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NASCAR as a Public Good

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Abstract

This paper looks for evidence that either a NASCAR track or NASCAR-sanctioned event influences the monthly rents on residential units. Data cover individual housing units in more than 140 SMSAs over the period spanning from 1993 until 2005. During this period, several new tracks opened, while some other tracks closed, and numerous races changed venues. These changes enable us to identify the capitalization of costs and benefits to a community from the presence of NASCAR tracks and events into rental values. The evidence is mixed, varying with the treatment of housing units located in or out of central cities of SMSAs, as well as the manner in which missing housing and community characteristics are treated in the analysis. The results are reasonably clear that presence of a track by itself has little effect, especially on housing units outside the central city of an SMSA. Specific types of races largely appear to have no impact, though in some specifications, the central city and non-central city impacts are about equal but have opposite signs. In these cases, the indication is that the NASCAR events affect non-central city rents, but not those in the central city. Overall, we must conclude that our results reject NASCAR as a source of either large benefits or costs to residents of the host community.

JEL Classification Codes: L83

Keywords: tourism, economic impact, special events, NASCAR, auto racing

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Introduction

When the National Association for Stock Car Auto Racing (NASCAR) began in 1948, it organized a sport based almost entirely in the Southeastern United States. Some of the first tracks on which NASCAR competed were in North and South Carolina, Alabama, Georgia, and Florida. Almost fifty years later, NASCAR had seen little change in its relatively small fan base, and began to search for ways to gain mass appeal.

One of the most successful endeavors used by NASCAR to expand its fan base during the mid- and late-1990s was the introduction of additional race tracks in some large metropolitan areas, including those in Homestead, Florida; Las Vegas, Nevada; and Fort Worth, Texas. Each of these tracks was originally constructed by individual investors who sought a NASCAR-sanctioned event. Because of the amount of money that is made by the owners of existing tracks, corporations all over the country petition NASCAR to bring a top-tier Cup Series race to their area. Even in light of these facts, track construction has still been largely abandoned by NASCAR in the past five years. Two of the most recent attempts to construct a new track were those outside of Seattle, Washington and on Staten Island, New York. There has also been talk of building a track outside of Denver, Colorado.

Like all large building projects, race track construction faces opposition from local residents. There is a growing number of people convinced that the only things an automobile race track brings to an area are event-day traffic, and the unpleasant roar of 30,000+ horsepower. Proponents of new tracks, however, point to economic welfare as a reason to build. They argue that a race track would boost the local economy by providing jobs and introducing new tourist revenues. The question for policymakers becomes, "Do automobile race tracks really generate enough local economic welfare to justify their publicly-funded construction?" This paper seeks to answer that question.

The nature of NASCAR events also allows us to separately address two issues related to sports-led development. First, NASCAR-sanctioned tracks hold only a small number of races, each of which could be likened to mega-events. For example, the Daytona International Speedway, one of the most well-known NASCAR tracks, holds only two events each year in the Cup Series, the most prominent division in NASCAR, and only five total in the top three NASCAR Series (Cup, Grand National, and Truck). Other tracks hold even fewer of these events, with many holding no races in the Cup Series. This is quite different from other professional sports in which each stadium or arena has the same fairly large number of regularly scheduled contests each year, making it impossible to isolate the impact of the games from the ongoing activities at the facility. Consequently, NASCAR races can be treated analogously to the Super Bowl or the March Madness tournament, as they attract a large number of visitors for a short period of time.[1]

At the same time, the tracks are also used for other activities. For instance, Daytona hosts Daytona "Bike Week" in the early spring and "Biketoberfest" in the fall. Bike Week is touted as "The World's Largest Motorcycle Event," and attracts thousands of motorcycle enthusiasts annually. Tracks also hold lesser racing events and are small tourist attractions throughout the year. These ongoing activities contribute to the local economy as well. The NASCAR situation allows us to assess the impact from the routine activities at the track, as well as the impact of the special activities. In other words, the day-to-day business of the track may contribute to the local economy while the racing mega-events do not, the mega-events may contribute while the typical activities do not, or both or neither may contribute to the local economy.

[1] Attendees at Cup Series events and the Super Bowl/March Madness do not necessarily travel similar distances or in the same mode. Our point is merely that both races and championship football games or basketball tournaments are likely to attract a substantial number of visitors to a community for only a few days out of the year.

The results consistently indicate the joint statistical significance of the track and event variables. Statistical significance of the individual coefficients is sensitive to specification and sample. For example, the presence of a track is sometimes found to be statistically significant independent of the events held there, while Grand National Series races are rarely statistically significant in our analysis. Our measure of economic benefit is rents on residences in the standard metropolitan statistical area (SMSA) in which a track exists. In this fashion, we follow the approach of Carlino and Coulson (2004). We use a variety of housing and neighborhood characteristics to explain the rents, and the sample for the analysis is sensitive to the inclusion of some of these variables. The qualitative results, however, are generally not sensitive to the sample under analysis.

Carlino and Coulson (2004) perform their analysis on a central city sub-sample as well as the entire SMSA. We address this split of the sample in two ways, first by interacting the race and track variables with a dummy variable indicating whether or not the observation lies within the central city, and second, by estimating the model separately on the central city and non-central city observations. In the former, the variables are almost always jointly significant, while several are individually significant. When separating the observations, there is evidence that events affect the rents of non-central city units but not those of central city units. If the estimation is done on the central city observations alone, the track and event variables are sometimes jointly significant but few are individually significant. By contrast, when using the non-central city observations, the variables are rarely even jointly significant.

The remainder of this paper is organized as follows. In the next section, the literature on the economic benefits of automobile race tracks and other sporting venues will be reviewed. Immediately following, the methodology and data to be used in this project to measure the

benefits of a race track will be described. The results are presented, followed by a discussion of some additional empirical issues. Finally, we conclude with a summary of our findings.

Literature Review

It is important to remember that the decisions to undertake projects of such magnitudes as automobile race tracks require the support of the people living in the surrounding area. Articles in the general news and in the business press are usually based on consultancy reports, to which we do not have access. Therefore, we describe the reports in the popular press to get a sense of the impact analyses done by consultants. Only after looking at the popular press will we turn our attention to the academic literature.

The economic impact of race tracks varies dramatically from track to track, and is often reported in different manners. For example, before Kansas Speedway opened in Wyandotte County in October 2002, the Gloucester County Times of New Jersey noted one prediction that the track itself would generate $170 million in tourism dollars, while an adjacent shopping and entertainment district (built at the same time as the track) would reach annual sales of $420 million. The Snohomish County Herald of Washington reported that, during the first year of operation, Kansas state officials claimed that Kansas Speedway generated $300 million for the state economy. The Herald also reported that in 1999, Phoenix International Raceway generated over $270 million for the Arizona state economy, including $124 million in out-of-state visitor spending. When a second Cup race was added in 2005, the Business Journal of Phoenix reported the expectation of an additional economic impact of between $175 and $200 million. On a larger scale, North East Business Today reported the estimated value of the North Carolina statewide motorsports industry to be between $1.5 and $2 billion per year.

The Snohomish County Herald reported that Daytona International Speedway, perhaps the most famous automobile race track in the world, has an estimated $1.8 billion economic impact on central Florida, with $850 million of that impact staying in Volusia County. The Gloucester County Times reported that Lowe's Motor Speedway in Concord, North Carolina brings in more than $275 million in the tri-county area, including $88 million in off-site spending. Atlanta Motor Speedway, the sister track to Lowe's, is expected to generate revenues of $2.275 billion over the next five years, with this amount being more than double the combined expected revenues of the Braves, Hawks, and Falcons. One of the newer tracks on the Cup circuit, California Speedway, brings in $136 million over the weekend when the NASCAR racers come to town. Racingone.com reported that during the 2004 championship weekend (for the Truck, Grand National, and Cup Series), Homestead-Miami Speedway injected $146 million into the South Florida economy. The Gloucester County Times reported that Watkins Glen International, one of the two challenging road courses on the Cup Series schedule, had a total economic impact of $176 million in only the three surrounding counties in 1998. It was also reported that the track creates more than 2,000 jobs, and $11 million in annual state and local taxes. A former public relations director at Lowe's Motor Speedway uses a personal anecdote to summarize race fan spending. Once, at a rest stop near Daytona, a waitress said that most of the people she serves visit the race track with at least $1,000 in their pockets and intend to go home with zero.

Predictions by the Seattle Sports Commission (as reported by the Snohomish County Herald) indicated that the proposed track in Kitsap County, Washington would hold 70,000 to 80,000 people, and bring in $87 million in yearly revenue, as well as another $58 million in state and local taxes. The formal analysis done by Berk & Associates estimated annual statewide economic benefits of $139.5 million, as well as an additional $492 million of positive economic impact during the construction phase. Once open, the track was projected to create 2,350 new

jobs, of which only 50 would be year-round at the track, generating $49.15 million in additional wages, while during the construction phase there would be employment of 5,900 people for a total of $180 million in wages. More recent information provided by the Associated Press in Olympia, Washington placed the cost of the new track at $386 million, of which the International Speedway Corporation (ISC, the publicly-traded sister company of NASCAR) would pay at least $180 million (plus any cost overruns), leaving the State of Washington to pay the balance. Lt. Governor Brad Owen and Representative Geoff Simpson, the main legislative supporters of the project, assured Washington voters that bond sales (to be repaid by sales and admission taxes generated by the facility) would repay the state share, and that no new taxes would be imposed. They also claimed that the track would boost the state economy by almost $4 billion over the next 30 years (though they pointed out that at the same time, predicted employment during the construction phase was lowered to about 5,600 people).

The reported facts are not all in favor of constructing tracks, however. Should a new track be built in the Puget Sound region of the northwest, it could force local Saturday-night short tracks out of business. The Snohomish County Herald reported that at Evergreen Speedway, located near the 500-acre site of the proposed Kitsap County track, management was worried that the introduction of well-funded competition could wipe out its operation, especially if lighting was included to allow the new track to function at night.

The Olympian of Washington reported that elsewhere, while the Chicagoland Speedway has developed in Joliet, Illinois, the surrounding area has not. Four years after the track opened, commercial businesses were just beginning to enter into negotiations to develop the vacant land surrounding the track. As for specific figures related to the economic impact of the track, research has not yet been conducted by management. It is often said that the biggest gainers in

Illinois on race weekends are the nearby farmers, who rent out their land as parking lots for motor homes.

Although there were claims, as reported by the Associated Press in Olympia, Washington, that more than 300 businesses in the Kitsap County region supported building a track nearby, county polls in September 2006 indicated only 54 percent of people in Kitsap, Mason, and Pierce Counties were in favor of its construction. Finally, in April 2007, the ISC abandoned the project in Washington. Although past and present Cup Series drivers attempted to persuade state legislators of the economic benefits of a race track, lawmakers such as House Speaker Frank Chopp and Senate Majority Leader Lisa Brown felt as though the funding of education and health care was a more pressing issue.

Support seems to be lacking for the ISC in other locations as well. In early December 2006, the Associated Press of Charlotte, North Carolina reported that the company was forced to cancel its plans to build a 0.8-mile short track on Staten Island, New York. After spending over $120 million for over 670 acres of land, and millions in land improvements and developments, lack of political support forced the company to abandon the project. New York City Council Minority Leader James S. Oddo called the outcome a "monumental victory for the people of Staten Island." This came less than a year after an April public meeting on the subject was stopped by police because of safety concerns, after tempers flared over would-be traffic tie-ups, road renovation to handle increased traffic volume, and environmental consequences. The Staten Island Advance reported that the developer estimated an additional $550 to $600 million in spending, beyond the cost of land and improvements, was required to complete the project.

As is well-known in the academic literature on other sports venues, there are reasons to be skeptical of the economic impact analysis implying large benefits from automobile race tracks. For example, some of the reported employment numbers seem excessive to operate tracks,

especially if the jobs are full-time. In the previously mentioned estimate of economic impact pertaining to Watkins Glen International, it was noted that this track generated 2,000 jobs. In NASCAR, most employees at a track on race day are either employed by NASCAR itself (car inspectors, pit officials, etc.), the broadcasting company (commentators, camera and production crews, etc.), or the race teams (drivers, crews, etc.), all of which leave the area afterwards. Safety crews and ushers are mostly local volunteers, and security and traffic control are provided by state and local police. In other words, many of those who are paid to work at the races have jobs anyway, which are not specific to the track. The track itself would employ mostly ticket punchers and general merchandise vendors. All race teams operate their own souvenir trailers that leave after the race is over. Therefore, the reported 2,000 jobs is likely to include many more part-time than full-time employees, meaning a smaller economic impact. Evidence of this can be seen in the Berk & Associates analysis of the proposed track in Kitsap County, which noted that only 50 of the 2,350 jobs created would be full-time. In other words, estimates of impact are likely to be overstated.

The academic literature has not addressed the general impact of NASCAR. Instead, the focus has been on the economic impact of a single automobile race. Baade and Matheson (2000) concentrate on the Daytona 500, and find that in February, the month during which the Great American Race is run, taxable sales in Volusia County and those adjacent to it increase just over $40 million. They suggest that this is likely to be an overestimation of the economic impact of the race. Of course, Baade and Matheson's finding is a far cry from both the $1.8 billion impact on Central Florida and the $850 million impact on Volusia County that the Snohomish County Herald reported. This vast difference suggests that policymakers should be wary of predicted economic impacts in the hundreds of millions of dollars range, especially since proposed tracks will never hold a race nearly as prestigious as the Daytona 500.

It is possible to compare the economic impact of the Daytona 500 to other sporting mega-events. For example, Matheson and Baade (2005) venture a best guess of a $6.8 million impact for a single Major League Baseball (MLB) post-season game. This translates to just under $75 million in total host community impact, assuming that a team appears in all 19 games possible for the championship (only 11 of which would be at home, assuming home-field advantage throughout). This is at the low end of the $50 to $250 million range that is often quoted by local officials when announcing the economic impact of a post-season appearance by a would-be championship team. Keeping with baseball, Baade and Matheson (2001) find questionable the studies conducted by Major League Baseball that estimate the economic impact of its All-Star Games to be at $60 million. Their results show that taxable sales actually fall $30 million below pre-All-Star Game levels in host cities, and that employment also falls by over 8,000 jobs. Regarding the National Football League (NFL), Matheson and Baade (2004) find that the average economic impact of the Super Bowl to be $92 million, which conflicts with NFL claims that Super Bowl XXXIII had a $393 million impact on South Florida. Looking at Houston, Texas, the host city for both the 2004 NFL Super Bowl and MLB All-Star Game, Coates (2006) finds that while the Super Bowl did significantly increase sales tax revenues, neither it nor the MLB All-Star Game generated large economic boosts. The National Collegiate Athletics Association (NCAA) basketball tournament is one of the collegiate mega-events. Just looking at the impact of the Final Four for Men, Matheson and Baade (2003) estimate the probability of realizing the claimed $100 million economic benefit to the hosting city is only slightly higher than five percent. On the other hand, there is a 20 percent probability that the Final Four for Women will have a local economic impact of at least $100 million, indicating that cities that desire to host a Final Four should concentrate on getting the women's games and pass on those of the men. The empirical analysis of other sporting mega-events seems to yield economic

impacts comparable to the Daytona 500. As with this event, the popular claims of other mega-event benefits also far exceed those calculated by independent analysts.

While the econometric literature contains only one analysis of a single-race weekend, it does not address at all the fact that automobile race tracks do not operate for only one or two weekends per year. The most publicized races are those of the NASCAR Cup Series, but there are events held by other racing series as well. In 2007, the Indy Racing League will race on nine of the same tracks as the Cup Series drivers. A vast number of lesser known racing series and car models race on these tracks as well. In between races, tracks also hold test dates, during which teams get a head start on preparing for future races. There are also tire testing dates, where teams are chosen by tire manufacturers to see if tires can survive the chassis setups the cars are running. In NASCAR, in particular, tire testing has become very important, since at the Fall 2005 race at Lowe's Motor Speedway, many drivers in the Cup Series field were eliminated as their poorly-engineered tires failed under the racing conditions.

When a professional racing series is not at a track, driving schools, which teach ordinary fans how to drive on different race tracks, take their place. For example, Fast Track High Performance Driving School will offer 36 Thunder Courses at Lowe's Motor Speedway in 2007. With each class holding 20 (and each class selling out), this implies over 700 people utilizing the track for just one type of non-competition activity. The school will also offer 10 Classic Oval Courses (two-day course) and 10 Basic Oval Courses (one-day course) at the track over the same period of time. Each of these classes holds between 20 and 25 students as well. During the breaks in formal classes, instructors also take those not in the classes (who randomly show up as part of track tours) for hot laps. These laps are at 165 mph, and are designed to give a person an idea of what a driver experiences during a race. Due to their reduced length and cost, they are

very popular. Also, Fast Track is only one of eight driving schools that operate out of Lowe's Motor Speedway.

Race tracks are also used to film motion pictures about racing. Perhaps the most notable of these motion pictures is *Days of Thunder*, which was filmed at Daytona International Speedway and Lowe's Motor Speedway. The more recent film, *Talladega Nights*, was also filmed at Lowe's Motor Speedway, as well as at Talladega Superspeedway and North Carolina Speedway. On a smaller scale, commercials for some of the sponsors affiliated with NASCAR, including Chevrolet, Tylenol, and Pepsi, are filmed at the tracks.

Additionally, year round, tourists can enter the track for tours given by the speedways. There is also a growing trend that has seen housing units built at some of the bigger tracks. These allow die-hard fans the opportunity to live at their favorite race track. Each time an individual associated with a race team, racing organization (NASCAR, etc.), tire manufacturer, driving course, motion picture production crew, or just a tourist, comes to a race track, he or she will spend money in the surrounding area. The aggregate effect of this spending contributes, along with the jobs created by the race track, to the local economy.

Because the tracks are in operation year round, it is reasonable to think that they may have an impact similar to, or greater than, that of other sports venues that operate outside the season as well as during the season. There is a broad literature on the impact of stadiums and arenas used for professional football, baseball, basketball and hockey. Baade and Dye (1988, 1990) and Baade (1996) were the first to systematically assess the impact of professional sports on the economy of the host community. Coates and Humphreys (1999) expand the analysis in several dimensions to look at the effects on a metropolitan area's economy of construction of stadiums for professional baseball, basketball, and football teams, and the coming and going of franchises in those sports. They find that at the average professional baseball stadium capacity,

additional real per capita income would increase by $9.40 if capacity was increased by 1,000. They also find that the construction of a professional basketball arena will result in a per capita loss of $73 for each of the next 10 years following its completion. In the previous section on mega-event literature, it was shown that the economic impact of the non-racing mega-events was similar to that of the Daytona 500. Should the overall impact of race tracks be similar to that of the stadiums and arenas of other professional sports, it would be expected that significant positive benefits do not stem from their existence.

Recently, the analysis of the effects of sports on local economies has taken a more microeconomic tack. Carlino and Coulson (2004) use a hedonic approach to measure the implicit price of a professional football team as it is capitalized into residential rents. The approach of this paper mirrors that analysis, except the focus is on NASCAR-sanctioned race tracks and events. We will not only explore the economic impact of these tracks on the community, but will also separate that impact into that which comes from hosting the Cup, Grand National, and Truck Series mega-events, and that which comes from the non-race activities. In the next section, we describe the model in more detail.

Model Presentation

In this section, we describe the hedonic model of the rental price of housing. In a hedonic model, the equilibrium price of a good is a function of the good's observable characteristics, each of which has an implicit value. Relating this to housing, the price of a home is a function of both its physical attributes, such as its age or the number of bedrooms, and its immediate surroundings, such as the presence of heavy traffic or garbage in the neighborhood streets. In a hedonic price equation for housing, the coefficient on each characteristic (either an attribute or surrounding) is interpreted as the marginal value of that characteristic in equilibrium.

If a coefficient is significant, this means the presence of the associated characteristic shifts the demand or the supply for housing, and either increases or decreases the equilibrium price.

The hedonic model is typically applied in two ways. In the first way, most common in the environmental literature, the assumption is that proximity to an undesirable facility, such as a garbage dump or prison, lowers property values. As distance from the facility rises, the effect it has on property values declines. In the second way hedonic analysis is used, the characteristic whose value is of interest has an equal impact on all houses in the community. For example, houses in communities with good schools will sell for a price premium over identical houses in communities with lower quality schools. Carlino and Coulson (2004) follow this second approach to assess the social benefits to a community of hosting a professional football franchise.

To see if an automobile race track adds local economic value, we adapt the Carlino and Coulson (2004) approach. If people receive non-pecuniary benefits from the presence of a NASCAR-sanctioned automobile race track in their locality, they express it indirectly through an increased demand for housing in the area. This increased demand bids up the price of housing, which consequently increases rental values. One possible non-pecuniary benefit received from the presence of a track is the sense of community pride stemming from the fact that people live in an area that is important enough to host a NASCAR event. This effect is the same for all of the people living in the area, regardless of their proximity to the race track, and is something we attempt to measure.

This paper will follow Carlino and Coulson (2004) by using essentially the same housing data, and many of the same control variables. It will attempt to measure the impact of NASCAR-sanctioned automobile race tracks on local rental values (those within the same SMSA), without controlling for the type or quantity of event held there. However, unlike Carlino and Coulson (2004), this paper will also address the impact of the specific events. Of

course, they could not evaluate the effect of specific events because each city with an NFL franchise plays host to the same number of events each season. This is not true for the tracks holding NASCAR events. Consequently, we estimate a model including variables indicating the specific type of NASCAR Series events, Cup, Grand National, or Truck, held at a track. Note that a track may hold between zero and three types of these events. Each type of event is allowed to have a different effect, and tests are conducted to assess whether different event types have different effects. Only the results of these models are presented, but additional information is available upon request.

The dependent variable in all of the models will be the natural log of deflated rent, with 1993 as the base year. Deflation is done using the CPI inflation calculator available at the Bureau of Labor Statistics website[2]. The model is estimated both with SMSA-specific fixed effects and with SMSA-specific time trends. These variables are included to soak up the systematic variation in rents unique to the SMSA that cannot be linked to explicit variables, either because those variables are unobserved or because they are unobservable. Their inclusion also means that the effects of the variables of interest are identified from the SMSAs where tracks have opened or closed and where races have been introduced or lost. This raises the possibility of reverse causation, namely that tracks and races are placed in SMSAs that have high (or low) rents rather than rents being high (or low) as a consequence of the track or races. We will discuss this issue in more detail later.

The general model is as follows:

$$\text{lndrent}_{ijt} = \alpha R_{jt} + \beta H_{ijt} + \sum \delta_j \text{SMSA}_{jt} + \sum \gamma_j (\text{SMSA*time})_{jt} + \varepsilon_{ijt},$$

where R_{jt} and H_{ijt} are racing and housing unit characteristics, respectively, and α and β are vectors of parameters to be estimated which reflect the implicit rental prices of the racing and

[2] The BLS CPI inflation calculator web address is http://data.bls.gov/cgi-bin/cpicalc.pl.

housing characteristics. The δ_j and γ_j vectors of parameters are city j-specific intercepts and time trends to be estimated, and ε_{ijt} is a random error with mean zero but whose variance differs by SMSA and year. All of the models will be clustered by SMSAid, a variable that uniquely identifies observations from both the same SMSA and year. This will account for any correlation between the errors that occurs in observations from the same SMSA during a given year, but not between the errors in observations from other SMSAs in other years. In other words, if the observation variance is assumed to be similar either among all SMSAs or among all years, and it is in fact, dissimilar, the standard errors of the regressions will be incorrect, and hypothesis tests will be unreliable. Clustering by both SMSA and year will allow the error variance to differ by both SMSA and year. In addition, inverse probability of selection weights are placed on the observations to make the sample data more representative of the population.

The null hypotheses are that neither the presence of an automobile race track, nor a NASCAR event (whether it be in the Cup, Grand National, or Truck Series), has a significant impact on rental value. That is, all the coefficients in the vector α are equal to zero. The alternative hypothesis is that at least one of those coefficients is different from zero. In each model with more than one racing variable of interest, the coefficients on those variables will be both individually and jointly tested for significance. If the null hypothesis is rejected in any of these tests, this is support for the belief that NASCAR-sanctioned tracks or events significantly affect rental value.

The Data

The housing unit data used (both rental values and unit-specific characteristics) comes from the American Housing Survey (AHS national data, as opposed to metro). Descriptive statistics and variable definitions are reported in Table 1. The duration spans 13 years, from

1993 to 2005 (inclusive), covering all 141 SMSAs identified in the AHS. Over this time period, NASCAR held at least one Cup, Grand National, or Truck Series event on 52 different race tracks. Unfortunately, 21 of these 52 tracks are not included in our data, as 12 are located in SMSAs not included in the AHS, while the other nine are not located within SMSAs at all. Consequently, we have just 31 of the 52 tracks accounted for in the data. These 31 tracks only held about half of the Cup, Grand National, or Truck Series races over the sample period. Specifically, our 31 tracks hosted 300 of the 598 events, broken down into 89 of 235 Cup races, 110 of 218 Grand National races, and 101 of 145 Truck races. It is important to note that while there exist numerous other series in NASCAR, these serve as driver development series, and are somewhat akin to the minor leagues. Therefore, they are omitted from the study. All of the event- and track-specific data comes from a variety of sources, most notably NASCAR itself, through its website. Information on all 52 tracks may be seen in Tables 2 & 3. In Table 2, the 2005 NASCAR Series events held at each track are shown. These events change over time, as some of the races in 2005 were previously held at different tracks, or not at all.

Use of such a wide array of SMSAs clearly means that many contribute very few observations to the data. One might, therefore, be tempted to limit analysis to larger SMSAs. Unfortunately, this affects the tracks and events that are included in the data. For example, if the analysis is limited to SMSAs that contribute 100 or more observations, then Daytona Beach, Florida and Johnson City-Kingsport-Bristol, Tennessee-Virginia would be omitted from the analysis. Between them, these two SMSAs host 10 races per year, including of course, the premier event of NASCAR, the Daytona 500. In fact, only eight SMSAs have fewer observations in the data than does Daytona, and Bristol is not one of them. Given the small coverage of NASCAR events in the data, the decision to include all the SMSAs seemed prudent.

It should be noted that some of the 21 tracks omitted from the data are recognizable even to those who do not follow NASCAR. The relative popularity of some of the missing tracks, such as Lowe's Motor Speedway in Concord, North Carolina, which holds the Coca-Cola 600, and Darlington Raceway in Darlington, South Carolina, which held the Southern 500 until 2004, would seem to indicate that at least some of the positive economic impact of tracks will not be included in the data. This can also be seen in the fact that the majority of the Cup races, which are likely to generate the most economic impact, are held at tracks outside of the data.

There are five other important aspects of the data to mention. First, the AHS is a random sampling of households, but with over-sampling of some types to assure they are represented. Thus, without accounting for the sampling weights, the AHS is not representative of the population. As previously mentioned, observation weights will be used to account for this. Second, the best hope of detecting an effect of a track on rental values is to focus on the smallest possible areas around the track. Therefore, not included in the analysis are SMSAs for the Chicago, New York, and Northern New Jersey areas that are aggregations of two or more smaller SMSAs. Third, all of the observations that are not classified as being within an SMSA (SMSA 9999 in the data) were also dropped. The exact location of these observations could not be identified sufficiently to determine whether properties in them were or were not near a track.

The fourth issue pertaining to the data is that in the AHS, there are frequently observations with no value recorded for certain variables.[3] For example, our base data set contains 69,068 (weighted) observations, but because variables related to some observations are missing values, the final sample drops to the 48,433 reported in Table 1. Certain variables, such as average monthly electricity cost and unit square footage, have more missing values than

[3] Coates, Humphreys, and Zimbalist (2006) criticize Carlino and Coulson (2004) because their inclusion of the average monthly electricity cost in their regressions non-randomly dropped low rent-low rent growth observations from their analysis.

others. Including these two variables further reduces the sample to 27,151 observations. Values for six additional variables – the presence of crime, street noise, subsidized rent, rent control, abandoned buildings, and trash in the streets – are also frequently missing in the data. Excluding these variables, as well as average monthly electricity cost and unit square footage, raises the sample size to 67,180. Because observations with missing values of these variables may not be random, we estimate the model including them all, excluding them all, and excluding only average monthly electricity cost and unit square footage, resulting in 27,151, 67,180, and 48,433 weighted observations, respectively. Indeed, we test for a different mean rent between the observations included in the larger sample and those excluded by the smaller sample.[4] The tests reveal that in each case, the excluded observations have a statistically smaller mean rent than the included observations. In other words, dropping observations based on missing values of average monthly electricity cost, unit square footage, crime, street noise, subsidized rent, rent control, abandoned buildings, or trash in the streets, produces a non-random sample of observations. Our estimation with the larger samples is an attempt to assess the sensitivity of the results to this non-randomness.[5]

Finally, many of the tracks are quite distant from the central city area of the SMSA. For example, Atlanta Motor Speedway is about 25 miles from downtown Atlanta, while Chicagoland Speedway is in Joliet, Illinois, nearly 50 miles from downtown Chicago. It is hard to imagine that tracks as distant as these have measurable impacts on rental values across the SMSA. To address this issue, we estimate the model both on the full sample of observations, and separately on both those observations that are identified as being within the central city of the SMSA and

[4] These tests are on the unweighted observations.
[5] The approach requires us to drop variables from the list of regressors. To the extent that these variables determine rent and are correlated with the track and racing event variables, their exclusion from the regression biases the track and race coefficients.

those that are not. This is, we recognize, a weak method of controlling for distance from downtown. However, actual distance does not vary across time, so it would be captured in the SMSA-specific effect. Likewise, area of an SMSA does not vary over the sample period, and would also be captured in the fixed effect. Consequently, to assess the importance of distance from the central city, we estimate the models with interaction terms involving the central city identifier, as well as on the split samples of central city and non-central city observations.

Results

The results are presented in Tables 4 through 6. These tables report the coefficients on the NASCAR variables under several alternative specifications of the regression equation.[6] Each of the three tables is for a specific subset of the data as described above. In each table, the results are reported for the full sample, for both the central and non-central city sub-samples, and for the full sample when the model includes interactions between the NASCAR variables and the central city dummy.

Table 4 shows the results for the largest regression sample, omitting those eight variables that are frequently missing in the data and hence constrict the sample the most. The results in Tables 5 and 6, with the more restrictive samples, are consistent with those from Table 4 and are, therefore, not discussed separately. The results imply that the effects of the NASCAR variables are different on central city and non-central city housing units. In the split samples, no track or race variable is significant in the central city regression, while the Truck Series race variable is in the non-central city regressions. When the data are pooled and interaction terms included, three of the central city interactions are statistically significant, as are three of the uninteracted race

[6] Each regression also includes SMSA-fixed effects, SMSA-specific time trends, and housing unit characteristics such as age, number of bedrooms, number of bathrooms, and whether the unit has central air conditioning or a garage. Table 1 shows the full list of housing unit explanatory variables.

variables. A Cup Series race appears to lower non-central city rents by nearly ten percent, but to raise central city rents by about five percent relative to that. However, one cannot reject the null that the two coefficients are equal but of opposite sign. In both the central and non-central city sub-samples, one cannot reject the null hypothesis that the NASCAR variables all have zero coefficients. However, in the pooled sample with interactions, one can reject the null.

Table 7 reports the p-values for joint hypothesis tests on the significance of the NASCAR variables for each sub-sample. In most cases, one can reject the null of no significance of the track and race variables at the one percent level or better. The cases when the null cannot be rejected occur when the central city interaction terms are not included in the regression, or when the null focuses exclusively on the uninteracted track and event variables. In other words, treating central city and non-central city units as though they are affected the same by the NASCAR variables is a mistake.

Consider now the sizes of the effects. To do this, we restrict attention to the pooled regressions with the central city interaction variables, as these specifications are supported by the joint hypothesis tests. Our focus is also directed at the sample with over 67,000 observations. In this case, six of the eight NASCAR variables are individually significant at the five percent level or better. The coefficients on both the Grand National Series event variable and its interaction term are each significant at better than the one percent level. The pattern of coefficients implies that the presence of a track in an SMSA may raise rents on central city units about 4.7 percent, but that the specific events have no effect on central city units. For example, the effect of a Grand National Series race on a central city unit is the sum of the coefficients of the Grand National Series event variable and its interaction term, or 0.1805 + (-0.1813) = -.0008. Testing that this sum is zero cannot reject the null. Likewise, the sum of the coefficients of the Truck Series event variable (-0.0743) and its interaction term (0.0872) is not different from zero,

nor are the sums of the coefficients of the Cup Series event variable and its interaction term, or those of the track variable and its interaction term. The individual statistical significance of the event variables indicates that these events alter rents on non-central city residences. Interestingly, Cup and Truck Series races significantly reduce rents while Grand National Series races raise them. The size of these effects is substantial. The coefficients imply percentage changes in real average monthly rent of -9.2, -7.2, and 19.8 percent due to Cup, Truck, and Grand National Series races, respectively.

The effects of events on rents in non-central city areas are substantial and may suggest biased coefficient estimates. One possibility is that the event variables are capturing the effects of the omitted average monthly electricity cost, unit square footage, abandoned buildings, trash in the streets, the presence of crime, street noise, rent control and subsidized rent variables.[7] To assess this possibility, we re-estimate the model including these variables, replacing the missing values with zero and creating dummy variables that identify the observations for which these replacements were done.[8] The Grand National race variable drops to 0.1146, well below the 0.1805 value reported in Table 4 but still implying a very large impact of Grand National races on non-central city rents. The Truck Series race variable also drops in (absolute) magnitude, from -0.0743 to -0.0520. Implications of joint hypothesis tests under this new model are identical to those reported in Table 7.

Discussion

There are two large issues with respect to the analysis here. First, the sample does not include a large number of tracks and events. Second, the question of whether our results indicate

[7] Having a missing value for any of these variables is, for the most part, strongly correlated with one or more of the NASCAR variables. In other words, the NASCAR variables will pick up some of the effects of the omitted variables for the observations whose values are missing.
[8] Complete results are available upon request.

tracks and races cause rents or if rents induce track construction and the granting of races casts doubt on our results. We take these issues in turn.

There is little we can do about the missing tracks and events. Table 3 indicates that most of the tracks and events omitted from our data are either not included in the AHS sample or are unidentifiable in that data. Only the two tracks in Portland, Oregon, and Lowe's Motor Speedway outside Charlotte, North Carolina, exist in identifiable SMSAs in data collected by the AHS. Unfortunately, the Metro Survey is conducted in the opposite years of the National Sample, which provides us with the existing observations, and is not available for each of the intervening years. According to the AHS website, Charlotte and Portland are available only for 1995 and 2002. Lowe's Motor Speedway hosts two each of Cup and Grand National Series races in each year of our sample and began hosting a Truck Series event in 2003. Portland Speedway hosted a single Truck Series event in 1995 and 1997, while Portland International Raceway hosted one in 1999. Neither of the Portland tracks hosted any Cup or Grand National Series events during our sample period, and the Portland Speedway closed at the end of the 2001 season. Because of the timing of the Metro Survey of the AHS, and the events in Charlotte and Portland, it was deemed of little use to collect the associated data.

Endogeneity of the track or event location is a potentially severe problem with our analysis. Of the 31 tracks in our analysis, 12 opened after 1993 and six shut down during the time period. In our analysis, given the use of SMSA-fixed effects, the track coefficient is identified off of these openings and closings. If the decision to open or close a track is influenced by local land costs and property values, then our results are suspect. The standard approach to the endogeneity of a regressor is to use an instrumental variables regressor. However, the long time span of our analysis and the breadth of the sample make it difficult to imagine what would be valid instruments.

We assess the likely severity of the bias by looking at the mean of the log of the real rental value before and after a track opened in those SMSAs which had a track open during our sample period. The test is conducted on the full set of almost 70,000 weighted observations as well as on the regression samples. The mean (unweighted) rent is higher after the track opened than it is before. At the same time, the mean rent is lower where a new track has opened than it is where no track opened during the period of our sample. This evidence suggests that if track locations are influenced by rents, it is that they are going where rents are low, not where they are high, which is the opposite of the reverse causation argument for the positive coefficients on the track variable. Based on this, we feel it is unlikely that our results are being driven by endogeneity of track locations.

Conclusions

This paper has looked at the economic impact of NASCAR-sanctioned automobile race tracks on their surrounding localities. It has added to the existing literature, which only seems to focus on the competition events held at the tracks. Our basic conclusion is that tracks and events are jointly significant determinants of rents, especially on central city rental units. However, the mere presence of a track is statistically significant and positive in several specifications, suggesting that the non-NASCAR event activities at a track have a significant positive economic impact on the area. This impact may, however, be limited to central city areas of an SMSA, as the significant track variables occur almost exclusively in central city sub-samples or as central city-track interaction terms.

The evidence of the effects of specific events is mixed. In central city and non-central city sub-sample regressions, event variables are rarely statistically significant. In the pooled sample with interaction terms, negative effects of Cup and Truck Series races on non-central city

units are common. Grand National Series races may have positive impacts on non-central city units. None of the event variables has a significant effect on central city observations.

These results suggest that tracks and even specific events are probably not useful as general tools for encouraging economic development. This is likely to be especially true for tracks in more urban settings. However, if a community outside the central city area of an SMSA has a track, or plans to build one, that community may want to push to host a Grand National Series race, and should avoid attracting a Cup or Truck Series race.

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Table 1 - Weighted Descriptive Statistics

Variable	Description	Mean	Std. Dev.
	Auto Racing Variables of Interest		
cuprace*	Track hosts at least one Cup Series race during the year	0.098	0.297
gnrace*	Track hosts at least one Grand National Series race during the year	0.131	0.337
track*	SMSA has an operational automobile race track	0.279	0.449
truckrace*	Track hosts at least one Truck Series race during the year	0.128	0.334
	American Housing Survey Control Variables		
airsys*	Unit has central air conditioning	0.409	0.492
baths	Number of full bathrooms in unit	1.172	0.442
bedrms	Number of bedrooms in unit	1.820	0.890
cencity*	Unit in central city of MSA	0.612	0.487
crimea*	Neighborhood has neighborhood crime	0.219	0.414
detone*	Structure is one-unit building, detached from all others	0.167	0.373
eaban*	Abandoned/vandalized buildings within 1/2 block of unit	0.068	0.252
ejunk*	Trash/junk in streets/properties within 1/2 block of unit	0.195	0.396
garage*	Garage or carport included with unit	0.331	0.471
halfb	Number of half bathrooms in unit	0.134	0.371
highrise*	Unit is in a building with more than six floors	0.047	0.212
holes*	Unit has holes in floor	0.019	0.135
lndrent	Natural log of deflated rent	6.213	0.555
lowrise*	Unit is in a building with less than four floors	0.813	0.390
pubsew*	Unit connected to public sewer	0.985	0.123
rcntrl*	Rent limited by rent control/stabilization	0.062	0.242
strna*	Neighborhood has heavy street noise/traffic	0.306	0.461
subrnt*	Government subsidizes rent for unit	0.019	0.137
unitage	Age of unit (years)	41.039	23.872
unitagesq	Age of unit squared (years)	2254.035	2288.510
	Number of Observations: 48,433		

* Variables are dummy variables, and take on a value of 1 if the condition in the description is met, and a value of 0 otherwise

Table 2 - NASCAR-Sanctioned Race Tracks Present in Data

	SMSA	2005 Series Events		
		Cup	GN	Truck
Superspeedways (Ovals of 2 miles or more)				
California Speedway	Riverside-San Bernardino, CA	2	2	1
Daytona International Speedway	Daytona Beach, FL	2	2	1
Indianapolis Motor Speedway	Indianapolis, IN	1	0	0
Intermediate Speedways (Ovals >1 mile but <2 miles)				
Atlanta Motor Speedway	Atlanta, GA	2	1	2
Chicago Motor Speedway	Chicago, IL	0	0	0
Chicagoland Speedway	Chicago, IL	1	1	0
Gateway International Raceway	St. Louis, MO-IL	0	1	1
Homestead-Miami Speedway	Miami-Ft. Lauderdale, FL	1	1	1
Kansas Speedway	Kansas City, MO-KS	1	1	1
Kentucky Speedway	Cincinnati, OH-KY-IN	0	1	1
Las Vegas Motor Speedway	Las Vegas, NV	1	1	1
Nashville Superspeedway	Nashville, TN	0	2	1
Texas Motor Speedway	Fort Worth-Arlington, TX	2	2	2
Short Tracks (Ovals of 1 mile or less)				
Bristol Motor Speedway	Johnson City-Kingsport-Bristol, TN-VA	2	2	1
Colorado National Speedway	Boulder-Longmont, CO	0	0	0
Evergreen Speedway	Seattle, WA	0	0	0
Flemington Speedway	Middlesex-Somerset-Hunterdon, NJ	0	0	0
I-70 Speedway	Kansas City, MO-KS	0	0	0
Indianapolis / O'Reilly Raceway Park	Indianapolis, IN	0	1	1
Memphis Motorsports Park	Memphis, TN-AR-MS	0	1	1
Mesa Marin Raceway	Bakersfield, CA	0	0	0
Nashville Speedway USA / Music City Motorplex	Nashville, TN	0	0	0
Nazareth Speedway	Allentown-Bethlehem-Easton, PA	0	0	0
Orange County Speedway	Raleigh-Durham, NC	0	0	0
Phoenix International Raceway	Phoenix, AZ	2	2	1
Pike's Peak International Raceway	Colorado Springs, CO	0	1	0
Saugus Speedway	Los Angeles-Long Beach, CA	0	0	0
The Milwaukee Mile	Milwaukee, WI	0	1	1
Tucson Raceway Park	Tucson, AZ	0	0	0
Walt Disney World Speedway	Orlando, FL	0	0	0
Road Courses (Require right turns)				
Sears Point International / Infineon Raceway	Santa Rosa-Petaluma, CA	1	0	0

Table 3 - NASCAR-Sanctioned Race Tracks Not Present in Data

	Location	SMSA
In Metro Survey Only		
Charlotte / Lowe's Motor Speedway	Concord, North Carolina	1520
Portland International Raceway	Portland, Oregon	6440
Portland Speedway	Portland, Oregon	6440
Not Present in American Housing Survey		
Dover (Downs) International Speedway	Dover, Delaware	2190
Heartland Park Topeka	Topeka, Kansas	8440
Hickory Motor Speedway	Hickory, North Carolina	3290
Louisville Motor Speedway	Louisville, Kentucky	4520
Mansfield Motorsports Speedway	Mansfield, Ohio	4800
Michigan International Speedway	Brooklyn, Michigan	3520
Myrtle Beach Speedway	Myrtle Beach, South Carolina	5330
New Hampshire International Speedway	Loudon, New Hampshire	4760
Richmond International Speedway	Richmond, Virginia	6760
Not Part of SMSA		
Autodromo Hermanos Rodriguez	Mexico City, Mexico	N/A
Darlington Raceway	Darlington, South Carolina	N/A
Martinsville Speedway	Martinsville, Virginia	N/A
North Carolina (Motor) Speedway	Rockingham, North Carolina	N/A
North Wilkesboro Speedway	North Wilkesboro, North Carolina	N/A
Pocono Raceway	Long Pond, Pennsylvania	N/A
(Big Daddy's) South Boston Speedway	South Boston, Virginia	N/A
Talladega Superspeedway	Talladega, Alabama	N/A
Watkins Glen International	Watkins Glen, New York	N/A

Table 4 - Regression Results: Excluding Eight Variables

Independent Variables	Coefficients	t-Statistics	Independent Variables	Coefficients	t-Statistics
			Full Sample - 67,180 Observations		
Without Central City Interactions			With Central City Interactions		
track	0.0218	0.95	track	0.0116	0.45
			cctrack	0.0181	0.87
track	-0.0154	0.54	track	-0.0271	-0.76
cuprace	-0.0543	-1.30	cuprace	-0.0965	**-1.98****
gnrace	0.0520	1.62	gnrace	0.1805	**3.90*****
truckrace	-0.0230	-0.95	truckrace	-0.0743	**-2.01****
			cctrack	0.0460	**2.07****
			cccuprace	0.0517	1.19
			ccgnrace	-0.1813	**-4.12*****
			cctruckrace	0.0872	**2.29****
Central City Sample 42,105 Observations			Non-Central City Sample 25,075 Observations		
track	-0.0028	-0.09	track	0.0571	1.64
track	-0.0086	-0.27	track	0.0465	1.08
cuprace	-0.0774	-1.42	cuprace	-0.0225	-0.46
gnrace	0.0345	0.94	gnrace	0.0786	1.57
truckrace	0.0012	0.05	truckrace	-0.0591	**-1.68***

***, **, and * denote significance at 1, 5, and 10% levels, respectively

The eight omitted variables include average monthly electricity cost, unit square footage, as well as crimea, eaban, ejunk, rcntrl, strna, and subrnt.

Table 5 - Regression Results: Excluding Two Variables

Independent Variables	Coefficients	t-Statistics	Independent Variables	Coefficients	t-Statistics
			Full Sample - 48,133 Observations		
Without Central City Interactions			With Central City Interactions		
track	0.0266	1.57	track	0.0197	1.06
			cctrack	0.0127	1.08
track	0.0322	**1.85***	track	0.0237	1.17
cuprace	-0.0116	-0.46	cuprace	-0.0662	**-1.82***
gnrace	-0.0145	-0.61	gnrace	0.0318	0.93
truckrace	0.0075	0.55	truckrace	-0.0028	-0.17
			cctrack	0.0062	0.45
			cccuprace	0.0878	**3.12****
			ccgnrace	-0.0678	**-2.67****
			cctruckrace	0.0180	1.23
Central City Sample 29,351 Observations			Non-Central City Sample 19,082 Observations		
track	0.0513	**2.98****	track	0.0007	0.02
track	0.0410	**2.29****	track	0.0299	1.31
cuprace	-0.0367	-1.51	cuprace	0.0176	0.38
gnrace	-0.0066	-0.26	gnrace	-0.0244	-0.61
truckrace	0.0324	**2.16****	truckrace	-0.0278	-1.55

***, **, and * denote significance at 1, 5, and 10% levels, respectively

The two omitted variables are average monthly electricity cost and unit square footage.

Table 6 - Regression Results: Including All Variables

Independent Variables	Coefficients	t-Statistics	Independent Variables	Coefficients	t-Statistics
			Full Sample - 27,151 Observations		
Without Central City Interactions			With Central City Interactions		
track	0.0175	0.53	track	0.0180	0.50
			cctrack	-0.0010	-0.07
track	0.0350	1.17	track	0.0477	1.53
cuprace	-0.0779	**-1.78***	cuprace	-0.1562	**-2.75****
gnrace	0.0249	0.72	gnrace	0.0640	1.21
truckrace	-0.0156	-0.97	truckrace	-0.0220	-0.99
			cctrack	-0.0288	**-2.06****
			cccuprace	0.1250	**3.17*****
			ccgnrace	-0.0538	-1.33
			cctruckrace	0.0121	0.54
Central City Sample 15,899 Observations			Non-Central City Sample 11,252 Observations		
track	0.0664	**2.18****	track	-0.0313	-0.58
track	0.0635	**1.99****	track	0.0292	0.74
cuprace	-0.0742	-1.54	cuprace	-0.0592	-0.71
gnrace	0.0462	1.26	gnrace	-0.0249	-0.34
truckrace	-0.0019	-0.11	truckrace	-0.0417	**-1.75***

***, **, and * denote significance at 1, 5, and 10% levels, respectively

Table 7 - Joint Hypothesis Tests of Variable Significance

Null Hypothesis	p-Value	Result
Sample - 67,180 Observations		
Without Central City Interactions		
track = cuprace = gnrace = truckrace = 0	0.2261	Cannot Reject
With Central City Interactions		
track = cuprace = gnrace = truckrace = 0	0.0014	Reject
cctrack = cccuprace = ccgnrace = cctruckrace = 0	0.0008	Reject
track = cup = gn = truck = cctrack = cccup = ccgn = cctruck = 0	0.0021	Reject
Sample - 48,433 Observations		
Without Central City Interactions		
track = cuprace = gnrace = truckrace = 0	0.2418	Cannot Reject
With Central City Interactions		
track = cuprace = gnrace = truckrace = 0	0.1938	Cannot Reject
cctrack = cccuprace = ccgnrace = cctruckrace = 0	0.0023	Reject
track = cup = gn = truck = cctrack = cccup = ccgn = cctruck = 0	0.0049	Reject
Sample - 27,151 Observations		
Without Central City Interactions		
track = cuprace = gnrace = truckrace = 0	0.2183	Cannot Reject
With Central City Interactions		
track = cuprace = gnrace = truckrace = 0	0.0262	Reject
cctrack = cccuprace = ccgnrace = cctruckrace = 0	0.0003	Reject
track = cup = gn = truck = cctrack = cccup = ccgn = cctruck = 0	0.0033	Reject