The Impact of Professional Sports Facilities on County-to-County Migration

Adam Taschner

The University of Akron

Department of Economics

Senior Project

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Abstract

The goal of this paper is to effectively utilize a difference-in-difference model in order to determine the impact of the construction of a professional sports facility on migration to the county where it is built. This paper analyzes research that has been previously done to determine that stadium construction corresponds with negative economic impacts as well as negative economic impacts corresponding with decreased migration. The difference-in-difference model uses dummy variables and an interaction term to determine if the migration trends in counties where stadiums are built is directly caused by the construction of the stadium. The results show that a pro sports facility's construction in a county is not the cause of negative migration trends in that county, but rather lead to a long-term increase in net migration as the only data of mine that is statistically significant. Overall, demographic variables, socio-economic variables, and housing prices have a greater significance on migration trends to a county.

1. Introduction

Professional sports are a major part of many American's everyday life. From Colin Kaepernick's peaceful protest against police brutality to LeBron James opening up his I Promise School for low-income children in Akron, Ohio, the reach of professional sports goes far beyond the playing field. Because of this, the impact sports have on our lives and the culture of the country cannot be understated. Sports are a highly influential part of our world and, therefore, play a crucial role in the economics of both the country and the city where a team is located. With every sports team comes a stadium or arena, and these facilities come with economic implications as well. Extensive studies have looked into the economic impacts of professional sports facilities in terms of variables such as tax revenues (Siegfried & Zimbalist, 2006) and the economic growth of the city (Coates & Humphreys, 2019). But what is yet to be discussed is the economic impact of stadiums in terms of migration within the United States. Other papers have looked at the impact of sports on global migration (Maguire, 2004), but migration within America plays a more direct role in the economics of a city or region where that sports team is located. Does simply having a sports team encourage people to move to a certain city or region? Or do the economic impacts that come with sports teams tend to cause people to leave a city or region? Looking at migration could help explain the real impact of having a sports team on the taxpayers of that city. Therefore, this paper will analyze the question: What impact does the construction of a new professional sports facility have on migration to and from a city where the facility is built?

A city does not necessarily need to add a sports team in order to build a new stadium or arena. Many cities decide to update their stadiums or arenas at some point to replace older venues and hopefully attract more fans to the new venues while raising ticket prices for the new

and improved stadium or arena. Because of this, facilities for both new and existing teams will be analyzed in this paper. Furthermore, this paper will analyze stadiums or arenas built for sports teams in the past ten years to get an understanding of more recent and relevant data. By analyzing migration trends in cities where new sports facilities are constructed, this paper will help better understand how the economic impacts of constructing a new professional sports facility actually affect the individuals who live in that city.

Variables such as per capita income, employment, and housing prices along with demographic variables will be relevant when conducting this analysis since those are variables that are indicative of economic activity and could impact the migration variable that this paper will analyze. These economic activity variables will be able to show if negative or positive economic impacts are felt by the taxpayers of the city, which will help this paper construct a hypothesis on how the economic impact of constructing professional sports facilities affects migration. This paper will utilize the Neoclassical Economic Theory of Migration, migration data from the IRS, and demographic data from the US Census in order to run a difference-in-difference analysis to see if there is a causal relationship between the economic impact of constructing a new pro sports facility and migration. In the end, my research shows that the negative economic impact of constructing a new sports facility does not have the negative impact on migration that I had anticipated.

The rest of this paper is organized as follows: a review of the research done on the economic impact of the construction of a professional sports facility and the impact of increased or decreased economic activity on migration. Following this, a theoretical discussion and review of the data used in this study will occur. Next, a section on the empirical methodology used in this paper will occur, and finally a section describing the results and conclusions of my research.

Overall, this analysis will allow for a more complete understanding of the real impact that sports teams and their home facilities have on the individuals of a city.

2. Literature Review

The business of professional sports is one of the most profitable industries in the world. The global sports market totaled $488.5 billion in 2018 and was projected to pass $500 billion in 2020, with the United States accounting for about 30% of that revenue (Torrens, 2020). However, with all this revenue, there must be some pretty steep costs, especially when it comes to the extravagant facilities these professional sports franchises call home. This cost falls heavily on the taxpayer, as it is now commonplace for the locations that sports franchises are associated with to use a combination of broad-based taxes or special taxes to help build and operate these facilities (Swindell & Rosentraub, 1998). With the increasing cost of facilities due to the team owners' desire to maximize attendance, the burden on the taxpayers can be heavy.

However, sports franchises themselves are small businesses for the city or region they are located in. For example, when looking at the professional baseball team of a medium-sized city like St. Louis, the franchise accounts for less than 0.3 percent of local economic activity while the baseball teams for a large city like New York account for less than 0.03 percent of its local economic activity (Siegfried & Zimbalist, 2000). Unlike the rest of the small businesses in these cities, however, the employees of sports teams, such as the players, coaches, and owners, make far more on average than the average small business owner. In fact, according to Forbes, out of the five major sports leagues in the United States, the MLB, NHL, NBA, NFL, and MLS, those who compete in the MLS make the least on average, as players averaged $308,969 per year in 2016, with the highest paying league being the NBA, which has an average annual salary per

player of $6.2 million in 2016, with the team owners making even more (Badenhausen, 2016). To compare, the median household income in America in 2016 is just $57,617 (Census, 2017), which is far less than the average major league professional athlete in America. If the professional sports players and owners make so much more annually than the majority of taxpayers, why are the facilities where they play funded largely by the public? What are the benefits for a city to host a professional sports team? And what impact does the economic activity from sporting facilities have on migration? This paper will look at the research done on economic activity's impact on migration and the economic impact of sports facilities in order to determine the construction of a new sports facility's impact on migration.

Professional sports facilities were not always publicly funded. Recently, however, teams have moved towards the public funding of their facilities. Because of this, there is now competition between cities to acquire sports teams, and with limited teams available for relocation or expansion, the league can wait to see which city offers the best subsidy. Without this competition, there would be no need to wield tax breaks or to have publicly funded private stadiums (Paulas, 2018). With private funding options becoming increasingly unattractive for private investors and team owners because of the enormous costs, public financing of sports facilities is now the norm.

There are several reasons why a city would want a sports team. First, consumer surplus can be substantial for a limited group of consumers. In other words, a small group of super fans who are indifferent to the cost of the stadium may create enough support for the local and state government to support the construction of a facility. Second, a general benefit for those who never get to attend the games occurs, giving many casual fans something to talk about with friends, family, and coworkers and creating broad support. Third, the impression that it

announces the city as a “major league” city and will therefore attract more tourists who will help boost the local economy (Siegfried and Zimbalist, 2000). While these reasons are all helpful in the addition of a professional sports team, there are more significant reasons that will be discussed next.

Some claim the true benefit of sports franchises are intangible benefits. These benefits that have no monetary value can be very powerful. A study done by Owen (2006) identifies that there may be some “immeasurable” benefits to a city taking on the public funding of a facility for a sports franchise. These “immeasurable” benefits include fan identification and civic pride. These intangible benefits can also go a long way in raising public support for funding a new sports facility, which is tied in with the reasons previously mentioned. If there is enough fan support from the residents of a city, there is a very good chance that the city will approve the public funding of a facility (Owen, 2006). While it is true that there are intangible benefits to a sports franchise being in a city, the main reason argued by the public authorities that a sports team ends up in a city is the economic benefits that the teams promise.

A study done by Vegesna (2019) looks into the economic reasoning behind adding a sports team. Vegesna (2019) states that the teams and team owners convince the governments that there will be an increase in jobs in the short run while there will be increased tourist spending in the long run. Lastly, the study points out that the threat of leaving or choosing a different city and causing dissatisfaction among the city’s residents can lead the city to agree to publicly fund these projects out of fear for political backlash (Vegesna, 2019). This is because the city would be fearful of the negative impacts that would result from the dissatisfaction of its residents. Additionally, a team leaving a city would leave an unoccupied stadium, which would

be a financial burden to the city. Because of these reasons, city officials are willing to give the team owners these subsidies to publicly fund the facility.

Owners of sports franchises almost always present the state and local governments with economic impact studies when making a pitch to have a facility publicly funded. As Coates and Humphreys (2019) point out, these studies are typically prospective in nature, predicting a big economic benefit to the city in the future. This includes hundreds of millions of dollars in tax revenues and hundreds or thousands of jobs created. These impact studies often rely on a spending multiplier to arrive at these large positive impacts (Coates & Humphreys, 2019). However, Baade and Matheson (2011), find that, in reality, there is a much lower multiplier effect than is predicted in the economic impact studies given by the teams. They find that spending at a sporting event could actually reduce local incomes since money is being spent at the sporting event instead of locally owned and operated businesses. Here, we see a drawback of the public funding of new sports facilities (Baade & Matheson, 2011).

Baade (2003) adds that public subsidy advocates claim that the subsidies should be considered more of an investment than an expense, as the indirect economic activity induced by stadiums is enough to fund other projects (Baade, 2003). A study done by Feng and Humphreys (2016) shows that the values of houses surrounding a new sports facility increase, most noticeably within a mile from the new facility, which is a benefit for the residents (Feng & Humphreys, 2016). This monetary benefit shows that there is value added for the residents. However, while there are some benefits to the city such as housing prices increasing a bit, scholars unanimously agree that these impacts are not too big and the claims are hyperbole (Baade, 2003). Due to this, we can see that the economic impact reports given by the teams themselves are largely exaggerated and do not reflect the reality.

When it comes to the true economic impact of constructing a pro sports facility, Baade and Matheson (2011) find that the economic benefits of publicly funded sports facilities go only to the wealthy, as they can afford the increased taxes and get to reap all the benefits of the team, as the majority of attendees at sporting events make above-average income (Baade & Matheson, 2011). However, as mentioned in a study by Irani (1997), the very method of raising taxes in order to publicly fund a sports facility causes negative economic effects. By publicly funding a sports facility, low-income individuals bear a disproportionate burden of the cost of building the facility (Irani, 1997). Baade (2003) agrees with this issue of equity for lower-income taxpayers (Baade, 2003). Additionally, in a study conducted by Baade and Dye (1988), it was found that there is no statistically significant increase in manufacturing in cities where stadiums are publicly funded. This means there is no evidence that the impact on the manufacturing industry from the addition of a publicly funded sporting facility is different from zero, meaning the addition of a stadium does not mean the addition of manufacturing jobs (Baade & Dye, 1988). This issue of equity mixed with the lack of job creation is a major negative economic impact on the taxpayers of the city.

While the previous negative economic impacts may not be directly felt or noticed by each individual resident of a city, the impact of per capita income will affect each tax paying resident. In a study by Lertwachara and Cochran (2007), the impact of the per capita income of the residents of the community where the sports facilities are built is analyzed. In the study, they analyze both the short-run and long-run impact that these teams have on the per capita income of residents of the host city. They find that there is either no improvement in income or a declining growth rate of per capita income for these residents. This depends largely on the league in which the team is in (Lertwachara & Cochran, 2007). Research done by Lasley and Turner (2010)

agrees with this, as they find that new sports facilities have little impact on income or employment for individuals (Lasley & Turner, 2010), which is a contradiction to what the studies given by the teams themselves say. Therefore, from an economic standpoint, the negative impacts seem to outweigh the positive effects.

Next, economic activity's impact on migration must be analyzed. A study done by Cebula (2005) shows that increased per capita income and increased employment both lead to increased migration (Cebula, 2005), showing that there is a positive relationship between economic activity and migration. These findings are consistent with other research done on the subject, including studies like Davies et al. (2001). This study also shows that per capita income and employment, which are both indicators of increased economic activity, lead to increased migration to a location (Davies et al., 2001). Further, a study done by Treyz et al. (1993) demonstrates that migration is stimulated by employment probability, even more so than wage potential (Treyz et al., 1993). This shows that positive economic impacts, such as high unemployment, result in high migration rates. Additionally, Renas and Kumar (1973), find that cost-of-living factors and migration are significantly related, as migration increases when the cost of living decreases (Renas & Kumar, 1973). Lastly, according to Massey et al. (1993), migrants move from societies where labor is abundant and wages are low, to societies where labor is scarce and wages are high. Decisions to migrate are taken at the individual level and consider that higher earnings in the long run compensate for the cost and risk of relocating (Massey et al., 1993). Therefore, economic activity and migration are positively related and we should expect to see an inflow of migration to the city with increased economic activity and an outflow of migration to the city with decreased economic activity.

As seen above, economic activity has a positive relationship with migration and the economic benefits that come from a professional sports facility being built are minimal. However, no research has analyzed if these expensive sports facilities actually drive people away. Are the negative economic impacts enough to drive individuals away from that county in order to get away from the increased taxes? Or do the intangible benefits to having a pro sports team and facility outweigh these economic drawbacks, causing people to move to a county in order to be closer to the team? My research will look to answer these questions and determine the impact of building a new professional sports facility on migration. Based on the research already conducted, I expect migration to decrease due to the negative economic impacts that largely come with a new professional sports facility.

3. Theoretical Discussion

The economic theory that this paper will focus on is the Neoclassical Economic Theory of Migration. This theory, according to Massey et al. (1993), as previously mentioned, states that migrants move from societies where labor is abundant and wages are low, to societies where labor is scarce and wages are high. Decisions to migrate are taken at the individual level and consider that higher earnings in the long run compensate for the cost and risk of relocating (Massey et al., 1993). In the context of my research, those who are impacted by the negative effects of the construction of a new professional sports facility may decide that he or she may achieve higher earnings if that individual relocates. At the same time, there will be those from other locations who feel they can achieve higher earnings in the location where the facility is built, causing him or her to move to that county. Also, those who feel little economic impact or minor negative economic impacts from the addition of a professional sports facility, barring

other factors, will likely decide that the cost of relocation is not worth it. The net flow of migration will tell if more felt that it was the best option to live in that county where the facility is built. Because of this Neoclassical Economic Theory of Migration, we will see a mix of inflow and outflow of migration to the county where the facility is based due to the individual preferences.

Another economic theory that will need to be considered in this paper is the Substitution Effect. This theory accounts for the change in demand for a good when prices are changed. Most times, if the price for a good is raised, people will tend to substitute that good with a cheaper option that will satisfy their consumption. In the context of my research, an example would be property taxes increasing in order to construct the sports facility, which would likely cause fewer houses to be bought because the value of the house drops. Therefore, this means the stadium does not provide enough amenity to cover the extra costs imposed on homeowners in terms of higher taxes. The Substitution Effect tells us that the house prices have to drop in order to match the lower value, otherwise people would move to other cities where they can buy comparable houses with higher values while paying the same price. The drop in housing prices in the city would continue until a new equilibrium is found. However, at the same time, the reverse could happen and housing values may go up if the stadium provides enough value that it exceeds the costs of paying higher taxes. Economic activity variables will be able to show if negative or positive economic impacts are felt by the taxpayers of the city, which will help this paper construct a hypothesis on how the economic impact of constructing professional sports facilities affects migration. While the Neoclassical Economic Theory of Migration will be the main economic theory discussed in my paper, it is important to be aware that the substitution effect may also be impacting some of the data.

4. Data

The first step in collecting the data that will be used in my analysis is to find which professional sports facilities have been built in the past ten years. A study from Reichard (2017) lists NFL stadiums built since 2010 (Reichard, 2017), Goldberg (2017b) lists NBA arenas built since 2010 (Goldberg, 2017b), Goldberg (2017a) shows MLB stadiums built since 2010 (Goldberg, 2017a), and Spedden (2018) shows NHL arenas built since 2010 (Spedden, 2018). There may be some overlap between facilities, as some teams may share a facility in one city. These facilities will only be analyzed once. For example, the Philadelphia 76ers NBA team and the Philadelphia Flyers NHL team both play home games at the Wells Fargo Center in Philadelphia, Pennsylvania. Since the facility was only constructed once, it would be repetitive and wasteful to analyze its impact on migration once for both of the teams. While constructing a stadium can increase the return on investment for the residents of that city which cannot be totally ignored, in my analysis, the facility will only be counted once per city, not once per team.

Variables such as per capita income, employment, and housing prices will be relevant when conducting this analysis since those are variables that are indicative of economic activity and could impact the migration variable that this paper will analyze. Additionally, demographic variables such as percent white, percent male, and percentage working age, which in this context will be 15 to 64 years old. The migration data for this paper will come from the IRS and show annual county-to-county migration by year for each county in the United States (IRS, 2021). From this, the paper will analyze annual migration trends from before and after the sports facility was built in that county. Lastly, socio-economic variables will be important, such as income and employment, as well as demographic variables, such as age and sex. Through this, the paper will

better understand the impact the negative economic effects that come with the addition of a sports facility have on migration to and from the county in which the facility is located.

In Exhibit 1 below, the results of individual t-tests are shown. In these t-tests, the treatment and control counties were compared only for the pretreatment period. The idea behind these t-tests is to have the results come back that the treatment and control data for the pretreatment period are not statistically significant, meaning that the two groups are comparable prior to treatment. This would show that comparing the two groups after treatment is a reasonable process. In Exhibit 1, differences that have three stars (***) indicate statistical significance at the 1% level, differences that have two stars (**) indicate statistical significance at the 5% level, and differences that have one star (*) indicate statistical significance at the 10% level.

Exhibit 1: Results of T-Test on Pre-Construction Treatment and Control Variables

Variable	Treatment	Control	Difference
Migration - Inflow	10.42	8.01	2.41***
Migration - Outflow	10.44	7.96	2.48***
Migration - Net	-2.69	1.19	-3.88***
Income	38617.60	31476.30	7141.30**
Unemployment	5.10	5.85	-0.75
Housing Index	507.90	330.70	177.20***
Percent Male	0.49	0.50	-0.01***
Percent White	0.66	0.83	-0.17***
Percent Working Class	0.68	0.66	0.02***

Source: IRS and US Census Data

Notes: *** indicates significance at 1%, ** at 5%, and * at 10%. Results are rounded to two decimal points.

Exhibit 1 shows that all the variables, excluding Unemployment, are statistically significant. This raises some concerns for my research, as I do not want to compare data that was

already statistically different in the first place. Therefore, the next step in my data analysis is to run a parallel trend test on the data.

While the data seems to be statistically different when comparing the levels of different variables, a parallel trend analysis is used to check and see if the outcome/dependent variables have a similar trend. In other words, since the levels of the variables are different, we look to the parallel trend analysis to show that at least the trends are the same. Difference-in-difference models, which will be ran later to get the results of my research, require the trends of the variables to be the same and do not require the levels of the variables to be the same. Because of this, the parallel trend analysis for my research is crucial to being able to get trustworthy results. In a parallel trend analysis, a regression model is run with the dependent variable being the same dependent variable that is the focus of this study, migration. The migration variable will be tested for migration inflow, migration outflow, and net migration. Next, a treatment dummy variable is used to determine whether or not the data being analyzed is from a county where a facility is being constructed or not. The treatment variable equals 1 if the data is from a county where the facility is being built and 0 otherwise. Then, a time variable (TimeTrend) is used. This variable indicates time relative to the sports facility being constructed. For instance, if the data from a county is two years prior to treatment, or facility construction, then TimeTrend would equal -2. Lastly, an interaction term between the treatment and TimeTrend variables is used. The interaction term shows if the treatment group has a trend that is different from the control group. For this reason, we want the interaction term to be statistically insignificant so that we can say the treatment and control groups have parallel trends. Below, in Exhibit 2, are the results of my parallel trend analysis.

Exhibit 2: Results of Parallel Trend Test

	Migration - Inflow	Migration - Outflow	Migration - Net
	Parameter Estimate (Standard Error)	Parameter Estimate (Standard Error)	Parameter Estimate (Standard Error)
Treatment*TimeTrend	0.00 (0.22)	0.02 (0.21)	-1.17 (0.92)
Treatment	2.40*** (0.47)	2.51*** (0.46)	-5.88*** (1.99)
TimeTrend	0.04 (0.06)	0.02 (0.06)	0.26 (0.27)
Intercept	8.08*** (0.14)	8.00*** (0.13)	1.81*** (0.58)

Source: IRS and US Census Data

Notes: *** indicates significance at 1%, ** at 5%, and * at 10%. Results are rounded to two decimal points.

From the above Exhibit 2, we see that the interaction term, Treatment*TimeTrend, is not significant on any level for migration inflow, migration outflow, or net migration. These are the results that we were hoping to see because this means that the interaction term between the treatment and TimeTrend variables that represents a difference in trends across the two groups is statistically insignificant. This means that the outcome, or migration, variables follow the same trend in both the treatment and control groups prior to the construction of a professional sports facility. Because of the statistically insignificant results from the parallel trend test, we can be confident in the data and results that will come from the Difference-in-Difference model to answer the research question.

5. Empirical Methodology

This paper's analysis of the impact sports facilities have on migration centers around the averages of migration. Migration at the county level will be focused on. I will use data from the county where the stadium is located, the neighboring counties, or NC, to the county where the

stadium is located and the neighbors of those neighboring counties, or NON, where the stadium is located. By including all of these levels of counties, we will be able to understand fully the impact the facility's construction has on the region. From there, the data related to each county are broken down into five different categories, including: pretreatment average (1-3 years prior to stadium construction), short term post treatment average (1-3 years after stadium construction), medium term post treatment average (4-6 years after stadium construction), long term average (7-9 years after stadium construction), and overall average. In the context of this paper, the "treatment" is the construction of the sports facility. Also, the natural log of these averages will be taken so that we get a percentage change instead of an overall number, which will allow us to better interpret the results and find the true trends. The main analysis is focused on the comparison of the focal counties to the NC and NON counties with regard to migration into and out of these counties around the time of the construction of sport facilities in the focal counties. The difference-in-differences model of this study allows it to identify the causal relationship between the sports facility construction and the migration trends in the focal counties. Equation 1 shows the main model used in this analysis:

Equation 1

$$migration = \beta_0 + \beta_1 sportcounty + \beta_2 postconstruction + \beta_3 interaction + \beta_4 averageincome + \beta_5 ueaverage + \beta_6 hiavg + \beta_7 maleavg + \beta_8 whiteavg + \beta_9 ageavg + \varepsilon$$

In Equation 1, the *migration* variable on the left-hand side of the equation refers to migration inflow, outflow, or net migration. β_0 is the intercept term. The *sportcounty* and *postconstruction* variables are both dummy variables, with *sportcounty* equaling 1 if the county being analyzed is a focal county and 0 if NC or NON and *postconstruction* equaling 1 if the migration being analyzed is post construction of the stadium and 0 if preconstruction. The

interaction term is what makes the difference-in-differences model what it is, as it equals *sportcounty*postconstruction*. Therefore, *interaction* can only be 1 if *sportcounty* and *postconstruction* both equal 1, so *interaction* measures the impact of a focal county after construction on the model. By doing this, the model will be able to tell us the causal relationship between migration and the decreased economic activity due to the construction of a professional sports facility. *Averageincome* measures the average per capita income (in thousands of US dollars) in the county over the time period analyzed, *ueaverage* is average unemployment rate in that county over the period of time analyzed, and *hiavg* is the housing index average over the time period analyzed. Next, *maleavg* is the average percent male in the county over the time period analyzed, *whiteavg* is the average percent white in the county over the time period analyzed, and *ageavg* is the average percent working class (ages 15-64) in the county over the time period analyzed. The inclusion of all of these variables will give this analysis a good idea of the causal relationship between migration and the construction of a professional sports facility.

This paper will utilize a difference-in-difference model. By using this model, we will be able to compare the differences in outcomes between two outcomes. For example, we will compare the pretreatment average migration and the short-term post treatment migration data for the county where the sports facility is constructed to the pretreatment and short-term post treatment migration data from the neighboring county. The other explanatory variables will also be included for each county, not just the migration data, so we get a true picture of what kind of impact the treatment has on the counties. Doing a difference-in-difference will give a more reliable and useful result than an OLS regression analysis because this paper is looking to compare the migration trends to find if they are significantly different, not just determine the

trend and how other variables impact it. Because of this, a difference-in-difference analysis will be used, and the migration trends will be analyzed against other counties and other variables.

The main assumption that needs to be made for my model is that the sample data is normally distributed. This is because there is a limited number of sports facilities that have been built post-2000, so there is a limited number of data points that can be gathered. Therefore, this paper must assume that the sample data is normally distributed so that we can be confident in the results.

6. Results

The difference-in-differences model ran show that the economic activity caused by the construction of a new pro sports facility does cause a statistically significant decrease in net migration for the short and medium term periods, but is not significant for any other period or migration variable. Exhibit 3 below shows my results for the difference-in-difference model ran on the natural log of net migration:

Exhibit 3: Results of Net Migration Difference-in-Difference Model

Variable	Short	Medium	Long
Interaction	-2,469.22** (1,078.52)	-2,361.42** (967.23)	1,203.49 (906.93)
Sport County	-17.14 (804.45)	27.42 (703.03)	-428.28 (632.99)
Post-Construction	-210.70 (314.39)	-248.87 (292.99)	-173.85 (284.91)
Per-Capita Income	0.01 (0.01)	0.02* (0.01)	0.00 (0.01)
Unemployment	-12.88 (69.26)	-15.33 (48.95)	-75.77 (51.25)
Housing Index	-2.57*** (0.78)	-2.79*** (0.65)	-0.31 (0.71)

Percent Male	7,576.08 (10,140)	13,019.00 (9,336.03)	11,679.00 (8,728.32)
Percent White	2,260.77* (1,108.95)	3,098.42*** (1,047.77)	2,310.99** (949.50)
Percent Working Age	-2,380.77 (5,035.40)	1,810.73 (4,504.29)	1,630.74 (4,329.99)
Intercept	-3,022.93 (5,642.09)	-9,591.53 (5,075.62)	-7,908.83* (4,678.70)
F-Stat	6.26	8.85	1.96
N	516	484	456
Adj R^2	0.08	0.13	0.02

Source: IRS and US Census Data

Notes: *** indicates significance at 1%, ** at 5%, and * at 10%. Results are rounded to two decimal points. For each variable, parameter estimates are listed with standard errors in parentheses.

In the above exhibit, *Interaction* for net migration is significant for the short- and medium-term periods but is not statistically significant in the long term. This means that there is a causal relationship between stadium construction and net migration in the short and medium term periods, but not in the long term. For the significant periods, counties that build a professional sports stadium net a loss of about 2,469 households on average in the first three years post-construction and 2,361 households in four to six years after construction. The non-significant long-term period can be interpreted as counties that build sports facilities net an increase of 1,203 households, on average, seven to nine years post-construction. The dummy variables *Sport County* and *Post Construction* are not significant at any level in any period. The other significant variables for net migration include *Housing Index* in the short and medium terms, and *Percent White* in all three periods. For *Housing Index*, for every unit increase in the housing index, net migration decreases by over 2 households in both the first three years and four to nine years after stadium construction. For *Percent White*, an increase in one percent in a county's white population leads to a net increase in migration of 2,260 households in the short term, about 3,098 households in the medium term, and 2,310 households in the long term.

Therefore, the decrease in net migration that we see in the short and medium terms are caused by the construction of a pro sports facility, with *Housing Index* and *Percent White* also having a causal impact on the trends in net migration.

Next, Exhibit 4 shows the results of the difference-in-differences model on migration inflow:

Exhibit 4: Results of Migration Inflow Difference-in-Difference Model

Variable	Short	Medium	Long
Interaction	-305.79 (3,578.33)	-1,726.23 (3,884.32)	-862.94 (4,124.00)
Sport County	18,137.00*** (2,669.01)	18,892.00*** (2,823.31)	18,784.00*** (2,880.44)
Post-Construction	-1,362.56 (1,043.09)	-2,434.39** (1,176.62)	-3,112.81** (1,296.50)
Per-Capita Income	0.11** (0.04)	0.10** (0.05)	0.11* (0.06)
Unemployment	65.55 (229.79)	254.75 (196.60)	333.78 (233.20)
Housing Index	17.91*** (2.58)	12.94*** (2.62)	17.77*** (3.25)
Percent Male	-121,289.00*** (33,643.00)	-129,201.00*** (37,493.00)	-98,002.00** (39,718.00)
Percent White	-17,993.00*** (3,918.18)	-18,936.00*** (4,207.76)	-16,363.00*** (4,320.72)
Percent Working Age	59,202.00*** (16,707.00)	61,026.00*** (18,089.00)	62,384.00*** (19,704.00)
Intercept	34,859.00* (18,719.00)	39,162.00* (20,383.00)	18,194.00 (21,290.00)
F-Stat	56.42	43.47	39.10
N	516	484	456
Adj R^2	0.49	0.44	0.43

Source: IRS and US Census Data

Notes: *** indicates significance at 1%, ** at 5%, and * at 10%. Results are rounded to two decimal points. For each variable, parameter estimates are listed with standard errors in parentheses.

Unlike Exhibit 3, Exhibit 4 does not show that *Interaction* is significant at any level in any period, meaning that this paper has not found evidence that the construction of a professional sports facility significantly impacts the inflow of migration to a county. However, here again the results show that the *Sport County* variable is significant, this time at the 1% level for all three periods and *Post-Construction* is significant at 5% only for the medium- and long-term periods. This shows that the change in migration inflow is significant in the focal counties and in the medium- and long-term periods, but the change in migration inflow is not caused by the construction of a pro sports facility in that county. Here, *Average Income, Housing Index*, and the demographic variables of *Percent Male, Percent White,* and *Percent Working Age* are all significant at some level in each period. For example, for migration inflow, a 1% increase in the percentage of a county's population that are working age leads to an increase in 59,202 households in the short term, 61,026 households in the medium term, and 62,384 households in the long run. While these numbers are very large for just a 1% increase in working age, it is important to consider that a 1% increase in the percentage of a county's population that is working age would be a huge change, and, in reality, it would be more likely to see an even smaller change in percent working age. For migration inflow, the migration trend changes have more to do with the demographic variables of *Percent Male, Percent White,* and *Percent Working Age* as well as the socio-economic variable of *Average Income* along with the housing variable of *Housing Index,* as these variables are all significant at some level for all three periods.

Lastly, Exhibit 5 displays the results of the difference-in-differences model on migration outflow:

Exhibit 5: Results of Migration Outflow Difference-in-Difference Model

Variable	Short	Medium	Long
Interaction	2,163.98	635.43	-2,066.28

	(3,817.50)	(4,001.34)	(4,176.71)
Sport County	18,154.00*** (2,847.41)	18,864.00*** (2,908.37)	19,212.00*** (2,915.13)
Post-Construction	-1,151.82 (1,112.81)	-2,185.44* (1,212.07)	-2,938.93** (1,312.12)
Per-Capita Income	0.10** (0.05)	0.08 (0.05)	0.11* (0.06)
Unemployment	78.44 (245.15)	270.08 (202.52)	409.55* (236.00)
Housing Index	20.48*** (2.75)	15.74*** (2.70)	18.08*** (3.29)
Percent Male	-128,865.00*** (35,891.00)	-142,220.00*** (38,622.00)	-109,680.00*** (40,197.00)
Percent White	-20,253.00*** (4,180.07)	-22,035.00*** (4,334.53)	-18,674.00*** (4,372.75)
Percent Working Age	61,583.00*** (17,823.00)	59,215.00*** (18,634.00)	60,752.00*** (19,941.00)
Intercept	37,882.00* (19,971.00)	48,754.00** (20,997.00)	26,103.00 (21,547.00)
F-Stat	58.94	49.07	40.40
N	516	484	456
Adj R^2	0.50	0.47	0.44

Source: IRS and US Census Data

Notes: *** indicates significance at 1%, ** at 5%, and * at 10%. Results are rounded to two decimal points. For each variable, parameter estimates are listed with standard errors in parentheses.

With the outflow data from Exhibit 5, the results again show that *Interaction* is not significant at any level for any period, similar to the inflow migration data in Exhibit 4. Again, this paper has not found evidence that the change in migration outflow is significantly impacted by the construction of a pro sports facility. The results show that *Sport County* is significant at the 1% level for all periods and *Post-Construction* is significant at some level for both medium- and long-term periods. This shows, once again, that the focal counties are again statistically significant to the change in migration outflow, and the medium- and long-term periods are statistically significant as well, but the construction of a pro sports facility in one of these focal

counties is not statistically significant to the change in migration outflow in any period. Once again, it is the demographic variables of *Percent Male, Percent White,* and *Percent Working Age* and *Housing Index* that are statistically significant at some level in each period. *Unemployment* and *Average Income* are also significant at some level in some periods, but not every period like the demographic variables. Here, we see that there is no causal relationship between migration outflow and the construction of a professional sports facility, and instead the changes in migration outflow trends have more to do with demographic variables, socio-economic variables, and the housing index.

Overall, the results show that, contrary to my hypothesis, the construction of a professional sports facility is not statistically significant in terms of migration inflow or outflow for a county where the facility is built. However, my hypothesis holds true for the short and medium term of net migration, as those periods are statistically significant and show negative net migration trends. This means that the construction of a professional sports facility has a causal impact in the short- and medium-term net migration that aligns with my hypothesis that the negative economic activity that comes with the construction of a pro sports facility lead to decreased migration to that county where the facility is built. Additionally, it appears that demographics, income, and the housing index have significant impacts on migration inflow and outflow, and *Percent White* and *Housing Index* are significant in terms of net migration along with the interaction term. Lastly, for migration inflow and outflow, the focal counties appear to be significant in terms of change in migration trends, but the construction of a sports facility in these focal counties does not appear to be significant.

7. Conclusion

My results were only able to provide evidence of a causal relationship between negative net migration trends in the focal counties and the construction of a professional sports facility in the short- and medium-term periods. My results were not able to prove any causal relationship between the construction of a sports facility and a change in migration inflow, outflow, or long-term net migration. As the results show, the construction of a professional sports facility causes a significant decrease in net migration trends to the focal counties for the short and medium terms, which agrees with what my hypothesis predicted. Additionally, demographic variables, socio-economic variables, and the housing index seem to play a significant impact of some form for migration inflow, outflow, and net migration. This paper is able to say that the construction of a pro sports facility has a statistically significant impact on decreasing net migration trends in the short and medium terms to the focal counties, which is what I was expecting to see based on the previous researched that was analyzed. However, this paper cannot say that the construction of a professional sports facility has a causal impact on migration inflow, outflow, or long-term net migration, which does not agree with my hypothesis or with what I had expected to see.

Overall, the results force me to conclude that the construction of a sports facility is only statistically significant in the negative net migration trends for a county for the short- and medium-term periods. This means for these periods of net migration, I am able to reject the Null hypothesis and accept that the construction of a professional sports facility has a causal impact on short and medium term net migration. However, for long term net migration along with migration inflow and outflow, I am unable to reject the Null hypothesis and must accept that the construction of a professional sports facility has no impact on migration trends for these periods. Although my results are a bit of a mixed bag, I am content with finding evidence that my

hypothesis is true for some periods in net migration. The conclusion that I end this paper with is that while the construction of a professional sports facility is significant in the negative net migration trends in the short and medium term, demographic variables, socio-economic variables, and housing prices seem to play a significant role more often in the migration trends of a county.

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Appendix:

Exhibit 6: Results of Natural Log of Net Migration Difference-in-Difference Model

Variable	Short	Medium	Long
Interaction	-2.22 (1.83)	1.36 (1.91)	5.33*** (1.98)
Sport County	-3.66*** (1.37)	-3.50** (1.39)	-4.55*** (0.38)
Post-Construction	0.43 (0.54)	-0.90 (0.58)	-0.77 (0.62)
Per-Capita Income	0.00 (0.01)	0.00 (0.01)	0.00 (0.00)
Unemployment	-0.24** (0.12)	-0.19** (0.10)	-0.33*** (0.11)
Housing Index	0.00 (0.00)	0.00** (0.00)	0.00 (0.00)
Percent Male	9.20 (17.27)	17.71 (18.48)	4.47 (19.04)
Percent White	5.18** (2.01)	5.88*** (2.07)	4.54*** (2.07)
Percent Working Age	0.32 (8.57)	5.44 (8.91)	7.43 (9.44)
Intercept	-5.00 (9.61)	-13.56 (10.05)	-7.01 (10.21)
F-Stat	8.74	7.13	4.03
N	515	483	455
Adj R^2	0.12	0.10	0.06

Source: IRS and US Census Data

Notes: *** indicates significance at 1%, ** at 5%, and * at 10%. Results are rounded to two decimal points. For each variable, parameter estimates are listed with standard errors in parentheses. Natural log of net migration is used for control variable.

Exhibit 7: Results of Natural Log of Migration Inflow Difference-in-Difference Model

Variable	Short	Medium	Long
Interaction	-0.14 (0.31)	-0.19 (0.33)	-0.01 (0.35)
Sport County	1.20*** (0.23)	1.25*** (0.24)	1.15*** (0.24)
Post-Construction	-0.13 (0.09)	-0.26*** (0.10)	-0.37*** (0.11)
Per-Capita Income	0.01* (0.01)	0.01 (0.01)	0.01 (0.01)
Unemployment	0.00 (0.02)	0.01 (0.02)	0.00 (0.02)
Housing Index	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
Percent Male	-22.43*** (2.93)	-23.48*** (3.22)	-19.19*** (3.35)
Percent White	-1.31*** (0.34)	-1.59*** (0.36)	-1.50*** (0.36)
Percent Working Age	9.00*** (1.45)	8.29*** (1.55)	8.05*** (1.66)
Intercept	13.40*** (1.63)	14.79*** (1.75)	12.49*** (1.80)
F-Stat	79.00	63.36	65.29
N	516	484	456
Adj R^2	0.58	0.54	0.56

Source: IRS and US Census Data

Notes: *** indicates significance at 1%, ** at 5%, and * at 10%. Results are rounded to two decimal points. For each variable, parameter estimates are listed with standard errors in parentheses. Natural log of net migration is used for control variable.

Exhibit 8: Results of Natural Log of Migration Outflow Difference-in-Difference Model

Variable	Short	Medium	Long
Interaction	-0.08 (0.30)	-0.15 (0.32)	-0.09 (0.33)
Sport County	1.25*** (0.22)	1.31*** (0.23)	1.22*** (0.23)
Post-Construction	-0.14 (0.09)	-0.25** (0.10)	-0.33*** (0.11)
Per-Capita Income	0.01* (0.01)	0.01 (0.01)	0.01 (0.01)
Unemployment	0.012 (0.019)	0.01 (0.02)	0.01 (0.02)
Housing Index	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
Percent Male	-22.87*** (2.79)	-23.62*** (3.07)	-19.34*** (3.21)
Percent White	-1.46*** (0.33)	-1.74*** (0.35)	-1.64*** (0.35)
Percent Working Age	8.84*** (1.38)	7.90*** (1.48)	7.57*** (1.59)
Intercept	13.74*** (1.55)	15.16*** (1.67)	12.89*** (1.72)
F-Stat	93.15	74.79	72.35
N	516	484	456
Adj R^2	0.62	0.58	0.59

Source: IRS and US Census Data

Notes: *** indicates significance at 1%, ** at 5%, and * at 10%. Results are rounded to two decimal points. For each variable, parameter estimates are listed with standard errors in parentheses. Natural log of net migration is used for control variable.

SAS Code:

Difference-in-Difference Model:

```
proc reg;
model migrationin = interaction sportcounty postconstruction averageincome ueaverage hiavg
maleavg whiteavg ageavg;
run;

proc reg;
model migrationout = interaction sportcounty postconstruction averageincome ueaverage hiavg
maleavg whiteavg ageavg;
run;
quit;

proc reg;
model netmigration = interaction sportcounty postconstruction averageincome ueaverage hiavg
maleavg whiteavg ageavg;
run;
```

NOTE: I changed the dependent migration variable name based on the period I was using (short,

medium, or long), but the rest of the code and variables stayed the same.

T-Test Code:

```
proc ttest;
        class treatment;
        var migrationin;
run;
```

NOTE: Here, again, the variable name was changed based on if I was doing inflow, outflow, or

net.

Parallel Trend Code:

```
proc reg;
model migrationin = treatment timetrend interaction;
run;
```

NOTE: Migration variable changed depending on what kind of migration was being examined

(inflow, outflow, or net).