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Romanticising the NFL Stadium

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Background

- Professional sports in every department have experienced exponential inflation regarding the money involved in the industry, the National Football League (NFL) is not exception to the phenomenon and there is no greater price tag and expense to an NFL team than a brand new multi billion-dollar stadium project.
- Despite the gluttonous amount of money circulated throughout the NFL, the sport and its teams remain extremely popular amongst the general public and in almost every major city there is a connected team with an elaborate stadium for their obsessed fans to come support their favorite players.
- Recently U.S. professional sports were stopped due to the coronavirus outbreak, and it was clear just how missed professional sports were. United States culture adores professional, people love their local team and often believe that their teams’ existence in the city provides a positive effect on the local economy.
- However, the question remains that although the public support their team on the field does having an NFL team in one's city support the city financially as is often suggested when discussing the effects of hosting an NFL team and the expensive stadium that compliments it.
- Analysis on the reality of NFL franchise’s actual widespread economic impact begins by identifying the large costs that are associated with establishing a new stadium and if the team ever truly reimburses this by acting as a catalyst for economic growth.
- As a business an NFL team is a substantial source of economic activity for the city, but is the amplitude of this local economic impact significantly positive, negative, or entirely insignificant?
- Team owners over the years have continued to be able to convince cities to invest in publicly funding the construction of new football stadiums. While other teams have opted to entirely privately fund these enormous projects begging the question which is the optimal approach.
- Baade and Dye’s study “The Impact of Stadium and Professional Sports on Metropolitan Area Development” published in 1990 became the landmark research for how an NFL stadium and its stadium effect the local economy.
- Inspired by the recent opening of the record breaking $5 billion-dollar, Sofi Stadium project in Los Angeles that managed to attract two NFL teams to move to the city, this research aims to bring some clarity into what are the true determinates for GDP and do they include the existence of an NFL team and the construction on a new stadium.

Theory

- Local politicians are always constrained by land and money, two of the most demanded factors for NFL stadium construction.
- An important economic principle is the concept of maximization, local politicians are influential decision makers for what gets maximized.
- Government spending is part of the GDP equation and theoretically an increase of government spending such as investing in building a new NFL stadium will result in an increase in GDP If GDP = C + I + G + X – M, government spending to build the stadium automatically counts (G).
- There is an opportunity cost to consider when discussing how public funding for these stadiums is going to be raised and who it will impact.
- The term, compensating differential, comes from labor economics, looking at tradeoff between monetary compensation and non-monetary characteristics of the job. People may except lower wages in order to live in a city with the nonmonetary benefit of an NFL team.
- Professional sports teams just like any other entertainment outlet may improve the quality of life for its local communities. Professional sports teams are unique however in that they inspire civic pride and a sense of comradery amongst fans. This emotional factor can be all that is required for residents to support a plan for building their team a new stadium.
- The last economic theory that is applicable in this discussion as mentioned before is the multiplier effect. The idea that locals and travelling fans spending money related to the stadium and the team will boost the economy significantly due to the multiplier effect.
- The multiplier effect is a function of consumers propensity to consume and believes that any one dollar spent related to a new stadium will actually contribute to the local economy as more than just the initial dollar as that dollar continues to circulate through the local economy.

Fig 1: Bank of America Stadium, Home of the Carolina Panthers, and located directly in the heart of Charlotte, North Carolina.

Data

- Two types of Data were needed to be collected for this study, firstly data on each of the NFL stadiums, and then also data on all the Metropolitan Statistical areas in the U.S.
- The data found in this study was collected from the three sources.
- The Bureau of economic analysis which provided all the data about the MSA’s this included the dependent variable, GDP, and three MSA specific independent variables which were Population, Employment, and Average Salary, due to this size of these variables the log of all these variables was generated so that a percentage change could be identified rather than a unit change.
- More stadium specific independent variables were sourced from the reference of stadiums of pro football. This included three dummy variables which were whether of not the MSA contained a current NFL team, whether there had ever been an an NFL team in the area ever, and lastly whether a new stadium built during the period of interest existed in the area. Also included from this source were stadium cost, the amount of the stadium cost that was publicly funded, and privately funded.
- Lastly directly from the NFL website the average winning percentage of the team(s) in the area.
- There are a total of 384 Metropolitan Statistical areas in the United States.
- Data on the MSA’s was collected from the 19-year period 2001-2019 resulting in 7296 total. Observations.
- 33 Metropolitan areas that have hosted NFL teams in the period of 2001-2018
- 12 Metropolitan areas experienced a new stadium in their area during the period of 2001-2018.

Model

- The initial model is a simple linear regression showing the effect that the various MSA specific and NFL team specific independent variables have on the economic measurement of GDP.
- In all model the Dependent variable was log GDP while the other non dummy variables other than the winning percentage were also in log form.
- Several tweaks and methods of sample trimming were then employed to create models that reflect are more accurate version of the statistical truth.
- The first adjusted model is model 2 which provides a fixed effect model that enables for panel data analysis to create an average across time and compare each observation to that average.
- Although this means that time invariant variables are omitted it does give a stronger insight into what variables are responsible for the differences in GDP.
- The next set of regressions is limited to only include the MSA’s that have ever hosted an NFL team. Again, first a common OLS model was ran followed by the fixed effects adjustment (model 4).
- To isolate the effect of the new stadium in an attempt to create a difference in difference model to see the change experienced when an NFL city receives the treatment of a new stadium, model 5 included all the MSA variables but the only Stadium/team variable was the dummy for new stadium.
- Lastly, it is reasonable to assume that higher populated cities would be more well suited to accommodate an NFL franchise so two regressions were ran restricting the dataset using population.
- Model 6 omits any observation years in MSA’s with a population smaller than the smallest NFL host MSA, Green Ba, WI with an average population of 321384 .
- Lastly Model 7 factors in that all most all of the NFL host MSA’s have populations greater than 1 million and so the last model is restricted to only include MSA’s with populations that are similar to what seems to be the typical NFL host size MSA. Population > 1 million.

Results

- Throughout all the regressions average salary and employment consistently have a statistically significant impact on determining GDP.
- New stadium has a significant positive coefficient in regressions model 4 and 5 meaning that compared to other NFL teams building a new stadium can be connected to a positive change in GDP.
- In model 2 for every 1.1076% change in average salary there is a 1% increase in GDP
- In model 2 for every 0.7644% change in employment there is a 1% increase in GDP
- In model 4 for every 0.0167% change in new stadium there is a 1% increase in GDP (new stadium can only be 0 or 1)

Stadium and Economic Factors Influence on GDP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
VARIABLES	OLS	Fixed Effects	OLS	Fixed Effects	Fixed Effects	Fixed Effects	Fixed effects
log_SC	0.0032		0.0087***				
	(0.0033)		(0.0026)				
log_PrivFun	-0.0019***		-0.0021***				
	(0.0007)		(0.0005)				
log_PubFun	-0.0036***		-0.0046***				
	(0.0007)		(0.0005)				
log_AveSal	1.0332***	1.1147***	0.9213***	1.1076***	1.1070***	1.0823***	1.0208***
	(0.0065)	(0.0059)	(0.0189)	(0.0175)	(0.0175)	(0.0082)	(0.0111)
log_Pop	0.1606***	-0.0059	0.0662**	-0.0159	-0.0146	-0.0047	-0.0267
	(0.0082)	(0.0203)	(0.0330)	(0.0462)	(0.0460)	(0.0240)	(0.0312)
log_Emp	0.8191***	0.7644***	0.9072***	0.6893***	0.6895***	0.7537***	0.8219***
	(0.0080)	(0.0171)	(0.0325)	(0.0450)	(0.0449)	(0.0213)	(0.0293)
CurrentNFLTeam	-0.0427***	0.0160	-0.0166	0.0231		0.0274	0.0290
	(0.0149)	(0.0506)	(0.0120)	(0.0378)		(0.0386)	(0.0303)
NewStadium	-0.0120	0.0032	-0.0027	0.0167**	0.0174**	0.0063	0.0103*
	(0.0099)	(0.0087)	(0.0071)	(0.0070)	(0.0069)	(0.0071)	(0.0059)
NFLteamever	0.0828						
	(0.0588)						
Record	0.0263	0.0034	0.0259**	0.0027		-0.0032	0.0029
	(0.0188)	(0.0111)	(0.0131)	(0.0083)		(0.0092)	(0.0077)
Constant	-6.4944***	-4.5941***	-5.1811***	-2.9144***	-2.9076***	-3.8932***	-3.6447***
	(0.0651)	(0.1297)	(0.1896)	(0.3622)	(0.3616)	(0.1726)	(0.2319)
Observations	7,296	7,296	627	627	627	2,872	971
R-squared	0.9935	0.9501	0.9978	0.9731	0.9731	0.9697	0.9826

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Conclusion

- The first thing to consider is possible problems with the regression results before making any rigid conclusions. Larger cities usually have both higher GDP and also are usually the areas that attract NFL franchises.
- Identifying the distinct responsibility that a a new NFL stadium has on GDP can be challenging.
- Models 4 and 5 provide strong evidence that bringing a new stadium into a city will likely have a positive relationship with GDP.
- The large positive coefficients and the consistent statistical significance of the employment and average salary variables it is clear that these two are direct determinates for level of GDP.
- If a MSA wants to grow GDP they should focus on ways to increase both employment and average salary.
- A new stadium will bring in construction and improve the cities modern infrastructure which might be why a new stadium has caused GDP growth in MSA’s who have chosen to invest in these projects.
- A team and a new stadium do bring in a lot of money however a lot of this money does not go straight back into local area and the publics average salary which significantly dilutes the positive economic impact a stadium might cause , for example high player wages don’t go back into the local economy as players have homes outside the local MSA and do not directly reinvest back into their team's city.
- The idea that average salary is so important refutes the idea that NFL stadiums and teams are worthwhile because they provide compensating differential effects that might justify lower wages for other benefits. The regression results tell us that cities should always put average salary at the top of their priorities when wanting to maximize GDP.
- NFL teams and their stadiums are a big part of American Culture in the U.S. Major cities, and it is encouraging that those current host cities benefit from building new stadiums as an upgrade to their cities.
- Model 2 identifies both current NFL team and New stadium as a non statistically significant effects on GDP, so for those MSA’s considering being a part of a team relocation or starting an expansion franchise in their area, they should reconsider if their goal is to bring in a team to create GDP growth as it is certainly not a guaranteed catalyst.
- MSA’s should target different efforts and projects that focus specifically on significantly growing average salary and employment within the area as this would be much more effective in growing GDP.
- The allure of bringing in an NFL team and a fancy new stadium is obvious but especially as a lot of the money in sports now does not come from the stadium but from Television deals the the support that the fans give the team may never be directly financially reimbursed through growing GDP.