Income taxes and managerial incentives: Evidence from hedge funds

Vikas Agarwal*
Georgia State University

Gary Chen
University of Illinois at Chicago

Zhen Shi
Georgia State University

Bin Wang
Marquette University

December 2020

* Vikas Agarwal (vagarwal@gsu.edu) and Zhen Shi (zshi@gsu.edu) are with the Finance Department, J. Mack Robinson College of Business, Georgia State University, Atlanta, GA. Gary Chen (garychen@uic.edu) is with the Accounting Department, College of Business, University of Illinois at Chicago, Chicago, IL. Bin Wang (bin.wang@marquette.edu) is with the Finance Department, College of Business Administration, Marquette University. We are grateful to Fernando Anjos, Hadiye Aslan, William Ciconte, Matthew Denes, David Godsell, Umit Gurun, Mathias Kruttli, Paul Mason, Miles Romney, Sumudu Watugala, Steve Xiao, Baozhong Yang, Liang Zhang, Haibei Zhao, conference participants at the 2020 American Taxation Association (ATA) Midyear Meeting, the 2019 Conference on Financial Economics and Accounting (CFEA), the 2020 Financial Management Association (FMA) annual meeting, the 2019 Nova SBE-BPI Asset Management Conference, and the 3rd World Symposium on Investment Research and seminar participants at the College of William and Mary, Georgia State University, Lancaster University, the University of Alberta, the University of Hong Kong, the University of Illinois at Urbana-Champaign, the University of Iowa, and the University of Texas at Dallas for their comments. We thank Steve Utke for his insights on hedge fund taxation. We thank Alexander Ljungqvist for sharing data on the historical location of corporate headquarters and Daniel Feenberg of the NBER for providing data on personal income tax rates. Vikas Agarwal also thanks the Centre for Financial Research (CFR) in Cologne for its continued support. A previous version of this paper was circulated under the title "The Externality of Taxing the 'Rich': Evidence from Hedge Funds." We would also like to thank Sheela Kailasam, Rishabh Khurana, Bhavna Pandey, David Serrao, Bowen Song, Liying Wei, and Chenglu Zhang for excellent research assistance.

Income taxes and managerial incentives:
Evidence from hedge funds

Abstract

This study examines whether increases in personal income tax rates disincentivize hedge fund managers to exert effort. Using plausible exogenous variations in manager's marginal personal income tax rates, we find that higher tax rates are associated with lower fund performance. Following a tax hike, fund managers hold stocks with lower information asymmetry, suggesting a decline in managerial effort. We further find that higher incentives from compensation contracts help to mitigate tax-induced effort shirking. Our results highlight that higher taxes can reduce incentives of fund managers to exert effort, which can result in worse fund performance and adversely affect fund investors.

Keywords: hedge funds; personal income taxes; performance; incentives; effort
JEL: G12, G20, H20, H24

1. Introduction

Hedge fund managers are important participants in financial markets. They are highly incentivized to exert costly efforts in gathering and processing information, providing liquidity, and actively monitoring and influencing corporate managers to create value for funds' investors. However, changes in personal income taxes can alter managers' incentives to exert effort. 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 effort (i.e., substitution effect). On the other hand, tax increases can increase labor input—more effort needs to be exerted to make up for the loss of income and maintain current levels of consumption (i.e., income effect). Therefore, ultimately how taxes affect managers' incentives to exert effort is an empirical question, which we address in this study. In addition, we examine whether fund investors respond to changes in tax rates by adjusting their flows into the funds in anticipation of any changes in managerial effort. We believe that the hedge fund setting is ideal because managers are provided with strong performance-based incentives and fund performance can be more directly linked with individual manager's actions.[1]

Hedge fund managers are incentivized through both management and incentive fees, where the former constitutes a larger part of total compensation. For instance, Yin and Zhang (2019) document that the management fee, on average, account for more than 70% of a manager's compensation across a broad sample of funds. Lan, Wang, and Yang (2013), in their model calibration, find that the management fee constitutes 75% of the total compensation. Management

[1] Although one can also observe the performance of mutual fund managers, there is little data on their compensation in the US except the structure of their contracts (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 and actions.

fees are taxed as ordinary income. Incentive fees are also subject to ordinary income tax rates if hedge funds hold their positions for less than one year, which is typically the case for most funds (Davis, 2019; Ferrone, 2020; Picker, 2017).[2] Therefore, we use plausibly exogenous variations in personal (ordinary) income tax rates at both the federal and state levels over the 1994-2017 period to examine the relation between changes in tax rate and hedge fund performance. 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, given that every state taxes income earned in the state for both residents and non-residents.[3] Moreover, we use the highest marginal personal income tax rates because actual tax rates of hedge fund managers are unobservable and endogenous to fund performance (i.e., better performing fund managers are likely to be subject to higher tax rates). Therefore, following prior literature (e.g., Armstrong et al., 2019), we use plausibly exogenous highest personal income tax rates. To the extent that there is potential measurement error associated with these assumptions, it should bias us against finding significant results.

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 macroeconomic shocks and time trends,

[2] Furthermore, Griffin and Xu (2009) document that over half of the hedge funds in their sample have annual turnover of greater than 100% suggesting that these funds churn their entire portfolio at least once a year. Note that they infer turnover from changes in quarterly holdings reported in the 13f data. Therefore, their estimate is a lower bound of the actual portfolio turnover because it does not account for intra-quarter trading.

[3] A fund manager is likely to be located in the same state as his/her fund because there can be significant costs associated with a manager's location being different from his/her fund's location. 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 better due diligence and to mitigate operational risk. See Sialm, Sun, and Zheng (2019) for evidence on hedge fund investors' preference for geographical proximity to facilitate better access to fund managers and monitoring. We also manually collect data on managers' residence from the Intelius database (details in Appendix A), and find that a vast majority (89.2%) of managers indeed reside in the same state where their fund is located. In Section 3.2, we report that our results continue to hold when we incorporate the residential information in our analyses.

and fund fixed effects that absorb the effect of unobserved time-invariant factors such as managerial skill, all of which can impact fund performance. Specifically, a one standard deviation increase in the tax rate is associated with a 1.8 percentage point decrease in the annual net-of-fee alpha from the Fung and Hsieh (2004) seven-factor model augmented with an emerging market factor. This effect is economically large as it is 1.5 times of the average annual net-of-fee alpha of 1.2 percentage points. The inclusion of time fixed effects partially removes the variation in federal tax rates in our analyses because some states allow for reciprocal deductibility of state and federal income taxes. Therefore, to account for the influence of federal taxes on fund performance, we exclude time fixed effects and find similar results. Moreover, our findings are robust to considering gross-of-fee performance, including time-varying style fixed effects, accounting for potential serial correlation in fund performance, excluding offshore funds and their onshore twins, excluding fund managers with residences in states different from that of their fund's location as well as fund managers with residences in multiple states at the same time, and including fixed effects for manager's state of residence.

Our results continue to hold even after accounting for responses of different parties affected by tax changes, which include hedge fund managers, corporate managers of hedge funds' portfolio firms, and fund investors. Fund managers can offset the effect of any changes in personal income taxes in a number of ways. First, they may adopt investment strategies that are more tax efficient subsequent to an increase in income tax rates. Prior literature documents mixed results regarding the impact of tax management on fund performance. On the one hand, an increase in tax efficiency may be associated with a decline in pretax fund performance because managers need to engage in constrained security selection due to tax considerations (Blouin, Bushee, and Sikes 2017). On the other hand, Sialm and Zhang (2020) find a positive relation between tax management and fund

performance, consistent with more savvy managers with superior stock selection and timing abilities choosing to engage in tax management. Nevertheless, we include a measure of tax management as an additional control in our empirical analysis. We continue to find a negative and significant impact of managerial personal income tax rate on fund performance. Our results also remain unchanged when we consider a specific case where fund managers have weaker incentives to engage in tax management, i.e., subsample of states where capital gain or dividend tax rates are identical to managers' personal income tax rates.[4]

Second, it is conceivable that managers avoid setting up their funds in states with higher taxes. Such a behavior can reduce the competition among funds within a state with higher tax rates, which should help improve fund performance, i.e., bias against our main finding of worse performance.[5] Nonetheless, we control for competition intensity in our tests, and continue to find a negative relation between tax rate and fund performance.

Third, if tax rate changes also affect the work incentives of corporate managers, our results could potentially be driven by tax rates affecting performance of firms located in the same state as the hedge fund. To obviate concerns about performance of local firms driving our findings, we divide hedge funds' portfolio firms into those that are co-located in the same state as the fund (local firms) and firms located in other states (non-local firms). We find that the negative association between personal tax rates and fund performance is concentrated in the non-local stock portfolios, suggesting that any effect of tax rate on corporate managers of local firms do not drive our results.

[4] For instance, if the income tax rate and dividend tax rate are the same, then a fund manager has little tax management incentives to gravitate towards higher dividend-paying stocks as compared with the case when dividends are taxed at a lower rate than income.

[5] While funds can move out of states with high income tax rates and relocate to those with lower rates, such moves involve significant costs including potential loss of key employees and investors. Consistent with this conjecture, using multiple snapshots of TASS database between 2007 and 2018, we find only 1.17% of funds changed their location. In addition, the main results continue to hold after excluding these funds.

Finally, fund investors' decision to invest in hedge funds may be affected by tax rates. Since investors ex ante do not know which effect (substitution or income) dominates when a fund manager is faced with higher income tax rates, they may choose not to alter their hedge fund investments. It is also conceivable that funds located in states with an increase in personal tax rates may experience lower flows because some high net worth individuals located in the same states have lower post-tax income. While we control for fund flows across all our empirical tests to take into account any changes in investors' capital allocation in response to tax changes, we also examine and do not find evidence of income tax rate significantly influencing fund flows.

Our baseline analysis does not allow us to test for asymmetric effects of changes in tax rates on fund performance. Therefore, we supplement it with difference-in-differences (DID) analyses within a five-year [−2, +2] window around major increases and decreases in state tax rates (100 basis points or more) as in Giroud and Rauh (2019). This approach also helps us address endogeneity concerns related to unobserved factors driving both tax changes and fund performance, and lend a plausible causal interpretation to our findings. We find that major tax increases are associated with deterioration in fund performance. In contrast, major tax cuts do not significantly affect fund performance, perhaps because of convexity in the cost of effort that precludes managers from exerting more effort.[6] In addition, our results from a dynamic panel DID analysis show that most of the decline in fund performance after tax increases occurs in the year of tax change, and does not reverse subsequently.

One potential concern with the DID analyses may be that major state tax changes are influenced by local economic conditions, and therefore are not completely exogenous. To begin with, such a concern can only explain changes in performance of funds if they invest largely in

[6] Convexity in an agent's cost of effort is standard in theoretical principal-agent models. See Jewitt (1988) for a classic example.

local firms. Nevertheless, we take two steps to further address this concern. First, we include several state-level macroeconomic variables (GDP growth rate and income growth rate) and corporate tax rate to control for time-varying economic conditions. Second, we follow Romer and Romer (2010), and Giroud and Rauh (2019) to examine a subsample of plausibly exogenous state tax rate changes. Specifically, they identify such changes as those that are driven by state budget deficits inherited from the previous administration or state's long-run goals and therefore less likely to be due to confounding factors that affect economic activity.[7] Our results are robust to the use of this subsample.

Since the key job function of a hedge fund manager is to make investment decisions on behalf of fund investors, we next explore more direct evidence of tax hikes on effort shirking by examining hedge fund managers' portfolio management decisions. If fund managers avoid exerting effort after an increase in their personal income tax rates, they may choose 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, and therefore requiring less effort to collect and process information. 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. Compensation contracts can be designed to incentivize portfolio managers to exert effort in information collection and processing

[7] 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 this information after 2012 until 2017.

(Stoughton, 1993). Therefore, we examine whether managerial incentives, captured through a manager's pay-performance sensitivity (or delta) and co-investment in the fund, could potentially mitigate the adverse consequences of higher personal income taxes on fund performance. We find that worse fund performance after tax increases is concentrated in low-delta and low-managerial ownership funds. In contrast, high delta and high managerial ownership help offset disincentives from tax increases. We also examine whether fund investors can 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 the incentive fee and the personal tax rate at fund's inception, after controlling for fund characteristics and fixed effects for both the investment company and state.[8] 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 study 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). 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 asset 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, 2020), 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

[8] Agarwal and Ray (2012) find that only 8% of funds change their fee structure over time.

prices (Gibson, Safieddine, and Titman, 2000). Our study extends this literature by examining 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. 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 2000–2017. Interstate data on GDP and income growth are from the Bureau of Economic Analysis. Hedge fund data are from the Lipper TASS database, which has been widely used in prior academic studies (e.g., Sadka, 2010; Teo, 2011). Lipper TASS provides monthly fund returns and assets under management as well as a snapshot of fund characteristics. Our sample period starts in 1994 when Lipper TASS started tracking defunct funds, which we include along with live funds to mitigate survivorship bias. In addition, funds often report return data prior to their listing dates 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 backfill and incubation biases, we remove the backfilled return data, and keep returns only after the listing date of each fund in the database. A fund must have non-missing characteristics, including location of fund's office, management fee, incentive fee, fund size, the use of highwater mark, and lockup period to be included in the sample.[9] Furthermore, our sample includes funds that report returns in U.S. dollars and have a U.S. office address. Using these filters,

[9] Specifically, to determine location, we use the *PeopleDetails* file of the TASS database. We remove 44 funds that have offices in multiple states. In untabulated analyses, excluding these funds does not materially affect our results.

we have 2,799 hedge funds (1,543 investment companies) in the final sample between January 1994 and December 2017.[10]

For some of our analyses, we also use the Thomson-Reuters Institutional (13f) Holdings dataset. This dataset provides quarterly holdings of asset management companies (AMCs) that are obligated to file Form 13F with the Securities and Exchange Commission (SEC) if they have more than $100 million in 13(f) securities.[11] Form 13F is filed at the level of the 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 Lipper 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 388 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 illustrate the geography of hedge funds to show statewide distribution of hedge funds in the U.S. over our sample period from 1994 to 2017. The number of funds across states ranges from 0 to 1,182. Not surprisingly, the top five states with the greatest number of funds are New York, California, Connecticut, Massachusetts, and Illinois. Ten states in our sample have no hedge funds. Figures 2 and 3 report the variation in state-level maximum income tax rates. Figure 2 illustrates the state-by-state variation in average maximum state tax rates. California has

[10] Note that we exclude funds of hedge funds (FOFs) throughout our analyses because we investigate the actions of fund managers in terms of security selection to proxy for changes in their effort. FOFs invest in other hedge funds rather than directly in the primary security markets.

[11] SEC provides a list of 13(f) securities on a quarterly basis: https://www.sec.gov/divisions/investment/13flists.htm. Section 13(f) securities generally include equity securities that trade on an exchange (including the Nasdaq National Market System), certain equity options and warrants, shares of closed-end investment companies, and certain convertible debt securities.

the highest rate at 11.4% 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 maximum 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 Georgia, Kentucky, exhibit little or no variation in tax rates over our sample period. Overall, these figures show that there exists both cross-sectional and time-series variation in maximum income tax rates.

Table I reports descriptive statistics of our sample. Panel A presents the distribution of top federal and state 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 monthly alpha is 0.1% and the standard deviation is 3.4%. Other fund characteristics 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. Appendix B provides detailed definitions of these variables.

On average, a 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 delta 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 do not change over time. 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 summary statistics of stocks held by hedge fund managers at the fund-stock-quarter level. *HFownership* is measured by shares of the stock owned by a fund divided by total shares outstanding. The average hedge fund 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 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 incentives to exert effort, we use fund performance. Unlike other settings where labor input is observable in terms of quantity, such as labor participation or hours worked from survey data, or as reported income in tax returns (McClelland and Mok, 2012), we do not have similar information for hedge fund managers. Therefore, 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). Later in Section 4, we also examine fund managers' choices in portfolio selection to further capture shifts in their labor input.

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 effort since other uses of time 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 sections, we examine the effect of personal tax rates on fund performance using difference-in-differences analyses.

3.1 Baseline analyses

In our baseline analyses, we examine the effect of fund managers' personal income tax rates on fund performance using fixed-effects panel regressions. We include fund fixed effects to control for unobservable fund manager skill. That is, we examine how changes in tax rate affect the performance of the same fund over time. The inclusion of time fixed effects removes the variation in federal taxes, but allows us to account for unobservable macroeconomic factors that can drive both fund performance and tax policy. Therefore, we conduct our baseline analyses both with and without time fixed effects. Later in the paper, for brevity, we tabulate only the results with both fund and time fixed effects although our findings are qualitatively similar when we exclude time fixed effects. The inclusion of fund and time fixed effects makes our analysis

essentially equivalent to a difference-in-differences (DID) approach.[12] Specifically, we estimate the following panel regression:

$$Performance_{i,t} = \alpha_0 + \alpha_1 ManagerTax_{i,t} + \sum \alpha_j Controls_{i,} + FundFE + TimeFE + \varepsilon_{i,t} \quad (1)$$

$Performance_{i,t}$ 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. In order to mitigate multi-period sampling bias associated with selecting funds having a minimum return history of 36 months (Fung and Hsieh, 2000), we require a minimum of only 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 returns on trend-following factors in bonds, currencies, and commodities, all of which can be influenced by changes in tax rates.

$ManagerTax_{i,t}$ is the maximum combined federal and state income tax rate of a manager i in month t. We use the highest marginal personal income tax rates because actual tax rates of hedge fund managers are unobservable and endogenous to fund performance (i.e., better performing fund managers are likely to be subject to higher tax rates). Therefore, following prior literature (e.g., Armstrong et al., 2019), we use plausibly exogenous highest personal income tax rates. 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

[12] That is, the difference in performance for fund managers before and after a tax change at a particular time (treatment group) is being compared with other fund managers whose taxes do not change at the same time (control group). See Angrist and Pischke (2008, pp. 169-184) for a textbook discussion of DID analysis.

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.[13]

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*), which can influence fund performance. All fund characteristics used as controls are lagged by one month. To account for other factors that may simultaneously influence both personal income tax rates and fund performance, we further include corporate tax rate (*CorporateTax*), state-level GDP growth rate (*StateGDPGrowth*), and state-level income growth rate (*StateIncomeGrowth*). We also include fund fixed effects and year-month time fixed effects denoted by *FundFE* and *TimeFE*, respectively. Throughout the paper, we adjust standard errors for heteroscedasticity and cluster them at the state level unless stated otherwise.

The results of the analysis based on equation (1) are shown in Table II. We report our findings for the two performance measures (raw return and 8-factor alpha) as well as gross-of-fee and net-of-fee performance. Columns (1) through (4) exclude time fixed effects while columns (5) through (8) include them. Regardless of whether we control for time fixed effects, the coefficient of $ManagerTax_{i,t}$ is negative and statistically significant. Furthermore, the economic magnitude is also significant. For example, column (6) in Table II shows that a one standard deviation increase in personal tax rate is associated with a 1.8 (= 0.053×0.029×12) percentage point decrease in annual alpha, which is 1.5 times of the annual average alpha of 1.2%. Fund size (*LnAsset*) is statistically significant and negatively associated with fund performance across all models, consistent with the prior work suggesting a decreasing returns-to-scale in the hedge fund industry (e.g., Getmansky, 2012; Yin, 2016). Also, growth in state gross domestic product

[13] One thing to note is that the NBER federal tax rate can vary across states because of the deductibility of state income taxes for federal tax purposes.

(*StateGDPGrowth*) is positively associated with fund performance and statistically significant in all specifications, suggesting that local macroeconomic conditions can influence fund performance.

Overall, these results indicate that a higher personal tax rate of the fund manager is associated with a lower fund performance, consistent with the substitution hypothesis. That is, when faced with higher personal income tax rates, fund managers reduce effort because rewards to effort (i.e., after-tax income) become lower.

< INSERT TABLE II >

3.2 Robustness tests for baseline analyses

We next conduct a series of robustness tests for our baseline analyses in equation (1). Table III reports the results of these tests. Our first test examines the possibility that our baseline results are attributable to the time-series variation due to fund's investment style (strategy). Therefore, we include month×style fixed effects in columns (1) and (2). Second, we consider the possibility of serial correlation in the two performance measures, raw returns and alphas, due to fund illiquidity and estimation using overlapping, 36-month windows, respectively. For this purpose, we re-estimate our baseline model and adjust the standard errors using the Newey and West (1987) correction with 36 lags, and report our findings in columns (3) and (4).

Offshore funds can defer paying taxes on their compensation (Kufeld and Noonan, 2016). Moreover, onshore twins of offshore funds can share the same manager. Hence, managerial incentives to exert effort may be influenced on account of simultaneously managing the offshore funds. Therefore, in columns (5) and (6), we repeat our analysis by excluding offshore funds and onshore twins of offshore funds (following the procedure in Aragon, Liang, and Park, 2014), and find similar results.

In columns (7) and (8), we repeat our baseline analyses on a subsample of funds excluding managers identified as residing in a state other than the one where their funds are located or managers with residences in multiple states (see Appendix A for the identification procedure of managers' residence).[14] Furthermore, columns (9) and (10) provide our baseline results after including fixed effects for manager's state of residence to account for time invariant, unobservable state level factors that can simultaneously impact income tax rates and fund performance. As shown in Table III, *Manager_Tax* retains a negative and statistically significant coefficient across all the alternative specifications.

< INSERT TABLE III >

3.3 Alternative Explanation #1: Tax Management

Hedge fund managers may adjust their trading behavior in response to changes in tax rates. For example, managers may become more tax efficient when tax rate increases. Prior literature documents mixed results regarding the impact of tax management on fund performance. On the one hand, an increase in tax efficiency may be associated with a decline in pretax fund performance because managers need to engage in constrained security selection due to tax considerations (Blouin, Bushee, and Sikes 2017). On the other hand, Sialm and Zhang (2020) find a positive relation between tax management and fund performance, consistent with more savvy managers with superior stock selection and timing abilities choosing to engage in tax management. We allow for tax management by hedge fund managers by including a measure of tax efficiency in the year prior to the tax change as an additional control in our main model specified in equation (1). We capture tax efficiency through *TaxBurden*, measured as the tax liability of an investment firm

[14] Of the fund managers in our sample, we are able to identify the residence of 19.5%. In this subsample of managers with residential information, we find that 89.2% of managers reside in the state where their funds are located. We assume that fund managers reside in the same state as their fund if there is no information on manager residence.

divided by the market value of its stock holdings (Sialm and Starks, 2012; Sialm and Zhang, 2020). 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. Following Blouin, Bushee, and Sikes (2017), we also use an alternative measure of tax efficiency, *TaxSensitivity*, which is an indicator variable set to one if the fund is tax sensitive and engages in tax-motivated trading, and zero otherwise. All other control variables remain the same as those in equation (1).

Table IV presents the results of the analyses. For the sake of brevity, hereon we only report our findings using net-of-fee performance measures. 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) report our findings 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. This is because we need to merge the commercial hedge fund data with Thomson Reuters 13f holdings data to compute capital gains and losses. Moreover, since the tax management measures can only be computed at an annual level, 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 *ManagerTax* across all four specifications. We also find a negative relation between *TaxBurden* and fund performance, consistent with Sialm and Zhang (2020).

< INSERT TABLE IV >

We conduct additional tests to allay concerns that tax management by fund managers after changes in personal income tax rates may be driving our results. If fund managers invest in stocks based on favorable state-level capital gain or dividend tax rates, there should be little tax

management incentives in states where these rates are the same. For instance, if income tax rate and long-term capital gain tax rate are the same, then fund managers need not shift their portfolios towards stocks with a longer horizon to minimize tax liability. Similarly, if the income tax rate and dividend tax rate are identical, then a fund manager do not have to gravitate towards higher dividend-paying stocks. We re-estimate our main specification in equation (1), but with three subsamples where (i) ordinary income tax rate equals long-term capital gain tax rate, (ii) ordinary income tax rate equals dividend income tax rate, and (iii) all tax rates are the same. Our findings in Table V uniformly show a negative and statistically significant relation between *ManagerTax* and fund performance across all the three subsamples. The findings in this table corroborate with our earlier findings in Table IV in that the negative relation between personal tax rates and fund performance is robust to potential tax management by fund managers.

< INSERT TABLE V >

3.4 Alternative Explanation #2: Competition

Hedge fund competition within a particular state may also be affected by personal income tax rates. Specifically, new funds may choose to locate in states with lower tax rates while existing funds may close and move out of states with higher tax rates. If this were to be true, fund competition should weaken in states with higher tax rates, which would predict *better*, and not worse, performance for funds located in those states. Therefore, a priori changes in hedge fund competition should bias us against finding worse performance after tax increases. Nonetheless, we examine this alternative explanation by including two alternative measures of fund competition as an additional control in our baseline specification in equation (1). Our first measure of competition, *HHI_State*, is the Herfindahl index of assets under management across all hedge funds located in a state. Our second measure, *LnNofunds_State*, is the natural logarithm of the number of funds in

a state. As shown in Table VI, *ManagerTax* continues to have a negative and statistically significant coefficient across all specifications, regardless of whether we use raw returns or 8-factor alphas to measure fund performance. These findings suggest that potential changes in fund competition because of changes in tax rates do not materially affect our primary finding of a negative relation between fund performance and personal income tax rate.

< INSERT TABLE VI >

3.5 Alternative Explanation #3: Local firms

If tax rate changes also affect the work incentives of corporate managers, our results could potentially be driven by tax rates affecting performance of local firms (located in the same state as the hedge fund), and if the fund invests substantially in local firms. In other words, the observed negative relation between personal income tax rates and hedge fund performance could then be driven by the performance of local firms rather than changes in fund manager's effort. To test this conjecture, we divide the fund's stock holdings into portfolios of local and non-local stocks based on the fund's 13f filings. If our main result continues to hold for non-local portfolio stocks, this would mitigate concerns that the overall decline in fund performance is being driven by corporate managers of local firms subject to the same personal income tax rates.

To compute returns for local and non-local stocks, we follow Daniel, Grinblatt, Titman, and Wermers (1997) (DGTW). The DGTW procedure accounts for stock characteristics (size, book-to-market, and momentum) and calculates a benchmark-adjusted measure of abnormal returns for each stock held by a fund. We then aggregate the abnormal returns at the portfolio level on a value-weighted basis to obtain *DGTW Adjusted Return*. We also construct an alternative measure, *FFC Alpha*, using the three-factor model of Fama and French (1993) augmented with a momentum factor from Carhart (1997).

We re-estimate the empirical specification in equation (1) separately for the local and non-local stock portfolios, and report the results in Table VII. Regardless of whether we use *DGTW Adjusted Return* or *FFC alpha*, we observe that the coefficient of *ManagerTax* is negative and significant for the portfolio of non-local stocks, but insignificant for the local stock portfolio. Overall, this evidence mitigates potential concerns that changes in local firms' performance in response to tax changes explain our findings. At the same time, these results also suggest that the observed relation between fund performance and personal income tax rate are not attributable to local macroeconomic conditions.

< INSERT TABLE VII >

3.6 Alternative Explanation #4: Fund Flows

Another possibility is that increases in personal tax rates can influence the behavior of fund investors which in turn can affect fund performance. To begin with, we control for fund flows across all our empirical tests to account for such a possibility. Moreover, it is not obvious how tax increases would affect fund flows for at least two reasons. First, investors might not know which effect (substitution or income) ex ante would dominate when a fund manager is faced with higher income tax rates, and choose not to respond. Second, funds located in states with an increase in personal tax rates may experience lower flows because some high-net-worth individuals located in the same states have lower post-tax income. In sum, the prediction regarding changes in fund flows in response to tax increases is ambiguous. Nevertheless, we examine how fund flows are impacted by increases in tax rates. As shown in Table VIII, we do not find evidence that personal tax rates significantly influence fund flows.

< INSERT TABLE VIII >

3.7 DID analyses using major state tax changes

We next employ another DID analysis using a five-year [−2, +2] window around major state tax change events to allow for asymmetric effect of tax increases and decreases on fund performance. Such an analysis also helps us lend a causal interpretation to our findings. 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 be both in the treatment and control groups at different points in time during our sample period. There are only 10 (7) major state tax increases (decreases), which significantly reduces the sample size for this empirical analysis.[15] Moreover, this analysis does not account for the effect of changes to federal income tax rates on fund performance which we consider earlier in Section 3.1.

Our model follows equation (1) but substitutes *ManagerTax* for *Treatment*, where *Treatment* is set to one in the post-event period for a fund if the fund manager is in a state that experiences a large increase or decrease in state personal income taxes and zero, otherwise. Table IX Panel A presents the results. 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 (3), the 8-factor alpha declines, on average by 0.4% per month for 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 indicate an asymmetric effect of tax changes

[15] While there are more large state-level tax increases (decreases) between 1994 and 2017, they do not qualify for our tests because either there are no hedge funds in those states or there is a subsequent reversal in the state tax change which disqualifies them for the sample.

that was not obvious from earlier findings in Table II.[16] 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).[17]

We also examine the dynamic response of fund managers 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 persists for the next two years (i.e., years +1 and +2). Relative to two years before tax increases, the monthly 8-factor alpha is 0.3% lower during years 0 and +1, and is 0.4% lower in year +2. That is, a majority of performance deterioration takes place in the year of tax change and does not reverse in subsequent 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 analysis. Consistent with no overall effect of major tax cuts in columns (5) and (7), there is no temporal pattern in the response of fund managers to tax decreases in columns (6) and (8). Together, the evidence from dynamic DID panel analysis shows that the effect of tax increases, but not tax decreases, on fund performance is not transient.

Since tax policy changes can be driven by economic conditions in the state that can simultaneously affect fund performance, we next identify plausibly exogenous income tax changes at the state level following Romer and Romer (2010), and Giroud and Rauh (2019). Specifically, they identify exogenous changes in tax rates as those that are due to the budget deficits inherited from the previous administration or state's long-run goals and are therefore less likely to be correlated with confounding factors that influence economic activity. Requiring exogeneity of

[16] Interestingly, prior studies by Heider and Ljungqvist (2015) and Mukherjee et al. (2017) also document an asymmetric effect of corporate taxes on firms' innovation and leverage, respectively.

[17] 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 greater cost of adverse consequences for the manager's health and well-being.

major tax changes further reduces our sample size as there are only 7 (6) exogenous tax increases (decreases) during our sample period. Despite the loss in statistical power of the tests, our results are similar though less significant using the subsample of these exogenous state-level changes in personal income tax rates. For example, as shown in column (3) in Panel B of Table IX, the coefficient on tax increases is again negative and statistically significant (coefficient = −0.004; *t*-stats = −3.42), indicating a decline of 0.4% in monthly alpha. The use of exogenous tax changes in addition to controlling for time fixed effects and state-level macroeconomic conditions further helps mitigate concerns about unobserved economic factors driving both tax changes and fund performance.

Our DID analysis so far uses an indicator variable for major tax changes that are more than 1%. Therefore, it does not differentiate between small and large changes above this threshold. Therefore, in Panel C, we also use the actual magnitude of the tax change, Δ*ManagerTax*, as a treatment variable to provide further insights into the economic significance of our findings. We continue to find a significant negative coefficient for the continuous treatment variable, Δ*ManagerTax* for tax increases in columns (1) through (4). To better compare the economic magnitude of the effect of taxes on fund performance with that in our baseline specification in equation (1), we use a one standard deviation change in the *level* of personal tax rates. Based on the estimates in column (2) in Table IX, annual alpha decreases by 2.6% (= 0.076×0.029×12), which is 44% larger than the 1.8% decline in alpha in the baseline results in Table II. In other words, there is a greater deterioration in fund performance when the magnitude of the tax increase is larger.

< INSERT TABLE IX >

4. Tax rate and stock selection

One advantage of using the hedge fund setting to examine the relation between tax and effort is that fund managers' actions are observable through their stock selection. This setting allows us to explore the possibility of effort shirking by examining the security selection decisions of fund managers. One of the primary job functions of fund managers is to acquire and process private information about security prices to manage the portfolios for their investors (e.g., Stoughton, 1993). Fund managers may shirk effort by avoiding 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 stock return volatility. We then examine the relation between the personal tax rate of fund managers and information asymmetry of stocks held in their portfolios.

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

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

$HFownership_{i,j,t}$ 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 at the end of quarter t-1. These proxies include firm size (*LnFirmSize*), analyst coverage (*LnAnalyst*), illiquidity (*Illiquidity*), R&D expenditures (*R&D*) and stock's idiosyncratic return volatility (*IdioVolatility*). Detailed variable definitions are in Appendix B. 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 (*FundFE*), stock (*StockFE*), and year-quarter (*YrQtrFE*) fixed effects to account for unobserved manager skill, stock characteristics, and macroeconomic factors, respectively.

The results of the security selection analyses are presented in Table X. 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. That is, fund managers invest in stocks with lower information asymmetry after increases in personal income tax rate. These results indicate that hedge fund managers 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.

< INSERT TABLE X >

We further split a fund manager's portfolio based on local and non-local stock holdings and re-estimate the model specified in equation (2). Subsequent to tax increases, if fund managers shirk effort by investing in stocks with lower information asymmetry, such behavior should be more pronounced in non-local stocks compared to local stocks where fund managers tend to possess an information advantage (e.g., Coval and Moskowitz, 2001; Bernile, Kumar, and Sulaeman, 2015). Consistent with this argument, in untabulated results, we find that results in Table X are indeed concentrated in a fund manager's non-local stock portfolio. Overall, these cross-sectional analyses suggest that one channel through which fund managers exert less effort is by holding stocks with lower information asymmetry when personal income tax rates are higher.[18]

Finally, we conduct two robustness tests. First, we verify whether the negative relation

[18] We acknowledge that shifting a portfolio to stocks with lower information asymmetry may not be the only channel through which higher personal income taxes could negatively impact fund performance.

between tax rates and fund performance continues to hold for this subsample of 13F filers. The model for these analyses follows equation (1). In untabulated analyses, we continue to find a negative association between *ManagerTax* and both measures of fund performance (*Raw Returns* and *8-Factor Alpha*). Second, changes in tax rate can also influence a fund manager's appetite for risk in addition to affecting manager's incentives to exert effort. As a result, the observed impact of income taxes on fund performance may be driven by a fund manager's risk-taking behavior. That is, a fund manager may be selecting less risky stocks, as opposed to exerting less effort in response to higher income taxes. While we adjust for risk in one of our main measures of fund performance (namely, *8-Factor Alpha*), we repeat our main analysis using *DGTW Adjusted Return* as an alternative measure of risk-adjusted fund performance. In untabulated analysis, the coefficient of *ManagerTax* remains negative and statistically significant.

5. Managerial incentives

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 attenuated when managerial incentives from their compensation contracts are greater.

5.1 Cross-sectional variation in managerial incentives

We begin by investigating how variation in managerial incentives can affect the relation between income tax rates and fund performance. Agarwal, Daniel, and Naik (2009) document that managerial incentives as captured by total delta, option delta, and managerial co-ownership are positively associated with future fund performance. 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.

Following their study, we also consider the two components of total delta: option delta based on outside investors' capital and manager's fractional ownership in the fund (scaled by AUM).

Using each of the three proxies, we construct two subsamples by splitting our sample on total delta ($TotalDelta_L$ and $TotalDelta_H$), option delta ($OptionDelta_L$ and $OptionDelta_H$), and managerial ownership ($Ownership_L$ and $Ownership_H$) using the median values for each month-year. Subscripts *L* and *H* indicate below- and above-median values. Panels A and B of Table XI present the results using raw returns and 8-factor alphas as the performance measure, respectively. The coefficient on *ManagerTax*, our main variable of interest, is negative and statistically significant for below-median subsamples corresponding to total delta ($TotalDelta_L$), option delta ($OptionDelta_L$), and ownership ($Ownership_L$). In contrast, this coefficient is not statistically significant for above-median subsamples as shown in columns (2), (4), and (6). Although differences in the two subsamples are generally not significant, these results suggest that the effect of tax rate hikes on effort shirking by fund managers is restricted to instances of weak managerial incentives.

< INSERT TABLE XI >

5.2 Income tax rate and incentive fee

We also investigate if fund investors attempt to mitigate the disincentives arising from higher taxes. 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. When the incentive fee is higher, managers get to keep a greater portion of fund profits and should therefore have a greater incentive to exert effort. 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 manager's personal tax rate at the fund's inception through the following cross-sectional regression:

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

$IncentiveFee_{i,t}$ is the incentive fee received by hedge fund manager i at a fund's inception month t. $ManagerTax_{i,t}$ is the maximum combined federal and state income tax rate of fund manager i at a fund's inception month t. Our vector of control variables include various characteristics of the investment company to which a fund belongs, namely *HighwaterMark*, an indicator set to one for the presence of a highwater mark, and zero otherwise; an indicator variable, *Lockup*, to denote the presence of a lockup period; and management fees (*ManagementFee*) since management and incentive fees are often determined jointly at the fund's inception. As in our baseline model, we also control for a set of macroeconomic variables (*StateIncomeGrowth*, and *StateGDPGrowth*) as well as *CorporateTax*. We include investment company fixed effects to capture unobserved time-invariant factors that can affect the incentive fee such as the reputation of the investment company.[19] We also include state fixed effects to account for unobservable state-specific factors that can simultaneously influence a fund's incentive fee.

Table XII shows a positive relation between incentive fee and personal tax rate across all specifications with similar economic magnitudes, regardless of whether we control for investment company or state fixed effects. 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 × 0.029) increase in the

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

incentive fee. Overall, these findings suggest that investors offer a higher incentive fee to managers of newly started funds to mitigate disincentives from greater taxation.

< INSERT TABLE XII >

6. Concluding remarks

We document 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. These findings are robust to considering gross-of-fee performance, including time-varying style fixed effects, accounting for potential serial correlation in fund performance, excluding offshore funds and their onshore twins, excluding fund managers with residences in states different from that of their fund's location as well as fund managers with residences in multiple states at the same time, and including fixed effects for manager's state of residence.

In addition, these findings are robust to controlling for responses by different parties affected by changes in personal income tax rates, which include fund managers, corporate managers of fund's portfolio firms, and fund investors. Our findings continue to hold even after allowing for tax management by fund managers, changes in competitive landscape within a state, variation in fund flows, and potential decline in the performance of local firms due to an adverse impact of taxes on corporate managers. 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 also show that higher incentives arising from the compensation contracts and managerial co-investment can help mitigate the disincentives from greater taxation of fund managers. We further find that investors offer higher incentive fees to managers of new funds when faced with higher personal income tax rates. Overall, our findings suggest that there exists a

negative externality of taxing hedge fund managers. Higher taxes can reduce the incentives of fund managers to exert effort, which can result in worse fund performance and adversely affect fund investors.

References

Aboody, D., Lev, B., 2000. Information asymmetry, R&D, and insider gains. *Journal of Finance* 55, 2747–2766.

Agarwal, V., Daniel, N., Naik, N., 2009. Role of managerial incentives and discretion in hedge fund performance. *Journal of Finance* 64, 2221–2256.

Agarwal, V., Vashishtha, R., Venkatachalam, M., 2018. Mutual fund transparency and corporate myopia. *Review of Financial Studies* 31, 1966–2003.

Agarwal, V., Ray, S., 2012. Determinants and implications of fee changes in the hedge fund industry. Working Paper.

Angrist, J.D., Pischke, J., 2008. *Mostly Harmless Econometrics: An Empiricist's Companion.* Princeton University Press.

Aragon, G., Liang, B., Park, H., 2014. Onshore and offshore hedge funds: are they twins? *Management Science* 60, 1–264.

Armstrong, C., Glaeser, S., Huang, S., Taylor, D., 2019. The economics of managerial taxes and corporate risk-taking. *The Accounting Review* 94, 1–24.

Bär, M., Kempf, A., Ruenzi, S., 2011. Is a team different from the sum of its parts? Evidence from mutual fund managers. *Review of Finance* 15, 359–396.

Bergstresser, D., Poterba, J., 2002. Do after-tax returns affect mutual fund inflows? *Journal of Financial Economics* 63, 381–414.

Bernile, G., Kumar, A., Sulaeman, J., 2015. Home away from home: Geography of information and local investors. *Review of Financial Studies* 28, 2009–2049.

Blouin, J.L., Bushee, B.J., Sikes, S.A., 2017. Measuring tax-sensitive institutional investor ownership. *The Accounting Review*, 92, 49–76.

Brennan, M., Subrahmanyam, A., 1995. Investment analysis and price formation in securities markets. *Journal of Financial Economics* 38, 361–381.

Carhart, M. M., 1997. On persistence in mutual fund performance. *Journal of Finance*, 52, 57–82.

Chari, V., Jagannanthan, R., Ofer, A., 1988. Seasonalities in security returns. The case of earnings announcements. *Journal of Financial Economics* 21, 101–121.

Chen, J., Hong, H., Huang, M., Kubik, J.D., 2004. Does fund size erode performance? The role of liquidity and organization. *American Economic Review* 94, 1276–1302.

Coval, J. D., Moskowitz, T. J., 2001. The geography of investment: Informed trading and asset prices. *Journal of Political Economy* 109, 811–41.

Davis, E., 2019. *How is "carried interest" relevant to hedge fund managers?* Available at: https://www.elliottdavis.com/carried-interest-relevant-hedge-fund-managers/.

Daniel, K., Grinblatt, M., Titman, S., Wermers, R., 1997. Measuring mutual fund performance with characteristic-based benchmarks. *Journal of Finance 52*(3), 1035–1058.

Elton, E., Gruber, M., Blake, C., 2003. Incentive fees and mutual funds. *Journal of Finance* 58, 779–804.

Fama, E.F., French, K.R., 1993. Common risk factors in the return on bonds and stocks. *Journal of Financial Economics* 33, 3–53.

Ferrone, J., 2020. The taxation of carried interest and its effects upon cities, *Fordham Urban Law Journal* 47, 717–754.

Fung, W., Hsieh, D.A., 2000. Performance characteristics of hedge funds and commodity funds: Natural versus spurious biases. *Journal of Financial and Quantitative Analysis* 35, 291–307.

Fung, W., Hsieh, D.A., 2004. Hedge fund benchmarks: A risk-based approach. *Financial Analysts Journal* 60, 65–80.
Getmansky, M., 2012. The life cycle of hedge funds: Fund flows, size, competition, and performance. *Quarterly Journal of Finance* 2, 1–53.
Gibson, S., Safieddine, A., Titman, S., 2000. Tax-motivated trading and price pressure: an analysis of mutual fund holdings. *Journal of Financial and Quantitative Analysis* 35, 369–386.
Giroud, X., Rauh, J., 2019. State taxation and the reallocation of business activity: Evidence from establishment-level data. *Journal of Political Economy* 127, 1262–1316.
Glosten, L., Milgrom, P., 1985. Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics* 14, 71–100.
Griffin, J., Xu, J., 2009. How smart are the smart guys? A unique view from hedge fund stock holdings. *Review of Financial Studies* 22, 2531–2570.
Hasbrouck, J., 2009. Trading costs and returns for U.S. equities: Estimating effective costs from daily data. *Journal of Finance* 64, 1445–1477.
Heider, F., Ljungqvist, A., 2015. As certain as debt and taxes: Estimating the tax sensitivity of leverage from state tax changes. *Journal of Financial Economics* 118, 684–712.
Jewitt, I., 1988. Justifying the first-order approach to principal-agent models, *Econometrica* 56, 1177–1190.
Kufeld, A.S., Noonan, T.P., 2016. *Hedge Funds and Deferred Management Fees: State Taxes.* Available at: https://www.pkfod.com/wp-content/uploads/2018/11/Hedge-Funds-and-Deferred-Management-Fees-FINAL.pdf
Lan, Y., Wang, N., Yang, J., 2013. The economics of hedge funds. *Journal of Financial Economics* 110, 300–323.
Ma, L., Tang, Y., Gómez, J., 2019. Portfolio manager compensation in the U.S. mutual fund industry. *Journal of Finance* 74, 587–638.
Massa, M., Reuter, J., Zitewitz, E., 2010. When should firms share credit with employees? Evidence from anonymously managed mutual funds. *Journal of Financial Economics* 95, 400–424.
McClelland, R., Mok, S., 2012. A review of recent research on labor supply elasticities. Working Paper 43675, Congressional Budget Office.
Mukherjee, A., Singh, M., Zaldokas, A., 2017. Do corporate taxes hinder innovation? *Journal of Financial Economics* 124, 195–221.
Newey, W. K., West, K.D., 1987. A simple, positive semi-definite, heteroscedasticity and auto-correlation consistent covariance matrix. *Econometrica* 55, 703–708.
Picker, L., 2017. *Hedge funds may lose this tax loophole, but they don't care.* Available at: https://www.cnbc.com/2017/09/06/hedge-funds-may-lose-this-tax-loophole-but-they-dont-care.html.
Sadka, R., 2010. Liquidity risk and the cross-section of hedge-fund returns. *Journal of Financial Economics* 98, 54–71.
Sialm, C., Starks, L., 2012. Mutual fund tax clienteles. *Journal of Finance* 67, 1397–1422.
Sialm, C., Zhang, H., 2020. Tax-efficient asset management: evidence from equity mutual funds. *Journal of Finance* 75, 735–777.
Stoughton, N., 1993. Moral hazard and the portfolio management problem. *Journal of Finance* 48, 2009–2028.
Teo, M., 2011. The liquidity risk of liquid hedge funds. *Journal of Financial Economics* 100, 24–44.

Yin, C., 2016. The optimal size of hedge funds: conflicts between investors and fund managers. *Journal of Finance* 71, 1857–1894.
Yin, C., Zhang, X., 2019. Gambling or de-risking: Hedge fund risk-taking vs. management fees. Working Paper. Purdue University and Tsinghua University.
Yost, B.P., 2018. Locked-In: The effect of CEOs' capital gains taxes on corporate risk-taking. *The Accounting Review* 93, 325–358.

Figure 1
Geography of Hedge Funds

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

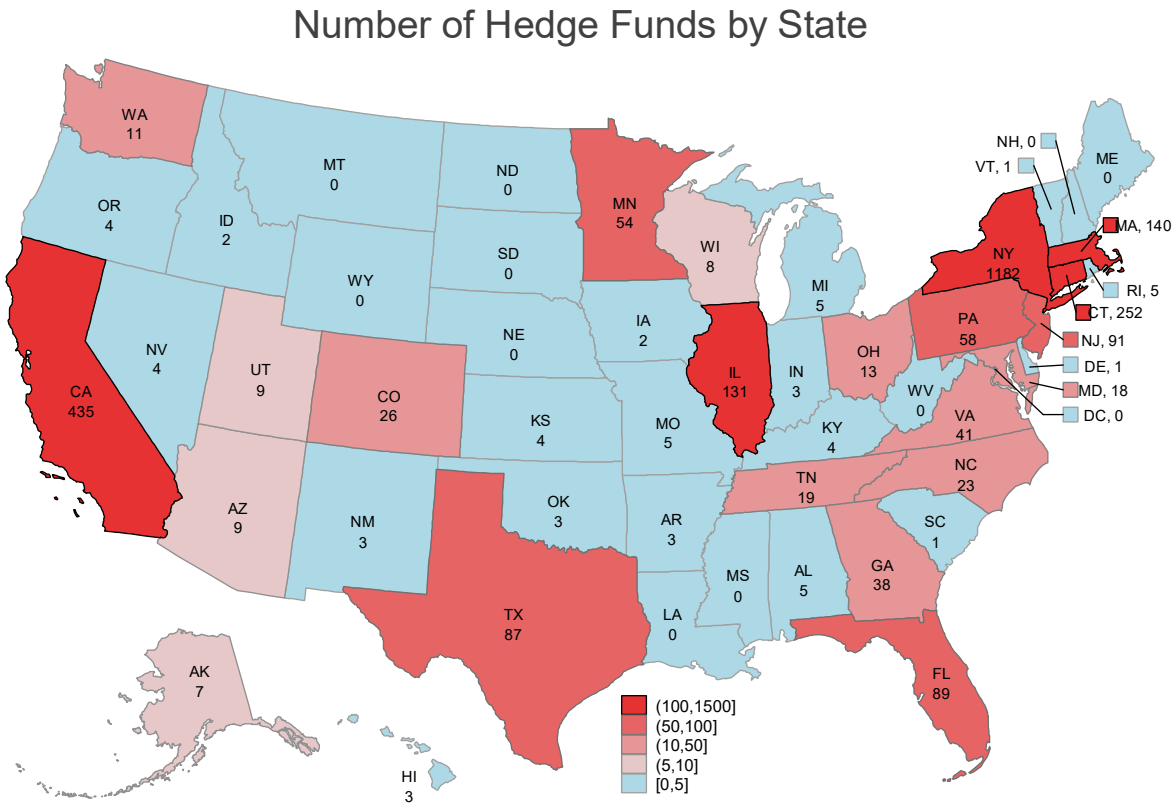
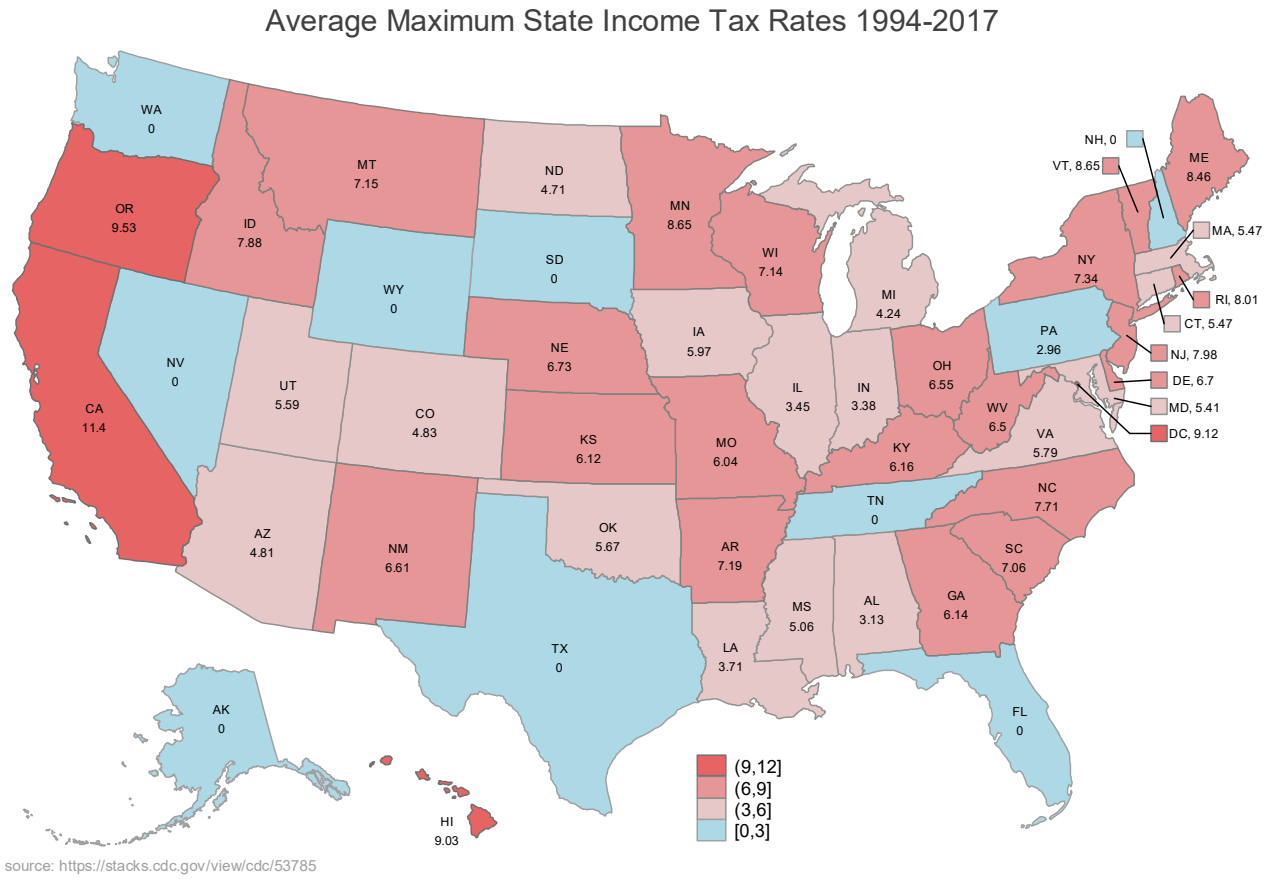


Figure 2
Average Maximum State Tax Rates

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.



source: https://stacks.cdc.gov/view/cdc/53785

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 a fund's assets under management (*Asset*) measured in millions of US dollars, flows (*Flow*), age (*Age*) measured in months, option and total delta (*OptionDelta* and *TotalDelta*) measured in thousands of US dollars, and manager's co-investment (*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 Appendix B. 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
ManagerTax	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
OptionDelta ($ Thousand)	103,778	180.185	28.524	443.539	3.647	127.541
TotalDelta ($ 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

Panel B: Hedge Fund Performance and Characteristics (contd.)

	N	Mean	Median	Std Dev	P25	P75
Fund-Level Observations						
ManagementFee	3,115	0.014	0.015	0.005	0.010	0.018
IncentiveFee	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
CorporateTax	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). Model results presented in columns (1) through (4) are without time fixed effects while the results in columns (5) through (8) have time fixed effects. The dependent variables are *Raw Return* in the odd-numbered columns and *8-Factor Alpha* in the even-numbered columns. Columns (1), (2), (5), and (6) use net-of-fee returns and alphas. Columns (3), (4), (7), and (8) report the results with gross-of-fee returns and alphas. Hedge fund manager's tax rate (*ManagerTax*) 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 net flow into a fund. *LnAge* is the logarithm of a fund's age. Macroeconomic factors included are *CorporateTax*, *StateGDPGrowth*, and *StateIncomeGrowth*. *CorporateTax* is the combined federal and state top marginal corporate tax rate. *StateGDPGrowth* is the annual growth rate in state gross 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 Appendix B. 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$_t$		Gross-of-fee returns$_t$		Net-of-fee returns$_t$		Gross-of-fee returns$_t$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	*Raw Returns*	*8-Factor Alpha*	*Raw Returns*	*8-Factor Alpha*	*Raw Returns*	*8-Factor Alpha*	*Raw Returns*	*8-Factor Alpha*
ManagerTax$_t$	-0.065***	-0.014**	-0.083***	-0.024*	−0.088**	−0.053**	−0.104**	−0.048*
	(-7.48)	(-2.27)	(-5.42)	(-2.03)	(−2.14)	(−2.09)	(−2.16)	(−1.69)
LnAsset$_{t-1}$	-0.004***	-0.003***	-0.005***	-0.003***	−0.003***	−0.003***	−0.004***	−0.003***
	(-12.68)	(-7.41)	(-8.92)	(-7.67)	(−14.71)	(−7.42)	(−8.62)	(−8.05)
Flow$_{t-1}$	0.000	0.000	0.001	0.001	0.000	0.000	0.003**	0.001
	(0.12)	(0.22)	(0.89)	(0.79)	(0.30)	(0.25)	(2.16)	(0.78)
LnAge$_{t-1}$	-0.003***	-0.004***	-0.003***	-0.004***	−0.002***	−0.001	−0.002	−0.001
	(-10.93)	(-6.83)	(-10.23)	(-5.29)	(−2.73)	(−0.68)	(−1.52)	(−0.74)
CorporateTax$_t$	0.132*	0.028	0.159	0.033	0.004	0.016	−0.026	0.030
	(1.79)	(0.84)	(1.31)	(0.62)	(0.11)	(0.37)	(−0.47)	(0.60)
StateGDPGrowth$_t$	0.197***	0.034***	0.244***	0.032***	0.014*	0.026***	0.023**	0.023**
	(6.30)	(4.03)	(7.22)	(3.65)	(1.77)	(2.89)	(2.31)	(2.25)
StateIncomeGrowth$_t$	-0.132***	-0.013**	-0.167***	-0.019**	0.028***	0.016*	0.044***	0.018
	(-6.76)	(-2.49)	(-6.41)	(-2.49)	(2.72)	(1.98)	(3.40)	(1.47)
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	136,180	97,518	103,783	71,024	136,180	97,518	103,783	71,024
Adj. R-squared	0.184	0.042	0.033	0.024	0.207	0.066	0.194	0.072

Table III: Robustness of Baseline Results

This table reports robustness tests of the baseline results. Columns (1) and (2) presents the robustness of baseline results controlling for fund style interacted with time fixed effects. Columns (3) and (4) presents the robustness of baseline results accounting for potential serial correlation in fund performance. Columns (5) and (6) present results among the subsample of funds excluding offshore funds and onshore twins of offshore funds. Columns (7) and (8) present results among the subsample of funds excluding managers identified as residing in states other than the states where their funds are located or managers with residences in multiple states at the same time. Columns (9) and (10) present results with the further inclusion of manager residential state fixed effects. Controls are the set of control variables specified in equation (1). Detailed variable definitions are provided in Appendix B. Standard errors are adjusted for heteroskedasticity and clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	including month × style fixed effects		adjusting standard errors by the Newey-West (1987) correction		excluding offshore funds and onshore twins of offshore funds		excluding managers with out-of-state residence and with residences in multiple states		including manager residential state fixed effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	*Raw Returns*	*8-Factor Alpha*	*Raw Returns*	*8-Factor Alpha*	*Raw Returns*	*8-Factor Alpha*	*Raw Returns*	*8-Factor Alpha*	*Raw Returns*	*8-Factor Alpha*
$ManagerTax_t$	−0.086**	−0.050*	−0.088***	−0.053*	-0.086***	-0.084***	-0.101**	-0.056**	-0.076*	-0.057**
	(−2.44)	(−1.78)	(−2.83)	(−1.70)	(-2.88)	(-3.70)	(-2.24)	(-2.28)	(-1.72)	(-2.36)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	136,180	97,518	136,180	97,518	70,732	50,208	117,754	96,592	133,027	95,196
Adj. R-squared	0.295	0.102	0.207	0.066	0.212	0.061	0.205	0.0660	0.207	0.067

Table IV: Tax 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 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 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 (*ManagerTax*) 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), and zero otherwise. *LnAsset* is the logarithm of a fund's assets under management. *Flow* is the net flow into a fund, and *LnAge* is the logarithm of a fund's age. Detailed variable definitions are described in Appendix B. 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$_t$
ManagerTax$_t$	−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)
CorporateTax$_t$	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 V: Alternative Tax Management Analysis

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 using subsample where state income tax rates equal capital gain and/or dividend tax rates. 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). Hedge fund manager's tax rate (*ManagerTax*) 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 a fund's assets under management. *Flow* is the net flow into a fund. *LnAge* is the logarithm of fund age. Macroeconomic factors included are *CorporateTax*, *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 Appendix B. 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	Raw Returns$_t$	8-Factor Alpha$_t$	Raw Returns$_t$	8-Factor Alpha$_t$	Raw Returns$_t$	8-Factor Alpha$_t$
	States where state ordinary income tax rate equals state long-term capital gain tax rate		States where state ordinary income tax rate equal state dividend income tax rate		States where all three tax rates are equal	
ManagerTax$_t$	−0.081**	−0.044**	−0.084*	−0.050**	−0.075*	−0.045**
	(−2.09)	(−2.20)	(−2.03)	(−2.28)	(−1.95)	(−2.15)
LnAsset$_{t-1}$	−0.003***	−0.003***	−0.003***	−0.003***	−0.003***	−0.003***
	(−14.56)	(−7.60)	(−13.54)	(−6.76)	(−13.35)	(−6.79)
Flow$_{t-1}$	0.000	0.000	0.000	−0.000	0.000	0.000
	(0.02)	(0.22)	(0.35)	(−0.08)	(0.07)	(0.14)
LnAge$_{t-1}$	−0.002**	−0.001	−0.002***	−0.001	−0.002***	−0.001
	(−2.51)	(−1.04)	(−3.26)	(−1.00)	(−3.00)	(−1.25)
CorporateTax$_t$	0.008	0.006	−0.003	0.005	0.001	0.002
	(0.21)	(0.16)	(−0.06)	(0.14)	(0.02)	(0.07)
StateGDPGrowth$_t$	0.013	0.021**	0.019**	0.028***	0.018**	0.026**
	(1.58)	(2.43)	(2.40)	(3.20)	(2.09)	(2.76)
StateIncomeGrowth$_t$	0.032***	0.022***	0.031**	0.018**	0.038**	0.021**
	(3.38)	(3.00)	(2.04)	(2.29)	(2.70)	(2.31)
Fund and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	133,631	96,217	125,996	90,185	123,447	88,884
Adj. R-squared	0.206	0.068	0.208	0.068	0.207	0.067

Table VI: 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 (*ManagerTax*) 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 its stock holdings. *LnAsset* is the logarithm of a fund's assets under management. *Flow* is the net flow into a 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 Appendix B. 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$_t$	
ManagerTax$_t$	−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)
CorporateTax$_t$	−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 VII: Local versus Non-Local Stocks

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 stock portfolio performance separated into local and non-local stock portfolios. Coefficients are estimated based on the model presented in equation (1). The dependent variables are *DGTW Adjusted Return* and *FFC Alpha*. Based on Daniel et al. (1997), *DGTW Adjusted Return* is the characteristic-based, benchmark-adjusted performance of a fund's stock portfolio. *FFC Alpha* is the abnormal portfolio return based on the four factors identified by Fama and French (1993) and augmented by Carhart (1997). *Non-local Firm Portfolio* is a fund manager's portfolio of non-local stocks. *Local Firm Portfolio* is a fund manager's portfolio of local stocks. Hedge fund manager's tax rate (*ManagerTax*) 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 a fund's assets under management. *Flow* is the net flow into a fund. *LnAge* is the logarithm of fund age. Macroeconomic factors included are *CorporateTax*, *StateGDPGrowth*, and *StateIncomeGrowth*. *CorporateTax* 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 Appendix B. 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)
	DGTW Adjusted Return$_t$		*FFC Alpha$_t$*	
VARIABLES	*Non-local Firm Portfolio*	*Local Firm Portfolio*	*Non-local Firm Portfolio*	*Local Firm Portfolio*
ManagerTax$_t$	−0.140*	0.072	−0.245**	−0.002
	(−1.85)	(0.43)	(−2.55)	(−0.01)
LnAsset$_{t-1}$	0.000	0.001	0.001	0.004**
	(0.04)	(0.71)	(1.40)	(2.12)
Flow$_{t-1}$	0.003	−0.002	0.001	−0.012
	(0.99)	(−0.45)	(0.30)	(−1.42)
LnAge$_{t-1}$	−0.002	−0.001	−0.003*	−0.011**
	(−1.33)	(−0.42)	(−1.93)	(−2.43)
CorporateTax$_t$	−0.051	−0.086	−0.147*	−0.229
	(−0.76)	(−1.18)	(−2.06)	(−1.47)
StateGDPGrowth$_t$	0.039	0.107*	−0.000	0.106
	(1.55)	(1.93)	(−0.01)	(1.12)
StateIncomeGrowth$_t$	−0.057	−0.006	0.115**	−0.160
	(−1.36)	(−0.11)	(2.33)	(−1.65)
Fund FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	39,448	34,280	27,803	24,115
Adj. R-squared	0.172	0.069	0.145	0.0545

Table VIII: Fund Flow

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 flows (*Flow*). Coefficients are estimated based on the model presented in equation (1). The dependent variable is *Flow* defined as the percentage capital flow into each fund at the end of each month. Hedge fund manager's tax rate (*ManagerTax*) 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, Returns*, and *LnAge. LnAsset* is the logarithm of a fund's assets under management. *Returns* is the monthly net-of-fee fund return. *LnAge* is the logarithm of a fund's age. Macroeconomic factors included are *Corporate_Tax*, *StateGDPGrowth*, and *StateIncomeGrowth*. *CorporateTax* 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 Appendix B. 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)
VARIABLES	$Flow_t$
$ManagerTax_t$	0.027
	(0.31)
$LnAsset_{t-1}$	−0.010***
	(−9.11)
$Returns_{t-1}$	0.074***
	(8.72)
$LnAge_{t-1}$	−0.030***
	(−17.27)
$CorporateTax_t$	0.004
	(0.06)
$StateGDPGrowth_t$	0.021
	(1.05)
$StateIncomeGrowth_t$	0.027
	(1.02)
Fund FE	Yes
Time FE	Yes
Observations	136,180
Adj. R-squared	0.084

Table IX: 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*) consists of 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 includes only exogenous tax changes. Panel C incorporates the magnitude of tax changes into the analyses. Detailed variable definitions are in Appendix B. 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 Decreases (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

	(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	−0.006		−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_ΔManagerTax	−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 X: 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 (*ManagerTax*) 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 a fund's assets under management. *Flow* is the net flow into a fund, and *LnAge* is the logarithm of a fund's 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-quarter fixed effects are included in all regressions. Detailed variable definitions are described in Appendix B. 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×ManagerTax	0.011***				
	(2.76)				
LnAnalyst×ManagerTax		0.017**			
		(2.22)			
Illiquidity×ManagerTax			−0.008***		
			(−4.13)		
R&D×ManagerTax				−0.017***	
				(−4.90)	
IdioVolatility×ManagerTax					−0.011***
					(−2.74)
ManagerTax	−0.121***	−0.084***	−0.038**	−0.037**	−0.037**
	(−3.27)	(−2.88)	(−2.40)	(−2.38)	(−2.35)
Stock Characteristics					
LnFirmSize	−0.008***	−0.003***	−0.003***	−0.003***	−0.003***
	(−4.48)	(−9.41)	(−9.37)	(−9.43)	(−9.48)
LnAnalyst	−0.001***	−0.008**	−0.001***	−0.001***	−0.001***
	(−4.63)	(−2.43)	(−4.34)	(−4.38)	(−4.40)
LnFirmAge	−0.000	−0.000	0.000	0.000	0.000

	(−1.07)	(−0.33)	(0.20)	(0.17)	(0.09)
Illiquidity	0.006***	0.006***	0.010***	0.006***	0.006***
	(5.20)	(5.18)	(7.70)	(5.19)	(5.16)
IdioVolatility	−0.003*	−0.004*	−0.004*	−0.004*	0.002
	(−1.76)	(−1.90)	(−1.84)	(−1.83)	(0.57)
R&D	−0.003***	−0.003***	−0.003***	0.005**	−0.003***
	(−2.93)	(−2.98)	(−2.97)	(2.34)	(−3.01)
MB	0.000***	0.000***	0.000***	0.000***	0.000***
	(2.65)	(3.87)	(4.42)	(4.59)	(4.33)
LnPrice	0.001***	0.001***	0.001***	0.001***	0.001***
	(6.62)	(6.35)	(6.13)	(6.17)	(6.26)
Momentum	0.000*	0.000*	0.000*	0.000*	0.000*
	(1.91)	(1.90)	(1.77)	(1.74)	(1.78)
D/P	−0.009*	−0.010**	−0.010**	−0.010**	−0.010**
	(−1.89)	(−2.06)	(−2.22)	(−2.22)	(−2.13)
P/S	0.000**	0.000**	0.000**	0.000**	0.000**
	(2.36)	(2.32)	(2.24)	(2.16)	(2.26)
Beta	−0.001***	−0.001***	−0.001***	−0.001***	−0.001***
	(−6.56)	(−6.33)	(−5.95)	(−5.95)	(−5.89)
Fund Characteristics					
LnAsset	0.001***	0.001***	0.001***	0.001***	0.001***
	(5.74)	(5.73)	(5.64)	(5.64)	(5.64)
Flow	−0.000	−0.000	−0.000	−0.000	−0.000
	(−0.82)	(−0.88)	(−0.91)	(−0.89)	(−0.87)
LnAge	0.000	0.000	0.000	0.000	0.000
	(0.99)	(0.92)	(0.92)	(0.93)	(0.93)
Macroeconomic Characteristics					
$CorporateTax_t$	−0.000	0.001	0.002	0.002	0.002
	(−0.01)	(0.09)	(0.17)	(0.17)	(0.17)
$StateGDPGrowth_t$	−0.013***	−0.013***	−0.012***	−0.012***	−0.012***
	(−5.13)	(−5.18)	(−5.09)	(−5.22)	(−5.21)
$StateIncomeGrowth_t$	−0.010***	−0.010***	−0.010***	−0.010***	−0.010***
	(−3.12)	(−3.15)	(−3.07)	(−3.07)	(−3.03)
Fund, Stock, and Time FE	Yes	Yes	Yes	Yes	Yes
Observations	1,448,766	1,448,766	1,448,766	1,448,766	1,448,766
Adj. R-squared	0.440	0.440	0.439	0.439	0.439

Table XI: 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 (*ManagerTax*) 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 the 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 Appendix B. Standard errors are adjusted for heteroskedasticity and clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Raw Returns$_t$					
	$TotalDelta_L$	$TotalDelta_H$	$OptionDelta_L$	$OptionDelta_H$	$Ownership_L$	$Ownership_H$
$ManagerTax_t$	−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)
$CorporateTax_t$	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$_H$
ManagerTax$_t$	−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)
CorporateTax$_t$	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 XII: 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 (*ManagerTax*) 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. *CorporateTax* 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 Appendix B. 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$_t$)	
ManagerTax$_t$	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)
CorporateTax$_t$	−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

Appendix A: Hedge Fund Manager Residence

We use Intelius, a public record information service provider, to collect the residential addresses of hedge fund managers in our sample. Intelius provides information services including background checks and property search. We begin by identifying individuals in the Intelius database who have the same first name and last name as a hedge fund manager in our sample. We then read the employment history of these individuals on Intelius. If the employment information matches the hedge fund name or the investment company name in TASS, the individual is identified as a hedge fund manager in our sample. For the hedge fund managers whose email addresses and phone numbers are available in TASS and Intelius, we use the information together with the employment information to identify and verify the match. We also search for a fund manager's college graduation year from online resources such as LinkedIn to infer the age of a fund manager. We further verify the matches with the age information in Intelius for fund managers where this information is available.

Appendix B: Variable Definitions

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 Fama-French (1993) and 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)		
CorporateTax	Combined federal and state top marginal corporate tax rate	1994–2002 University of Michigan Tax Database; Tax Foundation for 2000–2017
StateCorporateTax	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