.06)	(0.00)	(−1.06)	(0.15)
StateCorporateTax$_t$	0.000	0.001**	0.000	0.001***	−0.004***	−0.002	−0.003*	−0.001
	(0.23)	(3.20)	(0.03)	(4.28)	(−3.84)	(−1.86)	(−2.41)	(−0.46)
StateGDPGrowth$_t$	0.062***	0.028***	0.084	0.040*	0.142	0.130	0.113	0.076
	(5.67)	(5.35)	(1.72)	(2.02)	(0.88)	(0.50)	(0.61)	(0.40)
StateIncomeGrowth$_t$	0.028	−0.015	0.147	−0.041	0.122	−0.120	0.111	−0.145
	(1.31)	(−0.44)	(1.59)	(−1.72)	(1.58)	(−0.80)	(1.92)	(−0.74)
Fund and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,324	31,723	27,850	21,642	22,208	17,527	22,013	17,400
Adj. R-squared	0.0707	0.0815	0.0828	0.0829	0.0747	0.0846	0.0731	0.0848

Table IV: Personal Income Tax and Stock Selection

This table reports the regression results on the relation between a hedge fund manager's personal income tax rate and manager's stock selection. Our sample includes hedge funds that report returns in U.S. dollars and have a U.S. office address. The sample period is from 1994 to 2017. Coefficients are estimated based on the model presented in Equation (3). The dependent variable is *HFownership*, measured by the number of shares of a stock held by a fund divided by the total number of shares outstanding of the stock. Hedge fund manager's tax rate (*Manager_Tax*) is measured as the top federal and state combined ordinary income tax rate based on the fund manager's office address. *LnAsset* is the logarithm of fund assets under management. *Flow* is the flows of fund, and *LnAge* is the logarithm of fund age. Stock characteristics are firm size (*LnFirmSize*), analyst coverage (LnAnalyst), firm age (*LnFirmAge*), stock illiquidity (*Illiquidity*), idiosyncratic return volatility (*IdioVolatility*), R&D expenditures (*R&D*), market-to-book ratio (*MB*), stock price (*LnPrice*), stock momentum (*Momentum*), dividend yield (*D/P*), price-to-sales ratio (*P/S*), and equity beta (*Beta*). Fund, stock, and year fixed effects are included in all regressions. Detailed variable definitions are described in the Appendix. Standard errors are adjusted for heteroskedasticity and clustered by state. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES			*HFownership*		
LnFirmSize×Manager_Tax	0.011***				
	(2.78)				
LnAnalyst×Manager_Tax		0.017**			
		(2.25)			
Illiquidity×Manager_Tax			–0.008***		
			(–4.41)		
R&D×Manager_Tax				–0.018***	
				(–5.27)	
IdioVolatility×Manager_Tax					–0.012***
					(–2.89)
Manager_Tax	–0.122***	–0.085***	–0.038**	–0.038**	–0.038**
	(–3.30)	(–2.88)	(–2.26)	(–2.24)	(–2.22)
Stock Characteristics					
LnFirmSize	–0.008***	–0.003***	–0.003***	–0.003***	–0.003***
	(–4.54)	(–9.40)	(–9.36)	(–9.42)	(–9.47)
LnAnalyst	–0.001***	–0.008**	–0.001***	–0.001***	–0.001***
	(–4.89)	(–2.46)	(–4.63)	(–4.66)	(–4.68)
LnFirmAge	–0.000	–0.000	0.000	0.000	0.000

	(–1.07)	(–0.35)	(0.18)	(0.14)	(0.06)
Illiquidity	0.006***	0.006***	0.010***	0.006***	0.006***
	(4.89)	(4.87)	(7.96)	(4.86)	(4.84)
IdioVolatility	–0.003*	–0.004*	–0.004*	–0.004*	0.002
	(–1.71)	(–1.87)	(–1.82)	(–1.81)	(0.64)
R&D	–0.003***	–0.003***	–0.003***	0.006***	–0.003***
	(–2.70)	(–2.76)	(–2.76)	(2.71)	(–2.80)
MB	0.000***	0.000***	0.000***	0.000***	0.000***
	(2.73)	(3.97)	(4.55)	(4.73)	(4.45)
LnPrice	0.001***	0.001***	0.001***	0.001***	0.001***
	(6.59)	(6.35)	(6.13)	(6.17)	(6.26)
Momentum	0.000*	0.000*	0.000*	0.000*	0.000*
	(1.92)	(1.91)	(1.78)	(1.75)	(1.79)
D/P	–0.000	–0.000**	–0.000***	–0.000***	–0.000***
	(–1.49)	(–2.41)	(–2.73)	(–2.75)	(–2.65)
P/S	0.000**	0.000**	0.000**	0.000**	0.000**
	(2.43)	(2.41)	(2.34)	(2.26)	(2.36)
Beta	–0.001***	–0.001***	–0.001***	–0.001***	–0.001***
	(–6.59)	(–6.39)	(–6.02)	(–6.02)	(–5.96)
Fund Characteristics					
LnAsset	0.001***	0.001***	0.001***	0.001***	0.001***
	(5.50)	(5.49)	(5.41)	(5.41)	(5.41)
Flow	–0.000	–0.000	–0.000	–0.000	–0.000
	(–1.11)	(–1.17)	(–1.20)	(–1.18)	(–1.16)
LnAge	0.000	0.000	0.000	0.000	0.000
	(0.92)	(0.86)	(0.87)	(0.87)	(0.88)
Fund FE	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	1,464,017	1,464,017	1,464,017	1,464,017	1,464,017
Adj. R-squared	0.438	0.438	0.437	0.437	0.437

Table V: Managerial Incentives

This table reports the regression results on how managerial incentives can influence the relation between personal income tax rates and fund performance. The dependent variables are *Raw Returns* in Panel A and *8-Factor Alpha* in Panel B. Hedge fund manager's tax rate (*Manager_Tax*) is measured as the top federal and state combined ordinary income tax rate based on the fund manager's office address. *TotalDelta* is defined as the total expected dollar increase in the manager's compensation for a 1% increase in the fund's net asset value and is measured following Agarwal, Daniel, and Naik (2009). *OptionDelta* is the delta from the investors' assets without accounting for managerial coinvestment. *Ownership* is the manager's coinvestment in the fund scaled by fund's assets under management. Subscripts L and H on total delta, option delta, and ownership denote values below- and above-median, respectively. Detailed variable definitions are described in the Appendix. Standard errors are adjusted for heteroskedasticity and clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Panel A: Raw Returns$_t$					
	TotalDelta$_L$	TotalDelta$_H$	OptionDelta$_L$	OptionDelta$_H$	Ownership$_L$	Ownership$_H$
Manager_Tax$_t$	−0.144***	−0.061	−0.112**	−0.096	−0.187**	−0.061
	(−4.50)	(−0.83)	(−2.50)	(−1.55)	(−2.65)	(−1.25)
LnAsset$_{t-1}$	−0.004***	−0.004***	−0.004***	−0.005***	−0.005***	−0.005***
	(−7.72)	(−12.65)	(−8.00)	(−9.75)	(−11.94)	(−9.30)
Flow $_{t-1}$	0.002	−0.002	0.001	−0.000	−0.000	−0.001
	(1.55)	(−1.31)	(0.75)	(−0.28)	(−0.25)	(−0.87)
LnAge $_{t-1}$	−0.001**	−0.003*	−0.001	−0.001	0.000	−0.004***
	(−2.18)	(−1.88)	(−1.45)	(−1.03)	(0.32)	(−4.74)
Corporate_Tax$_t$	0.009	−0.013	−0.025	0.032	0.017	−0.040
	(0.15)	(−0.30)	(−0.29)	(0.94)	(0.33)	(−0.82)
StateGDPGrowth$_t$	0.023**	0.027*	0.017*	0.034**	0.012	0.032***
	(2.55)	(2.02)	(1.72)	(2.70)	(0.95)	(3.39)
StateIncomeGrowth$_t$	−0.006	0.050***	0.011	0.025	0.035**	0.036*
	(−0.31)	(3.06)	(0.47)	(1.43)	(2.18)	(1.91)
t-statistics Diff (*H-L*)	0.99		0.21		1.40	
(*p*-value)	(0.33)		(0.83)		(0.17)	
Fund and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	51,622	52,156	51,903	51,875	52,094	53,099
Adj. R-squared	0.217	0.237	0.255	0.220	0.196	0.260

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Panel B: 8-Factor $Alpha_t$					
	$TotalDelta_L$	$TotalDelta_H$	$OptionDelta_L$	$OptionDelta_H$	$Ownership_L$	$Ownership_H$
$Manager\_Tax_t$	−0.103*	−0.038	−0.100**	−0.017	−0.140**	−0.035
	(−2.01)	(−1.46)	(−2.34)	(−0.37)	(−2.06)	(−1.48)
$LnAsset_{t-1}$	−0.003***	−0.004***	−0.004***	−0.005***	−0.004***	−0.004***
	(−5.19)	(−9.41)	(−8.11)	(−7.26)	(−5.68)	(−5.74)
$Flow_{t-1}$	0.003*	−0.002	0.002*	−0.001	0.003	−0.003
	(1.76)	(−1.26)	(1.80)	(−0.31)	(1.51)	(−1.39)
$LnAge_{t-1}$	0.001	−0.001	−0.001	0.001	0.002	−0.003
	(0.46)	(−0.60)	(−0.53)	(0.34)	(0.96)	(−0.67)
$Corporate\_Tax_t$	0.090*	0.010	0.051	0.039	0.058	0.007
	(1.73)	(0.17)	(0.54)	(0.91)	(1.16)	(0.14)
$StateGDPGrowth_t$	0.004	0.035***	0.006	0.036***	−0.005	0.036***
	(0.27)	(3.49)	(0.41)	(3.66)	(−0.39)	(2.82)
$StateIncomeGrowth_t$	−0.028	0.048***	−0.023	0.059***	0.020	0.022
	(−1.04)	(2.89)	(−0.96)	(3.79)	(1.16)	(1.49)
t-statistics Diff (*H*-*L*)	1.54		1.16		1.84*	
(*p*-value)	(0.13)		(0.25)		(0.08)	
Fund and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33,560	40,337	37,052	36,845	37,573	37,702
Adj. R-squared	0.058	0.089	0.066	0.097	0.069	0.079

Table VI: Personal Tax Rate and Incentive Fee

This table reports the regression results on the relation between a hedge fund manager's personal income tax rate and fund's incentive fee. Our sample includes hedge funds that report returns in U.S. dollars and have a U.S. office address. The sample period is from 1994 to 2017. Coefficients are estimated based on the model presented in equation (3). The dependent variable is Log(1+*IncentiveFee*) where *IncentiveFee* is the fund's incentive fee. Hedge fund manager's tax rate (*Manager_Tax*) is measured as the top federal and state combined ordinary income tax rate based on the fund manager's office address. *HighwaterMark* is an indicator variable set to one for the presence of a high-water mark and zero, otherwise. *Lockup* is an indicator variable set to one for the presence of a lockup period and zero, otherwise. *ManagementFee* is the fund's management fees. *Corporate_Tax* is the combined federal and state top marginal corporate tax rate. *StateGDPGrowth* is the annual growth rate in gross state domestic product. *StateIncomeGrowth* is the annual growth rate in state personal income. Detailed variable definitions are described in the Appendix. Standard errors are adjusted for heteroskedasticity and clustered by state. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
VARIABLES		Log(1+Incentive fee$_t$)	
Manager_Tax$_t$	0.220***	0.208**	0.235**
	(3.42)	(2.21)	(2.49)
HighwaterMark$_t$	0.026***	0.030***	0.029***
	(12.42)	(5.94)	(6.64)
Lockup$_t$	0.002	0.004	0.003
	(1.09)	(1.29)	(1.21)
ManagementFee$_t$	1.241***	1.358**	1.393**
	(7.47)	(2.05)	(2.07)
Corporate_Tax$_t$	−0.145***	−0.155	−0.405
	(−3.74)	(−0.72)	(−0.91)
StateGDPGrowth$_t$	0.061	0.056	0.055
	(1.63)	(0.62)	(0.61)
StateIncomeGrowth$_t$	0.007	−0.039	−0.014
	(0.26)	(−0.38)	(−0.15)
Observations	3,115	3,115	3,115
Investment Company FE	No	Yes	Yes
State FE	No	No	Yes
Adj. R-squared	0.0833	0.365	0.358

Table VII: Tax Efficient Management

This table reports the panel regression results on the relation between a hedge fund manager's personal income tax rate and fund performance after controlling for tax efficient management. Our sample includes hedge funds that report returns in U.S. dollars and have a U.S. office address. The sample period is from 1994 to 2017. Coefficients are estimated based on the model presented in equation (1) with an additional control for tax efficient management (*TaxBurden*) or tax sensitivity (*TaxSensitivity*). The dependent variables are *Raw Return* in columns (1) and (3), and *8-Factor Alpha* in columns (2) and (4). Hedge fund manager's tax rate (*Manager_Tax*) is measured as the top federal and state combined ordinary income tax rate based on the fund manager's office address. *TaxBurden* is the tax liability of an investment firm divided by market value of the stock holdings. *TaxSensitivity* is an indicator variable set to one if the fund is tax sensitive and engages in tax-motivated trading as defined in Blouin et al. (2017). *LnAsset* is the logarithm of fund assets under management. *Flow* is the flows of fund, and *LnAge* is the logarithm of fund age. Detailed variable definitions are described in the Appendix. Standard errors are adjusted for heteroskedasticity and clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	Raw Returns$_t$	8-Factor Alpha$_t$	Raw Returns$_t$	8-Factor Alpha$_t$
Manager_Tax$_t$	−0.102**	−0.053**	−0.116***	−0.070**
	(−2.76)	(−2.28)	(−2.95)	(−2.74)
TaxBurden$_{t-1}$	−0.027**	−0.031***		
	(−2.37)	(−4.01)		
TaxSensitivity$_{t-1}$			−0.001	−0.001
			(−1.27)	(−1.69)
LnAsset$_{t-1}$	−0.003***	−0.002***	−0.003***	−0.002***
	(−4.47)	(−4.87)	(−4.43)	(−4.68)
Flow$_{t-1}$	0.002	−0.001	0.002	−0.001
	(0.61)	(−0.38)	(0.59)	(−0.39)
LnAge$_{t-1}$	−0.002***	0.003	−0.002***	0.003
	(−3.06)	(1.43)	(−3.10)	(1.40)
Corporate_Tax$_t$	0.010	−0.003	0.015	0.004
	(0.32)	(−0.06)	(0.48)	(0.06)
StateGDPGrowth$_t$	0.039*	0.041***	0.040*	0.044***
	(1.87)	(2.82)	(1.94)	(3.07)
StateIncomeGrowth$_t$	0.014	0.023	0.014	0.025
	(0.51)	(1.51)	(0.51)	(1.59)
Fund FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	42,850	33,978	42,850	33,978
Adj. R-squared	0.256	0.085	0.255	0.084

Table VIII: Competition

This table reports the panel regression results on the relation between a hedge fund manager's personal income tax rate and fund performance after controlling for fund competition. Our sample includes hedge funds that report returns in U.S. dollars and have a U.S. office address. The sample period is from 1994 to 2017. Coefficients are estimated based on the model presented in equation (1) with an additional control for fund competition (*HHI_State* or *LnNofunds_State*). *HHI_State* is the Herfindahl index of assets-under-management across all hedge funds located in a state. *LnNofunds_State* is the natural logarithm of the number of funds in a state. The dependent variables are *Raw Return* in column (1), and *8-Factor Alpha* in column (2). Hedge fund manager's tax rate (*Manager_Tax*) is measured as the top federal and state combined ordinary income tax rate based on the fund manager's office address. *Tax Burden* is the tax liability of an investment firm divided by market value of the stock holdings. *LnAsset* is the logarithm of fund assets under management. *Flow* is the flows of fund, and *LnAge* is the logarithm of fund age. *Corporate_Tax* is the combined federal and state top marginal corporate tax rate. *StateGDPGrowth* is the annual growth rate in gross state domestic product. *StateIncomeGrowth* is the annual growth rate in state personal income. Detailed variable definitions are described in the Appendix. Standard errors are adjusted for heteroskedasticity and clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	Raw Returns$_t$		8-Factor Alpha$_t$	
Manager_Tax$_t$	−0.089**	−0.094**	−0.053**	−0.058**
	(−2.13)	(−2.66)	(−2.03)	(−2.50)
HHI_State$_t$	0.003		−0.000	
	(1.44)		(−0.03)	
LnNofunds_State$_t$		−0.003***		−0.002*
		(−3.24)		(−1.74)
LnAsset$_{t-1}$	−0.003***	−0.003***	−0.003***	−0.003***
	(−15.49)	(−15.40)	(−7.50)	(−7.53)
Flow$_{t-1}$	0.000	0.000	0.000	0.000
	(0.21)	(0.15)	(0.25)	(0.24)
LnAge$_{t-1}$	−0.002***	−0.002***	−0.001	−0.001
	(−3.39)	(−3.54)	(−0.69)	(−0.67)
Corporate_Tax$_t$	−0.001	−0.002	0.016	0.016
	(−0.03)	(−0.04)	(0.38)	(0.36)
StateGDPGrowth$_t$	0.014*	0.014*	0.026***	0.027***
	(1.74)	(1.82)	(2.91)	(2.98)
StateIncomeGrowth$_t$	0.030***	0.028**	0.016*	0.016*
	(2.90)	(2.54)	(1.98)	(1.92)
Fund FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Observations	136,018	136,018	97,518	97,518
Adj. R-squared	0.207	0.207	0.066	0.066

Table IX: Personal Income Tax and Hedge fund Performance using 13F filers

This table reports the panel regression results on the relation between a hedge fund manager's personal income tax rate and fund performance using a subsample of 13F filers. Our sample includes hedge funds that report returns in U.S. dollars and have a U.S. office address. The sample period is from 1994 to 2017. Coefficients are estimated based on the model presented in equation (1). The dependent variables are *Raw Return* in column (1) and *8-Factor Alpha* in column (2). Hedge fund manager's tax rate (*Manager_Tax*) is measured as the top federal and state combined ordinary income tax rate based on the fund manager's office address. *LnAsset* is the logarithm of fund assets under management. *Flow* is the flows of fund, and *LnAge* is the logarithm of fund age. *Corporate_Tax* is the combined federal and state top marginal corporate tax rate. *StateGDPGrowth* is the annual growth rate in gross state domestic product. *StateIncomeGrowth* is the annual growth rate in state personal income. Detailed variable definitions are described in the Appendix. Standard errors are adjusted for heteroskedasticity and clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
VARIABLES	Raw Returns$_t$	8-Factor Alpha$_t$
	13F Sample	
Manager_Tax$_t$	−0.114***	−0.062**
	(−3.01)	(−2.34)
LnAsset$_{t-1}$	−0.003***	−0.003***
	(−4.45)	(−4.58)
Flow$_{t-1}$	0.002	−0.002
	(0.59)	(−0.74)
LnAge$_{t-1}$	−0.002***	0.003
	(−3.24)	(1.21)
CorporateTax$_t$	0.015	0.002
	(0.48)	(0.03)
StateGDPGrowth$_t$	0.040*	0.045***
	(1.93)	(2.91)
StateIncomeGrowth$_t$	0.014	0.025
	(0.50)	(1.50)
Fund FE	Yes	Yes
Time FE	Yes	Yes
Observations	42,850	33,978
Adj. R-squared	0.255	0.085

Appendix

Variable	Definition	Data Source
Panel A: Hedge Fund Performance		
Raw Returns	Fund monthly net-of-fee return.	TASS
8-Factor Alpha	Risk-adjusted returns calculated from Fung and Hsieh (2004) 7-factor model augmented with an emerging market factor.	TASS; David Hsieh's Data Library
Panel B: Income Tax Rate		
Manager_Tax	Highest combined federal and state income tax rate, assuming the individual is in top brackets at both the federal and state levels, married filing jointly with $150,000 in deductible property taxes, and allowing for deductibility of state income taxes in states where applicable.	NBER
Panel C: Hedge Fund Characteristics (listed in alphabetical order)		
TotalDelta	Total delta is the delta from both investors' assets and manager's coinvestment. It captures the overall pay-performance sensitivity of manager's compensation, and is computed based on Agarwal, Daniel, and Naik (2009).	TASS
Flow	Percentage capital flows of fund *i* at the end of each month *t*, estimated as: $Flow_{i,t} = [AUM_{i,t} - AUM_{i,t-1} \times (1+Return_{i,t})]/AUM_{i,t-1}$	TASS
HighWaterMark	A binary variable that equals one if a fund uses a highwater mark provision, and zero otherwise.	TASS
IncentiveFee	The percentage of fund profits that investors pay to fund managers.	TASS
LnAsset	Natural logarithm of asset under management (AUM).	TASS
LnFundAge	Natural logarithm of the number of months between the fund's inception date and the current date.	TASS
Lockup	An indicator variable set to one for the presence of a lockup period and zero.	TASS
ManagementFee	The percentage of fund AUM paid to fund managers regardless of the fund's performance.	TASS
OptionDelta	Option delta is the delta from investors' assets without accounting for manager's own investment in the fund. It is computed based on Agarwal, Daniel, and Naik (2009).	TASS
Ownership	Ownership is the manager's coinvestment in the fund scaled by the fund's assets under management. It is computed based on Agarwal, Daniel, and Naik (2009), assuming managers reinvest the incentive fees entirely into the fund.	TASS
TaxBurden	The tax liability of an investment firm divided by the market value of its stock holdings. Tax liability is computed as the realized long-term capital gain and short-term capital gains (net of losses), and dividend multiplied by their respective tax rates.	13f

TaxSensitivity	An indicator variable set to one if the fund is tax sensitive and engages in tax-motivated trading as defined in Blouin, Bushee, and Sikes (2017)	13f and Bushee 13f institutional investor classification
Panel D: Firm Characteristics and other (listed in alphabetical order)		
Beta	Market beta estimated from a market model using daily stock return.	CRSP
D/P	Dividend yield measured by dividend-to-price ratio.	CRSP
Idiosyncratic Return Volatility	The standard deviation of residuals estimated from the Carhart (1997) four-factor model for the past 36 months of stock returns.	CRSP
Iliquidity	The annual average of the square root of |stock return|/(Price×Volume) as in Hasbrouck (2009) and Agarwal, Jiang, Tang, and Yang (2013).	CRSP
HFOwnership	Percent of stockholdings by hedge funds in a firm each quarter.	TASS & 13F
LnAnalyst	Natural logarithm of the number of analysts covering a stock.	IBES
LnFirmAge	Natural logarithm of the number of years since the firm first appeared in Compustat	Compustat
LnFirmSize	Natural logarithm of the market capitalization of equity.	CRSP
LnPrice	Natural logarithm of the stock price for each firm-quarter.	CRSP
MB	The market to book ratio.	Compustat
Momentum	Stock price momentum calculated from past 12 months stock returns.	CRSP
P/S	Price-to-sale ratio.	Compustat
R&D	The expenses on research and development scaled by total assets.	Compustat
Panel E: State-level Macroeconomic Variables (listed in alphabetical order)		
Corporate_Tax	Combined federal and state top marginal corporate tax rate	1994–2002 University of Michigan Tax Database; Tax Foundation for 2000–2017
HHI_State	The Herfindahl index of assets-under-management across all hedge funds located in a state	TASS
LnNofunds_State	The natural logarithm of the number of hedge funds in a state	TASS
StateGDPGrowth	Annual growth rate in gross state product	Bureau of Economic Analysis
StateIncomeGrowth	Annual growth rate in state personal income	Bureau of Economic Analysis