State Income Taxes and Team Performance: Do Teams Bear the Burden?

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September 28, 2017

Abstract

State income tax rates differ across locations, potentially giving low-tax professional sports teams a competitive advantage. I investigate the effect of income tax rates on professional team performance between 1977 and 2016 using data from professional baseball, basketball, football, and hockey in the United States. Regressing income tax rates on winning percentage, I find little evidence of income tax effects prior to the mid 1990s, but since then a ten percent increase in income taxes is associated with a four percent decline in winning percentage. The income tax rate effect varies by league, with the largest effect in professional basketball, where a no income tax state team wins on average 6.5 to 8 more games each year than a team in a ten percent income tax state. Placebo tests using college team performance find no evidence of an income tax effect.

JEL Classification Codes:H23, Z23

Keywords: Income tax, Tax incidence, Sports.

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Introduction

Who bears the burden of state income taxation? As shown by Wallace (1993), the state income tax burden is determined by the relative elasticity of mobility of capital relative to labor. Given that households are far less mobile than capital, it is typically assumed that income taxation is mostly borne by labor. However, professional sports offers a unique market where the players (labor) are far more mobile than the teams (capital), implying that teams should bear most of the burden of state income taxation. Does state income taxes affect professional team performance? This paper investigates the question by analyzing team performance in the four major US professional sports leagues over the past forty years.

Anecdotal evidence suggests state income taxes hurt professional sports teams. Consider the NBA. Between 1993 and 2015, the thirteen teams located in the highest income tax states played in twelve NBA finals and won six championships. Over the same time period, the seven teams located in states without any income tax played in eighteen NBA finals and won eleven championships.[1] This means that low tax teams were three times more likely to play in a finals or win a championship as high tax teams.

While higher income taxes likely disadvantage a team, the magnitude of this effect is unclear given potential mitigating responses of teams. Normally, firms could mitigate higher income taxes by increasing incomes and payroll to compensate workers. However, collective bargaining agreements in all leagues but the MLB constrain team spending by imposing various forms of a salary cap. If players shift the burden of state income taxes onto teams, a binding salary cap implies team in high tax states are able to buy less player talent and in turn win fewer games. While teams have limited ability to increase player payroll to counteract higher income taxes, teams could instead increase spending on other team inputs such as coaching, scouting, or team amenities to mitigate lower player quality. Similarly, since players typically must gain several years of experience before they can freely negotiate contracts, highly taxed teams could focus their roste around restricted contract players.

Whether athletes or teams respond to state income taxes is a question several other papers have considered. For instance, Alm et al. (2011) analyze tax compensation of MLB free agents between 1995 and 2001 and find evidence that most of the state income tax burden is offset by higher salary. Similarly, Ross and Dunn (2007) study MLB All-Stars between 1991 and 2002 to find that a one

[1] Two teams located in states without an income tax relocated during this time period: the Seattle Supersonics and the Memphis Grizzlies. The Sonics relocated to Oklahoma City in 2008 and the Vancouver Grizzlies relocated to Memphis in 2001. Prior to moving, the Grizzlies never made the playoffs, but have made the playoffs in nine of fifteen seasons since moving to Memphis.

percent decrease in the state income tax rate leads to a three percent increase in salary. In the NBA, Kopkin (2012) studies NBA free agent signing between 2001 and 2008 to find that low tax teams sign higher quality free agent. These papers suggest that players are able to shift most of the burden of state income taxes onto teams. In considering migration choices, Kleven et al. (2013) considers the migration patterns of international soccer players with respect to national income tax rates, finding a higher elasitcity of mobility near one for foreign players. Driessen and Sheffrin (2017) examine choices of professional racecar drivers and golfers and conclude that golfers have a strong mobility response to higher state income taxes, while racecar drivers benefit from agglomoration effects in high income tax states and therefore have lower a mobility elasticity. I build on this work both by relating the incidence of state income taxes directly to team outcomes and analyzing a more comprehensive view of professional sports by looking at all four major sports leagues over a forty year period. Further, I provide behavioral evidence that teams counteract higher taxes by utilizing more players on restricted contracts (where players have little negotiating power) and update prior work on state income tax compensation in the MLB and NBA while utilizing a more advanced measure of player value, the value-above-replacement metric which measures the expected wins a player contributes to a team relative to a replacement-level player.[2]

More broadly, this paper contributes to topic of responses to state income tax rates. Recent work by Moretti and Wilson (2017) and Moretti and Wilson (2014) finds a very high elasticity of mobility among star scientistis in response to state income tax rates. Similarly, Bakija and Slemrod (2004) uses federal estate tax returns to find evidence of wealthy elderly households avoiding state income tax rate. However, such as Young and Varner (2011) and Conway and Rork (2012) find only small migration responses to state income tax rates among high earners and the elderly respectively. I contributes to the literature by focusing on the producer burden of state income taxation. Given the high elasticity of mobility among professional athletes, or high earners in general, one would expect businesses which employ a high share of these workers to bear most the burden of state taxation. While I cannot observe changes in profit among teams resulting from state income taxes, I instead measure team performance which should reflect the underlying income tax burden.

This paper focuses on the top maringal state income tax rates since current average salaries in the MLB, NBA, NFL, and NHL are comfortably above top state and federal tax brackets, at $3.4, $4.8, $2.3, and $2.4 million respectively.[3] Top state marginal income tax rates currently range between zero and fourteen percent. The response of players to state tax rates are likely amplified since players must

[2]The NHL and NFL are excluded from this analysis both because of shorter historical salary data and no value-added metric has been constructed yet for these sports.

[3]While the median player may make significantly less than the mean, note that tax rates should only affect free-agent choices, who are better-paid veterans, and that the minimum salary in any of the leagues is still this tax bracket threshold.

also pay agents and other advisors, typically as a percentage of the contract value and must pay state taxes on additional sources of revenue such as endorsement deals. While professional athletes are paid well, they still have strong incentives to respond to tax incentives. One reason is that the average professional sports career is short. The median NFL or NBA player drafted in the 1990s and playing at least one season, had a career lasting six and seven seasons respectively. Many athletes suffer from financial strains either due to poor money management or low non-sports labor market ability. In a *Sports Illustrated* article, Torre (2009) claims that 78% of NFL players go bankrupt or commit suicide within two years of retirement and sixty percent of NBA players go bankrupt within five years.

This paper focuses on state income taxes, as opposed to sales or property taxes, for several reasons. First is that income taxes are easily observable over time and location. This makes them particularly salient for players and convenient for an econometrician. While higher taxes can indicate higher public goods, such as parks, healthcare, and parks which would offset the burden of taxation, the progressivity of the tax code combined with player travel schedules and wealth means the benefit of these goods to players relative to cost is likely marginal. In contrast, property taxes are difficult to observe as they depend on locale choices within the area surrounding the team, are proportional to housing preferences, and typically provide highly local public goods such as education and safety. Measuring effective sales tax burden would require local consumption information about players and their families, which is similarly difficult to observe and easier to avoid than income taxes.[4]

To empirically test the link of state income taxes to team performance, this paper analyzes team outcomes from all four major US sports leagues, the National Basketball Association (NBA), National Football League (NFL), National Hockey League (NHL), and Major League Baseball (MLB), between 1977 and 2016. Income tax rates are regressed on team winning percentage to determine if there is a causal link between taxes and winning. The analysis controls for additional observable team and location characteristics which could impact team performance. Local population and income may affect team performance by increasing demand and boosting team revenues and payrolls. Similar to income taxes, areas differ by their local amenity values such as better weather, entertainment, and nightlife which players value. I control for this using local amenity quality as estimated by Albouy (2015). Lastly, team age can impact team performance, as expansion teams typically take several years to assemble a winning team. Alternative model specifications use within-state tax rate changes, hold 1993 tax rates constant, and exclude outliers.

The main analysis finds that state income tax rates significantly impact team performance. Since the mid-1990s, a ten percentage point increase in income tax rates is associated with between a 1.3-4.3

[4]Observation of effective sales tax would be further complicated as it requires knowledge of the sales tax incidence borne by consumers across locations.

percentage point decrease in winning percentage. Prior to the mid-1990s, the effect was not statistically significant. Estimating the income tax effect separately by league, the effect is greatest in the NBA and smallest in the MLB. Estimating the effect separately by league and year, the magnitude of the income tax effect has grown steadily over the past twenty years in the NBA while remaining relatively constant in the NFL and NHL.

The time-varying income tax effect, with minimal effects prior to the mid-1990s growing since then, is particularly interesting and follows tax burden incidence theory. The ability of players to shift the income tax burden on to teams depends critically on their negotiating leverage to move to other teams. Player free agency, and in turn mobility, was quite limited in the 1970s and 1980s but became a key negotiating point in collective bargaining agreements in the early and mid-1990s which included the 1994 strike-shortened MLB and NHL seasons, and the first-ever NBA player lockout in 1995. These combined with the 1993 NFL collective bargaining agreement all significantly increased the role of player free agency and allowed for larger player contracts Since then, player transitions between teams has grown significantly, enabled by the growing influence of free agency. Additionally, player salaries have outpaced inflation over the past thirty years. The average NBA salary in 1987, was around a million dollars (in constant 2016 dollars) whereas the current NBA average salary is $4.7 million. Player salaries grew particularly fast following the collective bargaining disputes in the mid-1990s. Increasing player mobility and salaries both validate the increasing income tax effect over the past twenty years.

The main analysis primarily relies on cross-state variation in income tax rates to identify the income tax effect, given that ninety percent of state income tax rate variation is cross-state as opposed to within-state variation over time. While state tax rates are not set exogenously, these rates are highly unlikely to be responsive to professional sports team performance. However, a variety of robustness checks, including utilizing within-state variation in tax rates, using championships or finals appearances instead of winning percentage, excluding outliers, including Canadian teams, and including local income tax rates in addition to state income taxes all affirm the main findings of this paper.

Another potential concern is that unobserved location heterogeneity may be correlated with income tax rates. For instance, if states without income taxes such as Texas and Florida have particularly strong tastes for sporting events, this could advantage teams similar to income and population effect. To test this, I run a placebo test using college sports team performance, where players should not respond to income tax rates given they are unpaid athletes. I find no evidence of an income tax effects on college team performance, alleviating this concern.

Further analysis strengthens the direct link between higher income taxes causing worse team performance. After showing that MLB and NBA teams directly compensate players for increased taxes, I find that NBA teams respond to income tax rates in their roster construction. Teams with higher state income taxes are less likely to rely on free-agent signings but instead rely more on early-career players on restricted contracts which do not compensate them for the increased tax burden.

The estimated income tax effect size is non-trivial. In the NBA, where the effect is highest, a team moving from Minnesota (a high income tax state) to Florida (a no income tax state) they could expect to win between 6.5 to 8 more games per year (out of 82). Using the Wins Above Replacement Player statistic developed by Kevin Pelton, this is of a similar value as adding a 2015 version of Marc Gasol or Draymond Green, both are all-star caliber players, in place of a mediocre bench player. Conversely, I find a small, positive and statistically insignificant effect of income taxes in the MLB, even though player salary regressions controlling for player quality indicate teams compensate players for higher income taxes. The minimal MLB income tax effect is not surprising given the lack of a salary cap results in variation of team spending that is roughly eight times greater than the variation income tax rates.

Data

To determine the effects of state tax rates on winning, I collect historical data on state top marginal tax rates and compare it to team performance data while controlling for other local economic and demographic variables. I restrict my analysis to teams playing in the United States both because of data limitations in tracking Canadian tax history data and other factors which might differ across countries such as the exchange rate.[5]

Top state marginal tax rate data from 1977-2016 are taken from the NBER Taxsim program.[6] Figure 1 shows the average top tax rate across states which have a professional sports team. Top marginal income tax rates do not vary much within a state over time. Only ten percent of the variation in annual top tax rates is within states as opposed to between states. Between 1977-2016, the average top marginal tax rate is 5.5%. Several states have never had state income tax, including Florida,

[5] One should expect inclusion of Canadian data to strengthen the findings that income taxes influence team performance. Canadian effective income tax rates are higher than most all US locations. The seven NHL Canadian hockey teams have not won a Stanley Cup since 1993. No Canadian NBA team has ever reached the NBA finals. The Canadian MLB team, the Toronto Blue Jays, did not make the playoffs for twenty-one consecutive years following their 1993 World Series win.

[6] Available at `http://users.nber.org/~taxsim/state-rates/`.

Tennessee, Washington, and Texas. Currently, the highest marginal state income tax rate is in California at 14.1%, followed by Minnesota at 10.15% and Oregon at 9.9%.

This paper assumes players and teams are responding to the top marginal tax rate in the state of team residency. However, the income taxation of athletes is complicated. Green (1998) and Fratto (2007) provide a summary of the important income taxation issues at hand for professional athletes. Tax issues could arise from the supplemental income athletes often earn from sponsorship deals or appearance fees, from spending several months of an offseason living in state different than where they are employed, and from playing away games in more than twenty states. Increasingly, professional athletes have been assessed a "jock tax", or an income tax targeting short-term entertainers, from playing games in the states of their opponent. This politically popular tax can be high, with its legal and fairness issues layed out in Ekmekjian (1994) and DiMascio (2006). DiMascio (2006) points out that as a result of a jock tax, the Seattle Seahawks players were required to pay an estimated $300,000 in income taxes to Michigan as a result of the 2006 Super Bowl being played at Ford Field in Detroit. To show how arduous tracking jock taxes could be, in 1992 the state of Illinois, angered over other states claiming income taxes from their players, proposed a bill informally known as "Michael Jordan's Revenge" which levied an income tax on visiting athletes, but only if their state collected income taxes from Illinois athletes. Since the expected tax burden of these would vary little across teams, since they play a similar set of opponents. Further, the questionable salience of expected future opponent income tax differentials makes this aspect, at best, a secondardy issue for analysis which I disregard here. A detailed review of the jock tax issue can be found in DiMascio (2006).

Team performance is assessed using regular season data on wins and losses (or points in hockey). Historical team records for the MLB, NFL, NBA, and NHL are collected from Sports-Reference at `http://www.sports-reference.com/`. Team records are available for the MLB from 1901-2016, the NBA from 1949-2016, the NFL from 1971-2016, and the NHL from 1917-2016. Regression analysis is restricted to when tax rate data is available, from 1977-2016. I throw out strike-shortened seasons, including 1994, 2004, and 2012 for the NHL, 1981 and 1994 for the MLB, and 1998 and 2011 for the NBA. Franchise data from Sports-Reference is recorded to compute franchise age each year. For all leagues but the NHL, regular season team win-loss records are used to create winning percentages. For the NHL, which uses a points system instead of wins and losses, winning percentage is derived by taking a team's season points and dividing them by the average points for the year. To standardize winning percentage across leagues, I adjust winning percentages to be mean 50 and have a standard deviation of 15.55 (the winning percentage standard deviation from the NBA). This adjustment ensures that tax effect size is weighed equally and comparably across leagues.

To account for other potential factors in winning, regressions include control variables for metro area

population, average income, quality-of-life, and franchise age. Table 1 displays summary statistics of these variables. Annual average income data comes from the Bureau of Economic Analysis, and metropolitan-area population estimates come from the US Census Bureau. Income and population may affect winning by increasing demand for tickets and in turn increase the marginal profit of a win. These variables are standardized by year given that winning is a zero-sum outcome variable. Although note that these averages appear slightly off since I drop Canadian teams.

Similar to income taxes, local amenities could matter for team performance. In standard labor market models such as Rosen (1979) and Roback (1982), workers consider wages, house prices, and amenity values when selecting where to reside, with wages compensated for variation in amenities across locations. However, when teams are competing with a fixed salary cap, high amenity values could serve as a bargaining advantage. A player valuing warm weather may sacrifice salary to play in a place like Miami, FL relative to Buffalo, NY. Amenity values are difficult to directly measure and quantify. Albouy (2015) estimates local amenity values using data on local wages, population, and home values. That is, given local wages and population he predicts home values. The difference between observed and expected home values is then taken to be a measure of local amenities. While other variables in this analysis are time-varying, I assume amenity values are static. While this is primarily due to data availability, a primary component of amenity value is local climate which is relatively unchanging over time as well.

Lastly, I consider team age. As leagues have grown, new expansion teams often perform poorly in their first few years of existence. This can be because these teams begin centered around young players they draft and which take several years to develop. Figure 2 displays a smoothed polynomial of the average winning percentage of franchises by team age, among franchises originating after 1970.[7] Note that team age is determined by first year of existence, and so does not reset if a team relocates. This figure displays a sharp learning curve during the first five years after expansion, that levels off over the next ten years. I include dummy variables in the regression to reflect this trend.

Summary of theoretical model

There is good reason to believe that state income tax rates might effect team performance. As discussed in Wallace (1993), the incidence of differential state income taxes can be investigated using a general Harberger model allowing the tax to affect the various factors of production in McClure

[7] Prior to 1970, expansion teams may have included the founding teams of the league. Founding teams would not have been at a relative disadvantage to other teams, which is what this variable is attempting to capture.

(1970). A main implication of the model is that the share of income tax burden borne by the labor market (in this case, the athletes) depends on the elasticity of labor mobility relative to the elasticity of capital.

The professional sports market differs from traditional labor markets in a few important ways. One difference is that new workers (rookies) typically have little input on who they play for and little negotiating power of their contract, playing under a "restricted" contract dictated by a collective bargaining agreements. As an example, in 2013 Russell Wilson was selected to the Pro Bowl for being one of the top quarterbacks in the league and led the Seattle Seahawks to win the Super Bowl. Because he was playing under his rookie contract, Russell only earned $500,000, while the average pay among the ninety-three NFL quarterbacks that year was $10 million.[8] As a result, in professional sports the traditional assumptions regarding the relative mobility elasticities of capital and labor are reversed. The labor force, the players, are highly mobile while the capital, the teams, are highly immobile. Once players become free agents, their location attachment is often small relative to the potential to gain millions of dollars by changing locations. Conversely, the teams can not easily switch locations and rarely do so.[9] Another difference is that the good is primarily sold on a local market through ticket sales or local television contracts instead of at a national level. This implies that team investment will depend on the local ticket prices, and in turn we expect more investment (i.e. higher team salaries) in areas with greater population and with higher incomes. Lastly, the competition between teams is to produce a zero-sum good: wins. Professional sports leagues strictly regulate both the number games played and number of players on each team. Instead, teams can increase the quality of their labor force to win more often and in turn increase demand for tickets. Since the number of wins league-wide is fixed (every game must end in a win or a loss), we will only consider the relative value of input variables.

The relatively elastic mobility of athletes predicts the state income tax burden will be borne primarily by the teams instead of the players. This provides some implications for empirical research. One implication is that conditional on quality, players in high-income tax states should receive higher pre-tax income. Indeed, a recent study by Alm et al. (2011) regresses MLB player performance and state taxes on free agent contract value to find a nearly dollar-for-dollar compensation for variation in income tax rates. Given this, a team in a high-tax state can respond in two possible ways: either pay a higher team salary for a given level of wins or trade-off paying less in salary for winning fewer games. The ability to choose first response, to raise team salary, is restricted depending on the league. For

[8] NFL Salary data according to `http://www.spotrac.com/`.

[9] Since 1990, there have been sixteen official franchise relocations meaning the relocation rate is around half a percent each year.

example, in the MLB, teams have no limit on team salary, although the highest spending teams must pay a "luxury tax" on a portion of their payroll. In contrast, in order to promote a competitive balance, the NFL and NHL impose spending restrictions through a "hard cap" on an upper bound to team payroll, while the NBA has a "soft cap" with a luxury tax, allowing teams to potentially spend above a capped amount, but penalizing them for doing so. Lastly, we expect teams in high tax states to focus more on utilizing players on restricted contracts relative to free agents, all else equal. Though rules vary by league, the negotiating power of early-career players is severely limited and are typically seen as being very team-friendly. Importantly, these early career contracts are not adjusted for state income taxes. Since teams in high-tax locations must compensate free agents for their income tax burden, but do not compensate early-career players for taxes, the relative value of players on restricted contracts is greater in high-tax locations.

Empirical Model

To estimate the effect of income tax rates on team performance, I estimate the following regression equation.

$$Y_{it} = \beta_0 + \beta_1 \tau_{it} + \beta_2 X_{it} + \varepsilon_{it} \tag{1}$$

The winning percentage, Y_{it} for team i in year t is modeled as a function of the state top marginal income tax rates, τ_{it}, and other team and location characteristics, X_{it}, including population, average income, quality-of-life estimate, and franchise age. In some specifications, β_1 is modified to allow for separate effects by league, β_1^L, by year β_1^t, or league-by-year effects, β_1^{Lt}.

Identification of the income tax effect, β_1, comes from the variation in income tax rates τ_{it} over time and across locations and the corresponding variation in winning percentage, Y_{it}. Since only ten percent of the income tax rate variation comes from within-states over time as opposed to between states, β_1 is primarily identified by cross-state income tax variation. This estimation strategy assumes that income tax rates are set exogenously relative to sports teams interests. Bias in estimated coefficients could arise if income tax rates are set in direct response to influence professional team performance or if income tax rates are correlated with factors influencing team performance not controlled for in the regression. Given the relatively minor role of professional sports on local budgets, it seems unlikely that tax rates are altered to help local teams.

An alternative approach could use within-state variation in tax rates to estimate its incidence, similar to Evans et al. (1999). While this would eliminate bias from unobserved differences in state characterstics, it is not suited for this study. Changes in top income tax rates are infrequently large, with only nine occurances of professional sports alternating top income tax rates by more than just two percent since 1990. Further, it would take several years for team responses to be fully realized in the outcome variable since player contracts are typically several years in length.

Perhaps the biggest unobserved team characteristic that could affect team performance is local demand for sports. If people in places with no or low income taxes, such as Florida and Texas, were also to have a differential preference for sports than people in high income states, such as California and New York, the income tax estimates may be bias.

Our analysis takes two steps to investigate the potential confounding influence of such unobserved factors. First, we run a robustness check on the results using a differenced version of Equation (1):

$$Y_{it} - Y_{it-1} = \beta_0 + \beta_1(\tau_{it} - \tau_{it-1}) + \beta_2(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \tag{2}$$

This regression identifies β_1 only using changes in income tax rates within the same state from one year to the next. The downside to this approach is that tax rates do not change very often within the same state, leaving limited variation to identify the income tax effect. As a result, there will not enough power to check similarly for league or league-by-year income tax effect. Secondly, we run a placebo test to check whether state income tax rates influence college team performance. Since college athletes are unpaid, we should expect income tax rates to either a very small or no influence on team performance, but if areas with low income taxes also have a high demand for sports, we would expect to find a negative relationship between income taxes and winning.[10]

Results

This section investigates the effect of top income tax rates on team performance. I begin by considering all leagues and time periods. The tax effect is then separately estimated by league and by league-year to test for differential effects leagues over time.

Table 2 displays regression results from estimating Equation (1). The table is split by estimation time period, with columns (1) through (3) displaying results from the full sample period 1977 through

[10]Income taxes could still affect college coaches and administrators, but this effect is likely to be sma ll.

2016, and columns (4) through (6) include only the modern period of 1993 through 2016.[11] All specifications include league-by-year fixed effects. Columns (1) and (4) run a bivariate regression of income tax rate on team winning percentage, while columns (2) and (5) add control variables. Columns (3) and (6) allow contol variables to vary league. All specifications use robust standard errors clustered at the MSA level. Team age is revealed to be an important control variable because on average, teams in their first four years of existence win eleven percent fewer games in the full time period, and seven percent fewer games in the modern period. Neither population nor income are statistically significant predictors of winning, but local amenities are positively associated with winning. More populated areas and areas with greater amenities are more likely to have winning teams.

Focusing on the modern period, the income tax effect ranges from from -0.159 to -0.434 and is statistically significant with control variables. The strongest income tax effect predicts that a team moving from a state with no income taxes to one with a ten percent income tax decreases their adjusted winning percentage by more than four percentage points, or a quarter of a standard deviation. Translating this effect to the unadjusted winning percentage implies that an MLB team would lose 3.0 more games, an NBA team would lose 3.4 more games, an NFL team would lose 0.8 more games, and an NHL team would lose 4.3 more games each season.[12]

Figure 3 displays the annual income tax effects when estimating Equation (1) with β_1^t, both with and without control variables. The graph highlights the shift from the 1980s to the 2000s, both with and without control variables, of the increasing effect of income taxes on winning.

Table 3 displays results from estimating Equation (1), allowing for separate income tax effects by league, β_1^L. As with Table 2, controlling for location characteristics and team age boosts the income tax effect across all leagues. Three trends stand out Table 3. First is that the magnitude of the income tax effect is greatest in the NBA. The largest NBA income tax effect of Table 3 in column (6) predicts that a income tax rate change of ten percentage points would result in losing an additional 4.5 games each season. Second is that the income tax effect is the smallest in the MLB. At most, these results predict a similar ten percentage point change in income tax rate would result in a team losing only 0.77 more games each season. And lastly, the income tax effect becomes substantially more negative

[11] I choose 1993 as the starting point of the modern period since each sport had significant labor strikes near this time. Both the MLB and NHL striked in 1994, and the NBA players were locked out for part of the 1995 season. These labor disputes resulted in changes to collective bargaining agreements and, importantly,allowed for easier player movement and increases to in player salaries. Similarly, the 1993 NFL collective bargaining agreement was the first to include unlimited free agency by players and resulted in a 38 percent increase to player salaries the following season Quinn (2012).

[12] The change in wins by league is based on a 162 game MLB season, 82 game NBA season, 16 game NFL season, and an 82 game NHL season.

in the modern period, columns (4) through (6), for all four major sports leagues. This is a large effect, trumping the effects of income, population, or local amenities.

Figure 4 displays estimation results from Equation (1) allowing league-by-year income tax effects, β_1^{Lt}. These results reinforce the findings in Table 3 and show interesting time trends by league. For instance, both the NFL and NBA display a sharp change in the income tax effect occurring around 1993, with a growing influence over the past twenty years. The tax effect is nearly double in the NBA relative to the NFL and in only one year since 1993 has the NBA had even a slightly positive association between income taxes and winning. Prior to the mid-1990s the NHL had a strong positive association between taxes and winning, however this dynamic was completeley reversed following the 1992 strike and has since moved toward a minimal income tax effect recently. Throughout the sample period the MLB income tax effect, while noisy, has been consistently positive with little change in average magnitude.

Mechanisms and Implications

In this section I evaluate several potential mechanisms driving the income tax effect on team performance and explore the implications of my findings. The main takeaways from the analysis are that higher income taxes have a modest and statistically significantly negative effect on team performance, that this effect varies by league with the NFL and NBA having a the largest effects, and has been growing over time. To provide further evidence of the direct link between income taxes and these three takeaways, I first test for evidence teams directly compensate players for taxes and examine the feasibility of the effect magnitude relative to player salaries. Then, using salary data from the NBA and MLB, reveal why the difference across leagues is so large. And lastly, to support the increasing trend, I show evidence that there was a substantial shift in the mid-1990s which allowed players to move more freely between teams and in turn make teams compensate them for increased income taxes and additionally show evidence in the NBA and MLB that teams have differentially responded to the increasing relative value of restricted players to unrestricted players over time.

A key assumption of the theoretical model that income taxes impact team performance is that teams must directly compensate players for the expected income tax burden. Previous research by Alm et al. (2011) and Ross and Dunn (2007) regressed player salary on tax rates and player characteristics and performance, revealing evidence of teams compensating players for taxes. I repeat this exercise, but build on it in several important ways. First I expand my analysis to consider both MLB and NBA data,

with MLB salary data provided by Seah Lahman and NBA salary data coming from Patricia Bender.[13] NFL and NHL player salaries are not included due to unavailable historical salary data and lack of analagous player value-added metrics. I expand the time range in Alm et al. (2011) from 2001-2011 to include all years between 1994-2016. Lastly, instead of controlling for each observable statistic, such as home runs or points per game, I use a statistic known as "Wins Above Replacement" (WAR) which calculates the additional value a player adds to the team in terms of wins relative to a replacement level player. Since teams should only consider home runs or points in how they relate to increased wins, it is the natural measure to use.

Table 4 reports the results of regressing salary (in thousands of constant 2016 dollars) on WAR, income taxes, and local characteristics among veteran players. Columns (1) through (3) report results from the NBA and Columns (4) through (6) the MLB. Previous year WAR is a strong predictor of salary, explaining thirty-seven percent of salary alone. Columns (2) and (5) use current year WAR instead if salary is meant to reflect expected future production more than past production. Control variables for tax rate, income, population, and amenities are included and interacted with WAR to reflect proportionality.[14] Table 4 suggest that an additional win in the NBA cost $1.8 million and $1.0 million in the MLB.[15] All salary regressions indicate that teams in higher-tax states pay higher salaries, conditional on player quality. Once other local control variables are included, Table 4 indicates that in response to an increase of state taxes by one percent, NBA teams and MLB teams pay $20,000 and $15,000 for each additional win a player brings them respectively. This is equivalent to paying $1.1 and $1.5 dollars per expected dollar of tax burden. These results suggest near dollar-for-dollar compensation by teams for expected tax burden and could indicate the team must bear the full expected income tax buden a player would face, including from additional sources of income such as endorsements as suggested by the findings of Ross and Dunn (2007).

In evaluating the validity of the income tax effect size, consider the NBA, where a ten percent income tax increase could translate into losing an additional 6.5-8.0 games. In 2016, the average NBA payroll was just over $100 million. This means that if teams bear the full burden of state income taxes they effectively have $10 million less to spend than a team with no income tax. As Table 4 reports, buying an additional win cost $1.8 million, so the $10 million spending disadvantage translates to winning 5.5 fewer games each season or 6.1 fewer games if indeed NBA teams must compenstate player $1.1

[13] NBA and MLB salary data can be found at `https://www.eskimo.com/~pbender/`, `http://www.seanlahman.com/baseball-archive/statistics/`.

[14] An alternative to interacting WAR with control variables would be log salary and control variables, however the purpose of this exercise is to examine estimates in terms of dollars.

[15] While this finding confirms that MLB teams compensate players for income taxes, it does not necessarily imply higher taxes should reduce winning given the lack of a salary cap in the MLB.

dollars per dollar of state income tax.

The increasing income tax effect over time may also be a direct result of the increasing salaries of professional athletes, shown in Figure 5. For instance, between 1986 and 2015, the average inflation-adjusted veteran NBA player salary increased by 12% annually from $1.04 million to $6.44 million. The higher a players income, the larger their incentive to respond to top marginal income tax rates. Accordingly, the ranking of average player salary between the NBA, NFL, and NHL mirrors the income tax effect size by league as yet more evidence justifying the analysis.

A justification for splitting the sample in the mid-1990s was the increased ability of players to respond to income tax rates through free-agency. This is an important point for the mechanism of higher income taxes to be the direct cause of poorer team performance. The income tax burden will be borne more by the team as the elasticity of mobility for players increases relative to teams. Older collective bargaining agreements restricted much of the free movement of players between teams, and reduced their negotiating power to be compensated for higher income taxes. Evidence of this mechanism is provided in Figure 6. Using annual player roster data, this graph displays the percent of players switching teams each season. Though this data do not distinguish movements as a result of free-agency relative to trades or firings, it reveals a large increase in the movement of players between the early period and the modern period since 1993.

While higher income taxes may put teams as a competitive disadvantage in bidding for free agents, a mitigating response could be to construct teams around early career players who have little bargaining power. In all four major sports league, new players are drafted onto their initial team without consent, and are not able to gain significant negotiating power until becoming free agents typically after four years of experience. I check for this mitigating response using NBA historical salary, player value, and playing time data. Figure 7 displays player salary and value as a function of experience by decade, with value determined by the Wins Above Replacement Player measure. In a standard wage determination framework, wage would reflect the marginal product of labor. This figure shows that the evolution of player value with respect to experience has held a similar pattern over time. However, the average salary profile with respect to experience has shifted dramatically over time, with veteran players earning considerably more than younger players. This differential trend is likely the result of recent collective bargaining agreements which gave veteran free agents more rights. This figure clearly displays the increased relative value of younger, or restricted contract, players in the modern period. Since higher-tax NBA teams are at a competitive disadvantage of luring free-agents, but not so for restricted contract players, we would expect higher-tax teams to construct more of their roster around these players. Table 5 reports results of regressing income tax rates on the number and share of minutes played by restricted contract NBA players. As expected, since 1993 teams in high tax states

have a greater share of player minutes given to restricted contract players. Column (2) suggests that, after controlling for the aggregate decrease in restricted contract players, a ten percent higher income tax rate after 1993 increased the team share of minutes to restricted contract players by 4.86 percent relative to the same tax rate difference prior to 1993. This mitigating response remains even after controlling for the number of team wins in column (3).

0.1 Robustness Checks

To test the robustness and validity of the income tax effect findings, I run several robustness checks on the main results from Table 2. These robustness checks include using differenced variables, exlcuding outliers, holding 1993 tax rates constant, and including Canadian teams. Every checks are only run on the modern time period, since this is when the income tax effect is present, and are run with and without control variables. Results of these checks are in Table 7. All but one robustness check increases the magnitude of the main tax effect size, giving strong support to the validity of the primary findings.

To check whether the income tax effect is confined to regular season success, Table 6 replicates Columns (4) and (5) in Table 2 but changes the outcome variable from winning percentage to a binary indicator for winning the championship in Columns (1) and (2) and for playing in the finals in Columns (3) and (4). Using a probit model, both with and without control variables, these regressions find a negative correlation between income tax rates and playoff success. Including control variables Table 6 suggests that a ten percentage point increase in income tax rate decreases the probability of winning a championship by three percentage points or playing in the finals by three and a half percentage points.

Columns (1) and (2) of Table 7 presents results from estimating Equation (2), regressing changes in winning percentage on changes income tax rates. As mentioned earlier, state income tax rates change infrequently and often are small in magnitude. Differenced esimtates are quite large, nearly four times greater than the main estimates, but also large standard errors. Columns (3) and (4) report estimated coefficients from a robust regression, which ignores outliers and overly influential observations. Both with and without control variables, the income tax effect increases in magnitude, suggesting that outliers are not driving the results but instead reducing the effect size.

Columns (5) and (6) of Table 7 keep constant each state's income tax rate as of 1993. One could be concerned that changes in tax rates are correlated with unobservables not already accounted for which may be related to team performance. Keeping tax rates steady from the year prior to my estimation

period of 1994-2016 eliminates this issue. For instance, suppose that income tax cuts are more likely to occur in republican states and republicans support their professional teams more than democrats. This could bias the results towards a larger income tax effect. However, both specifications using constant 1993 tax rates report similar but larger income tax effect sizes.

Lastly, Columns (7) and (8) of Table 7 include Canadian teams in the regressions. One difficulty with including Canadian teams is that federal income tax rates differ from the US. In these regressions I include the top marginal combined federal and state or provincial tax rates. I must also drop quality of life and income controls from these regerssions as those variables are not available for Canadian metropolitain areas. Results from including Canadian teams does not substantially change the initial tax rate effect findings.

Overall these robustness checks validate the assumption that income tax effects in professional sports are not being driven by permanent state characteristics, outliers, changes in tax rates, Canadian Teams, or regular season success.

Placebo Test: College Sports

To test the validity of the claims that state income tax rates directly influence professional sport team performance, I run a placebo test on college team performance. Since college athletes are not paid taxable income by their universities, state tax rates should not affect college athletes school choice or performance.[16] Considering college team performance should capture otherwise unobservable local variables that may impact team performance such as regional variation in enthusiasm for each sport and could potentially be correlated with tax rates. I gather college football records from 1977 through 2016 for 155 teams and college basketball records from 1986 through 2016 for 347 teams using `http://www.sports-reference.com/`. I match each team to its state and bring in annual top marginal income tax rates along with population, income, and quality of life measures.

Table 8 report results from regressing income tax rates on winning percentage. The specifications vary whether control variables are included, restricting the sample to the modern 1993-2016 period, and whether I only include the six "Power" conferences of the Big Ten, Big 12, Pac-12, SEC, and Big East (although their names have changed slightly over time). None of these specifications yields a statistically signficant result and are all small in magnitude. The largest effect size is only a third of the professional sports effect. These results reinforce the assumption that unobserved heterogeneity in sports preference is not driving the link between state income taxes and professional team

[16] Although state income tax rates could still affect coaches and administrators.

perfomrance.

Discussion

This paper investigated the effects of state income tax rates on team performance over the past forty years and found a modest overall effect with substantial variation across leagues. Considering all four major sports leagues across four decades, I find convincing evidence that until the mid-1990s income tax rates had little effect on competitive balance in sports. However, as both player salaries and player mobility have risen over the past twenty years, income taxes now factor into team performance. This effect is concentrated among the NBA, NFL, and NHL, which has more restrictions on player contracts and team spending than MLB. The effect in the NBA is especially large, where moving from a high-tax state to a low-tax state has a similar effect on winning as upgrading a bench player to an All-Star.

The findings of this paper should be of interest to economists, policymakers, and sports league officials. For economists and policymakers, professional sports is one of the few markets where labor is more mobile than capital, allowing me to test the theory of state income tax burden. My results validate this theory and could lend insights into other markets where labor is more mobile than capital, which could include the market for doctors and CEOs. Finding that the state income tax burden is fully shifted onto producers in a market with a highly mobile workforce is an novel finding which should be explored deeper in future work. Other industries such as healthcare and science may be particularly burdened by increasing state income taxes.

For sports leagues, the paper shows that differential income tax rates undermines efforts to create a level playing field for teams. Without allowing for tax adjustments, teams in high-tax states without other compensating qualities such as higher populations or local amenities, are persistently playing at a competitive disadvantage.

These results hold up under a variety of robustness checks, including regressing a differenced equation, ignoring outliers, using 1993 state income tax rates, and including Canadian teams. As expected I additionally find no evidence of a state income tax effect in college sports.

The analysis provides additional evidence that these main findings are supported by plausible mechanisms relating income taxes to team performance. I show that the tax effect has grown alongside similar growth in player salaries and increased player mobility. The tax effect divergence between the NBA and MLB also occurs alongside a divergence in the variation of team payroll, so as

NBA teams became more relatively more spending constrained than MLB teams, differential tax rates matter more. I document that teams in both the NBA and the MLB directly compensate players for increased tax burden by regressing player salary on player quality and income taxes. Lastly, we see evidence in the NBA that as players on restricted contracts became relatively more valuable, teams in higher tax states structured their teams around them more.

While this paper has provided clear evidence of the increasing impact of income taxes in professional sports, future research could build upon this work in a several aspects. First, a deeper investigation into the mechanisms driving the cross-league differences in income tax effects could reveal the extent to which teams are able to mitigate higher income taxes by investing in higher quality team capital, such as coaches, scouting, front-office staff, or team amenities. Another interesting extension would be considering how income taxes affect expansion or relocation choices of teams, as several recent expansion teams have located in no income tax states.[17] A similarly interesting question yet to be answered is how state income tax rates get capitalized into team value.

Overall, income tax rates has been shown here to significantly influence team performance. Though effect sizes vary by league, if player salaries continue to rapidly increase we should expect the impact of income taxes to rise with it. This may force leagues to confront the competitive disadvantage this puts teams in high income tax states.

[17]These now include the Las Vegas Raiders (2020), Houston Texans (2002), Memphis Grizzlies (2000), Tampa Bay Rays (1998), Florida Marlins (1993), and the Florida Panthers (1993).

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Table 1: Summary Statistics

	(1) All	(2) High Tax	(3) Low Tax
Winning Percentage	50.05	49.61	50.64
	(15.62)	(15.51)	(15.76)
Tax Rate	5.53	7.78	2.49
	(3.73)	(2.89)	(2.32)
Population	-0.00	0.04	-0.06
	(0.98)	(1.15)	(0.69)
Income	0.00	0.18	-0.24
	(0.98)	(1.09)	(0.74)
Franchise Age	18.32	18.79	17.68
	(11.44)	(11.51)	(11.32)
QOL	0.00	0.14	-0.19
	(0.98)	(1.10)	(0.74)
Observations	3,943	2,266	1,677

Note: Winning percentage adjusted to have the same standard deviation across leagues. Population and Income variables standardized by league-year. Tax rates are top marginal income state tax rate. Local amenities estimates come from Albouy (2015).

Table 2: Effect of State Income Taxes on Winning Percentage

	(1)	(2)	(3)	(4)	(5)	(6)
Tax Rate	0.012	-0.105	-0.132	-0.159	-0.384**	-0.434***
	(0.129)	(0.151)	(0.140)	(0.170)	(0.189)	(0.157)
Team Age 1-4 Years		-11.030***			-9.176***	
		(2.761)			(3.116)	
Team Age 5-14 Years		-3.015*			-4.116**	
		(1.663)			(1.690)	
Population		0.430			0.124	
		(0.388)			(0.614)	
Income		0.036			0.100	
		(0.621)			(0.810)	
Local Amenities		0.297			0.806	
		(0.444)			(0.639)	
League Varying Coefficients	No	No	Yes	No	No	Yes
Modern Period	No	No	No	Yes	Yes	Yes
Observations	3,943	3,943	3,943	2,494	2,494	2,494

* p<0.10, ** p<0.05, *** p<0.010

Note: Modern period is 1993-2016. All specifications include league-by-year fixed effects. Winning percentage adjusted to have the same standard deviation across leagues. Tax rates are top marginal state income tax rate. Population and Income variables standardized by league-year. Local amenities estimates come from Albouy (2015).

Table 3: Effect of State Income Taxes on Winning Percentage, By League

	(1)	(2)	(3)	(4)
Tax Rate*MLB	0.404*	0.320	0.484*	0.196
	(0.200)	(0.232)	(0.272)	(0.293)
Tax Rate*NBA	-0.437*	-0.581**	-0.749**	-1.023***
	(0.237)	(0.217)	(0.320)	(0.245)
Tax Rate*NFL	-0.073	-0.407*	-0.218	-0.554*
	(0.201)	(0.224)	(0.197)	(0.275)
Tax Rate*NHL	0.284	0.439	-0.118	-0.201
	(0.345)	(0.360)	(0.321)	(0.314)
League-Varying Controls	No	Yes	No	Yes
Modern Period	No	No	Yes	Yes
Observations	3,943	3,943	2,494	2,494

* p<0.10, ** p<0.05, *** p<0.010

Note: Modern period is 1993-2016. All specifications include league-by-year fixed effects. Winning percentage adjusted to have the same standard deviation across leagues. Tax rates are top marginal state income tax rate. Population and Income variables standardized by league-year. Local amenities estimates come from Albouy (2015).

Table 4: Player Salary and Income Tax Regression Results

	NBA			MLB		
	(1)	(2)	(3)	(4)	(5)	(6)
WAR	1,704***	1,684***	1,805***	1,121***	902***	1,045***
	(90)	(97)	(110)	(58)	(65)	(61)
Tax Rate * WAR	41***	15	20	8	13	15
	(13)	(15)	(17)	(9)	(10)	(10)
Income * WAR		-28	25		161***	153***
		(64)	(72)		(39)	(37)
Population * WAR		221***	232***		326***	311***
		(63)	(69)		(35)	(32)
Amenities * WAR		56	42		-189***	-186***
		(65)	(73)		(42)	(40)
Observations	3,238	4,311	3,238	8,709	10,035	8,709

* p<0.10, ** p<0.05, *** p<0.010

Note: This table displays results of regressing NBA and MLB player salary (in thousands of dollars) on value-added measures and income tax rates for 1993-2014. All specifications include year fixed-effects. Only players with four years experience included. Control variables interacted with Wins Above Replacement measure. Winning percentage adjusted to have the same standard deviation across leagues. Tax rates are top marginal state income tax rate. Population and Income variables standardized by league-year. Local amenities estimates come from Albouy (2015).

Table 5: Income Tax Rates and Share of NBA Minutes by Restricted Contract Players

	(1)	(2)	(3)
Tax Rate, Pre-1993	-0.158	-0.015	-0.090
	(0.521)	(0.538)	(0.533)
Tax Rate, Post-1993	0.428**	0.486**	0.177
	(0.205)	(0.247)	(0.244)
Post-1993 Dummy	-4.200	-6.062	-5.563
	(3.907)	(4.161)	(4.054)
Population		-1.197	-0.877
		(0.930)	(0.895)
Income		-0.163	-1.166
		(0.928)	(0.905)
Local Amenities		-3.862	8.067
		(18.455)	(17.674)
Team Age 1-4 Years		1.228	-5.009
		(5.882)	(5.762)
Team Age 5-14 Years		-3.694	-4.649**
		(2.502)	(2.362)
Wins			-0.406***
			(0.056)
Observations	740	740	740

* p<0.10, ** p<0.05, *** p<0.010

Note: This table displays results of regressing income tax rates on the share of minutes played by players with four years or less experience in the NBA. Winning percentage adjusted to have the same standard deviation across leagues. Income tax rates are top marginal state tax rate. Population and Income variables standardized by league-year. Local amenities estimates come from Albouy (2015).

Table 6: Effect of State Income Taxes on Probability of Championship or Finals Appearance

	Championship		Finals	
	(1)	(2)	(3)	(4)
Income Tax Rate	-0.008	-0.036*	-0.010	-0.029**
	(0.015)	(0.020)	(0.012)	(0.015)
Team Age 1-4 Years		-0.016		-0.150
		(0.274)		(0.220)
Team Age 5-14 Years		-0.487***		-0.357**
		(0.157)		(0.148)
Population		0.099**		0.085**
		(0.050)		(0.034)
Income		0.028		-0.017
		(0.082)		(0.066)
Local Amenities		0.114		0.102
		(0.080)		(0.064)
Observations	2,449	2,449	2,494	2,494

* p<0.10, ** p<0.05, *** p<0.010

Note: Regression is probit model and reporting marginal effects. Tax rates are top marginal state income tax rate. Time period restricted to 1993 to 2016. Population and Income variables standardized by league-year. Local amenities estimates come from Albouy (2015).

Table 7: Effect of State Income Taxes Rates on Winning Percentage Robustness Checks

	Difference		Outliers		1993 Taxes		Canada	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Tax Rate	-1.420***	-1.463***						
	(0.447)	(0.510)						
Tax Rate			-0.197**	-0.413***	-0.248	-0.441**	-0.235	-0.348*
			(0.093)	(0.113)	(0.159)	(0.176)	(0.207)	(0.184)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2,325	2,325	2,494	2,494	2,494	2,494	2,677	2,656

* p<0.10, ** p<0.05, *** p<0.010

Note: Time period restricted to 1993 to 2016. Columns (1) and (2) use differenced variables. Columns (3) and (4) use robust regression which eliminates outliers and overly influential observations. Columns (5) and (6) hold constant 1993 state income rates. Columns (7) and (8) include Canadian teams and use combined federal and state or provincial top maringal income tax rates. Winning percentage adjusted to have the same standard deviation across leagues. Tax rates are top marginal income tax rate. Population and Income variables standardized by league-year. Local amenities estimates come from Albouy (2015).

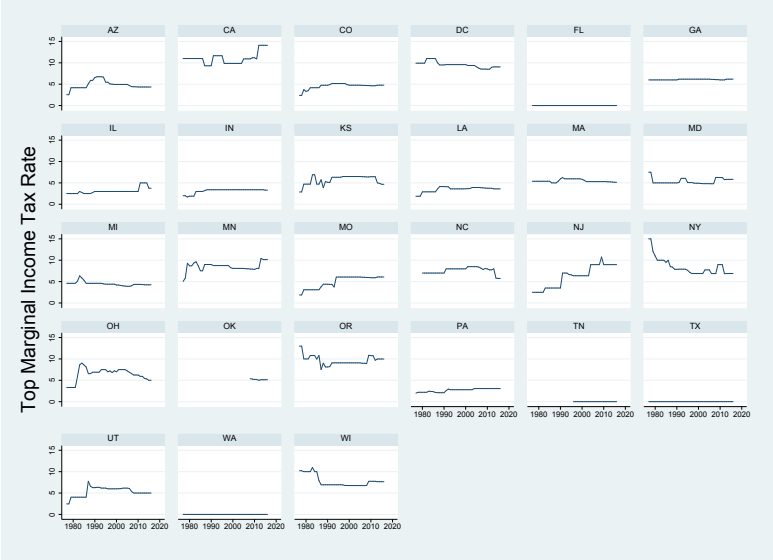
Table 8: Effect of State Income Taxes Rates on College Team Winning Percentage

	(1)	(2)	(3)	(4)	(5)	(6)
Tax Rate	0.016	0.109	-0.039	0.033	-0.023	-0.043
	(0.300)	(0.280)	(0.140)	(0.120)	(0.237)	(0.121)
Controls	Yes	Yes	Yes	Yes	No	No
Power Conferences	Yes	Yes	No	No	Yes	No
Modern	No	Yes	No	Yes	Yes	Yes
Observations	3,092	2,497	10,178	8,451	2,572	8,815

* p<0.10, ** p<0.05, *** p<0.010

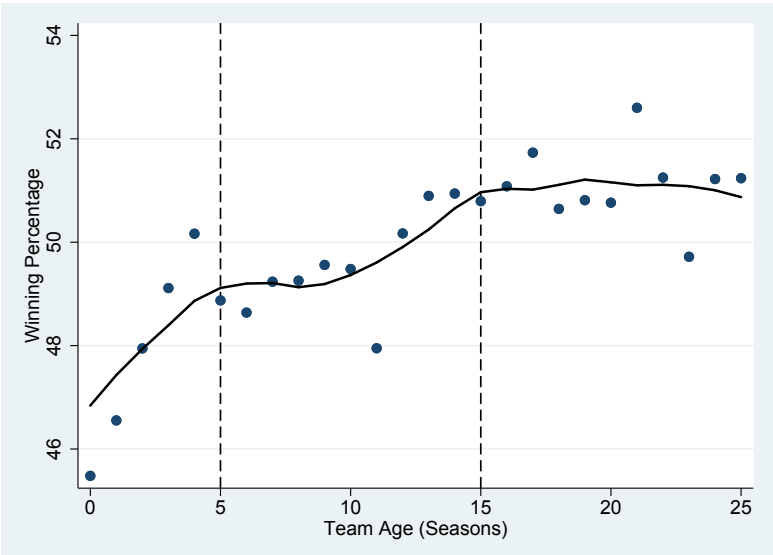
Note: This table presents results from regressing state income tax rates on team winning percentages in men's college football 1977-2016 and basketball 1986-2016. Control variables include area population, income, and quality of life. Power conferences include the Big Ten, Big 12, Pac-12, SEC, and Big East. Modern time period is 1993-2016. Tax rates are top marginal state income tax rates.

Figure 1: Top Marginal State Income Tax Rates, 1977-2016



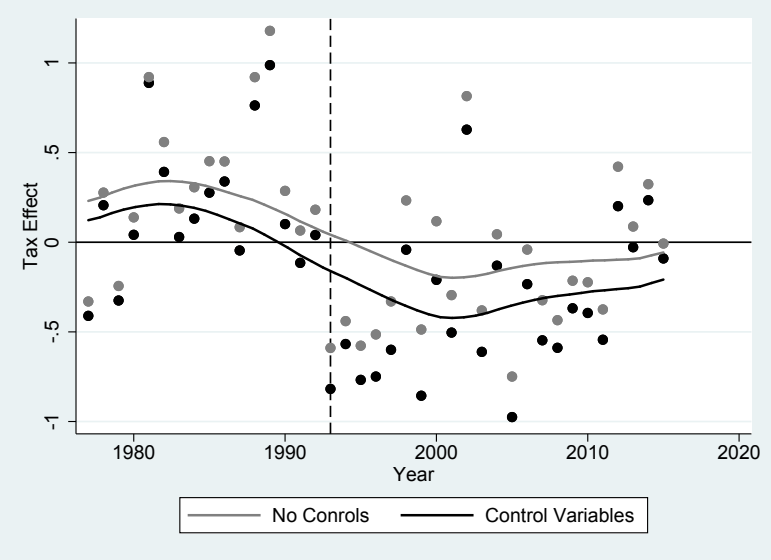
Source: NBER Taxsim.
Notes: This graph displays the top marginal state income tax rate on earned income. Sample restricted to years in which each state had a professional sports team.

Figure 2: Franchise Age and Team Winning Percentage, 1977-2016



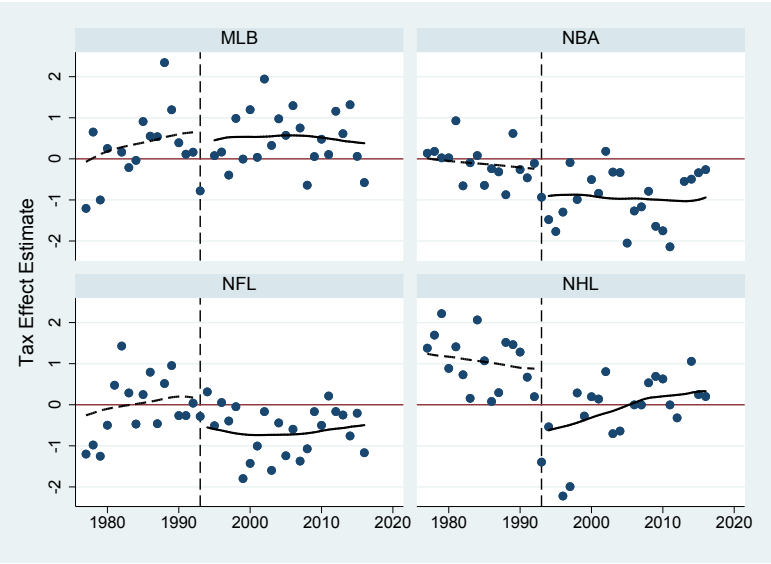
Source: Author's calculations based on data from SportsReference.com.
Note: This graph displays the average winning percentage of teams by the number of years the franchise has existed for NBA, NFL, MLB, and NHL teams 1977-2016. Teams changing locations remain the same franchise and are treated as such.

Figure 3: State Income Tax Effect on Team Winning Percentage



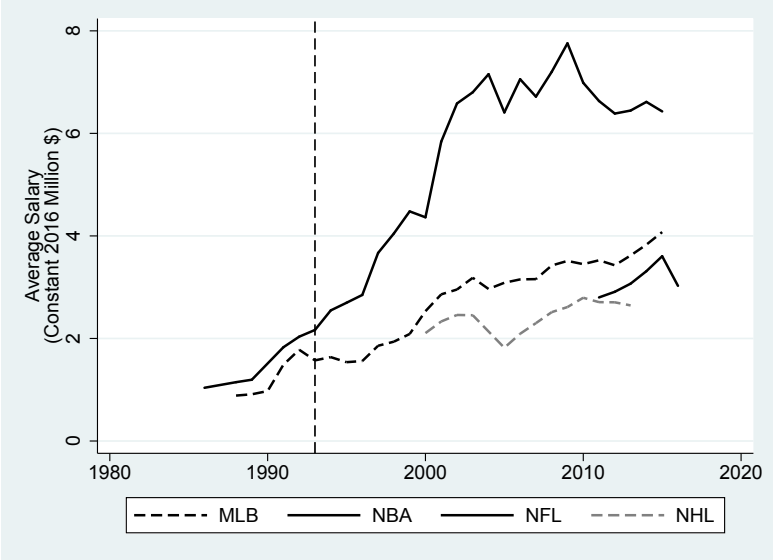
Source: Author's calculations based on data from SportsReference.com.
Note: This graph displays point estimates of regression of income tax rates on winning percentage by year for 1977-2016. Dotted line set at the year 1993. Control variables include MSA average income, population, amenities, and franchise age.

Figure 4: State Income Tax Effect On Team Winning Percentage, by League



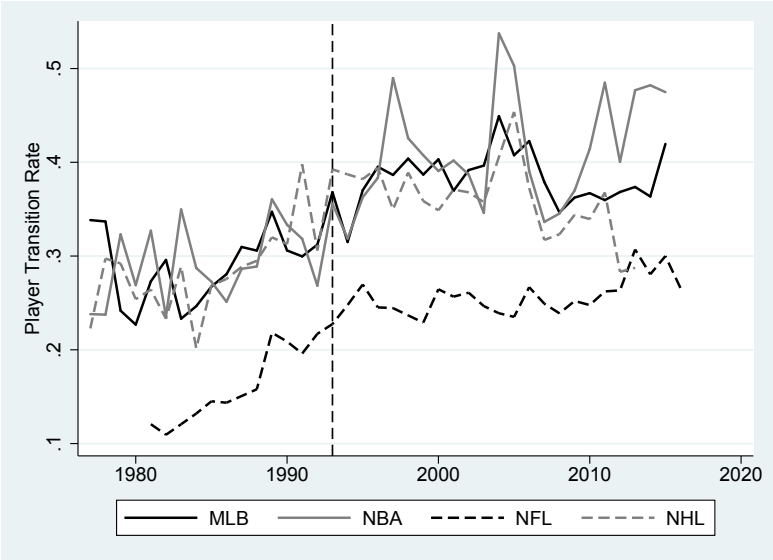
Source: Author's calculations based on data from SportsReference.com.
Note: This graph displays point estimates of regression of income tax rates on winning percentage by league and year for 1977-2016. Dotted line set at the year 1993. Control variables include MSA average income, population, amenities, and franchise age.

Figure 5: Average Veteran Player Salary by League



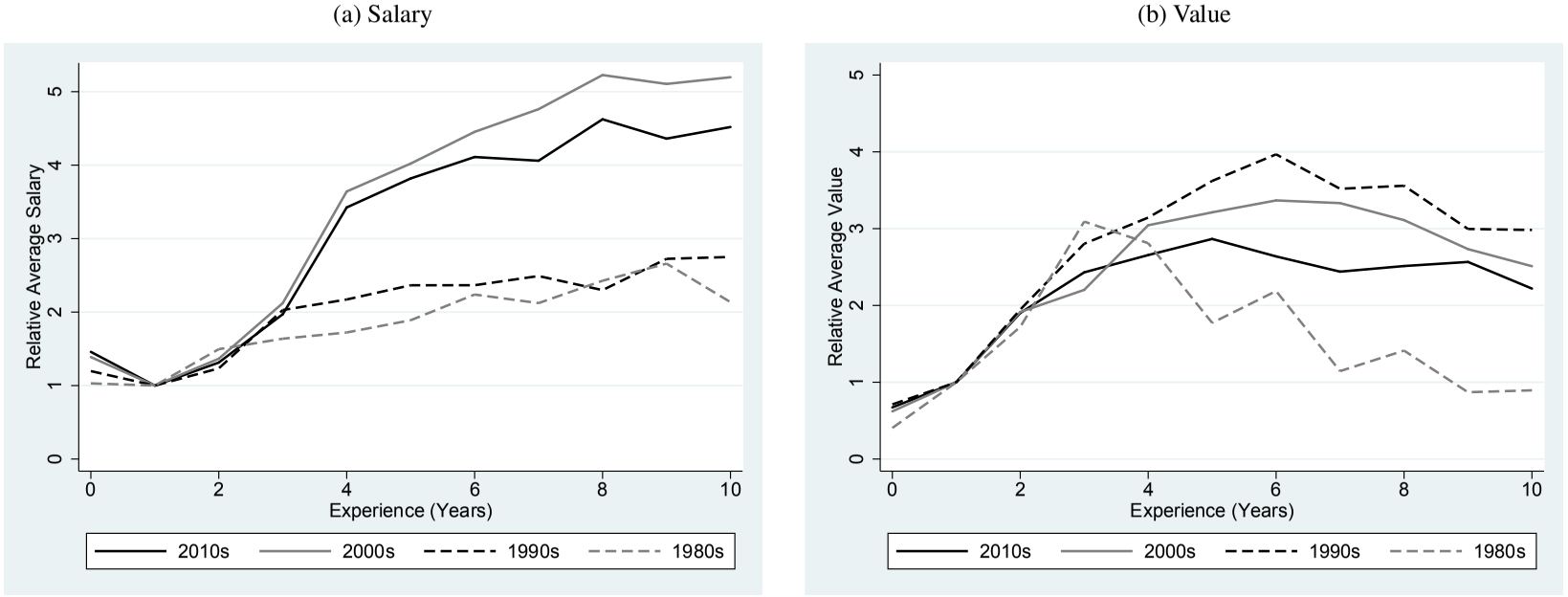
Source: Sean Lahman (MLB), Patricia Bender (NBA), USA Today (NHL), SportTrac (NFL).
Note: Average player salary (in millions of constant 2016 dollars) among players with at least four years experience by league. Dotted line at 1993.

Figure 6: Player Transition Rates by League



Source: Author's calculations based on data from SportsReference.com.
Note: This graph displays the rate of player movement between teams each year by league. Players restricted to at least four years experience. Excludes retirements. Dotted line at 1993.

Figure 7: NBA Player Salary and Value Profile by Decade



Source: Player value and experience data from SportsReference.com. Player salary data from Patricia Bender.
Note: This graph displays average player salary and value by years of experience separately by decade. Value is the Wins Above Replacement statistic, represented the marginal wins a player contributes relative to an average player. Average salary and value indexed to an experience of one year.