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**Professional Sports Facilities: Interstate Value Added and Brownfields**

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*This cost-benefit analysis will examine if the addition of brownfields and the possibility of interstate commerce should influence policy makers when considering stadium initiatives.*

The vast majority of existing literature on publicly funded stadium initiatives suggests they are economically inefficient. Andrew Zimbalist and many other opponents of stadium initiatives claim they do not create real value in the community and alternative uses for the land would be more productive by adding greater value to the community. Adding a stadium to a city is merely going to rearrange the allocation of entertainment spending in a community without increasing the amount of net spending. This is called the substitution effect; consumers are likely to change how they spend their entertainment dollars, without increasing the amount of income they devote to entertainment spending. In his paper “The Economics of Sports Facilities and Their Communities” Zimbalist claims, “sports teams may rearrange the spending and economic activity in an urban area, they are not likely to add much to it.”[[1]](#footnote-1)

Opponents of stadium initiatives also express concerns over the use of the land and the value that is created. Concerned residents argue that using resources to attract industry, commercial development, and improve existing infrastructure instead of financing stadiums is a more efficient use of tax dollars. Stadiums and the professional team that they host employ very few full time employees, most are hired only for the day of game activities, and most revenue diverted from other areas in the community go directly to the team. Addition of industry and full time employers would bring more full time jobs and increased productivity to the community. For these reasons many citizens and experts remain skeptical of any real economic activity generated by a stadium.

However, what previous literature has failed to consider is how land parcels that are environmentally degraded along with the possibility of interstate value added can affect the profitability of stadium initiatives. If uses for vacant land plots are limited and municipalities are able to attract fans and revenue from other jurisdictions it may be possible that stadium projects can provide positive net benefits on a community.

The urban centers of the late twentieth century experienced a rapid decline of heavy industry in and around urban centers. Improvements in transportation and manufacturing technology have allowed many industries to move from city centers to suburbs or in many cases outsourced to other countries. This has left many urban centers with abandoned parcels of land that are environmentally less than desirable. The contamination or even the perceived contamination of this land can make new development a risky and difficult undertaking. Many times unknown abandoned chemical tanks or other hidden pollution can add millions of dollars in unforeseen costs. Development of these abandoned sites can be so risky that many private businesses will be dissuaded from undertaking such an effort. Several organizations around the country have joined efforts with the goal of promoting the development of the abandoned sites; they have named these areas “Brownfields.”

The total cost of cleaning up a Brownfield is directly related to the extent of the environmental damage and the intended future use. The more polluted a site is the more costly it will be to clean up. Along with the amount of pollution, the intended future use plays a major in deciding total clean up costs. For instance, you would want to ensure that sites intended to be used for a school or a workplace should be cleaner than if it were going to be used for a sports stadium. It is assumed that the longer someone is exposed to the contaminated site the more pollution they are exposed to. In fact some sites may be so environmentally degraded that use as a school or a workplace is not feasible. In these cases there may be little or no opportunity costs for use of the land plots, in fact municipal development of brownfields may have positive benefits if private development seems unlikely. This reduction of costs and an addition of benefits may increase the efficiency of the stadium initiative.

In order to evaluate the impact of brownfields the analysis will look at the recent development of the Nationals Stadium in the Southeast waterfront area of Washington DC. The stadium was proposed by the Washington city council as a way to entice the Montreal Expos to relocate to the district. The chosen development site, a former asphalt plant, is an officially designated Brownfield along the Anacostia River; ground was broken on this site in May of 2006. Once complete, the stadium will be owned by the city and it will be leased by agreement to the team who will be responsible for the operation and upkeep of the stadium.

Along with being constructed on a Brownfield the unique location of the stadium in Washington DC allows for investigation of interstate value added. The jurisdictional boundary of Washington DC is relatively small containing about 580,000 thousand people in an area only 61.4 square miles in size. However, the larger Washington Metropolitan area contains over five million people and stretches far into Virginia and Maryland. This close proximity to large populations makes it very likely that the stadium will attract many fans from the Maryland and Virginia area, and may negate the substitution effect that reallocates spending within a community. The absence of any sort of tax base revenue sharing between jurisdictions in the metropolitan area makes any additional taxes collected to be real increases in tax revenue. Additionally, any spending done by residents of Virginia and Maryland within the district can be viewed as real value added, this is money that would have been spent and taxed in these neighboring states had it not been for the stadium. The addition of benefits added by Brownfields and the interstate value added created by the location should be enough to increase the social and economic efficiency of the stadium and could turn the net benefits positive.

**Methodology**

This analysis will be an ex post analysis and will look at the economic efficiency of the stadium initiative from a local perspective. Those with standing include the taxpayers of the city, both citizens and businesses, the residents of the waterfront area, and workers in and around the district; residents and taxpayers of Maryland and Virginia and the team will not be considered as having standing in this analysis as they are not stakeholders of the city. The project has a useful life of thirty years and was financed using thirty year municipal bonds; therefore cost and benefits will be allocated over the thirty year useful life of the stadium. Given the relatively long nature of the project, a social discount rate will be used. A projected inflation rate of three percent will be assumed, making the real social discount rate to be one percent.

**Costs**

Shortly after the district city council passed a resolution approving the stadium initiative, it reached an agreement that would cap the financial cost of the stadium at $611 million. This price includes costs for the acquisition of the land as well as the workers needed to build the stadium. As part of this agreement the city would sell $535 million in bonds on Wall Street to help finance the stadium.[[2]](#footnote-2) The bonds were approved and auctioned off on May 3, 2006; on this day thirty year bonds closed at a rate of 5.24%. It will be assumed that the $535 million up-front cost of the project will be allocated and paid off over thirty years at a 5.24% rate, this comes out to roughly $36 million per year. There is no need to adjust this number for inflation since the principle and rate is constant, the payment will stay constant over the thirty years. This means that costs in real dollars will actually decrease over time, the city is able to pay off the bonds with cheaper dollars in later years. The remainder of the $611 million price tag of the stadium is paid for by the team, sponsors, and private donors; it will not be considered in this analysis.

Along with the large initial capital costs of the stadium, several smaller costs dealing with day to day operations and maintenance will be incurred yearly. These costs include the hiring of additional police and security personnel in and around the stadium, maintenance of increased wear to surrounding roads and transportation facilities, and the maintenance and upkeep of the stadium itself. While these costs may be small and incremental when considered individually, together they are a substantial cost that must be considered. However, under the lease agreement reached between the city and the team, the team is responsible for financing any needed routine stadium maintenance; additionally the team is responsible for reimbursing the city for any costs resulting from additional police and security patrols and added maintenance of roads and transportation facilities.[[3]](#footnote-3) These costs will be paid for by the team and will come out of ticket revenue, and for this reason these costs will not be included in this CBA.

The cost of the land plot also needs to be assessed when deliberating a stadium proposal. Not only do policy makers need to consider the initial capital cost of the land itself, but also opportunity costs for future uses need to be evaluated. In the case of Washington Nationals Stadium the initial costs of accruing the land is included in the $535 million which the city is using to finance the stadium. In addition to this physical cost of the land, the costs of any forgone uses for the land need to be considered. When looking at most stadium projects this would be the highest value of any alternative use of the land. For example this cost could be measured using the value in production and jobs that placing an industry or employer on this site yields, the opportunity cost would be any value added above and beyond the value that the stadium creates.

If possible uses for a plot of land are severely limited, as in the case of a Brownfield, the opportunity cost of using the land may be greatly diminished or even eliminated altogether. Land plots that have severe environmental damage are poor candidates for private development and may never be reclaimed without the assistance of the local municipality. In such cases there is little cost of using a piece of land, and in fact its use my even create benefits. Such appears to be the case for the area of the Southeast Waterfront where Nationals Stadium is built, an area with a long history of underdevelopment and growing social problems. The Anacostia River and the area along the river are considered to be one of the most polluted rivers in the United States, greatly reducing its appeal for private development.[[4]](#footnote-4) Since private commercial development seemed sluggish and unlikely it will be assumed that land cost is solely the cost of the land itself and there is no opportunity cost. Benefits of developing the Brownfield will be considered later in the analysis.

With the large disparity between the populations of the district and its large metropolitan area and the relative ease of access to the district from surrounding suburbs it is probable that a large majority of Nationals fans come from Maryland and Virginia. If we assume that the propensity to go see a Nationals game is randomly distributed among residents of the metropolitan area than well over half of all fans attending games will be residents of these surrounding areas. This phenomenon increases the scope of the substitution effect, we are not just reallocating spending within the district but we are diverting spending that most likely would have occurred in Virginia and Maryland. This adds real value to the community. The remaining substitution effect created by residents of the district is small, and would be far outweighed by the benefits of attracting surrounding fans. Because of it is likely to be so small and its difficulty to measure this cost-benefit analysis will assume that there is no substitution effect for this project.

**Benefits**

The decision to build a stadium and undertake a project of this magnitude is certainly going to require the utilization of many resources, both in terms of capital and labor. Hundreds of workers would be required in order to build a stadium in the period of two years and even more would be needed in order to make the stadium function smoothly. This could have a significant impact on the labor market of the region, and may possibly positively benefit workers in the area by creating gainful employment. However, positive benefits created by the addition of new jobs will only be realized if there is a significant amount of idle workers. If the labor market is being fully or near-fully utilized these jobs will only be transfers from other sectors of the local economy, not newly created jobs. During the two year period of the Nationals Stadium construction unemployment in the Washington area remained steady around 3.5-3.6%. This rate is even lower than the rate of 4% that most economists agree to be the natural rate of unemployment. The labor market in the region was at full utilization, none of the jobs needed in the construction or operation of the stadium would be jobs created. For this reason exact accounts of the number of jobs and the value that they add is not required, they are merely transfers. We can assume that the stadium brings no new jobs to the region.

Benefits generated by fan spending at the stadium accruing to the district include the rent paid by the team and the ticket revenue generated by the stadium. As per the lease agreement between the city and the team, the team will pay a yearly rent for the use of the stadium. Rent for the first year is $3.5 million and is gradually increased to $5.5 million in year six, after that it is calculated by taking $10,000 less than 102% of the previous year’s amount.[[5]](#footnote-5) There is no need to adjust this number for inflation since it gradually increases taking this into account. Over the thirty years of the project the team will pay a total of about $193 million in rent to the city.

Along with rent paid by the team the city is entitled to a share of the ticket revenue collected by the team. The team may sell up to 2.5 million tickets in a year without having to pay the city a share; however, the city collects one dollar for every ticket sold over 2.5 million. Because of excitement created by the new stadium this analysis assumes that for the first three years the Nationals will sell 4/5 of the tickets to their 41,000 seat stadium. This is around 32,800 fans per game, and is well above their average of 28,000 from the previous three years. Total expected attendance for the season would be 2,656,800 and would add $156,800 in benefits to the city in these three years. The expected attendance in the following years is highly sensitive the success of the team in those years. If we assume that they will sell only 3/5 of tickets in a normal year and sell 4/5 of the total tickets in a winning season, defined as winning the division, and that every team in the division has the same chance of winning, then we get an expected attendance of 2,125,440 in a season. This would not require the team to share any ticket revenue with the city and the expected benefit for ticket revenue will be zero in all of these years.

The diversion of entertainment spending dollars away from Maryland and Virginia and into the district not only helps to negate the substitution effect, but it also creates significant benefits for the district and its business community. A recent survey conducted by Arthur Anderson at a Philadelphia Phillies game concluded that the average fan at a baseball game spent $23.32 outside of the ballpark. This is money that is spent at restaurants, hotels, and bars surrounding the stadium. If we assume that fifty percent of fans attending a Nationals game are from surrounding areas, this amounts to over $30 million in new value added generated by the stadium. Using the average rate of taxes on personal items and prepared food of 7.875% we can predict that about $28.5 million of these benefits will accrue to businesses and about $2.5 million will accrue to the city in the form of taxes. This rate of spending is adjusted for inflation yearly using an assumed rate of inflation of 3%.

The reclamation of the Brownfield and the development of a historically underdeveloped area may also add benefits while helping to mitigate costs. The use of a Brownfield negates the opportunity cost involved with using a piece of land and also adds value to an area that would have otherwise gone undeveloped, it adds a baseball stadium. Residents of the district benefit by being free of the pollution they once had to live among. Also, residents of the entire metropolitan area benefit from being able to spend recreation time outdoors in a new ballpark. These benefits are real and would not have existed prior to the development of the new ballpark; however, they are also difficult to measure. Citizens’ willingness to pay for the cleanup of the abandoned waste site is likely to vary widely, and contingent valuation methods can be easily manipulated by survey takers who highly value environmental cleanup and have hidden agendas.

Each game thousands of fans utilize the Washington Metro in order to commute to and from the game. In this analysis the amount of metro fares that attending fans spend to travel to the game will be used as an approximation for the value that individuals derive from the revitalization of the Brownfield. This secondary market can be used to estimate the individuals willingness to pay to clean up the Brownfield because it is the amount that they are willing to give up in order to travel to and enjoy the reclaimed area. Due to the limited availability of parking few fans drive to the game, it can be assumed that the ones who do drive actually have a higher willingness to pay because they must also pay for parking. Driving will not be considered, the average round trip metro fare of $6.15 will be used for every fan.[[6]](#footnote-6) Each fan enjoys $6.15 in benefits from the developed Brownfield, using average expected attendance we can calculate that approximately $16.5 million in benefits will be realized in the first year. This number is adjusted for inflation yearly using a rate of 3%; it is assumed that metro fares will increase to keep pace with inflation.

Other smaller benefits that may result from the stadium include revenue from parking, advertising revenue, and increases in publicity and fan bases. These benefits are relatively small, and are allocated to the team as outlined in the lease agreement between the city and the team; they do not need to be considered in this analysis, since the team does not have standing.

**Results**

In this analysis three models of the calculated net benefits of the stadium project will be examined. The first model (Model 1) takes the form of a standard cost-benefit analysis, considering the costs and benefits of the stadium without regard to the jurisdiction in which the fans reside. This model is merely used as a reference, making it easier to later add in and calculate considerations of residency and land revitalization. The impact of the substitution effect cannot be accessed without information on where fans travel from in order to reach the stadium. As would be expected, net benefits in this model are substantial and positive. Benefits in the first year are over $29 million dollars, and using a four percent social discount rate, the net present value of net benefits are predicted to be over $760 million. However, critics would argue most of these benefits are created by the substitution affect and represent no real value added to the community.

The second model (Model 2a) accounts for the possibility that some of the fans attending the games will be from Maryland and Virginia. Specifically, the model assumes that fifty percent of fans will be visitors from nearby areas. The benefits resulting from increased spending outside of the stadium is reduced by fifty percent, cutting in half the additional business and tax revenue. This reduction accounts for the fact that half of the fans will be from the District, and any spending done by District residents is a product of the substitution affect. In this model, benefits in the first year are slightly negative with expected net benefits just over a negative one million dollars. As inflation increases the nominal amount of spending, benefits increase and net benefits turn positive in year eight. Again using a social discount rate of four percent, we can predict the real net present value of net benefits for this project at just over $125 million. The reduction in spending to account for District residents has greatly reduced the predicted benefits, but net benefits have remained positive.

Net benefits appear to be very sensitive to the number of fans assumed to be from Virginia and Maryland. Assuming half of the fan base is from surrounding areas reduces the impacts of spending by fifty percent and reduces the amount of net benefits by over eighty percent. Clearly the amount of fans estimated to be visitors has a big impact on the results. In order to test the sensitivity of the estimate, Model 2b calculates the percentage of fans that are required to come from Virginia and Maryland in order for projected net benefits to be zero, which is called the breakeven percentage. This method is similar to the one used to calculate distributional weights. Assuming the actual percentage of fans coming from surrounding areas is greater than the breakeven percentage; the project will have positive net benefits and should be undertaken. If however, the breakeven percentage appears to be unrealistically high, then the project should be rejected. Model 2b shows the calculated breakeven percentage is forty percent, a number significantly less than the original estimate.

The third and final model in this analysis accounts for both the possibility of interstate value added and additionally considers the value of developing the brownfield. In Model 3a, it is again assumed half of the attending fans will from the surrounding metro areas. Also, the average Metro fare and the expected yearly attendance have been used to calculate the value of the reclaimed brownfield. In the first year, the brownfield adds over $16 million in benefits and increases yearly at a rate of three percent. When both the benefits from interstate travel and the brownfield are used to calculate net benefits the real net present value is predicted to be around $465 million. The benefits resulting from the mitigated brownfield greatly add to the expected benefits of this project.

Just as in Model 2a, the expected net benefits are highly sensitive to the amount of fans that are assumed to be from the surrounding areas. Running a sensitivity analysis to calculate the breakeven percentage in Model 3b, it is found that the project will breakeven when 13.7% of fans are non-district residents. This number is far less than the initially assumed fifty percent.

**Distributional Issues**

Just as with any project of this scope and magnitude, policy makers must consider issues of resource distribution and equity. Any project that disproportionately helps those higher in the income distribution or disproportionately harms those in the lower portion of the income distribution may be rejected on the grounds that it increases inequality, even if the project has positive net benefits and increases efficiency. This is a common concern with many stadium projects. When a city’s general fund is used to finance a stadium, it means that every taxpayer in the city is helping to finance the stadium, even those in the lower income brackets. At the same time, with the ever increasing cost of attending a professional sporting event, only those in the higher income brackets are able to attend an event. This means that lower income residents are bearing some of the costs for building a stadium without being able to enjoy most of the benefits. Clearly this situation would increase the economic inequality of the region. In such a situation the project should not be undertaken.

When the Washington Nationals Stadium project was approved using municipal bonds, it was agreed that the bonds would be paid off using a new tax on local businesses. This new business tax applied only to those businesses in the District that gross over three million dollars a year in revenue. It was predicted that the smallest of these businesses would pay about $2,500 a year with the largest paying up to $28,000. No money from the city’s general fund will be used to pay off the bonds.[[7]](#footnote-7) Under this framework none of the lower income residents’ taxes are used to finance the stadium. Also, all of the District residents are protected against a reduction in the city’s general fund. The new tax on local businesses has been used to eliminate the inequality issues produced by the stadium.

It is also feared that the addition of the stadium to the Waterfront area will increase land prices, increasing rent prices and forcing many lower income individuals to move from the area. While this may be a legitimate concern, this affect will also benefit some of the lower income residents of the Waterfront. Those residents of the Waterfront area who own property will benefit from the increased property values resulting from the removal of the pollution in the area. Also, those residents who can afford to stay and pay the higher rent will benefit from living in a neighborhood that is free of industrial pollution. The negative impacts of this increase in property values can be addressed by programs to subsidize rent for lower income households. The positive net benefits enjoyed by the stadium and the increase in tax revenue will make the financing of such projects possible.

**Policy Recommendations**

Based upon the predicted positive net benefits of the project in the model without consideration for the brownfield, Model 2a, it can be concluded that the stadium initiative was an efficient use of city resources. The percentage of fans from surrounding areas required to breakeven is well below the likely proportion of visiting fans. It is very probable that the stadium will exceed the breakeven percentage and will actually produce positive net benefits. The use of a new business tax in order to pay off municipal bonds sufficiently addresses the inequality issues that are present in the stadium initiative as any increased inequality is negated as much as possible. This project appears to efficiently add value to the community while minimizing inequality.

The choice of a brownfield as the development site, Model 3a, only serves to increase the benefits realized through the project and reduces the breakeven percentage. This demonstrates that it may be possible to use the value added produced by fans from surrounding areas in order to mitigate the pollution in the brownfield and encourage development in the area around the stadium. This is an efficient way for citizens of the District to utilize previously underdeveloped land and to rid the area of pollution that discourages private development. The building of the Washington Nationals Stadium was a financially efficient way to clean up the Waterfront area and make future private development possible.

This analysis showing the positive net benefits produced from the Washington Nationals Stadium, with somewhat limited external validity, is applicable to other metropolitan centers. There are several urban areas throughout the country that are positioned close to separate jurisdictions including St. Louis, Kansas City, Boston, Philadelphia, and New York City. Also similar to the Washington case, most of these cities have undergone an urban economic and industrial reform, leaving them with large plots of underdeveloped land in their urban center. Policy makers in these jurisdictions should consider the possibility of interstate value added as a way to efficiently mitigate pollution in these urban areas while encouraging private development.

Works Cited

Lease Agreement. District of Columbia Sports and Entertainment Commission and Baseball Expos, L.P.. February 2006.

*Nationals Park – New DC Baseball Stadium*. http://www.jdland.com/DC/stadium.cfm : (April 2008).

Reel, Monte; Karlyn Barker. *Businesses Receptive To D.C. Stadium Tax.*  The Washington Post : September 24, 2004.

www.metroopensdoors.com. (April 2008).

Zimmerman, Martin. *Big Plans and Bold Dreams Along the Anacostia.* The Urban Land Institute: (February 2006).

Zimbalist, Andrew; John Siegfried. “The Economics of Sports Facilities and Their Communities.” *The Journal of Economic Perspectives,* (Summer 2000): pp.95-114.

www.metroopensdoors.com. (April 2008).

1. Zimbalist, Andrew; John Siegfried, “The Economics of Sports Facilities and Their Communities,” *The Journal of Economic Perspectives,* (Summer 2000): pp.95-114. [↑](#footnote-ref-1)
2. *Nationals Park – New DC Baseball Stadium*, http://www.jdland.com/DC/stadium.cfm (April 2008). [↑](#footnote-ref-2)
3. Lease Agreement, District of Columbia Sports and Entertainment Commission and Baseball Expos, L.P., February 2006. [↑](#footnote-ref-3)
4. Zimmerman, Martin, *Big Plans and Bold Dreams Along the Anacostia,* The Urban Land Institute, (February 2006). [↑](#footnote-ref-4)
5. Lease Agreement, District of Columbia Sports and Entertainment Commission and Baseball Expos, L.P., February 2006. [↑](#footnote-ref-5)
6. www.metroopensdoors.com, (April 2008). [↑](#footnote-ref-6)
7. Reel, Monte, Karlyn Barker, *Businesses Receptive To D.C. Stadium Tax*, The Washington Post : September 24, 2004. [↑](#footnote-ref-7)