Slide 1:

Hello, my name is Emily Seay and I am a Senior Applied Economics Major. My project is titled "Winning and Attendance in Major League Baseball, Does Winning Attract More Fans?" and throughout this presentation, I will be attempting to answer this question through an economic approach using regression analysis.

Slide 2:

I will begin with a little bit of background on Major League Baseball. Founded in 1869, Major League Baseball is an organization that oversees 29 teams across the United States and one in Canada. These teams are broken down into two leagues, the American League and the National League, with 15 teams in each. Over the course of the season, each team plays 81 home games and 81 away games. In 2019 alone, Major League Baseball generated 10.7 billion dollars in revenue. I have included a graphic on the right side of the slide so you can see all of the 30 Major League Baseball team logos.

Slide 3:

Not only do these teams receive a large amount of revenue every year, but they also attract millions of patrons to their games throughout each season. This can be seen on the graph I have included on this slide which shows the number of fans in millions that attended Major League Baseball games from 1994 to 2019. Fans from across the country flock to stadiums to see their favorite teams play in hopes to see them pull out a win. Without fans, Major League Baseball would not be as successful as it is today. Fans generate income for teams by buying tickets to attend games, watching games on TV (which allows Major League Baseball to get more TV contracts), and buying team apparel. One of the greatest opportunities fans have is the option to attend games to root for their favorite team; but what attracts them to the stadiums? Are fans attracted more to teams who win more at their home stadiums? This presentation seeks to answer these questions.

Major League Baseball provides economists a prime look into demand because of the way in which the teams and matches are set up. The teams provide data on key determinants of demand and allows economists to apply that information to economic models. For this reason, it is a topic that has a large number of published studies.

At the Minor League level, there is evidence that a higher home win percentage, population, average ticket price, per capita income, value of merchandise, cost of food and drink, discounts on beer and tickets, days of the week games are played on, and months of the year that games are played on all have significant effects on attendance to games. This can be seen in Cebula's 2013 study. At the Major League level, studies have been conducted to conclude that price, income, performance, intercollegent games, time of day, day of the week, and month of the year have significant effects on attendance which can be seen in Denaux's2011 study looking at the 1979-2004 Major League Baseball seasons. Other notable studies have researched how economic crisis in Hong, Mondello, and Coate's 2o13 study, location and closeness of other teams in Winfree. McCluskey, Middlehammer, and Fort's 2004 study, player turnover in Kahane and Shmanske's 1997 study, and game outcome uncertainty as seen in Soebbing's 2008 study all affect Major League Baseball attendance.

The economics involved in baseball have even branched out past economic studies and into published books and movies. In 2003, *Moneyball: The Art of Winning an Unfair Game*, was published by Michael Lewis. This book, later turned into a movie, tells the story of Billy Beane, the general manager for the Oakland A's and how he was able to use economics to create a

successful team on a tight budget. Studies created because of this book have been conducted to look more specifically into how payroll affects attendance, concluding that variables such as win percentage, previous season win percentages, new stadiums, indoor stadiums, payroll, allstars significantly affect attendance to Major League Baseball games from as seen in Regan's 2012 study looking at the 1991-2008 seasons. This paper will be adding to the existing literature that examines various aspects which affect attendance by using data on only home team wins in Major League Baseball rather than the overall wins by each team and by studying one singular season.

Slide 5:

This will be adding to the existing literature that examines various aspects which affect attendance by answering the question to what extent do home game wins affect attendance. I will be using more recent data from the 2019 season, as well as using OLS regression to cross sectionally regress the 30 Major league teams against each other.

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The relationship between home game wins and attendance can be demonstrated by a demand model. This model explains demand as a function of a variety of variables and can be seen in the equation here. Where, Q_D is the quantity of tickets to Major League Baseball demanded. The demand is a function of the price of tickets, income, population, payroll amounts, and the number of wins. These variables have been included into the model due to their expected effects (positive or negative) on demand.

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The variables selected for this model have been chosen from Cebula's and Denaux's papers, due to their expected significance on Major League Baseball attendance and can be seen in the model here. Where the dependent variable for this study (ATTEND) is the attendance by team. The data for this variable has been collected from *Baseball Reference,* which lists the total attendance to each team's home stadium over the 2019 season. The first explanatory variable (HOME WINS) is the number of home games won by team. The Data for this variable has been collected from *Baseball Almanac* which lists each game played by teams over the 2019 season and whether the teams won or lost. From this source, the number of home game wins has been collected by finding the games played at the teams home stadiums and counting their number of wins.

Other explanatory variables include PAYROLL which has been measured by the payroll (in millions) paid by each team at the beginning of the 2019 season, collected from *CBS Sports.* STADIUM has been measured by the maximum seats in each stadium. INCOME has been measured by the average 2019 personal income by metropolitan area that the stadiums are located in. Data has been collected for this variable from the Bureau of Economic Analysis. INDEX is the fan cost index for each team. This variable is measured by "the prices of four average-price tickets, two small draft beers, four small soft drinks, four regular-size hot dogs, parking for one hour, two game programs and two least-expensive, adult-size adjustable caps".

The expected signs for HOME WINS, PAYROLL, STADIUM, and INCOME are all positive. If a team wins more at their home stadium, spends more money on better players, and has a larger stadium, then more people will be attracted and able to attend games. In addition, when income is higher, more people will have more disposable income to spend to be able to attend games. The expected sign for INDEX is negative. As the law of demand states, there is an

inverse relationship between price and quantity demanded. Therefore, when price increases, the quantity of tickets demanded decreases and attendance to games falls.

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The results presented in this slide, showing the descriptive statistics, reveal that the average number of home games won in the 2019 Major League Baseball season was slightly more than half with the average team winning 43.03 out of 81 of their home games. The table also shows that the attendance to games is highly varied. This is to be expected due to the variations in the other variables included in this regression.

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In addition to the regression that has been run, a Breusch-Pagan test has been conducted for the data collected in order to test for heteroskedasticity. This test has been conducted to ensure the distribution does not have a constant variance. When the predicted 2019 attendance is plotted against the squared residuals obtained from the regression results, the resulting graph shown here, does not show evidence of heteroskedasticity.

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Shown here is the results from the conducted Breusch-Pagan test. The results from this test indicate that there is no evidence of heteroskedasticity in this model. This test results shows that the N (which is the number of observations, in this case 30)) times the R^2 (which is 0.026) is 0.78 which is less than (<) the critical chi-squared value of 11.07, meaning that the null hypothesis cannot be rejected and that heteroskedasticity is not evident in the model.

Slide 11:

This slide presents the results from the regression that has been run. The regression results yield an R^2 of 0.76, as well as an adjusted (for the number of variables in the equation) R^2 of 0.71. These results explain that the results are of good quality and explain more than 70% of the variation in the data. The model is also a significant predictor of attendance for the 2019 season. The F statistic which is 15.047 is greater than (>) the critical F value at the 5% significance level which is 2.62. Therefore, we can reject the null hypothesis for this model and confirm its significance.

The results from the model explain that the Fan Cost Index and Income are not significant at the 5% level. However, home wins, payroll, and stadium capacity all have significant effects on attendance. At this level (5%), when home wins (the main explanatory variable) increase by one, attendance increases by nearly 23,000. Significant findings in other explanatory variables include: when payroll increases by one million, attendance increases by almost 11,000, and when capacity increases by one, attendance increases by about 45. These variables have a significantly positive effect on attendance, which is the effect that was expected.

Slide 12:

The analysis conducted provides evidence that increases in the number of home games won by the thirty teams in Major League Baseball significantly increases the attendance to home games: every additional win increases attendance by nearly 23,000. These results support the

expected effect winning at home games has on attendance. The results from this paper add to pre existing literature in agreement and support of the effect winning has on the demand for Major League Baseball Tickets. Further research and analysis can be conducted using this model to discover if it is a good indicator for other Major League Baseball seasons and not just the one studied here (the 2019 season). It might also be useful in further studies to add other variables such as days home games were played and possibly break down the fan cost index to see what effect each component has on attendance.

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This concludes my presentation. If you have any questions for me please feel free to leave them in the comments below and I will get back to you as soon as I can. Thank You!