

# Mega-events: Is Baylor Football to Waco what a Super Bowl is to Houston?

## *Abstract*

This paper analyzes the net impacts of a variety of professional and collegiate sporting events on the sales tax revenues and total taxable sales of the specific cities which host the events using monthly data describing twenty-three cities in Texas from January, 1990, through December, 2008. Contrary to the rhetoric offered by those who argue in favor of public subsidies to host professional sports franchises, we find that regular season and many post season games actually correspond with net decreases in economic activity in the host city, from which we infer that a professional sports franchise provides considerable substitution effects to the local population. We find that college football games have a positive impact on local host-city tax revenues and that the relative impact of a season of college football might be roughly equivalent to the relative impact of the Super Bowl on the host city.

*JEL Classifications:* L83, H27.

*Keywords:* tourism, economic impacts, special events.

# 1 Introduction

Super Bowls, Olympic Games, the NCAA Final Four, even political conventions are much sought after because cities believe that hosting them will be economically beneficial. While there may be enormous psychological gains to those who live in a community stages a high profile, high prestige event, quantifying the value of these feelings of pride, joy, and satisfaction has proven very difficult to measure. On the other hand, jobs, income, taxable sales created, and tax revenues produced by the events are measurable and have been investigated by a number of authors (see, for example, Baade and Matheson, 2001, 2004a, 2004b; Matheson and Baade, 2005; Coates and Humphreys, 2002; Porter, 1999; and Coates, 2006). In fact, a large literature seeks to measure the effects of holding these events so that policy makers can know just how valuable the events can be for their city. If a city plans to expend a large amount of public funds to attract and stage an event, it is imperative to have an estimate of what the community can expect to receive in return. The general consensus in the academic literature that analyzes these events *ex post* is that there are not large returns in terms of permanent jobs or income. However, the literature focusing on the amount of tax revenue generated is less developed.

Baade, Bauman and Matheson (2006) examine how events in the sports world or society more generally impact sales taxes in Florida, focusing specifically on the effects of sports strikes and lock-outs. In their analysis they also control for the effects of hurricanes and the opening of new stadiums or arenas as well as the arrival of expansion franchises in baseball, football, basketball, and hockey. Oddly, they do not include controls for the Super Bowls hosted in Miami, Tampa or Jacksonville. Their intuition is that work stoppages are mega-events, albeit of the negative variety. Work stoppages often last for a substantial period of time and cause the cancelation of a large number of games. Therefore, rather than testing for the positive impact of events being held, they test for any negative impact of events *not* being held. Unfortunately, neither work stoppages, the opening of new facilities, nor the arrival of a new team have a statistically significant effect on the host city's share of state taxable sales. One can infer that because the (missing) events have no effect on taxable sales, they also have no effect on tax revenue.

Coates (2006) and Coates and Depken (forthcoming) are most similar to what we do here. Coates

(2006) uses a time series of monthly sales tax revenues for Houston, Texas to estimate the effects on local sales tax revenues of hosting the 2004 NFL Super Bowl and the 2004 Major League Baseball All-Star game. He finds that hosting the Super Bowl may well have generated an increase in the sales tax revenues collected in Houston, but that the increment to revenues was possibly smaller than the increased expenditures on security and sanitation and other public services that the event required. His findings regarding the All-Star Game are also not supportive of mega-events as large tax revenue generators. In fact, he finds that sales tax revenues in Houston are smaller in July 2004, the month of the All Star Game, than they would have been in the typical July.

Coates and Depken (forthcoming) investigate the impact of college football games on sales tax revenues in four Texas cities: Lubbock, College Station, Waco, and Austin. They find that college football games generally have positive impacts on local sales tax revenues but that the impacts differ depending on whether the visiting team is from the state of Texas and whether the visiting team is a conference rival.

The present study extends the existing literature by examining a larger variety of sporting events in a larger number of cities in the same state over a longer period of time. The study is similar to Baade, Baumann, and Matheson (2006), but focuses on the levels of taxable sales and sales tax revenues on the actual city that hosts the event rather than at the county or metropolitan statistical area (MSA) level. Further, we address to what extent various events might be considered a mega-event depending on the size of the city that hosts the event. For a large metropolitan area like Houston or Dallas, the Super Bowl or Major League All-Star Game, both of which are events spread over several days and are of national and international interest, are prototypical “mega-events.” For these cities, a regular season home game of the Texans or Cowboys (both National Football League franchises) may be far less significant than a mega-event, and a home contest of the University of Houston or the Southern Methodist University may be of less consequence still. However, for Waco, Lubbock, or other middle to small sized city, a regular season home game of the local university football team may be a mega-event.

Using a panel of monthly tax revenues for twenty-three cities in Texas covering January 1990 through December 2008, we estimate the net effects of various sporting and entertainment events on real tax revenues and real taxable activity within the borders of the city that actually hosts the event.

The analysis reveals several interesting results. Regular season college football games seem to provide net increases, but post season college football games correspond with reductions, in local sales tax revenues and hence taxable activity. We find that the effects of many professional sporting events reduce local sales tax revenues, contrary to the *ex ante* rhetoric of proponents for hosting such events. However, the analysis does suggest that the NFL's Super Bowl and the NBA's All-star game have the largest impacts on taxable sales amongst the events investigated. Interestingly, and contrary to what convention and visitors bureaus might suggest, we find that hosting a national political convention corresponded with a dramatic net decrease in taxable activity.

## 2 Data and Empirical Model

Our goal is to estimate the effects of various sporting events on the tax revenue, alternatively taxable activity, in cities that host these events. To accomplish this, data on monthly sales tax allocations for 23 Texas towns and cities from January 1990 through December 2008 were obtained from the Texas Comptroller's Office.

The state of Texas does not have a state income tax and raises a significant portion of the state government's revenues from a state sales tax, currently set at 6.5%. Local cities can charge up to an additional 2% in sales taxes which can be dedicated to general city funds or to specific projects, including mass transit, street maintenance, and stadium construction. Our data reflect the local jurisdiction's portion of the overall sales tax collected in the jurisdiction. We also collected the prevailing state and local sales tax rates.

We obtain an estimate of real locally taxable activity by dividing the real sales tax revenues allocated to a particular city by the city's prevailing local sales tax rate. This measure of real locally taxable activity actually underestimates total taxable activity because not all activity is taxed at the local level in the state of Texas, e.g., new and used car sales and real estate transactions and on-line commerce. On the other hand, the activity reflected by our estimate is that which sports boosters would argue are most likely to be enhanced by the various sporting and entertainment events we investigate. At the worst, the measurement error inherent in our estimated real taxable activity would push standard errors upwards, perhaps leading to Type II errors.

A primary concern is the length of the sample period given the nominal measure of sales tax allocations. We convert the monthly sales tax allocations to real 2004 dollars using the monthly Consumer Price Index as reported by the Bureau of Labor Statistics.<sup>1</sup> Figures 1-3 provide some indication of the patterns of the real tax allocations for different sized cities. Figure 1 depicts monthly real allocations for three relatively large Texas cities: Arlington, Fort Worth, and Dallas. As can be seen, there is a significant difference in the averages between Dallas and, as a group, Arlington and Fort Worth. There is also considerable monthly variation in tax revenues. Much of this variation is systematic, essentially corresponding either to the more active shopping periods of the year, i.e., during major gift-giving holidays, or to the third month in each quarter. Under Texas state tax laws, small firms that collect the least amount of taxes each month are allowed to submit their collections quarterly rather than monthly. Figure 2 depicts the same set of data for three relatively small cities: Canyon, Commerce, and Kingsville.<sup>2</sup> As can be seen in Figure 2, real monthly tax revenues have been relatively constant over time for Canyon and Commerce and have been slightly increasing over time for Kingsville. The examples depicted in Figures 1 and 2 suggest that there is considerable intra-year variation in real tax revenues but that corresponding months across years have relatively similar levels of tax revenue. Moreover, the examples suggest that there might be city-specific fixed effects and city-specific time trends.

Figure 3 offers a closer view of the intra-year variation in real tax revenues by looking at real tax revenues to the city of Dallas, Texas, from January 2003 through December 2008. The figure clearly shows a spike in real tax revenue once a quarter, with what seems to be a slight upward trend. This intra-year variation suggests some seasonality in the data. We describe below how we control for this seasonality to avoid specification error that could lead to biased estimates or spurious results.

To measure the impact of sporting and entertainment events on taxable activity and sales tax revenue, we gathered data on a number of different events, including regular, post-season, and championship games in professional football, basketball, baseball, hockey, and soccer that occurred in a given month in a given tax jurisdiction. We also gathered information on the number of PGA events,

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<sup>1</sup>We use the Consumer Price Index - All Urban Consumers available at [www.bls.gov](http://www.bls.gov), last accessed March 2009.

<sup>2</sup>Canyon, a town of approximately 13,000 located about 18 miles south of Amarillo, Texas, is the home of West Texas A&M University. Commerce, a city of approximately 9,500 people located approximately 70 miles northeast of Dallas, is home of Texas A&M University - Commerce. Kingsville, a city of approximately 25,000 people located about 45 miles south of Corpus Christi, is home to Texas A&M University - Kingsville.

NASCAR and IRL auto races, the number of regular season FBS (formerly known as Division I-A), FCS (formerly known as Division I-AA), and Division II college football games, whether a city hosted a Big XII championship football game, and the number of college post-season bowl games by month and jurisdiction.<sup>3</sup> Finally, we recognize that the city of Houston hosted the 1992 Republican National Convention.

Table 1 reports descriptive statistics of the data sample. The upper panel reports the average level and twelve-month change in real tax revenues, the level and twelve-month change in real taxable activity, and the local sales tax for the sample of cities analyzed. As can be seen, the average monthly real sales tax revenue was \$4.4 million, the one-year change in real tax revenue averaged approximately \$115,000 each month, the average monthly level of taxable activity was \$58.9 million, and the average one-year change in taxable activity was approximately \$1.48 million.

During the sample period, there was considerable variation in both tax revenues and taxable activity, not only across cities but also within cities. For example, the city of Houston suffered the largest reduction in tax revenue of approximately \$7.6 million in October 2002 (relative to October 2001), while also experiencing the largest increase in tax revenues of approximately \$5.7 million in May 2006 (relative to May 2005). Over the course of the sample period the average local sales tax was 7.62 percent with a low of 7.25 and a high of 8.25, which is the state mandated limit to the combined state and local sales tax.

The lower panel of Table 1 reports the descriptive statistics of the various events that we analyze. The panel reports the number of non-zero observations for each type of event and the average number of events that took place in a given month. Of the 913 observations corresponding to cities that hosted regular season college football games, the average number of games hosted during the football season was 1.73 games per month.

During the various professional sports seasons, the average number of regular season baseball games was approximately 13 per month, the average number of basketball games was approximately 7 per month, the average number of NFL regular season games was approximately 2 per month, the average number of regular season hockey games was approximately 6 per month, and the average number of regular season MLS games was approximately 2 per month. Our data include three NFL games played

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<sup>3</sup>Starting in 2007, Division I-A football conferences are identified as being in the Football Bowl Subdivision, FBS, and Division I-AA football conferences are identified as being in the Football Championship Subdivision, FCS.

in San Antonio by the New Orleans Saints after Hurricane Katrina.

Amongst the post-season sporting events, there are sixty-five city-month observations during which an NCAA Bowl Game occurred, five city-month observations during which the Big XII football championship was played (which we initially consider as having a potentially different impact than a post-season bowl game), sixty-one city-month observations during which an NBA playoff game occurred, nineteen city-month observations during which an NHL playoff game was held, and fifteen city-month observations during which an MLS playoff game was held. Amongst the biggest events in our sample, seven city-month observations correspond with NBA finals games (in Houston, San Antonio, and Dallas), two city-month observations with the NBA All-star game, three city-month observations with the NHL finals, two city-month observations with the MLB All-star game (Arlington and Houston), one city-month observation with the World Series (Houston), thirty-two observations with a NASCAR/IRL race, ten observations with international soccer game, fifty-four observations with a PGA tour event, and one observation with a national political convention occurred (Houston).

The biggest event in our sample, the NFL Super Bowl, was played in Houston on February 1, 2004. The extended nature of the Super Bowl festivities, led us to link the Super Bowl to effects on the sales-tax revenue and taxable activity during both the months of January and February 2004. Because we identify the Super Bowl with two months, the estimated impacts are reported as twice the coefficient on the Super Bowl variable.

We postulate a linear relationship between real tax revenues (or real taxable activity) and the various sport and entertainment events, the local tax rate and its quadratic, a general time trend, and a time trend specific to the city of Houston which starts in January 2004<sup>4</sup> :

$$DEP_{it} = \alpha_i + \lambda_i TIME_{it} + \beta EVENTS_{it} + \gamma_1 RATE_{it} + \gamma_2 RATESQ_{it} + \delta X_{it} + \epsilon_{it}, \quad (1)$$

where  $i$  indexes the city,  $t$  indexes the month, and  $\epsilon_{it}$  is a zero-mean error term. The dependent variable,  $DEP_{it}$ , is alternatively real monthly tax revenues or real taxable activity for city  $i$  in month  $t$ , measured in 2004 CPI adjusted dollars. The parameters to be estimated include  $\alpha_i$ , a city-specific

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<sup>4</sup>We include this Houston specific trend because Coates (2006) found it to be statistically significant. Visual inspection of the data suggested that the Houston trend changed about January 2004.

fixed effect which is constant over time,  $\lambda_i$ , a city-specific time trend,  $\beta$ , a vector of parameters that measure the net impact of various sporting events on the dependent variable, and  $\delta$ , a vector of parameters associated with control variables  $X$ .

As mentioned, it is important to adequately control for the intra-year variability of tax revenues and taxable activity. A common approach is to first-difference the data, which would measure the one-month change in tax revenues (taxable activity) throughout the year. However, as can be seen in Figure 3, month-to-month differences are unlikely to sufficiently de-trend the data. Rather than impose a seasonality adjustment procedure, such as the Census Bureau’s X-12 seasonality adjustment, we use the twelve-month difference of the model described in equation (1). In this approach the dependent variable is measured as the twelve-month change in real sales tax revenue (or taxable activity) as are the independent variables. One advantage of this approach is that the fixed effect for city  $i$  in the estimated equation is actually the growth rate for city  $i$ ,  $\lambda_i$  in equation (1), while the city-specific fixed effects  $\alpha_i$  have been differenced out of the estimation.<sup>5</sup> Also differenced out are the effects of the annual stock and cattle shows that occur in the same month each year. Figure 4 plots the results of 12-month differencing the Dallas tax revenue data.

We also control for seasonality and general macroeconomic trends by including a time trend, and month and year dummy variables, to account for as many temporal and seasonal influences on taxable activity as possible. Although general time trends and dummy variables are not ideal for this purpose, the data that would ideally be used to model a city’s economic activity, e.g., population, unemployment, business starts, and education level, are not available on a monthly basis. Indeed, for many of the smaller cities in our sample it is not easy to obtain many of these variables on even an annual basis. the time trends and year-month dummy variables are used so as to take advantage of the high frequency tax revenue data that allows for a more focused measure of the impact of a particular sporting event.

We estimate two specifications for sales tax revenue and taxable sales activity. The first does not differentiate between NCAA football games by competitive classification; FBS (formerly Division I-A), FCS (formerly Division I-AA), and Division II games are assumed to have the same impact on taxable activity. The second specification recognizes the potential for FBS games to have a larger impact on

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<sup>5</sup>This does require an adjustment to the standard errors. Specifically, the fixed effects estimator will calculate the standard errors based on  $NT - N - k$  degrees of freedom whereas the correct degrees of freedom are actually  $NT - 2N - k$ .

the host city because of differences in fan bases, willingness to travel, and the level of attendance to the games.

We do this by interacting a dummy variable, *FBS*, which equals one if the home team plays in the Football Bowl Subdivision and zero otherwise, with the number of games in the host city. In the case of Denton, Texas, home of the University of North Texas, the football team was promoted to FBS status in 1995. Therefore, for 1990-1994, football games hosted in Denton are not included in the interaction terms. The city of Houston hosts two FBS teams (Houston and Rice) and one FCS team (Texas Southern). We include only the FBS-hosted games in Houston in the interaction term, with the remaining FCS-hosted games omitted.

For the most part, the timing of the events we investigate is not directly controllable by city officials. Therefore, when a city hosts a World Series or NBA Finals game, for example, the city enjoys a net tax benefit or bears a net tax cost without having to “bid” for the privilege; the success of the team can be considered exogenous to the city treasury. The parameter estimates on the various events can be interpreted as the net dollar impact of the specific event on the tax revenues (taxable activity) having controlled for the local tax rate, city-specific fixed effects, and city and state-level time trends.

### 3 Results and Discussion

Table 2 reports estimation results for the specifications described in the previous section. Often a city will solicit an economic impact analysis of an event it wishes or plans to host. These studies tend to focus on the impact an event will have on taxable activity (rather than sales tax returns to the city). Thus, the results in Table 2 concerning the impact of various events on taxable activity (columns three and four) can be directly compared to the *ex ante* predictions from economic impact studies. On the other hand, the majority of the academic studies of mega-events focus on the impact of events on local sales tax revenues. Looking at sales tax revenue facilitates a test of whether any additional public expenditure on security, beautification, and direct bidding for an event is offset by public revenues raised by the event. Therefore, the results in the first two columns of Table 2 can be directly compared to other academic studies of how events impact sales tax revenue.

We note that there are alternative sources of taxes that are not accounted for in our data.<sup>6</sup> Furthermore, exact line-item breakdowns of event costs are not available. Therefore the analysis of whether events “pay for themselves” is difficult to address with the available information. However, for those interested in pursuing one or more of the events investigated here, the parameter estimates provide insight into the expected tax revenues generated. Our results might suggest the maximum costs of police and rescue services worker overtime and costs of additional sanitation and other city-provided services for the event to break even for the city. Nevertheless, the results presented in Table 2 represent the most comprehensive analysis of how professional and college sporting events impact taxable activity and sales tax revenues to date.

Consider the first two columns of Table 2, which report estimation results where the dependent variable is real sales tax revenue. The most optimistic estimates suggest a city might enjoy an increase in additional sales tax revenues of approximately \$56,000 when hosting an NCAA regular season game. This might be a substantial boost in sales tax revenues for a middle-sized city. Consider that that average 12 month difference in sales tax revenues among the twenty-three host cities in the sample is about \$115,000. The effect of one more college football game during a given month might increase local tax revenues by approximately 50%.

College bowl games, the Big XII championship, NFL regular season and playoff games, and NBA regular season and playoff games do not appear to offer net increases in local tax revenues, although the events might add considerable consumer surplus to locals and tourists. Each of these events is associated with a reduction in host-city sales taxes during the month they occur, although the amounts vary across the different events. An NCAA bowl game is linked to a reduction in host-city sales tax revenues of approximately \$1.2 million, and an NFL regular season game of approximately \$237,000. In contrast, NBA regular season games, MLB regular season games, and PGA tour events, do not have a net impact on host-city sales tax revenues.

There are some events which correspond with increases in host-city sales tax revenues. For example, NHL regular season games are associated with approximately \$26,000 and an additional NASCAR/IRL race is associated with approximately \$115,000 more in additional host-city sales tax revenues. MLS

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<sup>6</sup>Both the state of Texas and the local jurisdictions can impose a local hotel occupancy tax, for example. Visitors in town to see a game who spend the night in a hotel or motel would pay this tax, providing revenue attributable to the event, at least in so far as these visitors did not displace others who would have come to town except for the occurrence of the sporting event.

regular season games (of which there are only 16 during the season) are associated with approximately \$230,000 in additional sales tax revenues. Allstar games seem to have different impacts. The NBA All-star game was associated with an increase in host-city tax revenues of approximately \$876,000 but the MLB All-star game had no significant impact on local sales tax revenues. These dramatic differences suggest that much of the activity surrounding the MLB All-star game is generated by local fans rather than by out-of-towners.

Depending on the sport, post-season games can provide a boon to local sales tax coffers. As the city government has no direct impact on the season-long performance of the city's sports franchises, post-season playoff games provide an opportunity for an exogenous and short-lived increase in sales tax revenues. Playoff games in the NFL and the NBA are associated with net reductions in host-city sales tax revenue; an NFL (NBA) playoff game is associated with a reduction in host-city sales tax revenues of approximately \$300,000 (\$115,000). However, playoff games in the MLB generate approximately \$300,000 in tax revenue, in the NHL approximately \$120,000, and in the MLS approximately \$375,000 per event.

The results also indicate the value of professional championship or finals games is distinct from playoff games. Games during the NBA finals have a small positive (but statistically insignificant) impact on host-city sales tax revenues, but this is an improvement over the negative impacts of NBA playoff and regular season games; the Super Bowl has a larger impact than NFL playoff games, and the World Series has a larger effect than MLB playoff games; and NHL finals game has a larger positive impact on local sales taxes than other NHL playoff games. The only anomaly in these comparisons is the MLS championship game, which did not have a statistically significant impact on the sales taxes in host-city Frisco, Texas.<sup>7</sup> International soccer matches, which included several World Cup matches hosted in Dallas and the remainder in Houston, had a positive net positive impact of approximately \$80,000 on host-city tax coffers; perhaps soccer has a larger impact than previously understood.

The different impacts of the NHL and NBA finals is especially interesting because the seasons largely overlap and the championship series in the two sports are often played contemporaneously.

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<sup>7</sup>The MLS Cup was hosted in Frisco, Texas, in 2005 and 2006. The 2005 MLS Cup pitted Los Angeles against New England, while the 2006 MLS Cup involved Houston versus New England. Thus, three of the four teams that participated in the two MLS cups were from far-flung cities that might have reduced the number of out-of-towners who stayed or otherwise spent money in Frisco. On the other hand, MLS playoff games involved the local team which might have encouraged more new spending in Frisco as residents of surrounding cities attended the game.

Moreover, the NHL is generally thought to be of less interest to U.S. sports fans than the NBA. The NHL championship series in Texas have only occurred in Dallas, whereas the NBA finals have occurred in Dallas, Houston, and San Antonio. One possible explanation for the disparate effects of the championship series in basketball and hockey is the recent championship experience of the opponents each franchise faced. For example, the Dallas Stars hockey team faced a Buffalo Sabres team in 1999 that had not made the Stanley Cup Finals since 1975. One might surmise the long Stanley Cup Series drought Sabres fans had endured might have resulted in a large contingent of Buffalo fans making a trip to Dallas during the championship series. San Antonio of the NBA, in contrast, played the Knicks in 1999, only five years after the last Knicks trip to the finals; they played the New Jersey Nets in 2003 when the Nets were in the finals for a second consecutive year; and they played the defending champion Detroit Pistons in 2005. In other words, for those instances where finals games have large positive impacts, the opponents have not had recent finals experience which may have resulted in especially large numbers of fans traveling to Texas for the games. But in the case where the finals have had no impact, the opponents generally have been in the championship series quite recently.

Of course, this explanation is dealt a severe blow by the other appearances of Texas franchises in the NBA finals. In 1994, the Houston Rockets played the New York Knicks for the NBA championship. New York had not reached the NBA finals since 1973. The 2006 appearance of the Dallas Mavericks in the NBA finals marked the first finals participation of the Mavericks and of their opponent, the Miami Heat. In these circumstances, one might expect Houston to have attracted large numbers of Knicks fans, Dallas to have attracted large numbers of Heat fans, and both to have experienced a boost to their sales tax revenues. We re-estimated the model separating the San Antonio NBA finals from the Houston and Dallas finals. The latter has a positive coefficient and the former a negative one, suggesting that the experiences of the cities are different. However neither is statistically significant.

Perhaps the most interesting, and most prominent, of the mega-events is the Super Bowl, the championship game for the NFL. Many people have studied the Super Bowl and its effects from a variety of perspectives. The first evaluation of the Super Bowl we mention is that of Phil Porter (1999). He finds that in the Florida (Dade and Hillsborough) and Arizona (Maricopa) counties that held Super Bowls between 1979 and 1996 only in one out of 18 specifications was a Super Bowl found to have a positive and statistically significant effect on real sales. Baade and Matheson (2004b) find

that Super Bowl impacts are generally about one-tenth of the \$300 million boosters generally claim. Coates (2006) examined the Houston case and found that sales tax revenues attributed to the Super Bowl could reach as much as \$5 million, which would be associated with an increase in local spending of approximately \$500 million. Coates and Humphreys (2002) found that the city whose team won the Super Bowl experienced a one year boost to income of about \$140 per capita, though hosting the game had no effect. Matheson (2005) contests that view, finding substantially smaller effects for the winning city, about \$50 or \$60, that are not statistically significant.

Our results add to the understanding of the effects of the Super Bowl on local economies. The analysis indicates that Houston sales taxes increased by about \$4 million (\$2 million in both January and February, 2004) from hosting the Super Bowl in 2004. This is, by far, the largest revenue boost of any of the sporting events in our data. Note that it takes more than six World Series games or four NBA All Star games to match the additional sales tax revenue generated by the Super Bowl. In an absolute sense, therefore, the Super Bowl can truly be considered a mega-event.<sup>8</sup>

One event included in our analysis deserves special mention. The 1992 Republican National Convention was held in Houston in August of that year. Like any event expected to draw lots of visitors, political conventions held every four years to select a presidential candidate would be expected to be a great boon for local business and the host city. The evidence here is that this is not necessarily true, at least in the case of Houston. The political convention reduced taxable sales by over \$19 million and reduced sales tax revenues by approximately \$1.4 million. An interesting question for future research is whether other conventions have a similar impact. For example, if the Allied Social Science Association were to meet in Dallas, do Dallas merchants and the city treasury suffer as much as when the Republicans meet there?<sup>9</sup>

Column 2 of Table 2 distinguishes between FBS football games and FCS and Division II games. FBS teams play in larger stadiums and, often, in larger communities, they enjoy larger fan and alumni bases, and therefore might have a larger impact on their host-cities. The results in Column 2 suggest that FBS games have a large and positive impact on their host-cities, but that FCS and Division II

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<sup>8</sup>To determine if hosting the Super Bowl is worthwhile from a fiscal perspective, it is necessary to compare the net revenues to the total costs of hosting the event to the host city. One estimate put the cost of hosting the Super Bowl at \$1.5 million for the city of Houston. If this estimate is accurate, the Super Bowl might have generated a small net surplus for the City of Houston. The City of Houston Controller's Office estimated the net revenues from hosting the Super Bowl at about \$900 thousand.

<sup>9</sup>The last time the ASSA meetings were held in Dallas was 1984, therefore we cannot test this question.

games have no discernable impact on their host-cities. Other than these differences, the results in Column 2 of Table 2 are essentially the same as in Column 1.

The results of using real taxable activity as the dependent variable are reported in Columns 3 and 4 of Table 2. In these specifications, the parameter estimates can be interpreted as the net increase or decrease in total taxable activity in the host-city associated with the event. In other words, a positive parameter estimate suggests that the event is associated with a net increase in local spending during the month in which the event occurs. On the other hand, a negative parameter estimate would represent a net decrease in spending. The results are consistent with those presented in columns 1 and 2, but facilitate comparisons with other economic impact studies.

Our analysis enables us to compare different events. For example, an additional NFL regular season game played in a city lowers taxable sales, in net, by an estimated \$3.5 million dollars. On the other hand, an additional NBA regular season game reduces local taxable activity by about \$250,000. As there are eight home games in the NFL, a host-city might suffer a reduction in total spending during the NFL season of approximately \$28 million over the course of the NFL season. However, with 41 regular season NBA games, the net reduction in local spending associated with a basketball team might only approach \$10.25 million, although the impact is not distinguishable from zero. To this extent, hosting an NBA franchise seems less costly than hosting an NFL franchise.

What might explain the reductions in taxable sales activity our results show are associated with the additional sporting events? There are three possibilities, none of which are directly testable with the data thus far collected. First, individuals substitute game expenditures for other types of spending, e.g., other leisure activities, at a more than one-for-one rate, which could explain the overall reduction in taxable sales activity. Another possibility is that those who attend a game in, say, November, shift spending intertemporally, say to May or June. Given the data thus far collected, it would be unlikely that such intertemporal shifts would be detected as it likely amounts to a small proportion of total taxable sales during the year. A third possible explanation is that, over time, these events reduce overall income, consistent with the results in Coates and Humphreys (1999), and that lower income translates into lower spending.

The impacts of events generally considered mega-events can also be compared. The Super Bowl has, by far, the largest impact on local spending. The Houston Super Bowl is estimated to have

increased taxable activity in Houston proper by approximately \$55 million over January and February 2004. Much like the Super Bowl, the NBA All-star game is a several day event in which many out-of-town visitors are involved. The impact of the NBA All-star game on local spending is estimated to be approximately \$20 million, or 35% of the impact of a Super Bowl.

While many of the other mega-events in our sample are associated with increases in local taxable activity, their impacts are considerably more modest than that of the Super Bowl or the NBA All-star game. The remaining mega-events, such as MLB playoff games, World Series games, and NHL and MLS playoff games, have positive and statistically significant effects on local spending but the economic benefits are relatively modest.

To put our estimates in context, Matheson and Baade (2005) studied the World Series over the period 1972-2001 and concluded that the best guess of per game economic impact is about \$6.8 million. Our estimates are approximately double that, but our estimates are for the first (and only) World Series for the Houston Astros. Therefore, it is possible that the impact of the Houston World Series was larger than, say, a World Series in Atlanta or Miami. Nevertheless, either estimate is considerably less than the hundreds of millions of dollars of impact boosters claim.

For college football games, the most optimistic estimates suggest that a football game might increase local taxable activity by about \$400,000. However, can an NCAA regular season football game be considered a mega-event? Many of the cities in our sample that host NCAA college football teams are relatively small.<sup>10</sup> Baylor and Texas Tech are both “Big Conference” institutions, first as members of the Southwest Conference and now as members of the Big XII Conference. These schools are located in mid-sized cities with large universities. For example, Lubbock (317 miles from Irving, where the NFL’s Cowboys play) has a population of about 200,000, while local Texas Tech University has a stadium that seats over 50,000; Waco (104 miles from Irving), home to Baylor University, has a population of about 222,000 and the university’s football stadium seats over 40,000. For these cities, NCAA football might be accurately characterized as a “mega-event.”

For cities like Dallas (2000 population 1.1 million) or Houston (2004 population of 2 million), which attract large numbers of visitors year round, that have both collegiate and professional football, and for whom a football crowd of 20,000 or even 70,000 is a small percentage of the local population,

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<sup>10</sup>The Data Appendix lists the cities in our sample and indicates what type of teams each hosts.

out-of-town visitors are likely a relatively smaller share of the attendees than for the small towns like Waco. Moreover, Dallas and Houston both have professional and college football teams and other professional sports alternatives in town or nearby.<sup>11</sup> As a result, it is plausible that an NCAA regular season football game could have a relatively modest impact on the local economy of a larger city.

## 4 Conclusions and Discussion

So, is the Texas-Baylor game to Waco what the Super Bowl is to Houston? In absolute terms, the question is an unambiguous no. According to our results, the Super Bowl provides a dramatic net increase in local spending in the host city and generates a significant amount of local sales tax revenue, far more than any regular season game in any professional sport or in college football. Nevertheless, a UT-Baylor football game held on a Saturday afternoon in October might have a similar relative impact on the local economy of Waco as the Super Bowl had for Houston.

In 2005, aggregate taxable activity in the city of Waco, Texas, was approximately \$1.64 billion. If the UT-Baylor game increased local spending by about \$400,000, this would constitute approximately 0.024% of the local Waco economy. In comparison, in 2005 aggregate taxable activity in the city of Houston was approximately \$38 billion. If the 2004 Houston Super Bowl increased local taxable activity by \$60 million, this would represent a 0.16% increase in local taxable activity. In other words, the UT-Baylor game has about one eighth the impact to the Waco economy as the Super Bowl did to the Houston city economy. However, the impact of an entire season of six Baylor home games would have approximately the same impact on the Waco economy as the single, but much less often occurring, Super Bowl in Houston. Moreover, our results indicate that hosting college football has a substantially larger beneficial impact on host-city spending than does hosting professional football; whether the consumer surplus from hosting college football is greater than for professional football is not testable here.

As far as the authors are aware, this is the first paper to provide estimates concerning the relative impact of college and professional football games on local economies. The striking similarity in the relative impacts deserves further scrutiny. However, to be clear, our estimated coefficients reflect the

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<sup>11</sup>The Dallas Cowboys play in Irving, a suburb of Dallas, and the Texas Rangers play in Arlington, just 20 miles to the west. Dallas is also home to the NBA's Mavericks and the NHL's Stars. Houston has the NBA's Rockets and MLB's Astros.

change in spending associated with the timing of a particular event net of 1) new spending by either locals or visitors and 2) reductions in spending that arose either because people chose not to spend during the event or chose to spend in a different city or town.

As for other possible mega-events, including All-Star Games, league championships, and political conventions, our evidence is quite mixed. Those special sporting events that cities must lobby to host, the All-Star games, are a mixed bag. The NBA All-Star game generates increased taxable sales and increased sales tax revenues but the MLB All-Star game does the opposite. Political conventions, also sought after by cities, appear to be bad for the local fiscal situation; the 1992 Republican National Convention reduced real sales activity in Houston by approximately \$25 million and cost the city almost \$1.6 million in sales tax revenues. These results indicate that cities should be very cautious in seeking to host such events.

Regular season games and the post-season mega-events that are hosted only by chance due to the success of a sports franchise also have uneven impacts on the cities. Regular season games for all the sports except Major League Soccer and the National Hockey League have very small or even negative net effects on both taxable activity and sales tax revenues. Championship series games for the NHL and MLB titles both generate positive net increases in sales tax revenues and taxable sales, however the estimated impacts differ.<sup>12</sup> However, the championship games in the NBA and the MLS have insignificant impacts on host-city tax revenues. However, it should be noted that the capacity for NBA (and NHL) events is considerably smaller than for MLB events and this could partially explain the differences in the impact of these events. Overall, these results indicate that cities attempting to lure a professional team should deeply discount any projected fiscal benefits of doing so.

The results presented in this paper are mixed. For many so-called mega-events, the net economic impact on the host city is negative or insignificant. While this does not imply that there is no spending associated with the event, it does indicate that those events associated with a reduction in sales tax revenues (and taxable activity) are somehow crowding out local spending. It is possible that local spending is exported to surrounding communities, which is clearly an avenue for future research. On the other hand, there are several so-called mega-events which are associated with a net increase in local sales taxes and taxable activity. The lesson seems to be that not all mega-events are the same

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<sup>12</sup>One reason may be the sales tax rate in Houston, where the World Series occurred in October 2005, differs from that of Dallas, where the NHL finals occurred in June 1999 and June 2000.

and might not be the economic windfall proponents claim.

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Table 1: Sample Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Real Tax Revenue	4964	4,399,694	7,000,663	2,211	5.31e+07
$\Delta$ Real Tax Revenue	4964	114,876	638,145	-7,620,596	5,734,816
Taxable Real Activity	4964	5.89e+07	9.53e+07	26801	7.33e+08
$\Delta$ Real Activity	4964	1,488,106	9,388,259	-1.05e+08	9.80e+07
Local Tax Rate	4964	7.62	0.37	7.25	8.25
NCAA Reg. Season	913	1.73	1.12	1.00	9.00
NCAA Bowl	65	1.00	0.00	1.00	1.00
Big 12 Championship - Football	5	1.00	0.00	1.00	1.00
NFL Reg. Season	127	1.98	0.69	1.00	4.00
NFL Playoff	10	1.2	0.42	1.00	2.00
Super Bowl	2	1.00	0.00	1.00	1.00
NBA Reg. Season	330	6.56	2.00	1.00	11.00
NBA Playoff	61	3.06	1.96	1.00	8.00
NBA All Star	2	1.00	0.00	1.00	1.00
NBA Finals	7	2.85	0.89	2.00	4.00
MLB Reg. Season	219	12.72	3.29	1.00	19.00
MLB All Star	2	1.00	0.00	1.00	1.00
MLB Playoff	10	2.10	1.60	1.00	5.00
World Series	1	2.00	0.00	2.00	2.00
NHL Reg. Season	98	5.82	1.95	1.00	9.00
NHL Playoff	19	3.16	1.74	1.00	6.00
NHL Finals	3	3.00	0.00	3.00	3.00
MLS Reg. Season	111	2.28	0.96	1.00	4.00
MLS Playoff	15	1.20	0.41	1.00	2.00
MLS Championship	2.00	1.00	0.00	1.00	1.00
International Soccer	10	2.30	1.05	1.00	4.00
NASCAR/IRL Races	32	1.90	0.39	1.00	3.00
PGA Tournament	54	1.00	0.00	1.00	1.00
Political Convention	1	1.00	0.00	1.00	1.00

Notes: The upper panel reports average monthly and twelve month changes in monthly real tax revenues and real taxable activity measured in 2004 CPI adjusted dollars. Prairie View, Texas, was not allocated any sales tax revenue from April 1994 through July 1994; these observations are not included in the analysis. The bottom panel reports the number of non-zero observations for the various events analyzed. The mean value is the average number of occurrences of each event during a month when at least one event took place. The Houston Super Bowl took place on Sunday, February 1, 2004. Therefore, the Super Bowl dummy variable takes a value of one for both January and February 2004.

Table 2: Estimation Results

Variable	$\Delta$ TaxRevenue	$\Delta$ TaxRevenue	$\Delta$ Activity	$\Delta$ Activity
NCAA Reg. Season	56,159*** (3.29)	15,468 (0.64)	438,589* (1.73)	385,553 (1.11)
FBS Conf. $\times$ NCAA Reg. Season		85,739** (2.32)		115,656 (0.22)
NCAA Bowl Game	-1,159,223*** (-4.03)	-1,205,861*** (-4.19)	-14,435,258*** (-3.38)	-17,363,861*** (-4.20)
Big 12 Championship	-1,072,522*** (-5.90)	-1,060,181*** (-5.84)	-13,069,705*** (-4.85)	-12,241,232*** (-4.69)
NFL Reg. Season	-237,046*** (-4.53)	-229,637*** (-4.39)	-3,669,583*** (-4.73)	-3,402,511*** (-4.53)
NFL Playoff	-292,688** (-1.97)	-287,122* (-1.94)	-4,324,447** (-1.96)	-4,184,314** (-1.96)
Super Bowl	1,963,863*** (6.83)	1,959,227*** (6.82)	27,636,587*** (6.48)	27,314,425*** (6.62)
NBA Reg. Season	-19,408 (-1.48)	-19,136 (-1.46)	-240,940 (-1.24)	-237,939 (-1.26)
NBA Playoff	-117,196*** (-5.17)	-116,995*** (-5.17)	-1,783,935*** (-5.31)	-1,775,345*** (-5.46)
NBA All-star Game	876,935*** (3.06)	839,549*** (2.94)	21,625,023*** (5.10)	18,274,913*** (4.44)
NBA Finals	67,774 (1.23)	74,919 (1.36)	856,914 (1.04)	1,453,444* (1.83)
MLB Reg. Season	-5,441 (-0.71)	-5,385 (-0.70)	-292,004** (-2.57)	-225,107** (-2.04)
MLB Playoff	295,486*** (4.10)	301,315*** (4.17)	5,312,959*** (4.97)	4,839,154*** (4.66)
MLB All-star Game	-184,711 (-0.64)	-188,225 (-0.65)	-2,285,298 (-0.53)	-2,412,930 (-0.58)
World Series	603,908*** (2.73)	516,109** (2.31)	13,936,598*** (4.24)	11,886,950*** (3.70)
NHL Reg. Season	25,902* (1.79)	25,281* (1.75)	355,343* (1.65)	321,561 (1.55)
NHL Playoff	123,027*** (3.07)	117,651*** (2.94)	1,932,924*** (3.26)	1,663,723*** (2.89)
NHL Finals	245,781** (2.23)	232,953** (2.11)	4,056,455** (2.48)	3,737,746** (2.36)
NASCAR/IRL Race	114,301** (1.99)	107,587* (1.87)	1,447,591* (1.70)	859,214 (1.04)
PGA Tournament	192,364 (0.83)	192,321 (0.83)	2,058,528 (0.60)	2,057,686 (0.62)

Table 2: Estimation Results (cont.)

Variable	$\Delta$ TaxRevenue	$\Delta$ TaxRevenue	$\Delta$ Activity	$\Delta$ Activity
MLS Reg. Season	233,044*** (7.57)	237,783*** (7.72)	1,315,108*** (2.88)	1,813,015*** (4.09)
MLS Playoff	374,507*** (3.50)	375,444*** (3.51)	4,545,458*** (2.86)	4,490,761*** (2.92)
MLS Championship	70,074 (0.17)	65,109 (0.16)	488,033 (0.081)	637,121 (0.11)
International Soccer	80,325* (1.72)	77,038* (1.65)	1,692,480** (2.45)	1,423,971** (2.12)
Political Convention	-1,656,690*** (-4.06)	-1,652,365*** (-4.06)	-24,713,505*** (-4.09)	-24,106,885*** (-4.12)
Time Trend	14,479*** (4.72)	14,662*** (4.73)	172,948*** (3.80)	129,241*** (2.90)
Tax Rate	13,717,916*** (6.34)	13,545,692*** (6.24)	296,086,540*** (9.22)	260,802,663*** (8.36)
FBS Conf. $\times$ Tax Rate		246,203*** (2.64)		23,545,540*** (17.5)
Tax Rate Squared	-850,807*** (-6.05)	-829,554*** (-5.88)	-19,878,960*** (-9.53)	-16,814,465*** (-8.29)
FBS Conf. $\times$ Tax Rate Squared		-34,043*** (-2.83)		-3,093,910*** (-17.9)
Constant	-192,864*** (-3.94)	-199,296*** (-4.07)	-1,528,316** (-2.11)	-1,678,649** (-2.38)
Observations	4964	4964	4964	4964
Number of Cities	23	23	23	23
$R^2$	0.154	0.157	0.151	0.205

Notes: Dependent variable is twelve-month change in monthly real tax revenues ( $\Delta$ TaxRevenue) or real taxable activity ( $\Delta$ Activity). FBS football conferences include: The Big XII, Conference USA, the Southwest Conference, Western Athletic Conference (when applicable). Prairie View, Texas, did not report any allocated sales tax revenue from April 1994 through July 1994; these observations are not included in the analysis. However, including them did not alter the results presented here. All specifications include year and month dummy variables.  $t$  statistics in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

# Figures

Figure 1: Monthly Real Sales Tax Revenue: Arlington, Fort Worth, Dallas

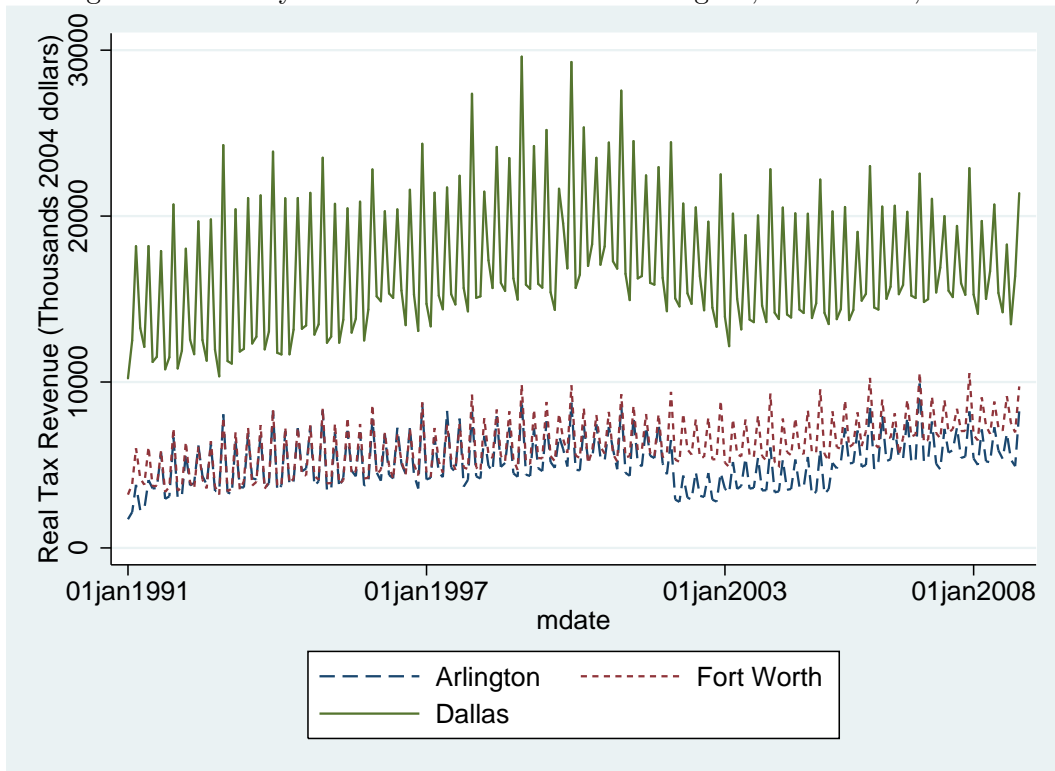


Figure 2: Monthly Real Sales Tax Revenue: Canyon, Commerce, Kingsville

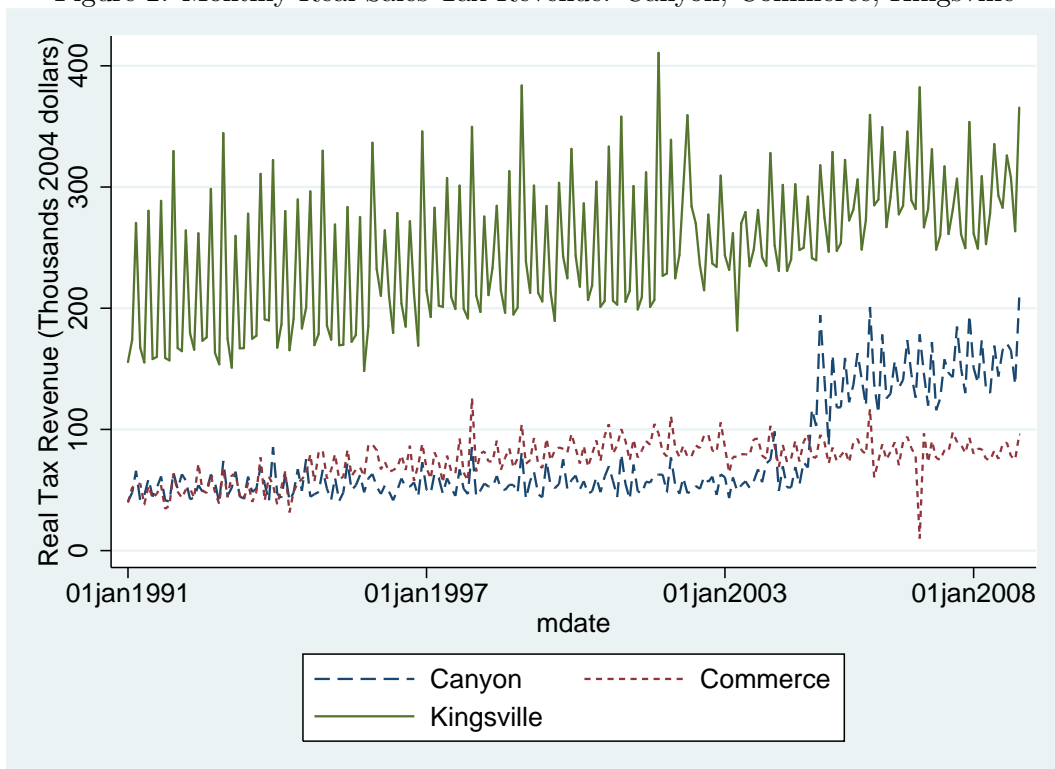


Figure 3: Monthly Real Sales Tax Revenue: Dallas (January 2003 to December 2008)

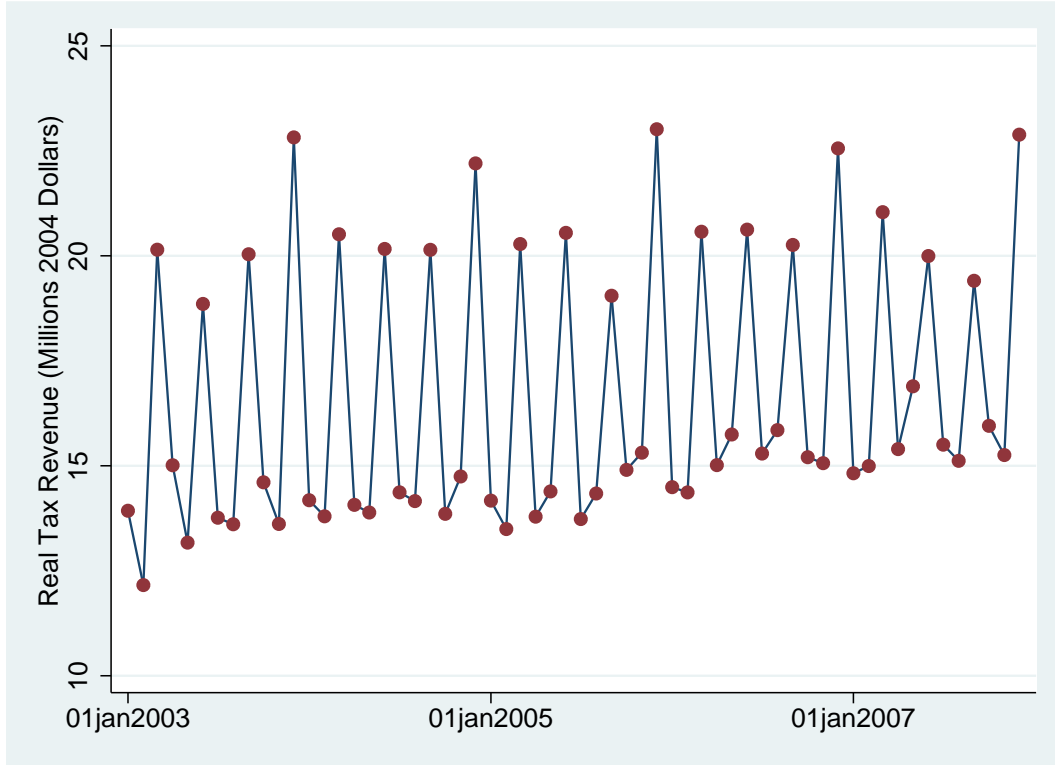
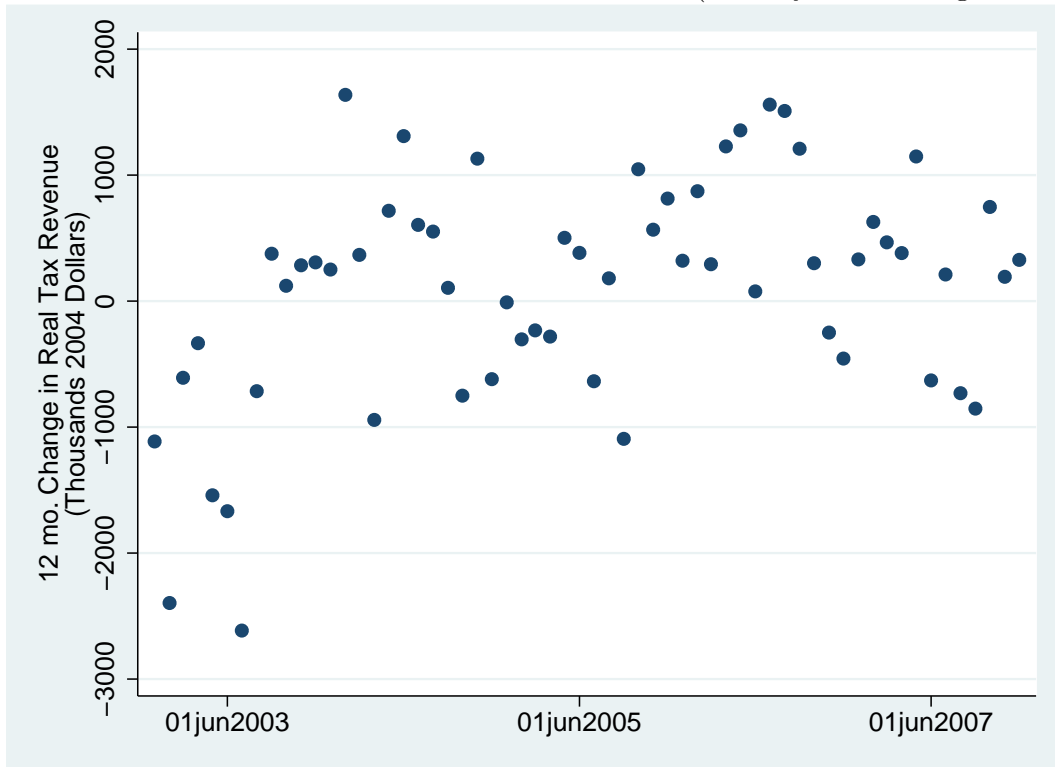


Figure 4: 12-Month Differenced Real Sales Tax Revenue: Dallas (January 2003 through December 2008)



## Appendix: Cities Included in Sample and Select Events Hosted

City	Freq.	MLB	NFL	NHL	NBA	MLS	FBS NCAA	FCS NCAA	DII NCAA	NCAA Bowl Game
Abilene	216							⊗		
Arlington	216	⊗								
Austin	216						⊗			
Canyon	216								⊗	
College Station	216						⊗			
Commerce	216								⊗	
Dallas	216			⊗	⊗		⊗			⊗
Denton	216						⊗			
El Paso	216						⊗			⊗
Fort Worth	216						⊗			⊗
Frisco	216					⊗				
Houston	216	⊗	⊗		⊗	⊗	⊗	⊗		⊗
Huntsville	216							⊗		
Irving	216			⊗		⊗				
Kingsville	216								⊗	
Lubbock	216						⊗			
Nacogdoches	216							⊗		
Prairie View	212							⊗		
San Angelo	216							⊗		
San Antonio	216		⊗		⊗					⊗
San Marcos	216								⊗	
Waco	216						⊗			
Wichita Falls	216								⊗	

Notes: Prairie View reported no sales tax allocations for four months; these observations were not included in the analysis.