The Game out of the Field: New Consumption Amenity and Local Economic Development

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Abstract

Existing estimates of the effects of the new sports venue on local development have suffered endogenous issues and other difficulties. The present paper leverages the mass replacement of new sports venues in the US between 1991 and 2010 and adopts difference-in-differences with matching design to estimate the causal effects of construction on local economic development, compared with other large metropolitan counties without the new venue. I find that local personal income per capita has decreased 5% in the long run. Neither population move-in nor resources shift-out contributed to the negative effect. The significant composition change toward higher labor-suppy group has been detected in the data. The local labor market experienced a small increase in employment and wages in directly related nontradable sectors. However, the average wage decreased in other nontradable sectors and tradable sectors, which could contribute to the average personal income decrease. The sports venue also led the local government to increase expenditure on highways and parking facilities but lower public welfare expenditures. Overpayment of the local government on the construction could lead to the welfare loss even without any other effects from opening.

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1 Introduction

Debates on whether the new sports venue can benefit local economic development have been persistent in both public media and academic literature on economics. Advocates of the sports venues have argued that a new construction could promote local economic activity (Rosentraub et al. (1994), Austrian and Rosentraub (2002)) and improve the infrastructure facility[1]. Some city planners have proposed a bigger new stadium with an aesthetic design and declared it to follow "the Jane Jacobs vision", which emphasizes the importance of organic development of the urban area and the diversity of structures in urban planning [2]. At the same time, critics against construction thought that the new sports venue would not bring large net benefits and that it was a waste of taxpayers' money (Baade and Dye (1990), Nelson (2001)). They thought that the multiplier effect of the sports venue on economic development had been overestimated by the advocates. The heated debates have not slowed down the pace of the investment in sports venues. During 1991-2010, the average construction cost of a new venue has risen more than two-fold compared to the past two decades, rising from $192 million to $435 million. It reported that state and local governments have paid 33 billion dollars to construct major-league sports venues between 1970 and 2020.

Despite the skyrocketing construction costs of the new sports venues and the popularity of public funding from the local government, there is little robust evidence in the economics study on the causal effects of the new sports venues. The estimation results have ranged from no significant effect, small insignificant negative effect (Baade and Dye (1990), Coates and Humphreys (1999), Coates and Humphreys (2003)), to even a slightly positive effect (Santo (2005), Agha (2013)) on the key socioeconomic variables. The empirical strategies

[1]The editor story of the magazine *Site Selection* in 2008, interpreted a spectator sports venue as an important business success factor, and could also attract new manufacturing factories to the cities. In the interview by the *Sports Illustrated* in 2022, the Inglewood Mayor believed the football stadium could create new jobs and spur local economic growth. The construction also brought the paved roads and improved the water system.

[2]The architect declared the design as being line with the prospect of influential urban activist Jane Jacobs when supported its proposal of West Side Stadium in New York in 2005. It proposed a sports venue plan including the residential complex and affiliated hotel and parks, which would cost over 1 billion in total.

have faced several difficulties. First, since the construction of the new stadium has happened in the central metropolitan areas with larger populations, the endogenous issues caused by omitted variables are common problems in past studies (Wassmer (2001)). Second, the number of treated areas is small due to limited cases of new stadiums. It would be hard to provide precise estimation results. Third, since the opening of the stadium is staggered adoption in different places, the estimation in past studies might lead to the results mixing up the short-run and long-run effects since the opening, which would bias the estimation. Moreover, It would make the estimation biased even if it included some fixed effects as controls for observables. In the difference-in-differences literature, the heterogeneity issues would make some comparison pairs between treated and control groups assigned the negative weights, which could bias the estimations.

In the present paper, I leverage the mass replacement of the sports venues in Major Sports Leagues in the US between 1991 and 2010 to solve the empirical problems in past studies and assess the causal impacts of new sports venues on personal income, new businesses, local employment, and local public finance at the county level. I start by estimating the impacts of replaced sports venues on economic growth and new businesses at the county level. I exploit the data on personal income, GDP, and firm entry and exit from the Bureau of Economic Analysis (BEA) and the Business Dynamics Statistics (BDS) in the corresponding periods. To estimate the causal effects, I use the staggered difference-in-differences design with matching. The propensity score matching method is exploited to trim and reweight the control groups to confront endogenous issues. Under the conditions of the comparable characteristics between counties, the incidence of opening a new sports venue is exogenous to the treated county since it only depends on the natural deterioration process of the previous building and the timing of the new building's proposal from the owners. Using the event study graphs, I show that the personal income per capita, population, employment, firm entry and exit were evolving similarly between treated counties and counterfactuals before the treatment happened. This indicates a quasi-random assignment of the sports venue

in the county, conditional on the similar pre-treatment covariates of counties. I also show that the timing of the event among the treated counties is uncorrelated with the initial characteristics. Besides the quasi-experimental design, the construction of new stadiums and arenas has increased fourfold over the past two decades to replace the deteriorated buildings during the studied periods, which could provide me with relatively more precise results compared to past studies limited to case studies or several metropolitan statistical areas. Finally, to account for the heterogeneous treatment effects, I adopt the difference-in-differences with staggered adoption methodology to get robust estimations for effect in each year since the opening.

First, I find that the new sports venue has generated a negative impact on the local economic growth since the fourth year after the opening, compared to other central counties without the opening. The personal income per capita decreases more than 5% relative to other large urban places eight years after the opening. The negative relative impact has been persistent over the years. The annual growth rates of personal income have been 0.33% less on average compared to other large-population metropolitan counties in the next decade after the opening. The total output in the county has also declined. The GDP per capita for the treated county suffered an average negative relative impact exceeding 5% compared to not opening a new sports venue case ten years after the opening. The decreases in the average values are not the result of population migration. The positive relative effects on population are small, less than 2%, and insignificant in the long run. The significant negative relative impacts on personal income per capita are robust even if we estimate the results at a larger aggregation level considering the spillover effects between treated county and neighbor counties. The significant composition change implied the potential chanel on the negative effects via more workers on the higher labor-supply but less income wage occupations.

Second, the sports venue did not raise the overall business but substituted the small firms with firms of larger sizes in the opening county compared to places that were not open.

Overall, the total number of firms was not affected by the new venue. The entry and exit rates of the firms also did not receive significant impacts compared to other metropolitan large-population counties. However, the average size, measured by the average number of employees, of the new firms experienced a significant increase in the medium run. The average size of new firms, when compared with not open counties, has risen more than 6% four years after the opening. On the other hand, the new sports venue had negative relative impacts on the incumbent firms. I find that a larger number of small firms quit the market compared to the county without the opening. Meanwhile, the surviving incumbent firms plausibly experienced an expansion in the opening year and more layoffs five years after the opening.

To explore other reasons for the negative impact on personal income per capita, I consider two other potential explanations. First, the structural change of the local labor market might shift to the non-traded sectors following the opening years. I use data from the Quarterly Census of Employment and Wages program of BLS, based on the NAICS classification, to study the impacts of a sports venue on employment and wages at the county level. The new sports venues benefited both the workers in the Amusement, Entertainment and Recreation sector and the Accomodation and Food sector. I find the positive relative impacts both on employment and wages in the short run compared to not opening counterfactual. To test the displacement effect, I also study the impacts on the manufacturing and retail sectors. Although there is no significant employment effect, the wages of workers in both sectors experienced a significant negative effect. The sports venues had a 20% negative relative impact on the wages of retail sector workers six years after the opening. Overall, the effects of the new sports venue on average wages in the treated county shared similar negative patterns to the personal income per capita over the years. The negative effects have been persistent after the fourth year, but the magnitude was smaller and stable at around 3%. The results indicate that other channels possibly contribute to negative personal income.

Second, the negative relative impacts on personal income per capita might be caused by the opportunity cost of the public expenditure increases on the venues-related facilities such as parking lots. I use the data on the finance status of local government created by Pierson et al. (2015) to assess the relative impacts of the sports venue on local public finance after the opening. I find that despite the slightly significant increase in the transfer of money from the state or federal government, the long-term debt and expenditures on the parking and highway facilities when compared with counties without a new sports venue, have been increasing in the medium-run after the opening of a new sports venue. Given the insignificant effect on the total expenditure after the first year, the negative relative impacts on the expenditures of public welfare probably were the results of increasing expenditures on the operation and supplementary facilities of the new sports venue.

The present paper contributes to our understanding of the role of large consumption amenities in local development and the effect of public-funded establishments on local economic growth. First, it contributes to the literature on estimating the impacts of stadiums and arenas on local development. Previous paper have focused on the outcomes of personal income (Baade and Dye (1990), Coates and Humphreys (1999), Coates and Humphreys (2003), Santo (2005)), local labor market (Rosentraub et al. (1994), Austrian and Rosentraub (2002)), housing prices (Ahlfeldt and Maennig (2009), Ahlfeldt and Maennig (2010)) and businesses activities (Stitzel and Rogers (2019), Abbiasov and Sedov (2023)). These papers either focused on the case study or the mixed results of the new franchise and the new stadium at the metropolitan statistical or the proximity to the venue level. Instead, I study the effects of the new stadium without the new franchise entry at the county level, which makes me capable of estimating the overall effects of the sports venue as a new consumption amenity in the local area. The comparison between the effects on the located county and neighboring counties suggests that a new sports venue would generate negative relative effects on income per capita rather than just the zero-sum effect related to the reallocation of the resources. Second, the previous studies have contradictory results in assessing the

effects on local personal income per capita. My estimation results provided evidence that the new sports venues generated large, persistent, negative effects on personal income at the county level. The previous literature did not leverage the quasi-experiment design to estimate the effects of the stadiums and arenas, which could lead to biased estimators on the results. Moreover, I examine the effect of the sports venue on attracting new businesses in total and across different sectors, which are the direct tests on the accomplishment status of the stadium projects' goals of the local government.

Second, the study of the new construction on local economic development has focused on the impacts of new facilities in the poorer areas (Evans and Topoleski (2002), Ando (2015), Munasib and Rickman (2015), Valero and Van Reenen (2019), He et al. (2020), Nimier-David (2022), Scheifele and Popp (2024)). Most of the facilities studied in the literature have been built only in low-income places to attract new businesses, such as Latino casinos, nuclear facilities, shale gas equipment, and solar parks. The other constructions, even if they were not restricted to poor areas, will generate larger positive effects in remote places, such as new departments of universities and expressways. The study on the impacts of new facilities constructed in urban areas has been overlooked. In the present paper, I study the effects of large-size consumption amenities on local development in relatively wealthier urban areas.

Third, the paper contributes to the place-based policy literature. Previous papers (Kline and Moretti (2014), Busso et al. (2013)) found positive effects on personal income by subsiding policies for infrastructure construction and firms in relatively poorer areas. I study one type of place-based policy in relatively richer areas, which is subsidizing the construction of consumption amenities to attract visitors and investment from the outside. The negative effect found on personal income was the reverse direction of the place-based policy promoting local development in poor areas. It suggested that the place-based policy in richer places might fail if the goal still focuses on attracting businesses from the rest of the country. The lack of an increase in the number of firms after the opening of a sports venue indicates

that the agglomeration effect on non-traded sectors might already be strong in metropolitan areas. The potential better policy on promoting growth in rich areas might be increasing the agglomeration effects on high-tech industries discussed in Glaeser and Gottlieb (2009) and Moretti (2021).

Fourth, the paper contributes to the literature on income inequality among different sectors in the US (Autor and Dorn (2013), Jaimovich and Siu (2020)). The polarization of income in the US has been disentangled into the decrease in wages of middle-income workers and the increase in wages of skilled-sector and service-sector workers. A similar displacement pattern among wages of different industries is also suggested in the effects of sports venues on workers in large population counties. Since the population studied in the present paper accounted for a large fraction of the US, it provided an alternative explanation of the income polarization that the different wage changes across the industries might be attributed to the mass constructions of large consumption amenities (e.g. cinemas, amusement parks, entertainment complex, etc.) besides the prominent technology change reasons in the previous papers.

The rest of the paper is organized as follows. Section 2 illustrates the background of sports venue construction. Section 3 describes the empirical strategy. Section 4 provides the data resources and sample restrictions. Section 5 outlines the event study results on personal income, local labor market, and public finance. Section 6 and Section 7 does the robustness check and concludes the current version of the paper.

2 Mass Replacement of the US Sports Venues

Sports venues studied in the paper featured three characteristics: consumption-amenity role, constructed for replacement and public-funded. Sports venues are special as a consumption amenity. It is constructed not only for the local resident's spectating sports entertainment activity but also for the places to attract visitors from out of the town. Due to the larger

seats volume and more entertainment facilities, the construction cost of new sports veneus have been increasing so dramatically that the team owners favored to seek funds from local government.

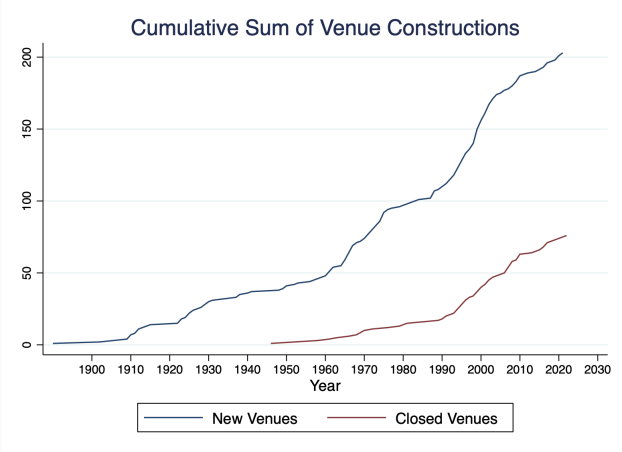
2.1 Background on the mass replacement

The sports venues of the present paper focused on the buildings serving professional sports teams from four major sports leagues: NBA, NHL, MLB, and NFL for two reasons. First, despite many minor league teams and collegiate sports having become popular across the US, most sports venues were constructed for the professional teams from Major Sports Leagues in history. 203 sports venues for the four major league sports have been built from 1900 to 2021.[3] Second, most of the minor league teams are affiliated with the major league teams and play in the same stadiums or fields. As for the venues for collegiate sports located near the campus, they are mostly funded by nonprofit education institutions rather than the local government and team owners. Using the panel of stadiums and the construction cost for each stadium collected by Bradbury et al. (2024), I capture several stylized facts on the construction frequency and the costs evolving for sports venues in the US.

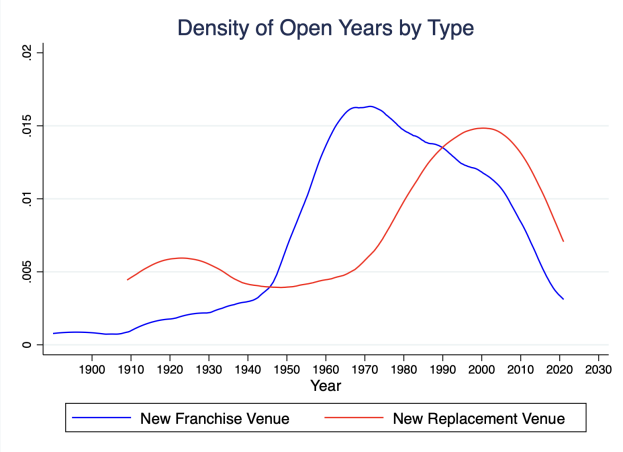
First, the frequency of construction has been rising since entering the 20th century, and a similar number of sports venues has been constructed between 1987 and 2021 compared to the past almost 90 years, which can be seen in Figure 1a. Besides each league's expansion, replacing the former buildings in the same area has been the main category of new venues in recent decades. The increasing number of closed venues entering 1990 might suggest this pattern. The pattern can be verified in Figure 1b. If we compare the density plot of the opening years between sports venues with new team entries and the replacement of the previous venue [4], we can see the former cases were concentrated between 1960 and 1990; the

[3]The list of the sports venues is collected from the Internet based on each team's history and then compared to the list created by Bradbury et al. (2024). The lists of around two hundred venues in the US are very similar, except for one stadium exclusive in their list and four stadiums exclusive in my list. We both have 77 stadiums opened between 1991 and 2010, and the opening years are exactly the same, respectively.

[4]The replacement is defined as a new sports venue built for the same franchise in the same county but



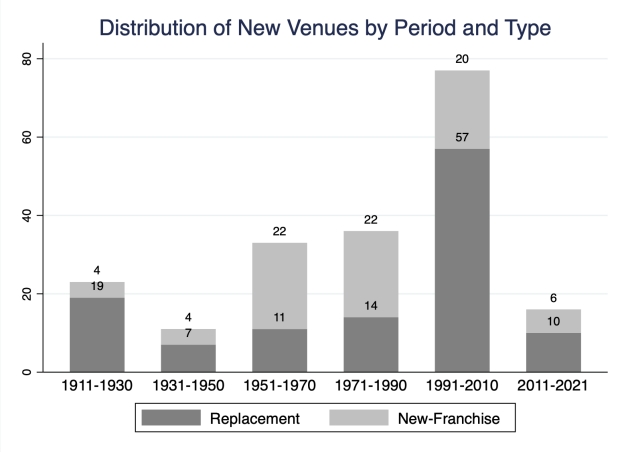
(a) Cumulative number of sports venues



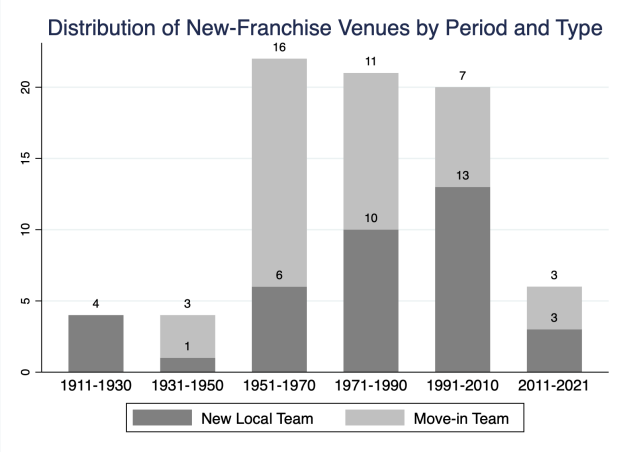
(b) Density of opening years

Figure 1: Sports Venues between 1900 and 2021

latter case has become popular since 1970, which is the inception of the mass deterioration on the old buildings after long-term usage.



(a) New Venues by period and type



(b) New-Franchise Venues by period and type.

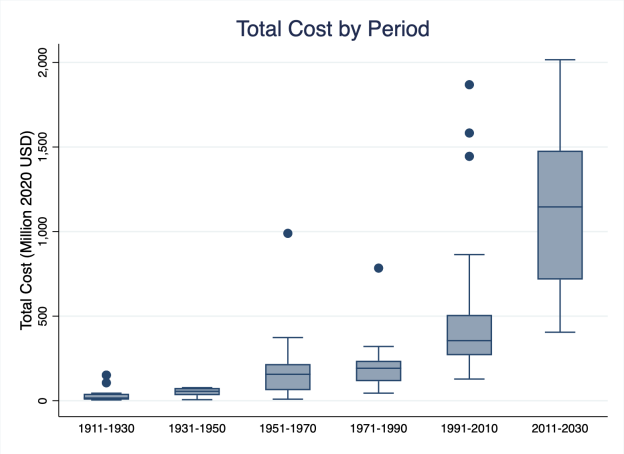
Figure 2: Distribution of sports venues by different types between 1900 and 2021

Second, both the total construction and the type of new replacement reached the prime between 1991 and 2010. To explore how the incidences of two types' constructions have changed over the years, I divided the years into six decades in Figure 2a. The present paper studies the sports venues that replaced the old buildings during this period. One reason is that the sports venues have been homogenous in terms of the negotiation process and

playing in a different sports venue. The previous stadium does not have to be demolished.

public funding resources, and the second one is that the proposal of the construction is quasi-random due to the natural deterioration of the construction which I can leverage to circumvent the endogenous issues in empirical work. Moreover, the large number of replaced cases could provide me with a relatively large number of treated samples.

Third, professional sports teams have had less intercity mobility in recent decades. The evidence can be seen in Figure 2b. During 1950 and 1970, several teams changed their location from the original eastern coast to the new rising metropolitan areas in the western and mid-western parts, which is the reason why the new move-in team sports venues surpassed the new local team cases in the figure in these decades. Most teams have cultivated a stable attachment to the local and the movement times have cut down after a couple of decades. It might be each league board had more strict evaluation systems for the entry of new teams. At the same time, the complete construction of the interstate highway system and the urban sprawl also affected the profits of staying in the current places. When the period entered 1990, the new sports venues built for new franchises were mainly related to the new local set-up team rather than accepting the new move-in teams.



Notes: The SoFi stadium is not included in the graph since the extreme outlier case cost 5.5 billion by estimation.

Figure 3: Total cost of new sports venues by period.

Fourth, the construction cost of the new sports venues has risen significantly in recent decades. Modern sports venues have added consumption amenity elements into the building.

It's a composite entertainment place for visitors besides speculating a game. The rising land value and more modern facilities inside the venues have contributed to the rising cost. It can be seen in Figure 3 that the average total cost was stable between 1951 and 1970 and between 1971 and 1990, which was $185 million and $198 million, respectively. However, the average total cost climbed to $435 million between 1991 and 2010.

Table 1: Public Partnership and Total Cost across Types

	Public-Funded	Public-Funded		Total Cost		
	(1)	(2)	(3)	(4)	(5)	(6)
	All Periods	Before 1990	1991-2010	All Periods	1951-1990	1991-2010
Period	0.06**					
	(0.027)					
New Replacement Venue		-0.20**	-0.01	310.35*	200.05	175.53
		(0.095)	(0.108)	(181.731)	(134.139)	(130.086)
Public-Private Partnership				149.24***	70.42***	115.12
				(50.615)	(20.468)	(82.359)
Public × New Replacement Venue				-199.79	-134.34	-123.75
				(177.851)	(142.185)	(160.028)
Intercept	0.53***	0.85***	0.80***	164.95***	97.30***	286.34***
	(0.112)	(0.050)	(0.092)	(33.578)	(13.246)	(19.186)
R^2	0.04	0.05	0.00	0.03	0.11	0.02
N. Obs	180	103	77	175	60	77
Clusters	63	52	48	61	41	48

Note: The unit of Total cost is Million 2020 USD. The results did not take the log. The estimated costs and public parternship are from Bradbury et al. (2024). The regression in each column is OLS regression. Standard errors are shown in paretheses and clustered by county. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

To break down the patterns of public funding and construction costs evolving over the years, I run several OLS regressions across different types of construction goals and different funding types in different periods. In Table 1, the first three columns are regression results, putting the dummy variable on whether the stadium is public-funded or not as the dependent variable to study the patterns on an extensive margin. The first column shows that public-funded sports venues have become more common as the periods approach nowadays. During 1991 and 2020 (when the period variable is equal to 5), more than 80% of venues received funding from the local government. Different types of sports venues have also had different public funding patterns over the years. Comparing the regression results in columns (2) and (3), in the earlier decades, the local government was more likely to provide the subsidy for

the new franchise sports venues rather than the replacement even when they have a similar total cost (the coefficient in front of New Replacement type in regression (5) is insignificantly positive). It was probably due to the new rising metropolitan area trying to use the generous subsidy package to attract the team to move in their places. The small, insignificantly negative coefficient in column (3) shows the stories changed entering the 1990s when the new replacement sports venues got the same chance to receive the subsidy, and the average cost of the sports venues rose (the evidence can be seen in intercept change in columns (5) and (6)). This suggests that the team owners started to seek the local government's support for constructing the new venue to replace the dilapidated venue.

The total cost spent on one venue has also been different among different types over the years. The new replacement venues had higher average costs than new franchise venues over the years, as shown in column (4), but it was probably due to the rocket-rising replacement costs in the latest decade. Based on the regression results in 1951-1990 and 1991-2010, the insignificant coefficient in front of the New Replacement Venue dummy across columns (5)-(6) indicates that the venues were similarly expensive among all construction goals. It indicates the similar subsiding capability for the counties persuading the existing team to stay and counties attracting the new franchise to move in during the 1991-2010 period.

The public-funded venues cost more and were relatively rare cases compared to non-public-funded ones between 1951 and 1990, but after the replacement got the same chance to receive the subsidy, the public-funded and private-funded venues had insignificant different prices between 1991 and 2010 if we compare the coefficients in front of the public dummies in columns (5) and (6). Combined with the fact that public funding cases have been rising, it suggested that the local government has become generous to the incumbent sports teams, probably to persuade them to stay. Lastly, the public-funded new replacement venues were not significantly more expensive than the public-funded new franchise and the private-funded venues between 1991 and 2010. It suggested that the sports venues constructed during these

decades were similar in the facilities [5].

2.2 Case Study on New Venue Decision: Guaranteed Rate Field

To illustrate how the decision was made to build a new sports venue in one county, I provide a case study on the incidence of the construction. I use the case to indicate the stadium project goals for the new venue in general and to interpret the comparable control groups considered in the present paper.

Guaranteed Rate Field was opened and served as the home field for the Chicago White Sox baseball team in 1991. It was the first new sports venue constructed in Cook County since 1929. Before the new facility, the team played in the antiquated construction built in 1910. The location inside the city used to be a playground in the park where they vacated for the baseball game. Entering the 1980s, the team owner started to negotiate with the municipal authority to construct a new field to replace the dilapidated old-fashioned facility.

Negotiation: After the proposal of the team owner, there was a political wrangling between the Senate and the House in the voting for the legislation on subsidizing the building of a new stadium. The team owner, Jerry Reinsdorf, threatened the local government and the public that if the legislation on the subsidy package didn't pass, the team would consider moving to other cities, for example, St.Petersburg, Florida. After the Governor, James Simpson, was involved in the dispute and lobbied both sides to make an agreement, the Illinois General Assembly passed the legislation in 1987 to construct the new field for the White Sox.

Objects: Illinois Sports Facilities Authority Act (ISFAA), the legislation passed by the Illinois General Assembly in 1987, decided to create an authority to develop and manage the stadium's construction. At the inception of the Act, it stated that the goals of construction were to stimulate economic activity, attract the entertainment industry and tourists, create and keep jobs, create and improve new and lasting infrastructure, increase retail sales, and

[5]There were limited construction companies capable of building large stadiums during the periods. Most of the sports venue programs were constructed by the HOK company.

promote economic growth. It provided us with the starting point for outcome variables to evaluate the benefits of a new sports venue.

Subsidy packages: The Act regulated the annual direct finance assistance on the construction and the sources of the money. The Authority can release the bonds borrowing from the public and impose a 2% occupation tax upon all hotels in the city. Besides the direct assistance, the facilities and concessions in the stadium area were exempted from the property tax and sales tax. The payments from bonds were also exempted from income tax. The authority will burden the cost of eminent domain. The revenue from the match-day and merchandise all belonged to the team. If the attendance didn't reach 1.2 million in one year, the team would not pay the annual lease of 1.5 million dollars.

In general case, the replacement of the new stadium venus in U.S. will be participated by team owners, local government, and local residents. Not limited to the Guaranteed Rate Field case, the local governments in metropolitan areas have provided generous subsidies for construction with the prospect of positive effects on local economic development. Most of the counties subsidized the construction cost by releasing the municipal bonds backed up by raising the hotel occupancy tax.

Based on the case study and stylized facts in the last subsection, I can consider a location decision model (see Appendix A.1) for the team owners when they confront the demand for the replacement of the deteriorated venue due to the years of usage. On the one side, the incumbent counties and attractor counties compete for the franchise by providing subsidy packages for the construction. They compete by raising the subsidy amount based on the ex-ante evaluation of the potential benefits that stadiums can generate according to their declared goals in the last subsection. On the other side, the team owners will choose the county that provides them with the most generous subsidy package and the largest box-office profits. If two places have the same capability to offer subsidy packages and to provide the same box-office profits for the team owners, then the decision to stay or move will only

relate to the exogenous unobserved covariates, such as the team owner's preference or city mayors' political consideration. The incidence of new stadium construction is plausibly quasi-randomly assigned among the counties with the same selected characteristics, which is only decided by the deterioration status of the sports venues. To study the causal effect of the new replacement sports venues, our control groups should be limited to the runner-up counties from the bidding, which means counties in the treated group and control group are close enough on characteristics affecting the amount of the subsidy package and box-office profits.

To conclude the subsection, the key identification assumption regarding my empirical design is that the characteristics of the counties related to subsidy amount and box-office profits are as close as possible in the sample. Given the assumption satisfied, the treatment assignments between the counties that won the bidding and joiners but lost are plausibly quasi-random. In this case, the variation in spatial and timing distribution will only depend on whether they had a sports venue over thirty years ago and the natural deterioration process of the old buildings. It helps the empirical strategy since the unobservables in the error term of the equation on counterfactuals of the treated and control samples are plausible to be unrelated to the treatment in each county. Last but no least, since professional sports teams are only located in metropolitan areas and places with large populations in the U.S., I restrict the attractor counties in the control group to those places before controlling any observed covariates, which corresponds to the study on consumption amenities in the metropolitan area.

3 Empirical Strategy

3.1 Econometric model

In the previous section, I discussed the quasi-random experiment on the mass replacement of the sports venue between 1991 and 2010. The deterioration of the facilities is an exogenous

reason for the place opening a new venue, which depended on when the franchise entered the area decades ago. It will not depend on the contemporaneous factors related to the outcomes of interest if we compare between the incumbent and the attractor county. The variations generated by the different cross-county decisions on the construction provide the opportunity to estimate the causal effects of the new stadium opening. To study the effects over the years and control the unobservable confounding factors that are not time-varying, I used the regression adopting the Difference-in-Difference with a staggered treatment design to estimate the effects over time. The model I consider:

$$Y_{ct} = \alpha_c + \lambda_t + \sum_{\substack{k=-j \\ k\neq -1}}^{k=i} \beta_k \cdot \mathbf{1}\{t = \text{Treated Year}_c + k\} + \gamma_{st} + \varepsilon_{ct}, \tag{1}$$

where Y_{ct} is the outcome of interest in county c in year t. α_c represents the time-invariant county fixed effects, for example, the distance to lakes and the historical infrastructure advantage in county c. λ_t captures the common macroeconomic factors such as financial crisis and war during the studied periods, affecting the common trends in the sample. γ_{st} represents the state-year fixed effects, which capture economic condition differences between states over the years. The dummy variable $opening_{c,t+k} = \mathbf{1}\{t = \text{Treated Year}_c + k\}$ is the event-year variable, representing whether the event happened or not at different time lags and leads in different counties. Treated Year_c is the year the county was first-time exposed to the treatment. The coefficient of interest is β_k, which captures the dynamic effect for each year k, which can provide us with the implication on the short-run and long-run effects, and the lagged coefficients can help us to test the common trend assumption.

The event study specification studies the Average Treatment Effect on the Treated (ATT) from new venue opening, the key identification assumption will be that counties in the sample will develop the same trend if they are without the treatment. Further, it requires that the factor that affected the decision on the assignment should not be the factor contributing to the outcomes of interest. While the assumption can not be tested directly, the even

study specification can help us to check the parallel trends assumption satisfied on the pre-treatment periods in Section 5. The conditional on observables is my case to alleviate the selection bias. In the previous section, I argued that the conditions where the incumbent county would win the bidding against attractor counties depended only on unobservable factors. It's plausible that the team owner's preference, political environment, and the deterioration speed of the buildings are uncorrelated to the economic conditions of one county. Following this setting, the subsidy package the county could provide is a good standard to justify whether the counties are homogeneous in the required characteristics. However, there is little information on the number they offer for every team when they consider the relocation. Whether the team owners were bluffing or not on the relocation is also untestable, but it's still reasonable to consider there is a counterfactual county commitment to provide a similar amount of the package if the local government felt the threats and responsed. Besides, I choose the size of hotel service industry which is measured by hotel employment as the good represent variable for the subsidy capability of each county since most of funding dependent on the local hotel tax raising.

3.2 Balanced covariates

As discussed in the previous section, to estimate the causal effects, we need to ensure the counties in the treated and control groups are comparable. To be more specific on the characteristics I should control for counties in the sample in Table 2, I followed the argument of the bidding game in Section 2. If I can proxy similar characteristics related to the potential benefits and box-office profits using the set of covariates $\{X_c\}$, it will imply:

$$E[Y_c^1 - Y_c^0|T = 1] = E[Y_c^1 - Y_c^0|X_c]. \tag{2}$$

Thus, I select the values of outcome variables in 1990, which provide us with a pattern of economic conditions in each county. The covariates X_c selected to make the treatment group

and the control group more comparable are measured before the treatment, which are the characteristics of the counties before or in 1990. This also helps us test the "selection on observables" assumption in the propensity score matching method later to get consistent treatment effect estimates. I also include total hotel employment, which can be used to proxy the capability of local government to raise money for subsidy packages by issuing municipal bonds backed up by hotel occupancy tax. Moreover, the public finance variables, such as general revenue and expenditure per capita, are also listed to capture the financial status of local government. Regarding the construction cost, I also select the median rent and median housing value to measure the land value. Finally, the population of the county, as an important factor that can affect the box-office profits for teams, is also included in the set of X_c.

First, I implement a cursory trimming on all the counties and limit the counties to those capable of joining the bidding for the franchise. I restricted the control group samples to metropolitan counties with a population larger than 50,000 in 1990. The smallest population in the treated counties is more than 300,000. Also, the 50,000 population in the core urban area is the threshold to divide the Micropolitan and Metropolitan Statistical Areas based on the Census geographical data. Transportation is another important factor in the possibility of bidding for the stadium. I dropped the counties where the interstate highway length in 1987 was below the 5%-percentile of control groups. It left me with 38 treated counties and 690 control counties.

After restricting the control groups to the potential treatment places, I still need to pare down the observations since the two groups are still not comparable along the set of covariates that could affect the expected benefits from the opening of a new sports venue and influence the outcome variables in Table 2. The counties in the control group had relatively smaller local markets compared to the treated group, which implies the stadiums are usually opened in the central county of the metropolitan area. Moreover, the hotel and motel employment,

which I leverage to measure the capability of one county providing subsidy packages, are far different without finer trimming on the sample.

Table 2: County Characteristics in 1990

	Untrimmed		Trimmed		
	(1)	(2)	(3)	(4)	(5)
	Treated	Control	Treated	Control	PS Reweighting
Log(average personal income)	9.200	8.991	9.200	9.009	9.387
Log(number of establishment)	10.147	7.888	10.147	8.078	10.281
Log(employment)	13.283	10.754	13.283	10.980	13.328
Log(average weekly wage)	6.195	5.961	6.195	5.981	6.291
Log(population)	13.897	11.742	13.897	11.914	13.976
Log(population density)	7.724	5.135	7.724	5.360	7.357
Log(median rent)	5.974	5.733	5.974	5.740	6.289
Log(median housing value)	11.450	11.125	11.450	11.127	12.033
Log(general revenue per capita)	7.649	7.216	7.649	7.221	7.355
Log(property tax per capita)	6.318	5.843	6.318	5.850	6.585
Log(directed expenditure per capita)	7.565	7.198	7.565	7.202	7.299
Log(outstanding debt)	14.834	11.783	14.834	11.990	13.653
Log(hotel employment)	8.948	6.231	8.948	6.370	8.696
Log(manufacturing employment)	11.221	9.000	11.221	9.267	11.712
Log(retail employment)	11.465	9.135	11.465	9.353	11.521
Log(manufacturing wage)	6.370	6.193	6.370	6.219	6.544
Log(retail wage)	5.580	5.369	5.580	5.379	5.650
Observations	38	690	38	517	517

Note: The local government finance data were from the 1987 Census of Governments.

To balance the selected covariates, I adopted the Propensity Score Matching method, proposed by Rosenbaum and Rubin (1983), to calculate the score related to probability of the county opening a new stadium. Then I trimmed the sample by different lower cut-point, as discussed on Dehejia and Wahba (2002), to drop the less similar observations in the control group. Similiar identification flavor can be found in analyzing the effect of Enterprise Zone and some other local-based policies. I used the logistic propensity score model to calculate the treatment probability and drop the counties in the control groups with scores below the 25 percentile. The trimmed method can also be found in Gobillon et al. (2012) and Kline and Moretti (2014). The logistic model results can be seen in Table A.4, where I did not include any target covariates in Table 2 into the independent variables (similar to the setting of Busso et al. (2013)). The factors I included in the logistic model are the demographic variables in 1980 and 1990, the poverty rate, and the trend for the outcomes between 1980

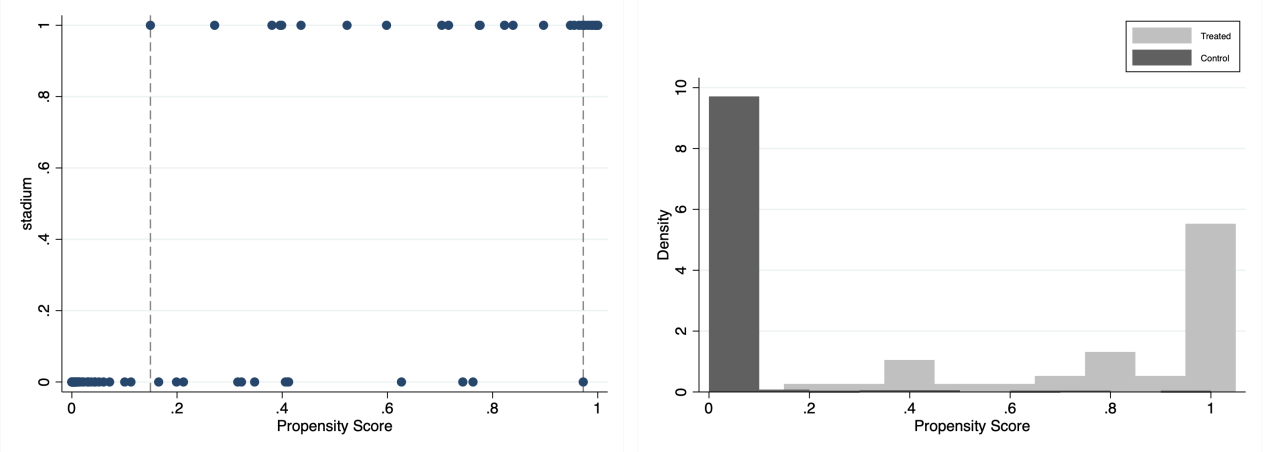
and 1990. I consider this setting on the method for two reasons. First, we can compare the characteristics between counties in columns (3) and (4) to test the "selection on observables" assumption on the propensity score matching method:

$$E[Y_c^0|X_c, T] = E[Y_c^0|T], \tag{3}$$

which can be suggested by the same mean outcome variables between treated and trimmed control groups in 1990. Second, when we trimmed the sample based on the higher propensity scores predicted by the logistic model, it indicated that we were selecting similar trends of the outcomes in the pre-treatment period. If the selection of similar trends can lead to similar observed covariates, it will suggest that the time-varying unobservables related to the outcomes are also similar between treated and trimmed control groups on the pre-treatment periods. From Table 2, there are slight gains in the balanced control group as each covariate becoming closer to the treated group.

However, the counties in history owned sports teams are not various, which leads to the small size of the treated group. Even if I trimmed the sample using a score below the 25 percentile and recalculated the propensity score, the overlap score ranges still did not include most of the observations in control groups, as we can see in Figure 4, which is the other important assumption for the matching method. Only 21 out of 38 treated counties can find the counterparts among the control units if I used the trimmed sample.

To make the treated and control counties more comparable, I used the standard propensity score reweighting method to assign the weight for each observation in the trimmed control groups, which makes the covariates more similar if we compare the columns (3) and (5) in Table 2. The method assigned the counties with higher propensity scores in control groups with larger weights rather than the same weight when calculating the counterfactual average based on the control group. The number of establishments, labor market variables, and public finance variables are all closer after the reweighting for each unit in the control



(a) Overlapped range on Propensity Score (b) Densities of Propensity Scores after trimming

Figure 4: Overlap

group. Moreover, the weighted average hotel employment in the reweighted control group has become similar to the average of the treated group. It suggests the two groups have a similar capability of providing subsidy packages, which is the signal on the balanced covariates if we treat it as the index on a similar amount of price the county would bid for the team.

A similar reweighting method on the control groups can be found in Kline and Moretti (2014) and Busso et al. (2013). The difference is I used the weights calculated from the standard logistic propensity score model; they used the Oaxaca-Blinder estimator developed by Kline (2011) to calculate the weights for the control groups, which can make them capable of assigning the negative weights on the less likely treated observations. Due to the staggered timing of the treatment, I could not adopt the OB method, but Kline (2011) proved the similarity in the estimated effects between logistic reweighting and Oaxaca-Blinder reweighting. Also, there is only one county assigned a weight over 10 based on the logistic propensity score model, which leads to potentially similar results to ones of the OB method after trimming the sample.

3.3 Random timing and staggered adoption

The empirical design faced the challenge caused by a staggered rollout on the treatment. To test the random order of the treatment adoption in the treated counties, I ran the regression between the opening year and several covariates of the counties in 1990. It can be seen in Table A.5 that all the variables are insignificant when we include all covariates in column (2), which means the timing of treatment is uncorrelated with the county's characteristics.

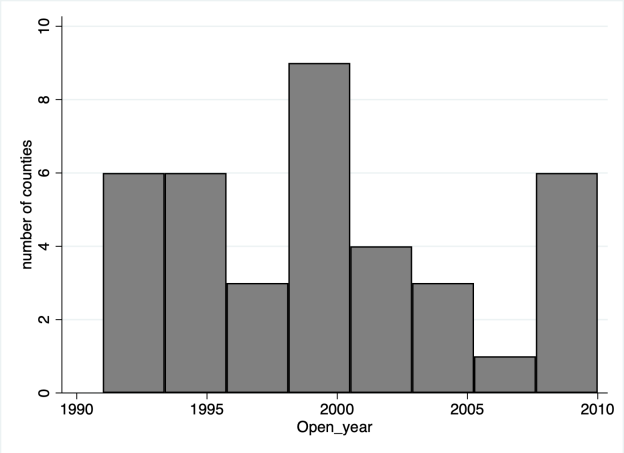


Figure 5: Number of Counties Opened New Building each period, 1991-2010.

Moreover, heterogeneous local development responses are plausible in this case due to different historical economic industry structures, infrastructure levels, land area, and natural resources. The DD literature has several seminal works pointing out the potential risks of biased estimators when heterogeneous effects appear in the groups. Weights of the comparison might be negative if the groups are highly likely to be treated, which is highly possible in my case since I have more earlier adopters than later adopters in the sample; most of the counties get the treatment before 2000, as shown in Figure 5. I adopt the method developed by Sun and Abraham (2021) to get more robust DD estimations. It could avoid the bias caused by the possibility of negative weight assignment to some "forbidden comparisons" when the heterogenous effects exist over time or across counties.

To conclude this section, the balanced selected covariates and random staggered adoption can help us alleviate the endogenous issues in my empirical model. The test on parallel trend

assumption in Section 5 would indicate the reliable estimates. The stronger assumption on the causal effects compared to the key assumption in equation (2) is that it's plausible that the unobservable related to the incidence of the building will not be correlated to the outcome of interest both on treated counties and counterfactuals.

The other thing to worry is the satisfication of stable unit treatment value assumption, which means that there is no direct or indirect influence of the treatment of the county on the outcomes of counties in the control groups. Since the counties in my trimmed sample are all larger population counties in each metropolitan statistical area, the spillover effect should be weak between places with long distances. I also provide evidence of weak spillover effects even on the contiguous counties in Section 5.

4 Data and sample restrictions

All datasets used in the current paper are public-published. The demographic data for each county are from the 1980 and 1990 Census. Personal income per capita and GDP data are from the Bureau of Economic Analysis (BEA). The local labor market data are calculated based on the Quarterly Census of Employment and Wages (QCEW) from the Bureau of Labor Statistics (BLS). I used the local government finances database created by Pierson et al. (2015) based on the Census of Governments. The firm dynamics data are from the Business Dynamics Statistics based on County Business Patterns. I supplemented the continuous annual housing market data in the Census with the FHFA Housing Price Index. Since the current paper focused on the counties in the metropolitan area, the combined datasets are still balanced after trimming the sample.

All stadium-constructed information is collected from the internet. The method is valid since teams from the Major Sports League all have complete digital records on the chronicles of the sports venues. I compared my stadium dataset with Bradbury et al. (2024), and the two datasets are very close both on opening years and observations, except that they included

the sports venues in Canada and a stadium opened in 1960. Due to the availability of the covariates data and the similar construction negotiation processes of the new venues, which I provided several suggestive evidence in previous sections, I focused on the 77 new major league venues built between 1991 and 2010. Among all the new stadiums, 57 are the replaced cases I considered as treatments, where the local government helped the team to build a new venue for an incumbent franchise. I adopted the first venue opening year as the event year for the counties with multiple venues opened during these twenty years. As a result, I have 38 counties treated between 1991 and 2010. Moreover, I dropped the counties in Alaska and Hawaii from the sample. The counties in Virginia are also dropped due to inconsistent county border in the studied periods.

Since the new venues for the new franchise are different stories compared to the events I studied in the paper, I need to ensure that the new franchise effect does not contaminate both treatment and control samples during 1991-2010. None of the treated counties were involved in the new franchise affair between 1991 and 2010. Besides that, none of them opened a new sports venue during 1980-1990. Those reflect that the county only considered the new building when the existing facilities were dilapidated. On the other side, we need to drop the counties with new construction accompanied by the new franchise between 1991 and 2010 and those with new venues between 1980 and 1990. 16 counties are dropped from the control groups.

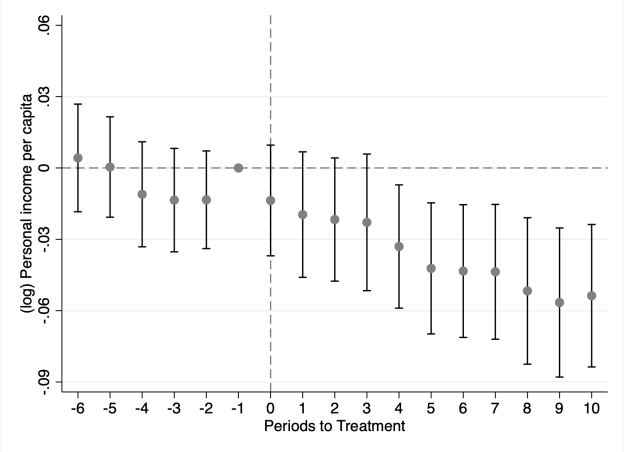
5 Results

It has not been clear in the literature on the causal effect from a new stadium on regional development. I explore the effects starting from the real personal income per capita. Based on the long-run negative effect I explore three potential reasons leading to the results: 1) population move-in; 2) resources shift-out to neighbor areas; 3) composition changes of the population in the long-run. Moreover, I examine the effects on the labor market to

check the potential structural change brought by the consumption amenity, for example, the employment and wage changes in the local and related industries. Finally, I study the impact on the government's financial status at the municipal level to test the opportunity cost on local welfare transfer due to funding the new stadium.

5.1 Local personal income per capita

The first outcome I studied is personal income per capita which could indicate the average income change for county residents after the new stadium opened. It can provide us a starting point as to whether the new stadium made the communities richer on average. Figure 6 plots the coefficients of the regression based on equation (1) following the event study design. The negative effects emerged quickly following the opening despite the values being insignificant in the initial years. Since the fourth year after the opening, the negative effects became significant and kept magnifying, and the decrease was more than 5% at the end of the seventh year. The coefficients for periods before the event are close to zero and jointly insignificant, implying that parallel trends evolved before the treatment. To verify the parallel trend assumption, I also tested the joint significance of the five lagged event-year dummy terms. The Chi-square statistic of 5.04 with p-values of 0.41 indicates the differences before the treatment are not jointly significant, supporting the parallel trend assumption. I also extended the pre-treatment periods to check the parallel trend assumption in Figure A.24.



Notes: The Figure plots the event study results on the personal income per capita. Standard errors are clustered at the county level. The confidence interval is at 95% level.

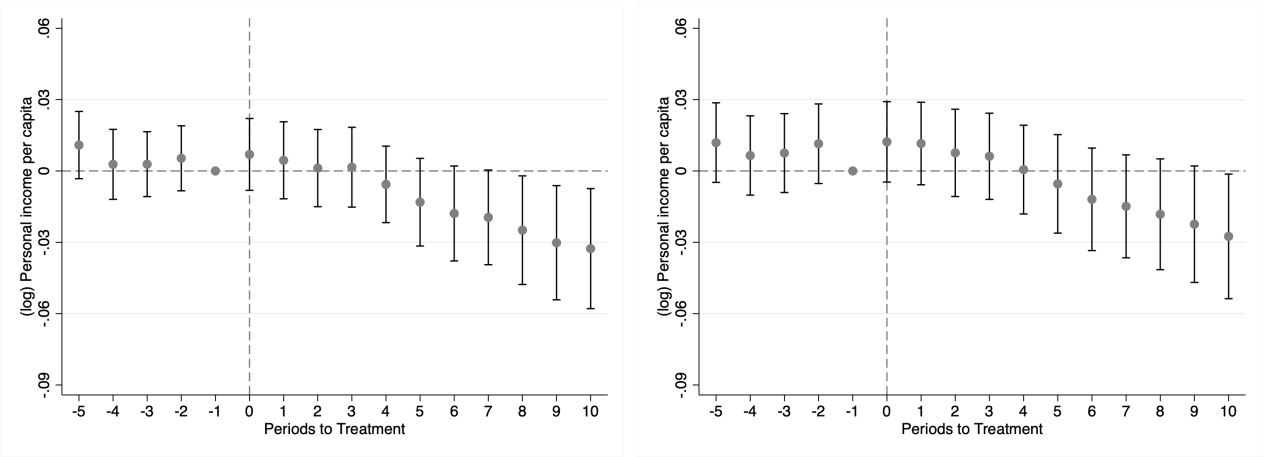
Figure 6: Personal Income

In Robustness check section, I used the GDP per capita to study the effects on overall productivity based on Synthetic Control Method, and I also checked the growth rate of the personal income per capita. All the estimated effects are significantly negative in the long-run. Then the question is why the new stadium can bring down the average personal income in local area. First, to check whether the average income and GDP decreases are caused by population mobility, I also checked the event study graph on the effect of the total population. The effects are small and insignificant in Figure 25.

5.1.1 Reallocation of Resources

The important topic of the evaluation of the place-based policy is the answer to the question of whether the effect only implies resource reallocation with a zero-sum net effect among different areas. In the stadium construction case, it could generate potential positive spillover effects on the surrounding area since the moving-out incentive of higher-income residents from the treated county and the new business in the surrounding without payment on the construction cost. To estimate the net effect considering the reallocation of resources, I studied the effect on the larger aggregated level by calculating the average personal income in the aggregated areas, which included the county and its contiguous counties, for each

sample unit. Figure 7a indicates that the overall effects are negative in the long run, even if we included the spillover effects on contiguous areas. The significantly negative effects from the new sports venue opening reached more than 3% after ten years. Although the negative relative effect on average was less than that on the smaller geographical unit, it was still a large magnitude. Since the negative effect on a larger geographical unit is smaller than the treated county on average, I also estimated the effects on the contiguous donuts only, excluding the central counties that opened the sports venue. The event study graph in Figure 7b suggests that there was no positive effect of opening a sports venue on the surrounding counties in the long run.



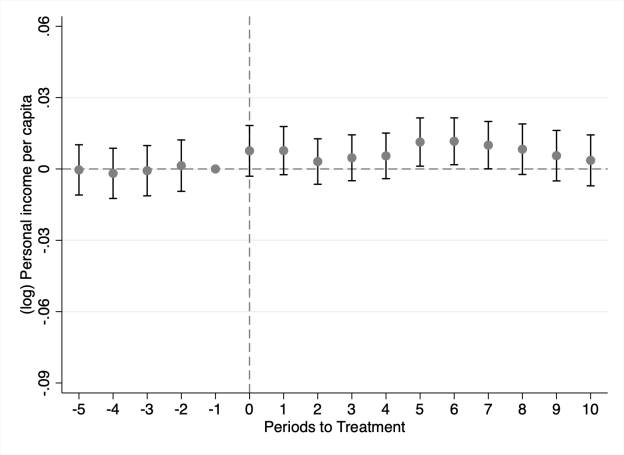
(a) Treated county and contiguous counties (b) Contiguous counties only

Notes: The Figures plot the event study results on the personal income per capita of larger aggregated geographical units and surrounding counties. Standard errors are clustered at the county level. The confidence interval is at 95% level.

Figure 7: Spillover effects of personal income

I also study the effect on the county whose neighbor opened a new sports venue between 1991 and 2010. To compare with the results in Figure 6, I assign the neighbor of the venue dummy in the same sample after the trimming and rerun the event study without the reweighting estimator. It's plausible that the neighbor's decision is exogenous to the considered county. The event study in Figure 8 shows an insignificant small positive effect in most of the years after the opening. The slightly significant positive effect in the sixth year is 1.2%. For the rest of the periods, especially for the long run, significant negative effects are robust in

Figure 6. The spillover effect on each county is close to zero. As for whether it means the reallocation of resources from the located county to neighbors, the interpretation of results in Figure 8 should be careful. The comparison is between the large neighbor county whose neighbor opened the stadium and the large county whose neighbor did not. 80 counties whose neighbor opened a new sports venue are dropped from the studies to justify the spillover effects based on previous results. In the appendix, I also report the results without dropping those relatively smaller counties. The small insignificant effects are persistent over the years and close to zero, which did not suggest any spillover effect.



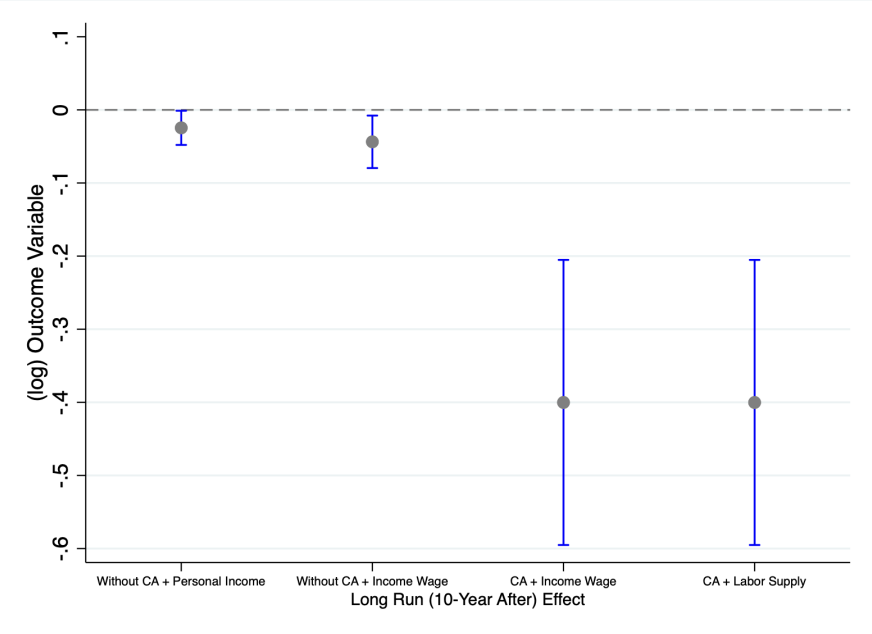
Notes: The Figure plots the event study results on the personal income per capita in neighbor counties. Standard errors are clustered at the county level. The confidence interval is at 95% level.

Figure 8: Personal Income in neighbors

5.1.2 Composition Change

Neither population change nor resources reallocation contributed to the long-run negative effect, however, the composition of population change caused by moving decisions of different groups and the labor supply decisions could affect the avergae personal income in local areas. I used the ACS data from 2005 to 2021 analyzing the question.

To explore the hypothesis, I calculated the composition adjusted income wage similar to the study on the skill premium by Katz and Murphy (1992) and Card and Lemieux (2001). I run the fixed effect regression across labor bins among the counties. To be more specific, I constructed the labor bin by sex, race, age, and education, and left-hand side variable is income wage per working hours of each labor bin along the years with the categorical variable for county year interaction and the categorical variable for labor bin on the right hand side of the regression. Based on the predicted value, I can derive the composition adjusted income wage for each county along the year and the efficiency labor supply aggregated in each county along the year.



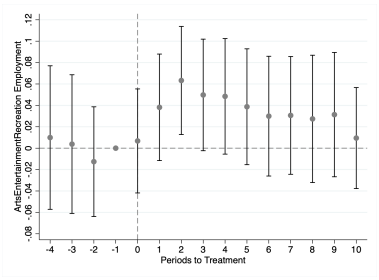
Notes: The Figure plots the event study results of the long-run effect on personal income per capita, wage income and labor supply with and without composition adjusting. Standard errors are clustered at the county level. The confidence interval is at 95% level.

Figure 9: Personal Income with Composition Adjusting

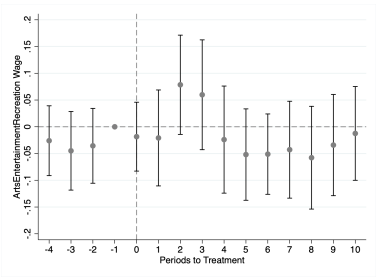
Based on the composition adjusting results, I rerun the balancing process in Section 3, and estimated the long-run effect is around -2.5% as shown in the first point in the Figure 9, which is significant at 5% level. The reason it became smaller since I dropped 9 treated counties due to data limits. If we run the study using the ACS data, we get the similar -4% significant effect. However, if we run the analysis using the composition adjusted income wage, the negative effect will be dramatically enlarged to - 40%. Compared to the before composition adjusting results, it suggested that the new stadium caused a significant composition change of residents in local area in the long run. Further, I did the test using the labor supply as the outcome variable, the similar results as income wage effect suggested that the compostion changes have been toward the more labor supply gruops in the long run.

5.2 Local labor market

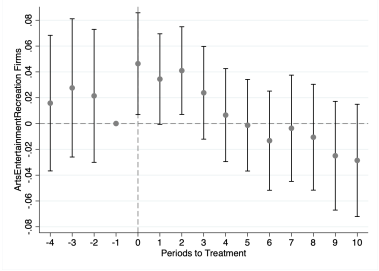
To explain the reasons for the negative relative impact on the personal income per capita, I studied the effects on employment and wage in the local labor market. The sports venues' effect on local activity directly promotes the demand for labor in several nontradable sectors, such as the entertainment industry, accommodation, and food service sectors. I started the study from the local labor market in the Arts, Entertainment, and Recreation sector[6].



(a) Employment



(b) Wage



(c) Firms

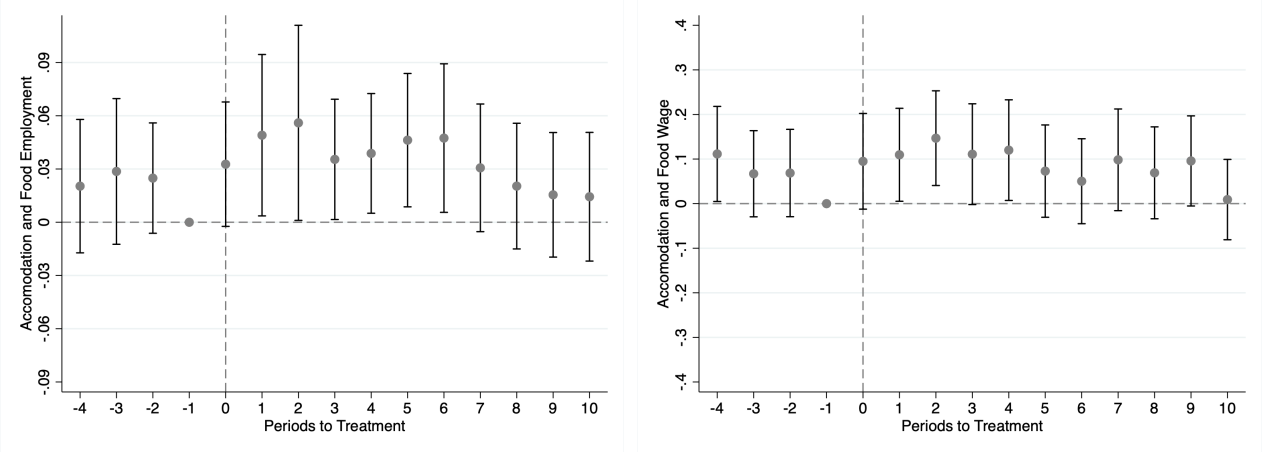
Notes: The Figures plot the event study results on the Amusement, Entertainment and Recreation sector. All firms in the graphs refer to the establishment, which includes the new branch of the firms. Standard errors are clustered at the county level. The confidence interval is at 90% level.

Figure 10: Amusement, Entertainment and Recreation sector

Since the NAICS used to measure the industry code from 1990, I dropped 6 counties that opened new sports venues before 1994 and reimplemented the propensity score model to trim the sample and generate the weight. It can provide us at least four pre-treatment periods to test the parallel trends assumption. The studies on the industry outcome variables are based on the new restricted sample. The new sports venues with more variety of service facilities compared to previous ones are supposed to raise the demand for related workers.

[6]NAICS code: 71

Based on the event study results in Figure 10 , there is an around 6% employment increase in the industries in the short term. The effect is inconsistent and only limited to the initial years following the opening. Although it also raised the number of firms in the following three years, the results again are not permanent. The gain will disappear after three years and even turn negative in the long run.



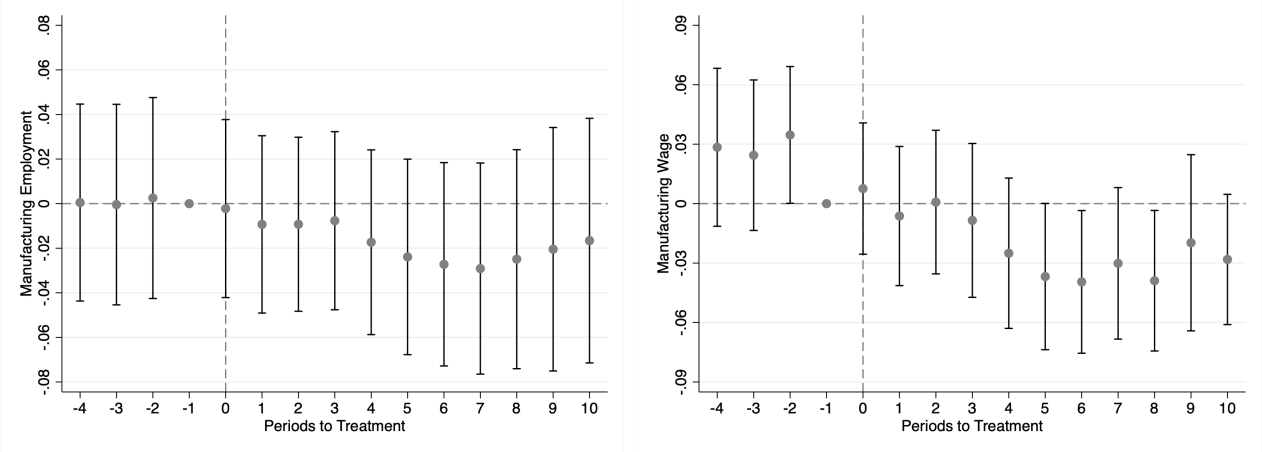
(a) Employment (b) Wage

Notes: The figures plot the event study results for the accommodation and food sector. All firms in the graphs refer to the establishment, which includes the new branch of the firms. Standard errors are clustered at the county level. The confidence interval in panel (a) is at 90% level, and in panel (b) is at 90% level.

Figure 11: Accomodation and Food sector

Another sector directly related to the sports venues is the Accommodation and Food sector, where there are expected to be more patrons in the restaurants and bars, and more tourists visit and temporarily live in the place. The employment in Figure 11a has received positive impacts six years after the opening; the maximum raise is 5.6 % in year 2, although the confidence interval is wide. The average wage also rose as shown in Figure 11b, and the magnitude is large, which could reach a 14.68 % significant increase in the second year after the opening.

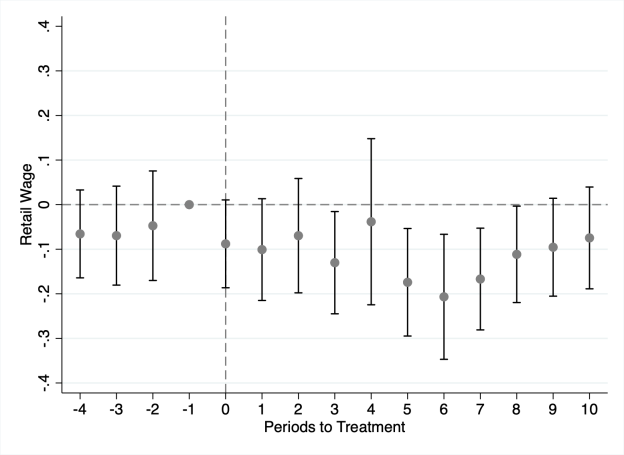
The manufacturing and retail trade industry also received significant impacts after the opening of sports venues. The event studies in Figure 12a implied that employment did not drop



(a) Employment (b) Wage

Notes: The figures plot the event study results for the manufacturing sector. Standard errors are clustered at the county level. The confidence intervals are at 90% level.

Figure 12: Manufacturing sector



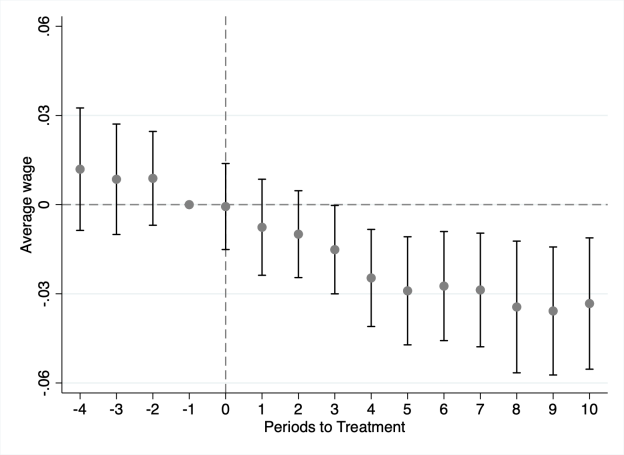
Notes: The Figures plot the event study results on the average wage in the retail industry. Standard errors are clustered at the county level. The confidence interval is at 99% level.

Figure 13: Wage in Retail Sector

significantly in the manufacturing sector, but the average wage in 12b has decreased in the medium and long run. The result is surprising in the retail sector; the wage experienced a large, significantly negative drop, which could reach 20% in Figure 13.

I consider a similar conceptual framework in Moretti (2010), and Aragón and Rud (2013), Ando (2015), which adopted the framework to explain the local effects of a large gold mine and a nuclear facility establishment, to explain the findings. Let's consider a competitive

local economy that produces nontradable and tradable goods. The price of the tradable good depends on the national market. Since the larger metropolitan areas usually have abundant skilled workers, which can be seen in Table 2, the elasticity of upward labor supply will be small. If the local demand for manufacturing products decreases after the opening, the decreased labor demand could generate a larger wage effect with an insignificant change in employment. A similar pattern happened in the retail sector, but the price of nontradable sectors depends on the local market. The higher wages in the other nontradable sectors will lead the unskilled workers to shift to these sectors. The larger decrease in the labor demand lowers the wage in the retail sector dramatically. The agglomeration effect in the service sector might promote the shift.



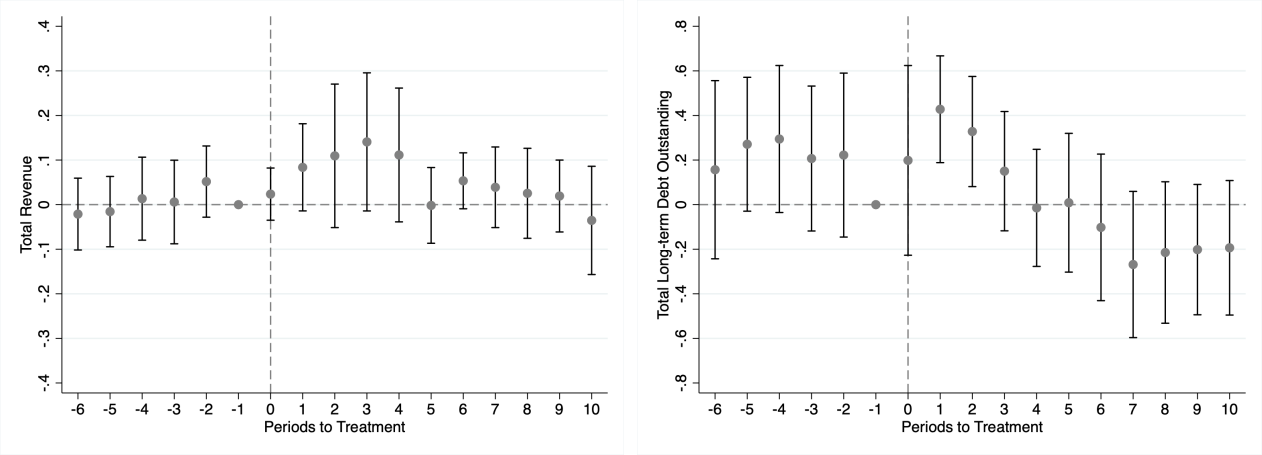
Notes: The Figures plot the event study results on the average wage in the treated county. Standard errors are clustered at the county level. The confidence interval is at 95% level.

Figure 14: Average Wage in labor market

The overall effect on total employment is insignificant and positive, and the effect on the wage verified the results in previous sections, where in Figure 14 the salary income has decreased among workers on average starting from the fourth year after the opening, and the negative around 3% effect is consistent in the long run. It might caused by the relatively higher elasticity of the labor supply curve in direct-related service sectors compared to other sectors, in which the wage decrease is larger than the increase.

5.3 Local public finance

Although the local government did not directly pay the construction cost from their current balance sheet, as I discussed in the incidence of the sports venues section, it's still possible that the released long-term bonds, raised taxes, and the expenditures on the amenity facilities impact the local government finance status. To study the effect, I dropped the two counties from New York that did not provide the information in the Census of the government and added the change of general revenue and change of total directed expenditure into the propensity score model. The results below are based on the study on the new weight after trimming the sample. Although the dataset is not balanced for each observation in each year, it should also provide us with some useful information.

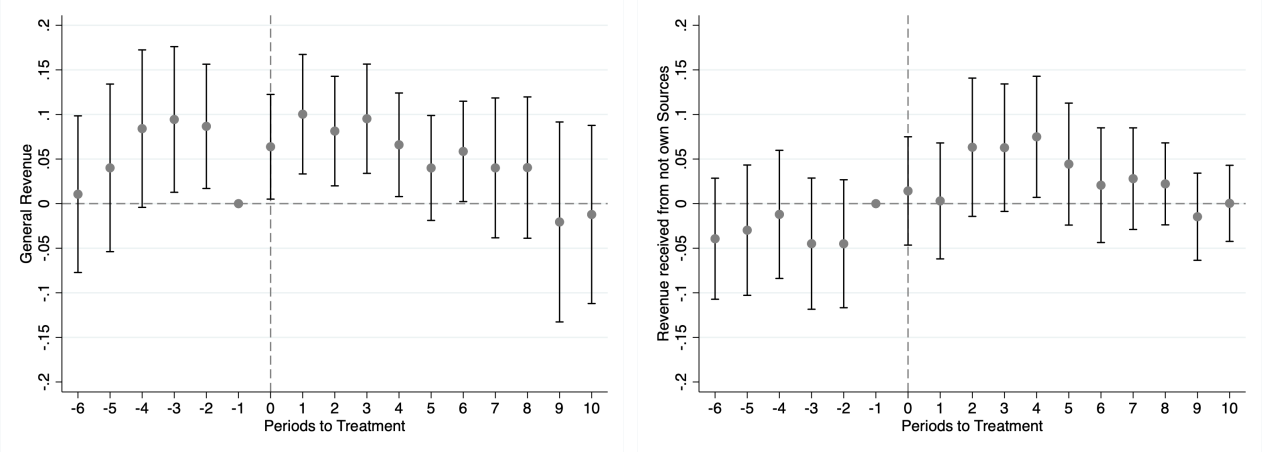


(a) Total revenue (b) Long-term debt

Notes: The figures plot the event study results for the total revenue and long-term debt of the local government. Standard errors are clustered at the county level. The confidence intervals are at 90% level.

Figure 15: Revenues and Debt

The local government experienced an average 10% increase in the total revenue though the coefficient is insignificant in Figure 15 . If I break down the total value into the general revenue, which captures the revenues from taxes and charges on local, the 10% positive effects are significant in Figure 16 , but the positive effect already started before the opening. If the parallel trend assumption is still satisfied, as suggested in earlier pre-treatment periods,



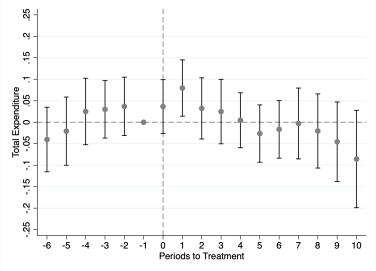
(a) General revenue (b) Revenue from outside sources

Notes: The figures plot the event study results for the general revenue and revenue from out of the county for the local government. Standard errors are clustered at the county level. The confidence intervals are at 90% level.

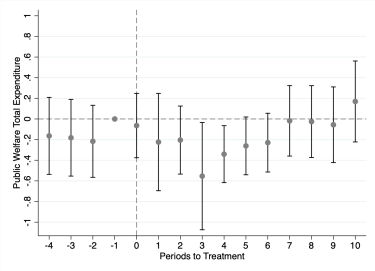
Figure 16: Revenues in detail

the results confirmed that the local government funded the construction based on the rise of hotel tax or sale tax. The local government also seemed to receive more inter-governmental transfers from the out-of-town in the medium run compared to other counties. In Figure 16, I studied the effect on the revenue from outside resources, and it showed the consistent three periods of 6% rise in the outcome. Moreover, the local government increased the release of long-term debt after the venues' opening to fund the cost of construction or accompanying facilities. The event study results in Figure 16b indicated the 40% at most increase on the long-term debt outstanding. The fact that the government received more money from the outside suggested the potential increase in local welfare, but when the government distributed the revenues, they spent more on the parking lot and cut down the spending on public welfare.

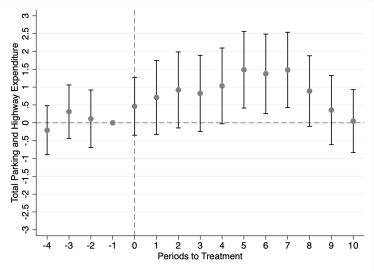
In the event study results in Figure 17 , the total expenditure was raised in the next year after the opening compared to other places and was not impacted after that. However, the local government decreased the investment in public welfare such as health insurance and unemployment insurance dramatically, which was more than 50% in the third year after the opening. On the other hand, due to the demand for public parking places, the local



(a) Total expenditure



(b) Expenditure: Public welfare



(c) Expenditure: Parking and highway

Notes: The figures plot the event study results for the total expenditures of the local government. Standard errors are clustered at the county level. The confidence intervals are at 90% level.

Figure 17: Expenditures

government increased spending more than 1 fold on the improvement of parking facilities.

6 Robustness Check

The coefficients plotted in Figure 6 are the effects of each year after the treatment happened. The specific effects are insignificant at the starting periods, implying the effect needs time to take off. Meanwhile, it doesn't provide information on the growth rate responses to the treatment. There might be the case that significant adverse effects have already existed on the growth rate, but the total effects have not achieved a significant magnitude yet. Moreover, the growth rate outcome can circumvent potential autocorrelation issues with personal income. Therefore, I used the growth rate of average personal income between

consecutive years and ran the regressions based on the equation,

$$g_{ct} = \gamma_c + \lambda_t + \beta_c \cdot opening_{c,t-i} + \mathbf{X}_c'\delta + \varepsilon_{ct}, \tag{4}$$

where g_{ct} is the growth rate of the outcome, $opening_{c,t-i}$ with $i \in \{5, 10\}$ represents whether the county has owned a new stadium in the past 5/10 years. Thus, β implies the average growth rate across counties five or ten years after opening a new stadium. A similar growth rate study can be found in Funke et al. (2023). As results shown in Table 3, the growth rates of personal income per capita in treated counties are 0.33 - 0.37 percentage points lower than in untreated counties after opening the new sports venues. The comparisons on the average growth rate differences between the ten-year and five-year aftermath suggest that the growth rate decrease is smaller in the later five years since the estimators are smaller in the ten-year average.

Table 3: Growth Rate: Personal Income

	(1) OLS	(2) FE	(3) Adding controls
Panel A: 5-year aftermath			
With Stadium	-0.2879	-0.3693**	-0.3694**
	(0.226)	(0.172)	(0.172)
N. Obs	19425	19425	19390
R2	0.00	0.30	0.30
Panel B: 10-year aftermath			
With Stadium	-0.3320**	-0.3299**	-0.3300**
	(0.155)	(0.148)	(0.148)
N. Obs	19425	19425	19390
R2	0.00	0.30	0.30

Significant level: * 0.1 ** 0.05 *** 0.01

The new stadium for the same franchise did not bring substantial pecuniary benefits to local residents from the findings above. However, the average income patterns might be explained

by the attraction of populations or job mobility working in relatively lower-income industries, such as restaurant servers or the stadium's event guards. Moreover, the new stadium might push the whole economy to structural change related to the share change in the tertiary industry.

To explore the total output effects, I studied the impact on local business activity in total using the GDP per capita. Due to the data availability, I can only collect the data on GDP across counties starting from 2001. There are 13 counties treated between 2001 and 2010. To get the precise estimators under small treated groups, I adopted the Synthetic Control Method developed by Abadie et al. (2010) and studied the treatment effect on the GDP per capita average in 10 counties that opened a new stadium between 2004 and 2010. I restricted the sample between 2004 and 2020 to ensure enough pre-treatment periods without losing too many events.

From Figure 18, the gaps between counterfactual GDP per capita and the actual one have been negative since the new stadium opening. In the long run, after 10 years, the real GDP per capita decreased more than 5% compared to the constructed counterfactual, which corresponds to the findings on personal income per capita.

7 Conclusion

In the present paper, I estimate the causal effect of a new sports venue on local economic development when compared to other larger metropolitan counties. I find that the new construction has a large, persistent, negative relative effect on personal income per capita, which can reach more than 5% after ten years of opening. The impact on the total population is insignificant and small, which does not suggest the findings should be attributed to the influx of population. The spillover effects on the neighboring counties are insignificant and small, which suggests a lack of evidence on the reallocation of resources. The same long-run significant negative impacts are also robust when we estimate the results at a larger

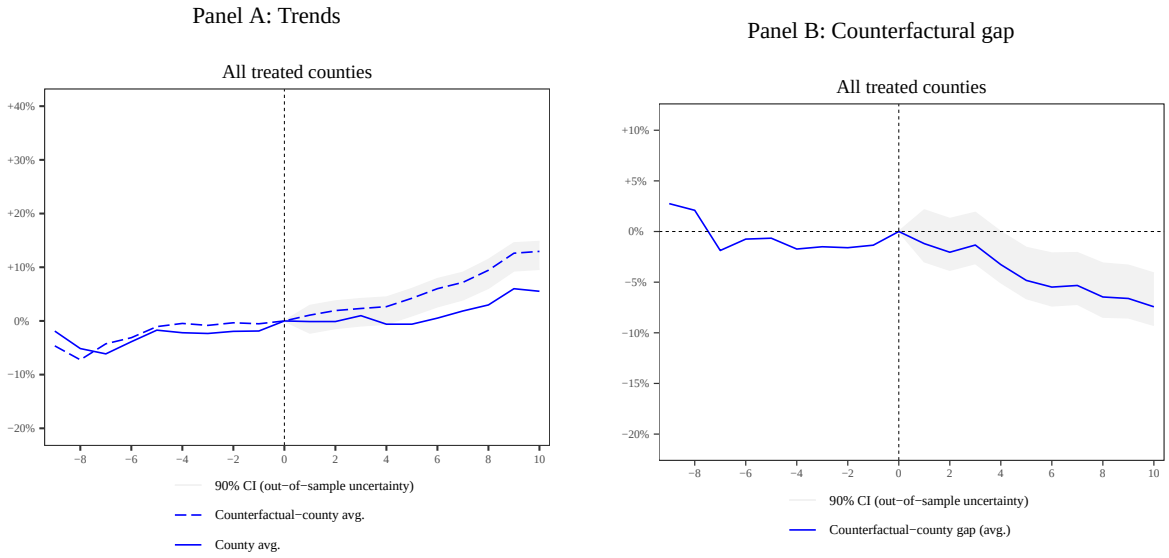


Figure 18: Real GDP per capita

aggregated geographical level and an aggregated donut of contiguous counties. Howver, the composition adjusting study shows that the new large consumption amenity, like sports spectator venues, has a significant composition effect on local population. It leads the local composition of population torward higher labor-supply bias direction.

The impacts on the local labor market are positive on the directly related Amusement, Entertainment and Recreation sector ,and Accommodation and Food sector. Both sectors received temporary positive impacts on employment and wages. The wages in the manufacturing sector and retail sector received a negative impact, which peaked at 20% in the sixth year after the opening in the retail sector. The overall effects on local wages are negative, around 3% compared to counties with similar pre-treatment characteristics without the new sports venue. I also find positive impacts on total expenditure and long-term debt of local

government in the short run after the opening, although there was no significant impact on the total revenue. The new sports venue increased the expenditures on parking and highways and decreased the expenditures on the public welfare of the local government.

I find no significant impact on the total number of firms or business dynamics related to entry and exit. However, new-entry firms received a positive impact of 2.9% at most on the number of employees hired, and more small firms were crowding out, which led to a slight increase in the local firm size. The incumbent firms in the treated county would expand by hiring more workers in the opening year, but compared to other larger metropolitan counties without the new stadium, their layoff raised 6% in the fifth year after the opening.

Overall, these results suggest that the public-funded construction of a new sports venue will bring the significant causal effect on local economic development in the long run. The current paper is limited to the dataset at the county level. To explore the business dynamics between incumbent and new firms, I should access the data at the firm level. Also the long-run individual effect of the large consumption amenity can be studied by comparing different cohorts in the county. The heterogeneity analysis between the distance of new and previous stadium locations, whether the new stadium located in the downtown still works in progress.

A Appendix A

A.1 A Stylized Model on Negotiations to Build the New Venue

The Stylized model provided in the appendix for two goals, one is to motivate my empirical strategy, the other is to show that the welfare loss might have already generated when the overpay occured for local government funding sports venues. The holdup issues, due to worry on the short-run loss if team leaving, probably drove the overpay, hence hurt the wealfare of local resident.

A.1.1 Set-up

To model the decision of the team owner and local government, I used a stylized model where the incumbent counties and attractor counties bid for the franchise by providing subsidy packages for the new sports venue's construction. The team owner will choose the counties where they can maximize their future profits.

Following the Roback (1982) model, I assumed the residents and capital are completely mobile across cities, and the cost of the move is zero. The lands for each county are fixed but they can transfer the uses within the counties. In the equilibrium, firms will have zero profit, and residents will not gain from moving to other countries. For the residents in the treated county, the replacement of the old venues is exogenous since the incidence is completely due to the deterioration of the former one. The construction of the stadium will cause the setup of the eminent domain and a direct increase in the housing demand. If there is an attraction on the new business and temporary accommodation demand, the firms will pay more for the limited land and raise the wage to compete for workers. The increased rental will balance the increased wage, and the real wage will not change for the residents in the equilibrium. Similar results as Greenstone and Moretti (2003), but without the assumption on the exogenous event, the only welfare gain for the residents is the land value increase benefits to residents who are landlords. The land value can capture the welfare

gain for the residents in the county. Therefore, the benefits and costs of each bidding result are based on the land values.

Residents will elect the mayor who can represent their welfare in the decision on the subsidy package. When the stadium deteriorated in the county, the team owner proposed a new construction for the local government, and she would consider the outside option, which was leaving for another county. After the franchise i claimed they entered the "franchise market", the incumbent j_0 and other counties $\{j_1, j_2...j_n\}$ would bid for the team by providing a subsidy package S_{ij} for the construction of the new team. In most cases, the team leased the training facility in the incumbent counties; thus, I assumed there was no moving cost for the team, and they would find the new training places in the new county. On the other side of the decision, the incumbent county was unlike the franchise. They have already developed business attached to the franchise, which would lead to a loss of D_0 if the franchise left. For the attractor counties, their outside options from bidding would be zero. The difference between the outside options is the source of holdup issues in the negotiations, which leads to a higher bidding price for the incumbent county.

The county made the bid according to the trade-off between benefits and costs. As the case study indicated, the winning county had expected gains on increased economic activity, attracting other entertainment industries, and increasing job and retail sales. Given the ex-ante expectations when they made the decision, the new business would attract investment from outside, and the stadium might create an agglomeration economy that would attract other entertainment companies and retail trade stores like restaurants. Several "arena districts" (Humphreys and Zhou (2015b)) have been developed for the goal of agglomeration economies in the county. The land price would capture the change of the capital supply increase via the demand for the land of the new firms. The value of the new stadium for the welfare of residents in each county V_{ij} is the land value raised after the construction. Besides the benefits, the costs of the construction C_{ij} would include direct financial assistance from

the local government, opportunity cost from the exemption from the property tax, and the investment in the infrastructure, such as new roads to connect the highway, sewage, and electricity system. The property tax is the main source the local government uses to fund public investment in the US. The loss of property tax would lower the quality of other public services and decrease the land value by reducing the attraction to new residents. Therefore, the total welfare gain from the new stadium will be

$$\Delta W_{ij} = V_{ij} - C_{ij}. \tag{5}$$

I assume the total subsidy package value S_{ij} received by the team would include the construction cost C_{ij} and the hotel occupancy tax[2] H_{ij}, which was the extra money provided outside the town. This is also the reason why the local government believes part of the costs are burdened by the visitors rather than the residents.

The team would choose the county that could maximize its future profits:

$$E[P] = S_{ij} + B_{ij}, \tag{6}$$

where B_{ij} is the box office profits depending on residents' preference, local sports culture, level of other amenities, and existing entertainment industry. S_{ij} is different across counties due to the characteristics of the county, such as the support of the franchises, government finance status, or the lobbying capability of the team owners.

A.1.2 Bidding results

The mayor will bid on the franchise market representing the county. Bidders received complete information on each other's benefits and costs. There is no collusion between counties. Since the teams prefer to get the highest bidding price, I assume the teams adopt the English auction. The bidding results will depend on the difference between county characteristics.

[2]Only Coors Field in Denver County was not funded by hotel tax in my treated groups.

The first case will assume the counties are homogenous and they have the same value of the benefits from the team, $V_{ij} = V_0$, and the same characteristics leading them to the same value for the team i, $B_{ij} = B_0$. The box offices are the same, and the counties have the same characteristics thus the hotel tax they can provide in the package will also be equal, $H_{ij} = H_0$. Under this assumption, the incumbent county and team will always agree on the public-funded construction of the new facility. The bidding results would not depend on other factors.

Case I: Mayor will maximize the welfare of the residents. Suppose there is no loss of incumbent county from the team leaving. All counties will adopt the same bidding strategy. They will raise the bidding until the second generous county is indifferent between winning and losing. The maximum subsidy package the team can receive is $S^* = V_0 + B_0$. The county will win by chance or the personal preference of the team owner, such as bringing the team to their hometown. The winning county will have no gain in the welfare, $\Delta W = 0$.

Case II: Now we consider how the holdup issues change the bidding results. Suppose if the incumbent team loses the bidding, there is a loss D_0 for the county. The incumbent county will raise the bid until the attractor county is indifferent between winning and losing since the outside option of the incumbent is non-zero. It will bid $S_0^* = V_0 + H_0 + \iota$, where $0 < \iota < D_0$. The gain from the bidding is $\Delta W = -\iota$.

Case III: The other case on the overpay might be caused by the mayor with a vested interest. Assume the mayors have their own benefits from the winning bid, and the incumbent county suffers the cost of losing. In this case, the mayor can capitalize on the opportunity cost of the incumbent county. Assume the mayor will gain $M = f(S)$ if they win with $f' > 0$, and she still cares about the election results of the residents. Her utility function is $u(\Delta W, M)$, where $u_1 > 0, u_2 \geq 0$. If $u_2 > 0$, assume the utility function is separable and $M = rS, r \in [0, 1]$. Assuming all mayors are identical, the incumbent county's mayor will raise the bid until the attractor county's mayor is indifferent about winning or losing, $S_0^* = \frac{V_0 + H_0}{1-r}$. The gain

of welfare is $\Delta W = -\frac{r}{1-r}(V_0 + H_0) < 0$. The mayor will overbid, and the welfare loss is transferred to the benefits of the mayor. She might keep overbidding if $u_1 = 0$, when $\Delta W \in [-\frac{r}{1-r}(V_0 + H_0 + D_0), -\frac{r}{1-r}(V_0 + H_0)]$, the residents will suffer more welfare loss. In this case, she could maximize the subsidy package and experience the utility $u_{max} = \frac{r}{1-r}D_0$. The welfare gain of the residents is $\Delta W = -D_0 < 0$.

Conclusions: In the homogenous county cases, the team's retention and the new stadium will always be constructed in the incumbent county. It would be impossible for the treated county's residents to experience a welfare gain. The treatment of the new stadium is randomly assigned among the counties conditional on the same characteristics based on the deterioration status of the current sports venues. To study the effect of the new replacement sports venues, our control groups will limited to the runner-up counties from the bidding, which means counties in my treated group and control group are close enough on characteristics affecting $\{V_{ij}, B_{ij}\}$. The model can also explain why the local government provides generous subsidy packages for the teams even if it brings a negative welfare gain for the residents due to the holdup issues for economic reasons besides the loss aversion of the fan base (Humphreys and Zhou (2015a)). The welfare represented by the land value will be negative, which is not good news for the residents. The welfare increases from the hotel tax or new investment are offset by either the mayor or the competition to attractor counties.

Now, to finish the discussion, I also consider the heterogeneous county cases to check whether the welfare gain will be probable and analyze the possible bias direction if the counties in the control group are different.

Since professional sports teams are only located in metropolitan areas and places with large populations in the U.S., I restrict the attractor counties to those places. The heterogeneity I introduced was across those "center counties". Counties value the same team differently based on the ex-ante expectation about the extent of growth stimulating after the construction. For example, the places with more infrastructure and amenities will attract more new

investment in related industries and tourists after the new venue's construction compared to those with less transportation infrastructure and other amenities. On the other side of the bidding, the teams evaluate the counties differently regarding the box office profits they can bring to the owner. It will depend on factors such as local sports culture, ticket price, and the population structure in each place. I assume there are two types of county and franchise across the value of $\{V, B\}$, either V_h or V_l, and one of B_h and B_l.

Case IV: Assume $Cov(V, B) > 0$ and incumbent counties are able to receive more money from raising occupancy tax on the hotel, H_h. The assumption is plausible since the counties the franchise located more than 30 years ago were all mega counties with larger populations. The existing accommodation magnitudes might be larger thirty years later. Due to this historical reason, I believe they can collect more hotel tax for the subsidy package.

If the incumbent county is with (V_h, B_h), they will bid until the other county is indifferent from the winning and losing. Therefore, they will bid $S_0^* = V_l + H_l$. The welfare gain is $\Delta W = (V_h - V_l) + (B_h - B_l) + (H_h - H_l) > 0$. The incumbent will always bid higher, and the franchise will satisfy the incentive compatibility on the maximized profits.

If the incumbent county is with (V_l, B_l), the results will be different, since they need enough hotel tax advantage to cover the value differences. Their bidding strategies cannot just be the amount leading the attractor indifferent. They will reimburse the team more from the bidding due to the lower box office profits. The incumbent will win the bidding, when $(H_h - H_l) + D_0 \geq (V_h - V_l) + (B_h - B_l)$, and the welfare gain $\Delta W = -(V_h - V_l) - (B_h - B_l) + (H_h - H_l)$. The sign of the welfare gain is unambiguous. The attractor county will win the bidding, when $(H_h - H_l) + D_0 \leq (V_h - V_l)$, and the welfare gain of the win $\Delta W = (V_h - V_l) - (H_h - H_l) - D_0 \geq 0$. The incumbent county will lose the franchise, the welfare gain is $\Delta W = -D_0$.

The value of (V, B) will affect the results of the bidding and we can not justify the bias direction caused by the endogeneity selection in the heterogenous case due to both incumbent

and attractor have the chance to win the bidding when $V_{ij} + B_{ij}$ is higher. However, it will be more important for us to control the factors contributing to the heterogeneity of the V_{ij} in the empirical analysis. If we control the factors leading to the same expectation on the V_{ij} across the counties, the incumbent will always win the bidding even when the two counties can bring the different box offices. The conclusion will adapt to the characteristics that affect the V_{ij} and B_{ij} in the same direction.

Case V: Assume $Cov(V, B) < 0$ and the incumbent counties are able to extract more from the hotel tax to fund the subsidy package, H_h.

If the incumbent county is with (V_h, B_l), they will bid until the other county is indifferent from the winning and losing but they need to comprise for a bit higher bidding since the $B_l < B_h$. Therefore, they will bid $S_0^* = V_l + H_l + (B_h - B_l)$. The welfare gain is $\Delta W = (V_h - V_l) - (B_h - B_l) + (H_h - H_l)$. The sign is ambiguous. The incumbent will always bid higher than the attractor, and the solution will only exist when $(H_h - H_l) + D_0 \geq -(V_h - V_l) + (B_h - B_l)$.

If the incumbent county is with (V_l, B_h), the incumbent will win the bidding by making the attractor indifferent between winning and losing when $(H_h - H_l) + D_0 \geq (V_h - V_l)$. The welfare gain $\Delta W = (H_h - H_l) - (V_h - V_l)$. The sign is ambiguous. The attractor county will win the bidding, when $(H_h - H_l) + D_0 \leq (V_h - V_l) - (B_h - B_l)$, and the welfare gain of the win $\Delta W = (V_h - V_l) - (B_h - B_l) - (H_h - H_l) - D_0 \geq 0$. The incumbent county will lose the franchise. The welfare gain is $\Delta W = -D_0$.

Similar to Case IV, the value of (V, B) will affect the results of the winner and runner-up. The incumbent will ensure the positive gain from winning the bidding only when they have the higher realized benefits for the local and higher profits for the team owners.

To lead the analysis on the empirical section, my key identification assumption on the design is that the characteristics of the counties related to V_{ij}, B_{ij} are as close as possible in the sample. Further, if I can balance the covariates that affect the expected benefits V_{ij}, and box-office profits B_{ij} of the stadium in the county, the key identification assumption will

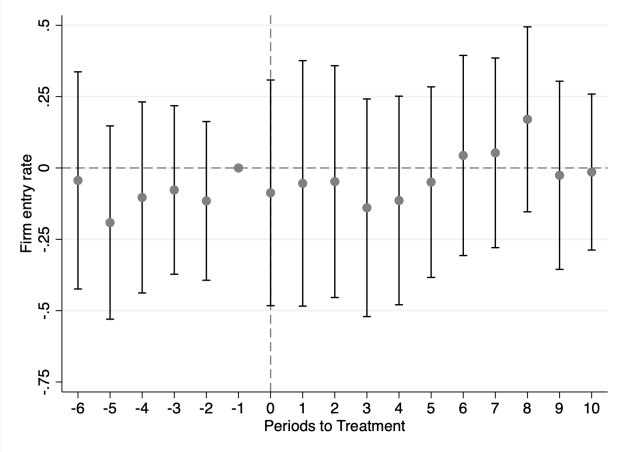
be plausibly satisfied. The treatment assignments between the counties won the bidding and replaced the old sports venues, and the counties joined the bidding but bid the second-best prices are plausibly quasi-random. Because the variation in the spatial and timing distribution will only depend on whether they had a sports venue over thirty years ago and the natural deterioration process of the old buildings.

A.2 Effects on Firm Activities

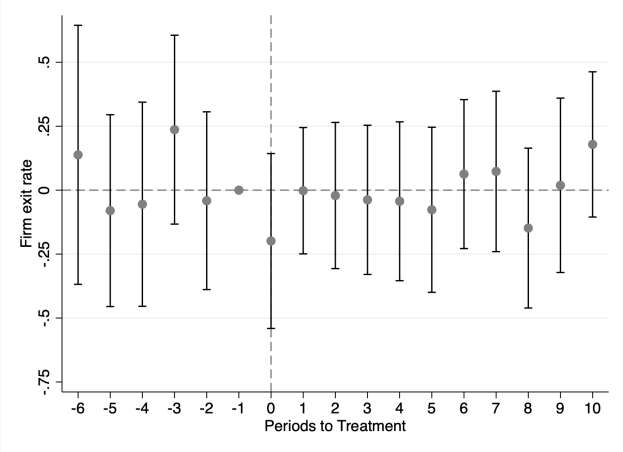
As the ISFAA stated the goal of funding new sports venues, the local government intended to attract businesses from out of town, especially those in the entertainment industry. Back to the earlier development stage of professional sports, the local government also built up the prospect of constructing the fashionable big dome or speculator landmark as an advertisement for the city, which attracts investment in other industries rather than limited to entertainment. The public thought that the new sports venues might appeal the investments from sports to manufacturing [7]. I started checking on the argument at the county level.

The new sports venues did not generate a significant impact on the total number of firms, which could be indicated in Figure 19c. To explore the possibility that the offset between entry and exit caused the insignificant total effect, I also studied both sides by estimating the treatment effect on the entry and exit rates, respectively. The event study graphs in Figure 19 showed that the new sports venues did not have a significant effect on the firm's entry and exit in the total numbers, either. Both the short-run and long-run effects are insignificant, and the magnitudes are close to 0. The new sports venues did not attract new businesses and probably crowded out a small amount of existing businesses. At the inception year of the opening, Figure 19b shows a negative effect on the exit rate, which was around 0.2%. The similar-magnitude insignificant positive effect in the three-year ahead opening might indicate that the new sports venues advanced the exit of a small amount of the firms. The

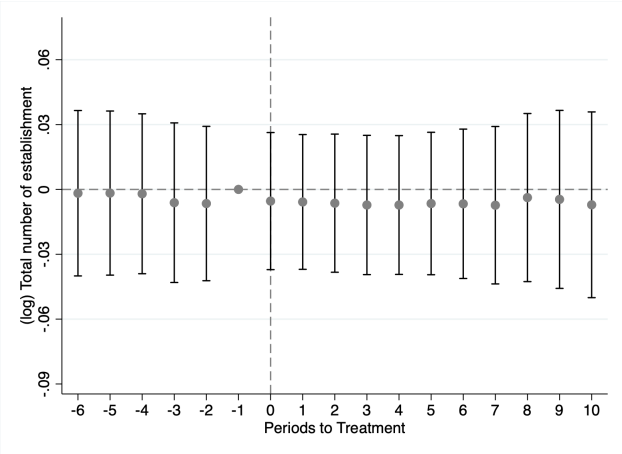
[7] In the cover story of March 2007, *Site Selection* provided an anecdotal fact that 5 of the Top 10 sports venues state were also among the list of Top 10 numbers of new plant attracted places in 2006.



(a) Entry rate of firms



(b) Exit rate of firms



(c) Total number of firms

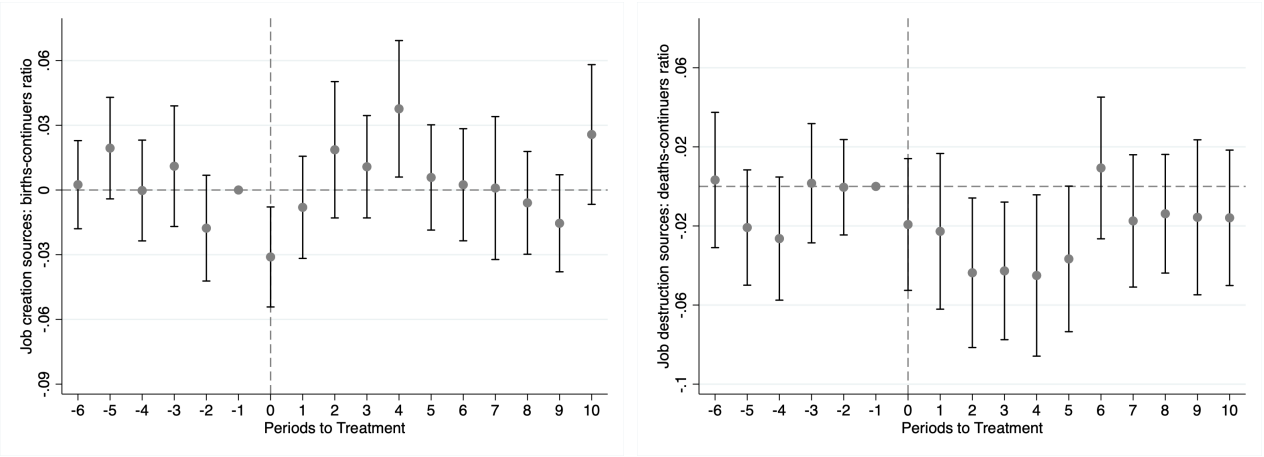
Notes: The Figures plot the event study results on the firm dynamics. The entry rate and exit rate are the number of new entry/exit establishments divided by the number of establishments at the start of the period. All firms in the graphs refer to the establishment, which includes the new branch of the firms. Standard errors are clustered at the county level. The confidence interval is at 95% level.

Figure 19: Firm Dynamics Back to main text

results are valid if the outcomes change to the numbers of new firms and exit firms.

Although the new sports venues did not have a significant impact on the total numbers of entry and exit of the firms, it affected the structures of the local labor demand by hiring and layoff behaviors of the new-entry and incumbent firms. To explore the intensive margin of the effects on local labor demand, I studied the proportion change among new job creations, by the birth-continuers ratio, which is $\frac{\text{Number of jobs created by the new firms}}{\text{Number of jobs created by the incumbent firms}}$. The event study results showed in Figure 20a described the places with new sports venues opening experi-

encing the relatively more jobs created by the incumbent firms when the new sports venues opened in that year.



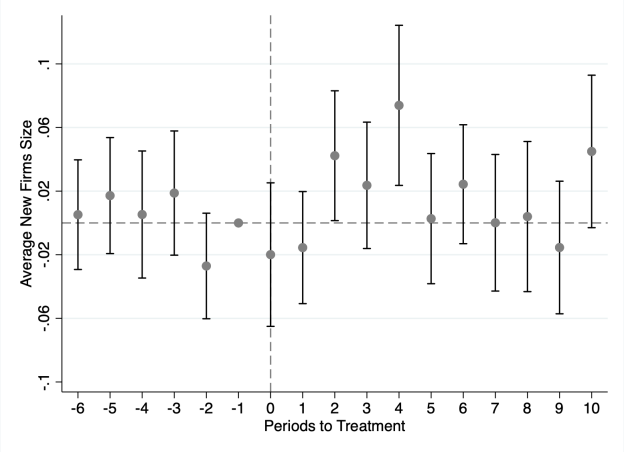
(a) New labors by firms (b) Job losses by firms

Notes: The Figures plot the event study results on the employment changes contributed by new-open/exit firms and existing firms. All firms in the graphs refer to the establishment, which includes the new branch of the firms. Standard errors are clustered at the county level. The confidence interval is at 90% level.

Figure 20: Labor change sources Back to main text

It suggested that the incumbent firms tried to expand the size in response to the new venues though the effects were not consistent and limited to the opening year. Interestingly, a significant positive effect occurred in the fourth period, which represents the reverse pattern in the medium run. This could be caused by the increase in the average size of the new firms. I verified this explanation by studying the effect on average jobs in the new firms in Figure 21. The sports venues significantly raised the average number of jobs hired by each new firm on average in the medium run, which indicated the larger new firms' size. The same spike in the effect magnitude in the fourth year suggested the story.

In contrast to the job creation reversed patterns along the periods, the effects on job destruction followed a consistent pattern both in short and medium runs. The outcome ratio captured the relative numbers of job destruction from exit of the firms to the ones from incumbent layoff, which is equal to $\frac{\text{Number of jobs destructed by the exited firms}}{\text{Number of layoffs by the incumbent firms}}$. The new sports venue generated a negative effect on the ratio, which described that the incumbent firms cut down



Notes: The Figures plot the event study results on the average size of new firms. All firms in the graphs refer to the establishment, which includes the new branch of the firms. Standard errors are clustered at the county level. The confidence interval is at 90% level.

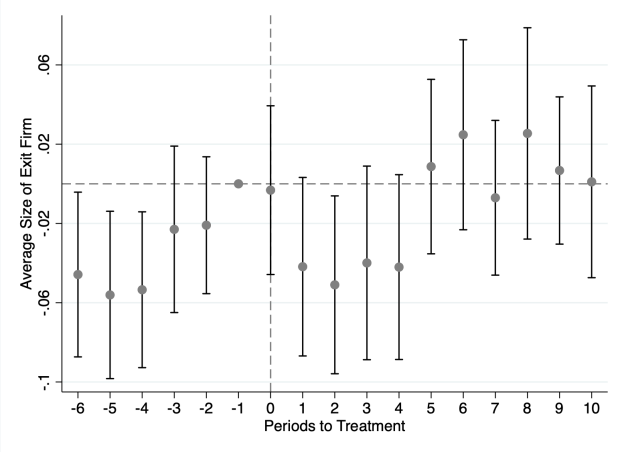
Figure 21: Average Size of New Firms Back to main text

relatively more jobs to the ones destructed by the exit firms [8]. The finding can be explained by the process of smaller firms quitting the market and only the larger firms left in the market, even though the overall entry and exit are not affected. This corresponds to the fact that posh restaurants have replaced parts of small establishments with low operation costs or relatively lower service and food quality in the stadium districts.

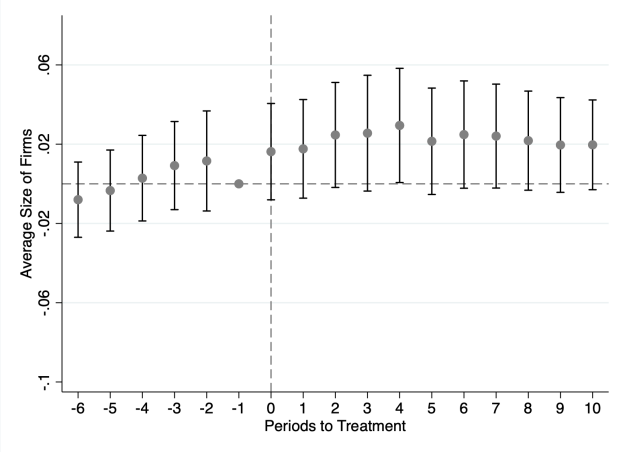
To test the hypothesis, I first study the effects on the average size of the firms quit and the overall average size of the firms after opening a new venue. The event study graphs for the average size of exit firms in Figure 22a happened to a similar pattern to the one on Job losses source ratio after the opening. Although the level is insignificant, the consistent negative effect suggests the average size of exit firms is smaller. Moreover, the smaller size in the earlier pre-treatment periods suggested the crowding-out effect on the small business probably had already started before the opening.

If we combine the findings above on the smaller exit firm size, larger entry firm size, and the impacts on the hiring and layoff of incumbent firms are not significant as shown in Figure 23

[8]The average firm sizes in the opening year among places with sports venues are 20.63 jobs per firm with the small standard deviation equal to 3.53, and the mean of job destruction source ratio is 0.535 with the small standard deviation, 0.075.



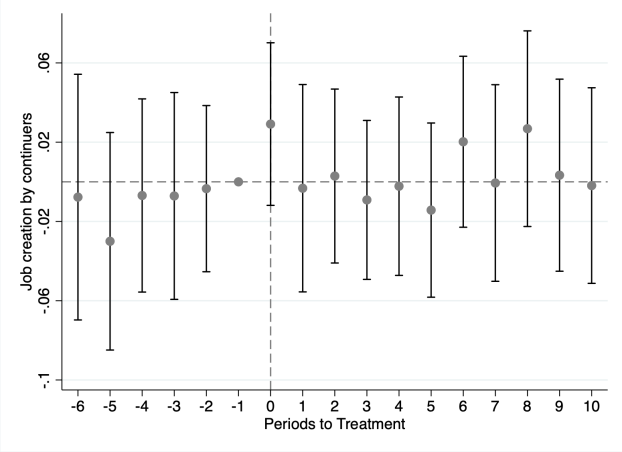
(a) Average size of exit firms



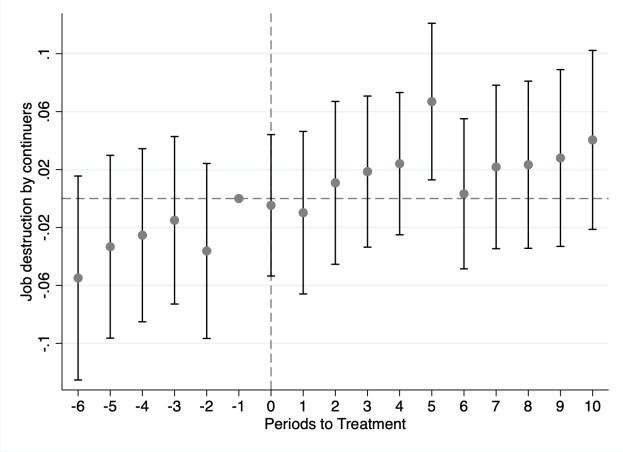
(b) Average size of firms

Notes: The Figures plot the event study results on the sizes of exit firms and all firms in the market. All firms in the graphs refer to the establishment, which includes the new branch of the firms. Standard errors are clustered at the county level. The confidence interval is at 90% level.

Figure 22: Size of Exit Firms and All Firms Back to main text



(a) Job creation by incumbent firms



(b) Job layoff by incumbent firms

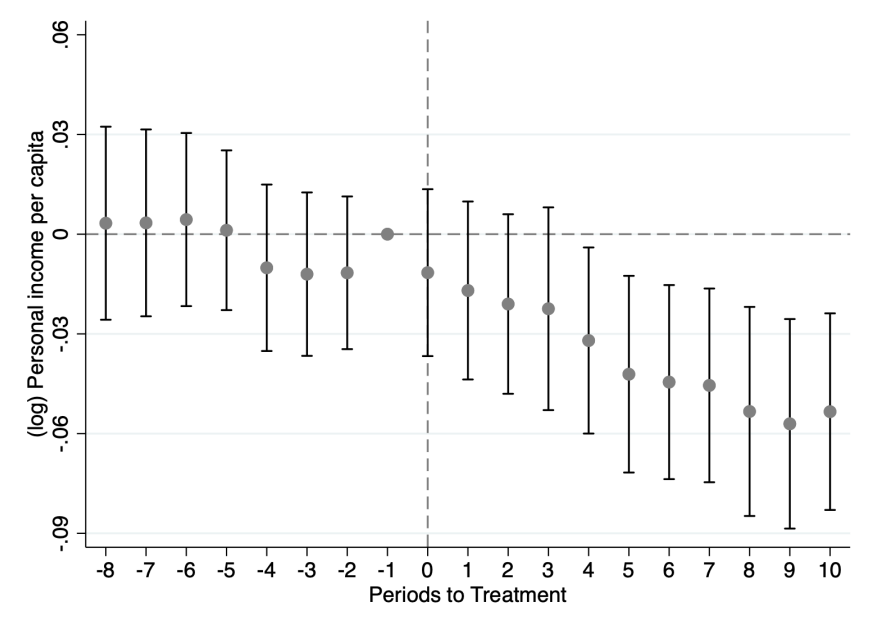
Notes: The Figures plot the event study results on job creation and layoff by incumbent firms. All firms in the graphs refer to the establishment, which includes the new branch of the firms. Standard errors are clustered at the county level. The confidence interval is at 90% level.

Figure 23: Incumbent Firms Back to main text

, we should expect the average firm sizes are larger compared to other counties. The event study graphs in Figure 22b suggested the small gain of the firm size after the opening, which is around 2.9% in the medium run. Therefore, the sports venues will not affect the total entry and exit number of firms in the extensive margin, but it will raise the size of entry

firms and propel the smaller size firms to exit, which leads to the average size increase of the firms in the local market. It might mislead the incumbent firms to expand in the opening year, but will cause more layoffs from the surviving firms later, which can be interpreted again by the rise in the job creation in the opening year in Figure 23a and the significant bump on the job destruction in period 5 in Figure 23b.

B Appendix B: Figures and Tables



Notes: The Figure plots the event study results on the personal income per capita with longer pre-treatment periods. Standard errors are clustered at the county level. The confidence interval is at 95% level.

Figure 24: Personal Income Back to main text

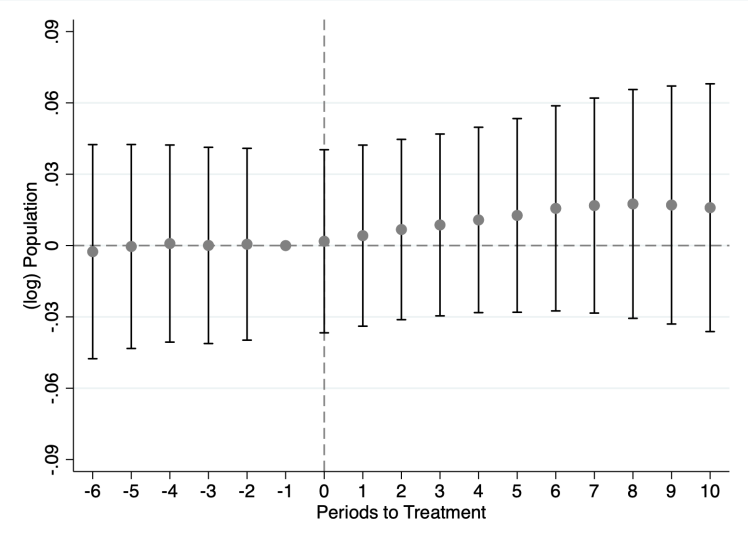


Figure 25: Total populationBack to main text

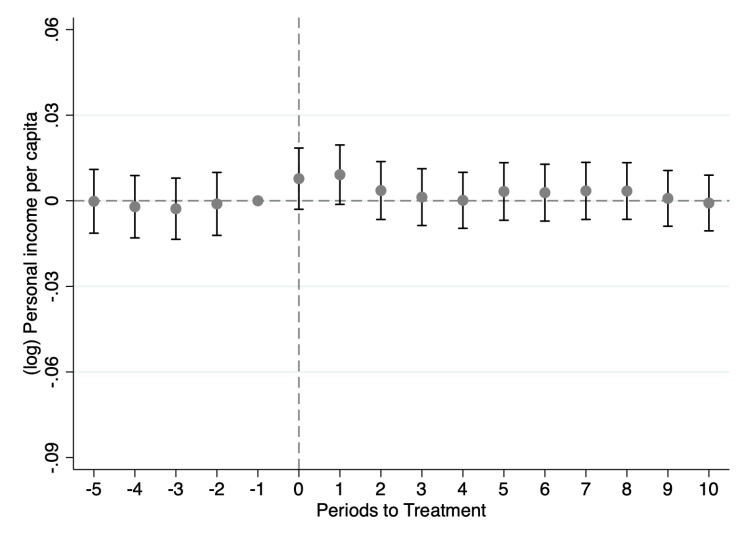


Figure 26: Spillover effect on all neighbors Back to main text

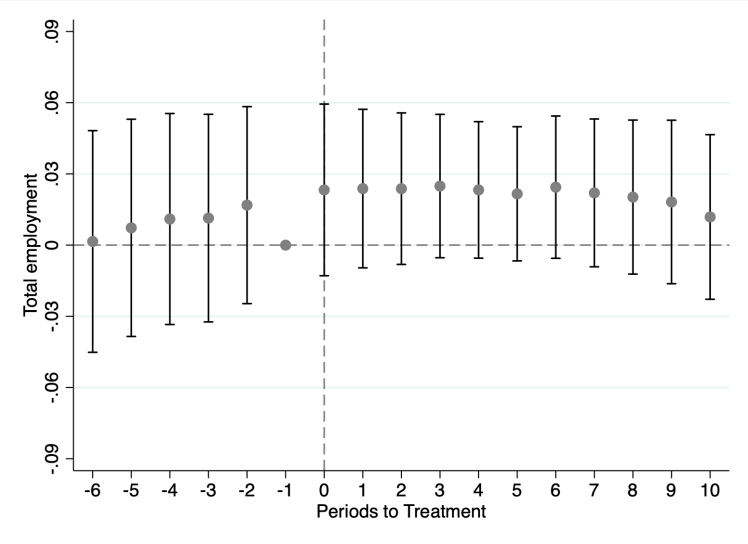


Figure 27: Total employment Back to main text

Table 4: Propensity Score Model

Dep variable: County level Venue dummy	Coeff.	s.e.
Poverty rate 1990	-0.059	0.282
Unemployment rate 1990	0.454	0.883
Log(establishment entry) 1990	9.286	8.722
Log(establishment exit) 1990	-1.838	9.238
Housing vacancy rate 1980	-81.798	47.148
Housing vacancy rate 1990	6.635	42.482
Proportion <18 years old 1980	0.334	1.039
Proportion <18 years old 1990	-0.258	0.899
Proportion $\geq$ 65 years old 1980	3.315	1.450
Proportion $\geq$65 years old 1990	-2.833	1.332
Proportion Black 1980	0.692	0.385
Proportion Black 1990	-0.631	0.396
Proportion Hispanic 1980	-0.588	0.434
Proportion Hispanic 1990	0.528	0.387
Change in log of establishments 1980-1990	-29.018	14.732
Change in log of average personal income 1980-1990	3.298	11.133
Change in log of median housing value 1980-1990	-7.660	5.998
Change in log of rent 1980-1990	2.920	6.161
Change in log of population 1980-1990	-77.752	30.845
Change in proportion of adult with college degree 1980-1990	-0.283	0.364
Change in log of household 1980-1990	88.662	30.432
Change in log of employment 1981-1990	2.753	12.232
Change in log of average wage 1981-1990	10.388	10.246
Observations	727	
Clusters	727	
Pseudo-R^2	0.8542	

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Table 5: Regression Opening Time and Characteristics

	(1) No controls	(2) With controls	(3) With controls	(4) Full treated group
Personal income	10.02	40.48	39.80	33.11
	(29.402)	(51.936)	(43.269)	(26.232)
Number of establishments	1.71	8.68	-1.25	0.99
	(17.682)	(55.051)	(17.628)	(11.514)
Total employment	-8.17	-32.17	-18.92	-4.56
	(12.553)	(30.239)	(17.873)	(9.468)
Average wage	-6.45	36.18	30.35	37.10
	(40.245)	(108.412)	(53.991)	(23.603)
Population	8.85	11.61	13.10	12.42
	(15.491)	(45.587)	(16.485)	(8.548)
Population density	0.66	-0.21	-1.47	-1.57
	(1.897)	(3.048)	(1.470)	(1.286)
Median rent	18.79	22.69	6.85	2.76
	(12.985)	(44.813)	(18.756)	(10.765)
Median housing value	-4.05	-8.93	-4.40	-0.47
	(6.311)	(18.633)	(10.108)	(4.735)
Total revenue per capita	-19.37	-8.11	5.14	
	(17.392)	(21.857)	(18.967)	
Property tax per capita	4.05	-2.69	-2.93	
	(4.019)	(8.383)	(6.257)	
Directed expenditure per capita	19.77*	21.49	12.36	
	(10.626)	(15.949)	(12.989)	
Outstanding debt	-0.49	-3.68	-2.48	
	(2.076)	(6.178)	(3.053)	
Hotel and motel employment	5.17	5.41		
	(5.752)	(7.948)		
Manufacturing employment	0.91	5.92	-3.85	-14.94*
	(4.345)	(16.313)	(12.397)	(7.716)
Retail employment	-10.39	-1.32	8.65	1.75
	(19.102)	(44.641)	(18.950)	(10.335)
manfwage_1990	17.48	13.60		
	(19.690)	(41.400)		
retailwage_1990	-14.49	-34.05		
	(31.862)	(68.938)		
Poverty rate		-0.05	-0.11	0.54
		(2.067)	(1.652)	(0.674)
Unemployment rate		-1.79	-1.98	-2.95**
		(6.246)	(3.703)	(1.337)
Population share younger than 17		0.89	0.32	-0.35
		(1.276)	(1.005)	(0.564)
Population share older than 64		-0.84	-1.01	-0.89
		(1.681)	(1.022)	(0.784)
Share of adults with college degree		-0.58	-1.07	-1.32*
		(1.521)	(0.852)	(0.660)
Share of adults without high-school diploma		0.37	0.04	-0.14
		(0.983)	(0.416)	(0.355)
Manufacturing share on total employment		-65.25	-1.22	99.36
		(109.266)	(104.409)	(76.639)
Observations	34	34	36	38
R^2	0.55	0.70	0.59	0.56

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Table 6: SCM events studied: 2004-2010

caseno	casename	County_Name	Opening_Year	Sports
1	Petco Park	San Diego, CA	2004	Baseball
2	Fedex Forum	Shelby, TN	2004	Basketball
3	Spectrum Center	Mecklenburg, NC	2005	Basketball
4	Prudential Center	Essex, NJ	2007	Hockey
5	Nationals Park	D.C.	2008	Baseball
6	Yankee Stadium	Bronx, NY	2009	Baseball
7	Citi Field	Queens, NY	2009	Baseball
8	MetLife Stadium	Bergen, NJ	2010	Football
9	Target Field	Hennepin, MN	2010	Baseball
10	Amway Center	Orange, FL	2010	Basketball

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