2013

The Economic Impact of Stadia and Teams: The Case of Minor League Baseball

Nola Agha
University of San Francisco, nagha@usfca.edu

Recommended Citation
Agha, N. (2013). The economic impact of stadia and teams: The case of Minor League Baseball. Journal of Sports Economics, 14(3), 227-252. http://dx.doi.org/10.1177/1527002511422939

Agha, N. (2013). The Economic Impact of Stadia and Teams: The Case of Minor League Baseball. *Journal of Sports Economics, 14*(3), 227-252.

The Economic Impact of Stadia and Teams: The Case of Minor League Baseball

Abstract

This paper uses an extensive unique dataset to investigate the justification of government subsidies for minor league baseball teams and stadiums by measuring pecuniary gains in a local economy. Specifically, a dynamic panel data model incorporating 238 Metropolitan Statistical Areas that hosted affiliated or independent minor league teams between 1985 and 2006 shows that AAA teams, A+ teams, AA stadiums, and rookie stadiums are all associated with significant positive effects on the change in local per capita income. The presence of positive effects is strikingly different from decades of non-positive results at the major league level.

JEL Classification Codes: L83, H23

Keywords: economic impact, minor league baseball, efficiency, sports stadiums

I. INTRODUCTION

Advocates of public stadium subsidies claim professional sports teams produce positive production and consumption externalities in a local economy. Theoretically, these externalities should manifest themselves through pecuniary increases in incomes, jobs, and taxes that could offset the public sector contribution, thus justifying government expenditures on efficiency grounds. Although research on major league sports shows these pecuniary effects are non-positive (e.g. Coates & Humphreys, 1999; Miller, 2002; Baade, Baumann, & Matheson, 2008) little empirical inquiry has been conducted in other sports that receive public subsidies.

A stadium building boom that resulted in a dramatic increase in both the cost and public contribution towards minor league baseball stadiums provides an interesting context in which to conduct economic policy research. Based on the unsupported claims of major league teams, minor league baseball team owners also maintain ex ante that new ballparks will increase employment, tax revenues, and other private economic development. Yet, no research has substantiated or refuted these assertions at the minor league level.

The purpose of this research is to remedy this gap in the literature by determining the effects of minor league teams and their stadiums on local economies. An extensive database is used to investigate claims of positive pecuniary benefits by analyzing changes in local per capita income in 238 Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas (MiSAs) that hosted minor league teams between 1985 and 2006.

This research acknowledges that minor league baseball is not a homogenous good. Structurally diverse classifications imply differential contributions to local economic well-being. The primary purpose of this paper is to investigate whether differences exist between minor

league baseball and Major League Baseball (MLB), between independent and affiliated teams, and within affiliated classifications (AAA, AA, A, and rookie).

While this research is primarily driven by the need to provide ex post analysis of government investment in minor league baseball, a variety of other contributions are made.

First, the smaller towns where minor league baseball teams are located help avoid an econometric issue that has plagued major league research. Because major league teams are located in roughly the 50 largest metro areas, there is a collinearity problem between population and the presence of a team. On the other hand, between 1980 and 2007 there were 269 metro areas that hosted a minor league baseball team with 2006 population ranging from 15,469 to 18.8 million. Thus, minor league baseball offers the opportunity to dramatically increase not only the variance in population but also the size of the sample. Next, although Baade et al. (2008) point out that the enormity of major metropolitan areas makes it difficult to find effects due to normal fluctuations in the regional economy, this problem should be partially alleviated in minor league baseball because metropolitan areas are generally smaller. Because the effect of a team may be smaller as well it may be theoretically ambiguous, ex ante, whether minor league teams are a larger or smaller portion of the economy than major league teams are. With 269 metro areas in the sample, at minimum there should be a wide variation in the degree to which teams are either a large or small part of the local economy.

Third, the minor league baseball context extends the current major league literature to a new and relevant segment of U.S. sports. Although there were several critical, but non-econometric, studies on the potential for minor league teams to affect local economics in the mid-1990's (Baade & Sanderson, 1997b; Colclough, Daellenbach, & Sherony, 1994; Johnson, 1995; Rosentraub & Swindell, 1991), it is only in recent years that econometric interest in minor

league baseball has begun (e.g. Cebula, Toma, & Carmichael, 2009; Gitter & Rhoads, 2010, 2011; Winfree, 2009) although none of these studies focus on economic impact. In 1997, Baade and Sanderson claimed that econometric analysis of minor league baseball was not possible because of the non-existence of data for small communities. Fortunately, the opposite is now true and data is so freely available, even for small communities, that this research contains all but five minor league teams that played in the U.S. in a 22-year period.

Finally, this research also helps inform the current debate on public funding for minor league stadiums by evaluating the veracity of claims made by stadium proponents. With hundreds of millions of public dollars spent each year on minor league baseball stadiums, the economic effects of teams on communities have important policy implications.

II. Theory and Literature

Common arguments for public subsidization involve claims that teams generate positive production externalities that result in economic growth effects in the local economy. Indeed the classic claim is that the bars and restaurants surrounding a stadium will be full of new patrons spending more money and generating new sales tax revenues. These busy establishments will hire more employees or raise salaries for existing employees. In short, the positive production externalities are claimed to affect multiple aspects of a local economy. Yet, the vast majority of academic research in this area has found non-positive effects on income (Baade & Dye, 1990; Baade, 1996; Coates & Humphreys, 1999, 2001, 2003; Matheson & Baade, 2005; Lertwachara & Cochran, 2007), employment (Rosentraub, Swindell, Przybylski, & Mullins, 1994; Baade, 1996; Baade & Sanderson, 1997a; Hudson, 1999; Miller, 2002; Coates & Humphreys, 2003), sales tax revenues (Rosentraub & Nunn, 1978; Coates & Depken, 2006; Baade et al., 2008), and spending (Zipp, 1996).

Since the study at hand operationalizes pecuniary gains through a change in per capita income, a more thorough discussion of the major league research on income is warranted. To begin, Baade and Dye (1990) found an insignificant effect of a new stadium on MSA personal income in nine major league cities between 1965 and 1983. Baade (1996) extended this to include all major league cities between 1958 and 1987 and still found insignificant results for all cities except Indianapolis (positive) and Baltimore (negative). Using a reduced form equation but obtaining similar results, Coates and Humphreys (1999) analyzed all major league cities between 1969 and 1994 and found the effect of a new team or stadium was insignificant although there were a few significant results. For example, the entrance of a basketball franchise increased per capita income by $67 but a new basketball arena decreased it by $73 for an overall loss in per capita income. Finally, Santo (2005) created a more modern dataset (1984-2001), but utilized Baade and Dye's (1990) original methodology, and found many positive effects of stadiums and teams on local area income, although a few negative effects were found as well. Santo believes his results, which conflict so strongly with previous research, result from different characteristics of new modern stadiums as well as their geographical locations in urban centers.

The positive results obtained by Santo are not necessarily an anomaly. Teams can theoretically affect income if they generate substantial new spending by out-of-area residents or discourage residents from spending outside the local economy. Both of these are more likely to occur in geographically isolated metro areas, especially small cities with few other entertainment options. Professional teams can also affect income if they effectively utilize their stadium to host a high number of events that draw new visitor spending, induce little or no crowding out effects, and generate low levels of leakages.

Instead of the claimed positive pecuniary gains to a local economy, the presence of a team or a stadium leads to neutral or negative changes primarily due to leakages and substitution. Team owners, players, concessionaires, and other recipients of consumer expenditures tend to remove those dollars from the local economy (Siegfried & Zimbalist, 2000, 2002). Because professional sports teams spend approximately 60% of their revenues on player payroll, a considerable amount of new spending flows out of the regional economy due to high tax rates, high savings rates, and the non-local permanent residences of players.

Crowding out can take the form of locals not venturing near a stadium when a game is taking place, normal business or leisure travelers avoiding a local economy when a large event is occurring, or local area residents purposefully leaving the local economy to avoid a mega-event. In all of these cases, normal local economic activity is reduced below its regular level, meaning any gains from an event must offset the loss in order for the community to simply break even.

Finally, considerable research at the major league level (Coates & Humphreys, 2001, 2003; Matheson & Baade, 2005) reveals that when consumers face a budget constraint, spending on sports is simply a substitute for spending in other higher multiplier local leisure activities (Siegfried & Zimbalist, 2000).

III. Minor League Baseball Context

Minor League Baseball, previously called the National Association of Professional Baseball Leagues, oversees all minor league teams that are affiliated with major league franchises. In 1990, MLB began decreasing its financial contributions to affiliated minor league baseball teams. At the same time, new stadium requirements mandated minor league teams to dramatically renovate or build new stadiums in order to retain their major league affiliations. The increased financial independence of minor league teams, coupled with more stringent

stadium requirements and the dramatically increased costs of purchasing a franchise, resulted in an increase in the already booming minor league stadium market, higher prices for new stadiums, and larger stadium contributions from communities throughout the U.S.

Independent leagues are not governed by Minor League Baseball, are free to set their own schedules, sign their own players, and were unaffected by the 1990 stadium requirements. Yet independent leagues have always struggled with financial viability because they have had to cover the entire portion of their expenses with no assistance from major league teams. Despite lower player talent than affiliated teams, independent teams must rely more on player talent, wins, promotions, and marketing to drive attendance and therefore revenues to the team. The result is independent leagues tend to exhibit more market volatility, as evidenced in Table 1, and stay in a city only 25% as long as an affiliated franchise, on average. <insert Table 1 here>

Affiliated minor league baseball teams are not a singular entity. Minor League Baseball governs 19 different minor leagues categorized into classifications where AAA is the highest followed by AA, A, and rookie leagues. Table 2 summarizes some of the differences between classifications for all of the teams that played in 2006. The A leagues were at one time broken down into advanced A (or A+), A, and short-season A (or A-). Although professional baseball officially did away with the distinction, its use is important in this research because rookie and A- leagues play "short seasons," which run from June through the end of August, and include roughly half as many games as other classifications. Since the amount of new visitor spending in a local economy is a function of the number of games played, these short-season leagues have fewer opportunities to generate positive economic effects. Table 2 also makes clear that some classifications (AA and independent) face steep competition from major league teams while others (rookie) face none. <insert Table 2 here>

Similar to the major leagues, minor league teams often move because of excess demand for teams generated from league cartels that limit the supply of teams. In this context, cities compete for teams and contribute millions of dollars for new facilities without any evidence as to whether minor league teams and stadiums are wise investments or not. If major league teams have non-positive effects on local per capita income, what can be expected at the minor league level?

Minor league baseball is major league baseball on a small scale. Teams play shorter seasons in smaller ballparks that tend to be located in smaller cities with lower per capita incomes. Minor league teams have operating budgets that pale in comparison to their major league affiliates, they employ fewer people, the salaries they pay are much smaller, and the jobs are mostly seasonal (Johnson, 1991, 1995). Although major leagues often import over 50% of their total budget from revenue sharing and lucrative national television contracts, the only financial inflows attributable to minor league teams are the player salaries paid by major league affiliates. Even these payments are absent in the case of independent leagues. In addition, the minor leagues have lower levels of media exposure and brand association, decreased league longevity, more frequent team moves**,** shorter seasons, and lower quality players producing lower quality contests. If the effect of a major league team on income is insignificant or negative, the minor league results should be more so.

In spite of this inauspicious expectation, it is important to note that minor league baseball is not a homogenous product. Affiliated teams should have a more positive effect than independent teams because of higher quality players, stronger history, fewer league and team movements, and the benefits of affiliation in branding, increasing attendance, and generating media exposure. Likewise, within classifications the quality of play, season length, population,

substitutes, and longevity in a market are distinctly different. For example, AAA and AA teams benefit from large populations (as a proxy for demand), little competition from MLB, and longer seasons in larger stadiums. Given these conditions, it is expected AAA and AA teams will have the least negative effect while A and rookie teams are expected to have a more negative effect on local per capita income.

Finally, minor league team owners routinely claim that their product is a local leisure activity, not a sporting contest (Johnson, 1995). If this is truly the case, then a comparison to MLB may be less appropriate than a stand-alone evaluation of the degree to which minor league baseball can generate new visitor spending.

IV. PECUNIARY ANALYSIS

Claims of economic growth effects are tested by measuring the impact of a minor league team and its stadium on levels of local per capita income. The following section provides a description of the sample, the model, its variables, and descriptive statistics, followed by the statistical method employed, results, and robustness checks.

Sample

The data collection process began by identifying all of the teams that played minor league baseball between 1980 and 2006. This included teams in 3 AAA leagues, 3 AA leagues, 7 A leagues, 2 advanced rookie leagues, and 22 independent leagues. Of all of the affiliated and independent minor league teams that played in this period, only five were located in cities that are not part of an MSA or MiSA. Likewise, teams playing in 19 Canadian cities were not included in the sample.

The unit of analysis for this research is not a team, but the MSA or MiSA in which each team plays. Thus, 4,495 team-year observations were sorted into over 200 corresponding metro

areas. A team's MSA is most reflective of its market size and drawing potential when the stadium is located near the urban core. If a team is located in a very far suburb of a large metropolitan area the MSA fails to accurately represent the market area of the team and the city or county data becomes more appropriate. For example, in 2003, the Chicago MSA hosted five Independent teams and one A team. The Joliet JackHammers, Cook County Cheetahs, Schaumburg Flyers, Gary SouthShore RailCats, Kenosha Mammoths, and Kane County Cougars are located 46, 25, 30, 32, 57, and 39 miles, respectively, from Chicago. While the Chicago MSA had a 2003 population of 9.3 million, the county population for each team was 581,199, 5.3 million, 5.3 million, 484,750, 155,729, and 455,672, respectively. Therefore, because the MSA was chosen as the geographical unit of measure for this analysis, there were simply some cases where minor league teams, although technically within the boundaries of the MSA, were not appropriately described by MSA data. Thus, to prevent a small area with a population of 155,729 people located 57 miles from Chicago as being erroneously treated as a 9.3 million person metropolitan area, the following 18 "big" MSAs were removed from the sample: Baltimore, Boston, Charlotte, Chicago, Cleveland, Dallas, Kansas City, Los Angeles, Miami, New York, Philadelphia, Pittsburgh, Raleigh, Riverside-San Bernardino, Seattle, St. Louis, Tampa, and Washington D.C.[1]

[1] An F-test was performed to statistically test the exclusion of these MSAs. The restricted model included all 256 MSAs while the unrestricted model was a sum of a) the 18 big MSAs and b) the 238 non-big MSAs. $F_{(51, 5526)} = 1.639$ is significant at $p < 0.01$ and confirms the big and non-big MSAs cannot be well specified with a single coefficient. Thus, the unrestricted model is preferred and the big MSAs are removed from this sample.

The first five years of the dataset were ultimately truncated to create honeymoon variables (as described in the following section). This resulted in the loss of 12 metro areas which, in addition to the removal of 18 Big metro areas, ultimately provided a final sample of 238 metro areas in the years between 1985 and 2006.

Model and Variables

In order to make a clear comparison between minor league and major league effects, this research uses a linear reduced form model first developed by Coates and Humphreys (1999) to determine if the presence or absence of a team or its stadium affects the level of per capita income in an economy. Specifically,

$$y_{jt} = \beta_1 X_{jt} + \beta_2 Z_{jt} + \upsilon_j + \mu_t + \varepsilon_{jt} \quad (1)$$

where:

y_{jt} is the real per capita personal income in MSA j at time t
β_1 is a vector of local market parameters to be estimated
X_{jt} is a vector of local market variables for each MSA j at time t
β_2 is a vector of sporting parameters to be estimated
Z_{jt} is a vector of franchise and stadium variables in MSA j at time t
υ_j is an MSA j specific fixed-effect
μ_t is a time t specific fixed-effect
ε_{jt} is a random disturbance

The model uses city fixed-effects (υ_j) to control for all time-invariant characteristics that are specific to a city and that contribute to levels of real per capita income. Likewise, a time disturbance (μ_t) captures all city-invariant factors that are specific to a year that affect per capita income.

The dependent variable is real per capita income for each MSA or MiSA adjusted for inflation using the consumer price index calculated by the Bureau of Labor Statistics (base year 2006). Real per capita income, population, and employment data were obtained from the Regional Economic Information System produced by the Bureau of Economic Analysis.

To control for variability unique to each local MSA, a series of local market parameters are included in the model. Again, to be clear, these parameters were chosen to replicate, as closely as possible, the model developed by Coates and Humphreys (1999) for clear comparison of major and minor league results. A lagged dependent variable serves to evaluate recent changes in the local industrial life cycle and the associated effects on income as suggested by product cycle theory (Vernon, 1966). A rate of employment variable is constructed as a proxy for labor demand and should positively affect local per capita income.

Change in population is a local market variable included to measure growth in a local market. This is especially relevant since many small towns that host minor league teams are actually shrinking. The theoretical relationship between population and per capita income is ambiguous though. Population growth can increase the labor supply which will drive down wages and negatively affect local per capita income. Conversely, population growth can increase the demand for products thus increasing labor demand and positively affecting local per capita income.

Stadium capacity measures the degree to which a community can utilize and consume the minor league sporting product. Presumably, a greater ability to consume sport induces a greater potential to generate income effects in the local economy.

The popularity of a parent club should positively affect a minor league team's ability to produce positive economic outcomes in a community to the degree to which it drives visiting consumers. The quality of affiliation is conceptualized as a function of the size of the MLB market and the popularity of its MLB team thus, the major league parent club's current MSA population is multiplied by a two year moving average of the previous season win percents (the robustness checks, below, investigate alternative specifications of this variable).

Finally, the number of professional major league teams in baseball, basketball, hockey, and football are controls that should have negative coefficients due to their previously established effects on local economies.

An important hypothesis is that minor league baseball at different levels of play exhibits different characteristics. Thus, the minor league variables differentiate between different league levels, affiliated v. independent status, and newness of team and a stadium in a community.

The actual number of teams at each level of affiliation is included instead of a presence dummy because minor league baseball can have multiple teams at the same level in the same MSA. For example, the Tampa-St. Petersburg MSA has hosted four A+ teams from the mid-1900's to 2000 including the Clearwater Phillies, Dunedin Blue Jays, St. Petersburg Cardinals (later renamed the St. Petersburg Devil Rays), and the Tampa Yankees. Affiliated teams should have a more positive effect on income than independent teams although both may be negative.

Previous research assumed the newness or "honeymoon" effect of a new stadium lasted ten years. More recent research by Clapp and Hakes (2005) and Leadley and Zygmont (2005) suggests the honeymoon effect is considerably shorter. This research uses a five-year period to dummy the effect of a new stadium. In other words, the variable takes on the value of 1 in the year a new stadium is built and the four subsequent years. The stadium newness dummy should be positive.

Identical coding was used for an entry dummy that measures the newness of a team and an exit dummy that measures the years after a team leaves to capture what sport sociologists Foster & Hyatt (2007) have identified as the euphoria surrounding a new team and the despair associated with a team leaving. The entry coefficient is expected to be positive and the exit negative.

Table 3 provides descriptive statistics for each variable described above.

<insert Table 3 here>

Analysis

The breadth and depth of this dataset necessitates careful examination of its adherence to the classical regression model assumptions. The degree to which the data deviate from the expected form will dictate the best estimator to be used. To begin, econometric investigation revealed no evidence of multicollinearity in the data using either variance inflation factors or the correlation matrix.

Visual inspection with augmented component-plus-residual plots indicates the presence of heteroskedastic errors. A likelihood ratio (LR) test ($\chi^2_{(237)} = 4439.61$, $p < 0.0001$) rejects the null hypothesis of homoskedasticity. Because this test is sensitive to the assumption of normality in the errors, an additional heteroskedasticity test is computed. Greene (2000, p. 598) developed a modified Wald statistic to test for group wise heteroskedasticity in the context of a fixed effects model. The Greene test ($\chi^2_{(238)} = 20640.78$, $p < 0.0001$) also rejects the null hypothesis of homoskedasticity suggesting each MSA has its own error variance.

Using Wooldridge's (2002, p. 282–283) test for autocorrelation in panel-data models ($F_{(1, 237)} = 9.72$, $p = 0.002$) the null hypothesis of no first order correlation is rejected. Similarly, a panel unit root test developed by Im, Pesaran, and Shin (2003) fails to reject the null of unit root series ($p = 0.925$).

The usual test for contemporaneous correlation in panel data models, the Breusch-Pagan LM test (1980), has been shown to over-reject when cross-sectional units (N) are greater than or equal to the number of time periods (T), especially with T between 20 and 30 (Pesaran, 2004). In this dataset, T=22. Pesaran's (2004) cross sectional dependence (CD) test was developed to

correct this problem as well as to handle unit root dynamic heterogeneous panels with short T and large N, as is the case in this research. The Pesaran test ($\chi^2_{(238)} = 4.466$, $p < 0.0001$) rejects the null hypothesis that error terms are independent across cross-sections in the same year.

Finally, because minor league teams move with a much higher frequency than major league teams it is possible that moves take place from cities with lower per capita incomes to those with higher per capita incomes. In addition, per capita income and population may be positively correlated. This implies that larger or wealthier cities are more capable of sustaining a minor league franchise and also implies the presence of a minor league team may be endogenous in this model specification. Despite this common belief and concern, a Wu (1973)-Hausman (1978) F-test fails to reject the null that each of the minor league presence variables is exogenous. The implication of this is further explored in the discussion section.

Ultimately, this is a panel heteroskedastic, autocorrelated model with contemporaneous correlation and a lagged dependent variable on the right-hand side. The lagged dependent variable is a concern because its presence in a fixed effect model can generate parameter estimates that are biased up to 20% even when the number of time units is as high as 30 (Judson & Owen, 1999).

Although the Monte Carlo evidence in Judson and Owen (1999) suggests that a Generalized Method of Moments (GMM) estimator is preferable to a Least Squares Dummy Variables estimator (also known as a fixed-effects model) in the case of a dynamic panel data model it cannot be used when dummy variables are 0 for almost all or 1 for almost all observations (Roodman, 2009). In this research most of the variables of interest are of this type resulting in a situation where a GMM estimator cannot be used. The other common alternative, a

Parks-Kmenta estimator requires $T \geq N$ in the case of contemporaneous correlation, a situation that does not exist in this data.

Thus, to obtain efficient and unbiased estimates, the original model,

$$y_{jt} = \beta_1 X_{jt} + \beta_2 Z_{jt} + \upsilon_j + \mu_t + \varepsilon_{jt} \quad (1)$$

is first differenced,

$$y_{jt} - y_{jt-1} = \beta_1 X_{jt} + \beta_2 Z_{jt} + \upsilon_j + \mu_t + \varepsilon_{jt} - \beta_1 X_{jt-1} - \beta_2 Z_{jt-1} - \upsilon_j - \mu_{t-1} - \varepsilon_{jt-1} \quad (2)$$

and when simplified,

$$y_{jt} - y_{jt-1} = \beta_1 (X_{jt} - X_{jt-1}) + \beta_2 (Z_{jt} - Z_{jt-1}) + (\mu_t - \mu_{t-1}) + (\varepsilon_{jt} - \varepsilon_{jt-1}) \quad (3)$$

eliminates autocorrelation, explicit fixed effects, and the correlation of the lagged dependent variable with the disturbances. Next, a panel corrected standard error estimator is applied to (3) to account for any panel level heteroskedasticity and contemporaneous correlation. This extension of White's (1980) heteroskedasticity-consistent standard errors accounts for the panel structure of the data and in Monte Carlo simulations is more efficient than OLS standard errors (Beck & Katz, 1995). To be clear, although the system has been first differenced, equations (1) and (3) show that the parameter interpretations are exactly the same as before first differencing.

Results

The nature of multiple league classifications and the associated hypotheses necessitates a model with a fairly large number of variables. Yet, often more parsimonious models are equally informative. Since one of the research questions involves the simple distinction between independent and affiliated teams, a simplified regression is first run with these variables and a single dummy for any new stadium in a market (see Model 1 in Table 4). Neither affiliated nor independent teams are significant. <insert Table 4 here>

Model 2 was run with a more detailed breakdown of affiliated teams to address the differences between classifications. Model 3 tested this further stratification and a Wald test confirmed ($p = 0.022$) that the distinction between A+, A, and A- was significantly different from zero. Therefore, Model 4 implemented this stratification at both the team and stadium level. Finally, Model 5 added entry and exit honeymoons. Model 5 is the fully specified model and is used for discussion, although the results are strongly similar between the various models. The R-squared value of 0.34 is lower than other similar major league research. But, since R-squared is simply the fraction of unexplained variance in the model, it seems unsurprising that 238 minor league metro areas that range from a AAA metropolis to an Independent village have more natural random unexplained variability than 40 nearly identical major league metro areas.

The first difference of the rate of employment is statistically significant and in the expected direction. The first difference of the percent change in population is negative suggesting, in this case, that the increasing labor supply is lowering wages. Two other control variables, the first differences of stadium capacity and the quality of the major league parent club, are statistically insignificant.

As mentioned in the previous section, although the model was first differenced, the parameter interpretations have not changed. Thus, the mere presence of an AAA franchise is associated with a \$67.25 ($p = 0.034$) increase in per capita incomes, holding all else constant. Similarly, an A+ franchise is associated with a \$117.57 ($p = 0.044$) increase in per capita income. The honeymoon period for stadiums at the AA (160.83, $p = 0.033$) and rookie level (201.99, $p = 0.032$) also have significant impacts on per capita income. The entry and exit honeymoon variables are all insignificant.

Robustness Checks

Because the positive effects of minor league teams and stadiums at various classifications are an unexpected outcome, three types of follow-up analyses were performed to ascertain the robustness of the results: removing variables from the fully specified model, adding variables to the fully specified model, and examining different samples of years and MSAs.

Two control variables, stadium capacity and major league affiliate quality, are insignificant in the fully specified model. Various modifications of major league affiliate quality were attempted including a three year moving average, only the previous season's win percent, and distance to the parent club. None of these controls for major league parent quality were significant. In addition, the removal of both stadium capacity and MLB quality variables from Model 5 did not affect the final results (see Table 5).

Similar to the insignificance of the control variables, a Wald test of the joint significance failed to reject the null that the entry and exit variables were collectively equal to zero ($p = 0.464$). Despite their individual and collective insignificance, their exclusion from the model did result in the AA stadium coefficient losing its significance.

The inclusion of a lagged dependent variable based on the notion of a product cycle is meant to capture the self-perpetuating tendencies of local industries and economies. Because some economists view the use of a lagged dependent variable as theoretically tenuous, its exclusion from the model was investigated. Both rookie and AA stadiums remained significant while AAA and A+ teams moved just beyond the 5% level of significance. <insert Table 5 here>

In terms of adding variables to the fully specified model, controls for spring training facilities and college stadiums were tested. Teams in Arizona and Florida on occasion use the same stadium as those used by major league teams for spring training. It was theorized that these

arrangements might result in additional benefits. The results were insignificant ($p = 0.774$). Likewise, some teams share facilities with local colleges and universities. A dummy variable to capture these arrangements was also insignificant ($p = 0.881$).

It should be noted that in all of the alternative specifications mentioned above, the other parameters not reported in Table 5 were essentially the same.

The last category of robustness tests involves changing the sample. Attendance was not included in the original model for several reasons, the most important of which was that attendance data for all affiliated teams started only in 1992, thus reducing the sample size considerably. No significance was found on attendance when the sample began in 1992.

Similarly, because the inclusion of entry and exit variables necessitated the removal of five years of data, their exclusion from the model allowed more data points. Thus, when entry and exit were removed and the sample was extended from 1980 to 2006, AAA teams and rookie stadiums remained significant at $p < 0.05$ while A+ teams and AA stadiums performed less well but still remained significant at $p < 0.10$.

In all of the new specifications, the AAA team and rookie stadium coefficients appear the most stable. In fact, only the removal of the lagged dependent variable pushes the AAA team coefficient to its highest p value of 0.057.

V. DISCUSSION

The discussion of these results begins by addressing the issue of potential endogeneity. It is certainly plausible that population and the presence of a team are related to per capita income. Indeed the popular press and our gut reactions tend to reinforce this belief. But as in major league sports, teams move away when attendance and profits fall and they move to cities that offer them new stadiums. But a new stadium is often a function of the local political landscape

(Fort, 1999) and does not necessarily imply that higher per capita incomes or larger populations increase the probability of obtaining a minor league team. This is supported by the Wu-Hausman test of the data which confirms no endogeneity problems.

The only person to explicitly investigate the factors affecting minor league team location used an ordered logit model to predict which cities were more likely to have teams at different levels (Davis, 2006). His results showed that personal income has a positive effect on the classification of the team in the city but he found the effect "surprising" (p. 263) and concluded the effect was of "secondary importance" (p. 260) to population. Indeed, in Davis' list of the 10 AAA cities with the lowest probability of having a team, those cities have actually hosted AAA teams for an average of 35 years! This certainly calls into question the ability of the variables (including per capita income) in Davis' model to accurately predict which cities are more likely to host a minor league baseball franchise. This may be due to the history of minor league baseball; AAA and rookie franchises are extremely stable and often began their tenure in cities over 20 years ago when the size and wealth of the city was significantly different than today.

Further research is needed to deeply clarify the issue, but for the purposes of this research, there is enough evidence to suggest that endogeneity is not a problem in the current minor league data set. Therefore, the results are discussed in terms of the concepts and theories that might explain why minor league baseball could lead to changes in per capita income.

The positive effects of AAA teams, A+ teams, AA stadiums, and rookie stadiums on the change in local per capita income are the most unexpected results from this analysis. As discussed above, the results for AAA teams and rookie stadiums are the most robust to alternative specifications and may be the most interesting outcomes of this inquiry.

What explains these positive results? Conceptually, there are myriad reasons minor league teams might have a more negative effect on local economies than their major league counterparts do, including lower levels of national media exposure, shorter seasons, decreased league longevity, more frequent moves, seasonal employment, lack of national revenue sharing, and the small size of the business. Although these are undeniable features of minor league baseball, they are simply descriptive features of the product. It is faulty to assume they are sufficient to explain the relationship between the presence of a team and per capita income.

Instead, there are a considerable number of well-established conditions, discussed in the Theory and Literature section, that could theoretically allow a minor league team to affect local income. For instance, increased incomes can result if a team and its stadium generate new spending by out-of-area visitors, discourage residents from spending outside the local economy, have low levels of leakages, result in little or no crowding out effects, are located in a metro area that is geographically isolated, have high stadium utilization rates, build a new stadium instead of a replacement stadium, and locate the stadium in a central business district. Thus, these conditions were compared with the raw data to draw some possible conclusions. Each will be discussed below, in terms of the three primary objectives of the research.

Differences within Minor League Baseball

Teams

Baade and Sanderson (1997a) suggested that teams that are more geographically isolated from other teams are likely to have a stronger regional following which will increase visitor spending. At the AAA level, there are 34 MSAs that ever hosted an AAA team in the sample period, 14 of which also hosted a major league team in a sport besides baseball. At the other end

of the spectrum, seven are geographically isolated with no major league team in any sport within a three hour drive. In these MSAs, the nature of their isolation drives visitor spending as does the presence of their AAA team as the highest quality in-stadium baseball experience in the region. Despite the fact that some minor league markets are home to popular university football and basketball programs, serious or casual fans seeking a live professional baseball experience have few or no other options in these markets. For example, Rosentraub and Swindell (1991) report that the AAA team in Indianapolis (a city with two other professional teams) draws 60% of its attendees from out of the area suggesting that visitors are specifically searching for an in-stadium baseball experience.

In regard to the 14 AAA MSAs with both major and minor league teams, the major league experience may be so expensive that sports connoisseurs are drawn to the more affordable, yet still relatively high quality, AAA game. Indeed, Gitter and Rhoads (2010) found that increasing ticket prices for major league teams within 100 miles of a minor league team led to increased minor league attendance.

Although the presence of a team at the AAA or A+ level is associated with positive income effects, no team entry or exit dummy variables at any level are significant. It seems that the smaller nature of minor league baseball diminishes any euphoria or despair effects associated with team entry and exit, respectively. At first glance, it may appear odd that a presence variable is significant while the corresponding entry variable is not. Yet, the entry variable is a honeymoon meant to capture the additional newness effect that often generates fanfare, interest, and attendance beyond the mere presence of the team. The insignificance of the entry honeymoon simply means there are no effects beyond those already associated with the presence of the team.

Stadiums

In terms of the positive effects associated with minor league stadiums, the results show a new stadium at the AA or rookie level is associated with an increase in the change in per capita income during the year the stadium was built and the four subsequent years. Theoretically, stadiums are more likely to affect per capita income if they are associated with other urban redevelopment, have a high degree of utilization, and if they drive new visitor spending.

Ultimately, it is hard to conceive that an AA stadium that draws an average of 3,837 attendees 70 times a year or a rookie stadium that draws an average of 1,364 attendees 35 times a year could possibly generate enough economic activity to create a measurable effect in the scope of a larger regional economy. The first reason these two classifications have positive stadium effects may be that these teams are more successful than others in utilizing the venue for activities that drive economic activity by drawing visitors from outside the local economy. When minor league ballparks are said to be built as community assets that host everything from high school marching band contests to minor league games, perhaps these are the markets where this holds true. For example, Hunter Wright Stadium in Kingsport, TN is home to the rookie-level Kingsport Mets. The stadium hosts the Mets, a baseball team from Gate City High School in nearby Virginia, and the post-season tournaments for the Appalachian Athletic Conference and Region XII of the National Association of Intercollegiate Athletics.

If the positive effect is not due to high venue utilization, then it may be related to urban redevelopment. Johnson (1998) points out that the location of a stadium can assist in development by opening up industrial corridors, acting as the centerpiece of larger entertainment projects, opening up land for new development, or driving infrastructure for future growth.

Urban economists all recognize that stadiums themselves will not cause significant development, rather, in communities with specific development logics and successful action plans a stadium can serve as the driver for other development. In this light, it is possible that AA and rookie MSAs have more successful redevelopment objectives.

A third reason is related to publicity. Johnson (1998) mentions that stadiums can also serve to improve a community's image if successfully exploited by the Chamber of Commerce, local officials, tourist offices, economic development agencies, and other local government and business organizations. When a large number of agencies act in concert to promote and market a team or its stadium it increases the opportunities for economic gain. Thus, positive effects may also be due to successful promotion of a minor league team or stadium. Rookie MSAs may be more likely to engage in this type of publicity since the team and stadium may be the only significant local attractions. For example, the official website for the town of Pulaski, VA, lists a visit to historic Calfee Park as the number one item on its list of Things to Do.

In addition to high venue utilization, stadiums as development devices, and high local publicity, there may be MSA-specific factors that induce the positive results. Rookie MSAs are the stereotypical version of rural, small town America. Virtually all are geographically isolated in deep Appalachian valleys or the open expanse of the rural west (Idaho, Utah, Wyoming, and Montana).

In addition to their isolated nature, rookie-level teams tend to be very stable. Team movements are rare and most teams have a long tenure in their MSAs. These teams may in fact be the "only show in town" which suggests a high level of psychological identification and may explain why a new stadium generates such a powerful response. Similar to the honeymoon

effect seen at major league parks, minor league fans and even the general public may be driven to these parks for several years out of curiosity, popularity, and word of mouth.

Differences between Affiliated and Independent Leagues

Neither independent teams nor stadiums exhibited significant effects. These results are not unexpected. Affiliated teams have a higher quality product, stronger team histories, increased team and league longevity, the branding benefits of affiliation, and more national media exposure. All of these factors positively affect intent to purchase and new visitor spending.

As a whole, independent teams are drastically less stable than affiliated teams leading to lower levels of regional interest, support, and visitor spending. In the period from 1980 to 2006, independent teams stayed in an MSA an average of four years while affiliated franchises averaged sixteen years (see Table 1). This is not to say that there aren't shining examples of successful independent teams only that, as a whole, independent teams are not associated with gains in local area per capita income.

Differences between Major and Minor League Baseball

The bulk of academic inquiry has shown professional teams and stadiums have predominately insignificant effects on local incomes. Therefore, the insignificance of the majority of independent variables at the minor league level is consistent with previous research at the major league level.

This study used a model as similar as possible to Coates and Humphreys (1999) so that comparisons could be made between major and minor league sports. Although the unique

structure of minor league baseball made it infeasible or impossible to include identical variables, many of the same ones were used. In addition to a longer and more current dataset, this research took advantage of new techniques in panel data analysis and used a different estimator.

Coates and Humphreys (1999) found insignificance for MLB stadium construction and entrance coefficients whereas the minor league coefficients are significant in four instances (see Table 6). The effect size of a minor league team is small, ranging from 0.7% of MSA per capita income for a rookie stadium to 0.2% for an AAA team, but is similar to other minor league research (Gitter & Rhoads, 2010; Winfree, 2009) that has also found small but strongly significant effects.

In terms of capacity, Coates and Humphreys (1999) found 1000 additional seats in a MLB stadium are associated with a small increase of $9.40 in real personal income. At the minor league level, where stadium capacity is dramatically smaller than the major leagues, 1000 additional seats results in a $5 to $6 decrease in real personal income.

<Insert Table 6 here>

Ultimately, the nature of minor league baseball teams and stadiums may be that they result in little or no crowding out effects, have low levels of leakages, and discourage residents from spending outside the local economy. The small scale nature of minor league baseball almost certainly guarantees little or no crowding out effects in local tourism establishments (e.g. hotels) and minimal local crowding out effects in terms of locals changing travel and spending habits to avoid pre- and post-game crowds[2].

[2] Yet a reviewer rightly points out that no research has yet confirmed whether this is true so it is plausible for very small towns to experience crowding out, even with low attendance numbers.

Minor league teams and stadiums may cause few leakages for two different reasons. First, minor league baseball salaries are so low that most players earn enough for basic sustenance so that little if any leaves the local economy. Second, in cases of rural towns and geographic isolation, the presence of a team or stadium may actually discourage residents from spending outside the local economy. If minor league baseball is one of only a few local entertainment options, having a team may inspire residents to stay and enjoy their leisure locally as opposed to traveling away to find another alternative. In fact, other local entertainment options such as movies most certainly have a higher propensity to leak than does minor league baseball.

Although this research was not specifically designed to explain why minor league teams and stadiums might have positive effects on local incomes, the raw data provides a fascinating pool of possible explanations and opens the door for further research to answer the many lingering questions as to why minor league teams and stadiums at some levels might be associated with increases in per capita income.

VI. CONCLUSION

The results of this research highlight the positive effects of AAA teams, A+ teams, AA stadiums, and rookie stadiums on local per capita income. The findings also indicate non-positive effects of AA, A, A-, rookie, and independent teams as well as AAA, A+, A, A-, and independent stadiums.

There are several reasons the positive effects are particularly interesting. First, and in contrast to decades of major league results, there are no significant negative effects. All of the

significant results are positive. In addition, the a priori expectations based on a thorough conceptual analysis were that all of the results would be negative.

To be clear, teams and stadiums in the majority of classifications have insignificant effects on per capita income. This is consistent with prior major league research. What is unique about the minor league context is that entire leagues of teams at the AAA and A+ levels are, for the first time, reflecting positive changes. Yet, no cost-benefit analysis was conducted so there is no implication that cities should invest in AA or rookie stadiums. What is distinctive about these results is the acknowledgement that perhaps fundamental differences in the business structure of sports can result in dramatic changes in the ability of sports teams to affect their local economies.

Considerable work is still necessary to refine our understanding of the effects of minor league sports on local economies. The positive effect of some classifications of minor league baseball may not be unique to the sport of baseball. Minor leagues in hockey are nearly as extensive and may well generate similar effects. European leagues that operate on promotion and relegation have even more "minor" leagues. English football, for example, has over 140 leagues in over 20 different levels. Many of these teams are located in cities not dissimilar to minor league baseball cities, suggesting a positive effect may exist there as well. Other academicians are encouraged to further pursue this line of research.

REFERENCES

Baade, R. A. (1996). Professional sports as catalysts for metropolitan economic development. *Journal of Urban Affairs, 18*(1), 1-17.

Baade, R. A., Baumann, R., & Matheson, V. A. (2008). Selling the game: Estimating the economic impact of professional sports through taxable sales. *Southern Economic Journal, 74*(3), 794-810.

Baade, R. A., & Dye, R. F. (1990). The impact of stadiums and professional sports on metropolitan area development. *Growth & Change, 21*(2), 1-14.

Baade, R. A., & Sanderson, A. R. (1997a). The employment effect of teams and sports facilities. In R. Noll, & A. Zimbalist (Eds.), *Sports, jobs and taxes: The economic impact of sports teams and stadiums* (pp. 92-118). Washington, DC: Brookings Institution.

Baade, R. A., & Sanderson, A. R. (1997b). Minor league teams and communities. In R. Noll, & A. Zimbalist (Eds.), *Sports, jobs and taxes: The economic impact of sports teams and stadiums* (pp. 452-493). Washington, DC: Brookings Institution.

Beck, N., & Katz, J. N. (1995). What to do (and not to do) with time-series cross-section data. *The American Political Science Review*, *89*(3), 634-647.

Breusch, T., & Pagan, A. (1980). The LM test and its applications to model specification in Econometrics. *Review of Economic Studies, 47*(1), 239-253.

Cebula, R., Toma, M., & Carmichael, J. (2009). Attendance and promotions in minor league baseball: The Carolina League. *Applied Economics, 41*, 3209-3214.

Clapp, C. M., & Hakes, J. K. (2005). How long a honeymoon? The effect of new stadiums on attendance in Major League Baseball. *Journal of Sports Economics, 6*(3), 237-263.

Coates, D., & Depken, C. (2006). Mega-events: Is the Texas-Baylor game to Waco what the Super Bowl is to Houston? *International Association of Sports Economists Working Paper Series, Paper no. 06-06,* 1-22.

Coates, D., & Humphreys, B. R. (1999). The growth effects of sport franchises, stadia, and arenas. *Journal of Policy Analysis and Management, 18*(4), 601-624.

Coates, D., & Humphreys, B. R. (2001). The economic consequences of professional sports strikes and lockouts. *Southern Economic Journal, 67*(3), 737-747.

Coates, D., & Humphreys, B. R. (2003). The effect of professional sports on earnings and employment in the services and retail sectors in US cities. *Regional Science and Urban Economics, 33*(2), 175-198.

Colclough, W. G., Daellenbach, L. A., & Sherony, K. R. (1994). Estimating the economic impact of a minor league baseball stadium. *Managerial and Decision Economics, 15*(5), 497-502.

Davis, M. (2006). Called up to the big leagues: An examination of the factors affecting the location of minor league baseball teams. *International Journal of Sport Finance, 1*(4), 253-264.

Fort, R. (1999). Stadium votes, market power, and politics. *University of Toledo Law Review, 30*(3), 419-441.

Foster, W. M., & Hyatt, C. (2007). I despise them! I detest them! Franchise relocation and the expanded model of organizational identification. *Journal of Sport Management, 21*(2), 194-212.

Gitter, S. R., & Rhoads, T. A. (2010). Determinants of minor league baseball attendance. *Journal of Sports Economics*, *11*(6), 614-628.

Gitter, S. R., & Rhoads, T. A. (2011). Top prospects and minor league baseball attendance. *Journal of Sports Economics*, *12*(3), 341-351.

Greene, W. (2000). *Econometric Analysis*. Upper Saddle River, NJ: Prentice--Hall.

Hausman, J. (1978). Specification tests in econometrics. *Econometrica, 46*, 1251-1271.

Hudson, I. (1999). Bright lights, big city: Do professional sports teams increase employment? *Journal of Urban Affairs, 21*(4), 397-408.

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics, 115*(1), 53-74.

Johnson, A. T. (1990). Professional baseball at the minor league level: Considerations for cities large and small. *State & Local Government Review, Spring*, 90-96.

Johnson, A. T. (1991). Local government, minor league baseball, and economic development strategies. *Economic Development Quarterly, 5*(4), 313-324.

Johnson, A. T. (1995). *Minor league baseball and local economic development*. Urbana and Chicago, IL: University of Illinois Press.

Johnson, A. T. (1998). Minor league baseball: Risks and potential benefits for communities large and small. *Policy Studies Review, 15*(1), 45-54.

Judson, R. A. & Owen, A. L. (1999). Estimating dynamic panel data models: a guide for macroeconomists. *Economics Letters, 65*(1), 9-15.

Leadley, J. C., & Zygmont, Z. X. (2005). When is the honeymoon over? National Basketball Association attendance 1971-2000. *Journal of Sports Economics, 6*(2), 203-221.

Lertwachara, K., & Cochran, J. J. (2007). An event study of the economic impact of professional sport franchises on local US economies. *Journal of Sports Economics, 8*(3), 244-254.

Matheson, V., & Baade, R. (2005). Striking out? The economic impact of Major League Baseball work stoppages on host communities. *College of the Holy Cross, Department of Economics Faculty Research Series, Working Paper no. 05-07,* 1-31.

Miller, P. A. (2002). The economic impact of sports stadium construction: The case of the construction industry in St. Louis, MO. *Journal of Urban Affairs, 24*(2), 159-173.

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. *University of Cambridge, Cambridge Working Papers in Economics, 0435*, 1-40.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, *9*(1).

Rosentraub, M. S., & Nunn, S. R. (1978). Suburban city investment in professional sports: Estimating the fiscal returns of the Dallas Cowboys and Texas Rangers to investor communities. *American Behavioral Scientist, 21*(3), 393-414.

Rosentraub, M. S., & Swindell, D. (1991). "Just say no?" The economic and political realities of a small city's investment in minor league baseball. *Economic Development Quarterly, 5*(2), 152-167.

Rosentraub, M. S., Swindell, D., Przybylski, M., & Mullins, D. R. (1994). Sport and downtown development strategy: If you build it, will jobs come? *Journal of Urban Affairs, 16*(3), 221-239.

Santo, C. (2005). The economic impact of sports stadiums: Recasting the analysis in context. *Journal of Urban Affairs, 27*(2), 177-192.

Siegfried, J., & Zimbalist, A. (2000). The economics of sports facilities and their communities. *The Journal of Economic Perspectives, 14*(3), 95-114.

Siegfried, J., & Zimbalist, A. (2002). A note on the local economic impact of sports expenditures. *Journal of Sports Economics, 3*(4), 361-366.

Vernon, R. (1966). International investment and international trade in the product cycle. *The Quarterly Journal of Economics, 80*(2), 190-207.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, *48*(4), 817-838.

Winfree, J. (2009). *Performance and ownership structure in minor league baseball.* Paper presented at the 84th Annual Conference of the Western Economic Association International, Vancouver, BC.

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge, MA: The MIT Press.

Wu, D. M. (1973). Alternative tests of independence between stochastic regressors and disturbances. *Econometrica, 41*, 733-750.

Zipp, J. F. (1996). The economic impact of the baseball strike of 1994. *Urban Affairs Review, 32*(2), 157-185.

TABLE 1

Franchise Volatility as Measured by the Number of Years in an MSA

	Affiliated Classification						
	AAA	AA	A+	A	A-	R	IND
Mean	17.23	13.57	18.76	15.64	15.06	16.85	4.61
Standard Error	1.53	1.19	1.44	1.24	1.37	2.01	0.33
Median	19	12	20	14	15	18	3
Minimum	1	2	1	1	1	3	1
Maximum	27	27	27	27	27	27	14

Note. All minor league teams in the 27 year period between 1980 and 2006.

[a] Excludes minor league teams playing in far suburbs of very large MSAs that are not reflective of their true market size.

TABLE 2

MSA Characteristics by Minor League Baseball Classification, 2006

	Average population[a]	% playing in cities with any major league team	% playing in cities with a MLB team	Average stadium age (years)	Average stadium seating capacity	Average games played per season
MLB	5,794,493	100%	100%	23	44,774	161
AAA	1,188,280	38%	3%	21	12,773	143
AA	569,885	11%	4%	16	7,519	140
All A's	466,078	19%	16%	26	5,477	117
A+	516,165	20%	15%	33	5,784	138
A	426,144	13%	10%	20	5,849	138
A-	455,925	24%	24%	26	4,799	75
Rookie	171,694	0%	0%	32	3,382	72
Ind.	632,672	33%	33%	28	4,995	na

TABLE 3

Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Dependent Variable				
Real per capita income (2006)	27393.82	5226.83	12782	74281
Local Market Variables				
Lagged real per capita income (2006)	27037.37	5122.35	12617	71042
Percent change in population	0.010150	0.013871	-0.244	0.105
Rate of employment	0.471758	0.070982	0.234	0.663
Stadium capacity	4074.781	5570.446	0	76273
Quality of MLB affiliation	1410783	2288318	0	15600000
Number of NFL franchises	0.0365	0.187495	0	1
Number of NBA franchises	0.0372	0.189373	0	1
Number of NHL franchises	0.0174	0.130694	0	1
Number of MLB franchises	0.0170	0.129275	0	1
Minor League Variables				
Number of affiliated franchises	0.5342	0.547440	0	3
Number of AAA franchises	0.0984	0.297826	0	1
Number of AA franchises	0.1083	0.310774	0	1
Number of A franchises (all)	0.2595	0.449190	0	3
Number of A+ franchises	0.0817	0.286271	0	3
Number of A franchises	0.1054	0.307128	0	1
Number of A- franchises	0.0724	0.264256	0	2
Number of rookie franchises	0.0680	0.295718	0	2
Number of independent franchises	0.0930	0.295042	0	3
Any stadium honeymoon	0.0252	0.156778	0	1
AAA stadium honeymoon	0.0206	0.142144	0	1
AA stadium honeymoon	0.0244	0.154444	0	1
All A stadium honeymoon	0.0372	0.189373	0	1
A+ stadium honeymoon	0.0094	0.096294	0	1
A stadium honeymoon	0.0204	0.141498	0	1
A- stadium honeymoon	0.0074	0.085991	0	1
Rookie stadium honeymoon	0.0078	0.088151	0	1
Independent stadium honeymoon	0.0118	0.108181	0	1
AAA entry honeymoon	0.0138	0.116467	0	1
AA entry honeymoon	0.0235	0.151472	0	1
A entry honeymoon	0.0487	0.215263	0	1
Rookie entry honeymoon	0.0143	0.118834	0	1
Independent entry honeymoon	0.0676	0.251098	0	1
AAA exit honeymoon	0.0099	0.099169	0	1
AA exit honeymoon	0.0229	0.149657	0	1
A exit honeymoon	0.0414	0.199334	0	1
Rookie exit honeymoon	0.0071	0.083773	0	1
Independent exit honeymoon	0.0737	0.261340	0	1

Note. Although the model is first-differenced before estimation, the un-differenced values are reported here since the interpretation of the coefficients is the same regardless of first-differencing, as described in the Analysis section.

TABLE 4

Effects of the Presence of Minor League Baseball Teams on Per Capita Income, 1985-2006

	Model				
First-differenced variables	1	2	3	4	5
Lagged real per capita income	-0.1269*	-0.1279*	-0.1297*	-0.1305*	-0.1315*
	0.060	0.060	0.059	0.059	0.059
Percent change in population	-11278.4***	-11244.1***	-11139.6***	-11148.5***	-11124.8***
	3336.283	3332.758	3319.176	3316.134	3311.445
Rate of employment	41067.55***	41105.41***	41323.91***	41335.76***	41401.12***
	2759.098	2745.166	2730.243	2715.703	2703.199
Stadium capacity	-0.0055	-0.0057	-0.0056	-0.0061	-0.0064
	0.0047	0.0047	0.0047	0.0047	0.0047
Quality of MLB affiliation	0.000002	0.000002	0.000002	0.000001	0.000002
	0.000008	0.000008	0.000008	0.000008	0.000008
Number of NFL franchises	-8.044	-20.685	-13.781	-14.222	-22.505
	140.393	141.631	140.911	140.589	141.754
Number of NBA franchises	69.481	55.120	50.738	52.721	60.424
	63.364	62.313	62.100	61.945	63.658
Number of NHL franchises	33.635	30.440	16.182	13.709	13.350
	102.373	102.925	102.528	102.417	102.991
Number of MLB franchises	151.260	170.490	172.485	172.769	182.462
	91.157	92.734	93.425	93.419	94.881
Number of affiliated franchises	35.099				
	21.495				
Number of AAA franchises		65.016*	66.031*	70.486*	67.245*
		30.412	30.237	32.652	31.781
Number of AA franchises		78.482*	75.327*	55.270	60.789
		35.048	34.188	35.840	37.122
Number of A franchises (all)		28.013			
		22.252			
Number of A+ franchises			110.088	123.626*	117.567*
			57.337	59.092	58.320
Number of A franchises			9.380	-2.548	-12.375
			29.936	32.723	34.794
Number of A- franchises			-45.233	-43.859	-52.268
			33.042	33.676	33.796
Number of rookie franchises		-9.351	-10.374	-28.504	-22.967
		33.835	33.693	35.278	35.134
Number of ind. franchises	29.010	30.605	29.928	22.359	-19.604
	44.716	44.848	44.839	45.318	76.387
Any stadium honeymoon	3.662	1.606	2.278		

	Model				
First-differenced variables	1	2	3	4	5
	54.564	54.546	54.618		
AAA stadium honeymoon				-16.238	-2.897
				89.445	113.605
AA stadium honeymoon				95.367	160.828*
				57.975	75.279
A+ stadium honeymoon				-94.691	-110.886
				57.975	75.279
A stadium honeymoon				68.287	56.599
				50.170	52.108
A- stadium honeymoon				-2.923	-14.511
				73.721	74.547
Rookie stadium honeymoon				179.708*	201.992*
				88.020	93.954
Ind. stadium honeymoon				71.508	53.510
				103.974	99.734
AAA entry honeymoon					-22.145
					151.672
AA entry honeymoon					-115.007
					77.547
A entry honeymoon					24.710
					35.627
Rookie entry honeymoon					-49.552
					71.528
Independent entry honeymoon					55.081
					97.399
AAA exit honeymoon					-36.588
					77.173
AA exit honeymoon					51.987
					52.223
A exit honeymoon					-34.962
					39.095
Rookie exit honeymoon					-156.032
					91.280
Independent exit honeymoon					-14.154
					50.384
R^2	0.33	0.33	0.34	0.34	0.34
Observations	5,236	5,236	5,236	5,236	5,236

Note. Heteroskedasticity-corrected standard errors are below the estimated coefficients.

* Significant at 5%; ** significant at 1%; *** significant at 0.1%

TABLE 5

Robustness Check for Four Significant Minor League Variables

	AAA Team	A+ Team	AA Stadium	Rookie Stadium
Original Sample				
Fully Specified	67.245*	117.567*	160.828*	201.992*
(Model 5)	31.781	58.320	75.279	93.954
Without Capacity and	67.771*	117.597*	159.6239*	203.407*
MLB Quality	31.773	58.263	75.290	93.979
Without Entry and Exit	70.486*	123.626*	95.367	179.708*
	32.652	59.092	57.975	88.020
Without Lagged	62.100	110.531	148.38474*	203.885*
Dependent Variable	32.646	57.831	72.882	93.889
Different Sample				
Without Entry and Exit	67.915*	86.355	95.827	182.664*
1980-2006	28.497	49.811	51.594	85.750
With Attendance	95.088*	101.514	238.895	158.362
1992-2006	39.703	85.158	131.686	119.846

Note. Heteroskedasticity-corrected standard errors are below the estimated coefficients.
* Significant at 5%

TABLE 6

Summary of the Effects of Major and Minor League Baseball on Real Per Capita Income

	Stadium	Team
MLB	--	--
AAA	--	+, $p < 0.05$
AA	+, $p < 0.05$	--
All A's	--	--
A+	--	+, $p < 0.05$
A	--	--
A-	--	--
Rookie	+, $p < 0.05$	--
Ind.	--	--

Note. Major league results from Coates and Humphreys (1999). Insignificance noted by --.