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## X-Rays Vision: Finding Success Through Sabermetrics in Major League Baseball

Madelyn Dickinson

Johnson & Wales University - Providence, J02219223@jwu.edu

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# X-Rays Vision: Finding Success Through Sabermetrics in Major League Baseball

By Madelyn Dickinson

Advisor: Scott Palmieri

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Submitted in partial fulfillment of  
the requirements for the University Honors Scholar designation  
at Johnson & Wales University

## **Abstract**

This study aims to evaluate the correlation between a Major League Baseball team's success and the team's use of sabermetrics, advanced baseball analytics. The timeline of the sabermetric revolution and its implementation into each MLB team are cross examined with that team's payroll, attendance, win/loss record, playoff success, and fan opinions. This study is conducted by cross-analyzing raw data regarding team records, attendance, and payroll data as well as background internet research on the sabermetric revolution as well as fan reactions to its use from social media or team-specific online forums. This research finds that there is a positive correlation between a team's success and their use of sabermetrics.

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## Introduction

Although it is among the oldest of the professional American sports leagues, baseball has changed arguably the most – not only in fundamental rule changes, but in the way the game is managed, watched, and marketed. As the sport became more popular with the rise of radio and, eventually, television, the use of statistical analysis to measure players' and teams' success became more popular as well. Originally used solely for record-keeping and basic evaluation, baseball statistics quickly evolved into something much more. In the 1980's, avid fan and baseball analyst Bill James began what is now known as the Sabermetric Revolution, using nuanced statistics and theories to evaluate the game in a much more complex fashion, shedding a light on baseball that had never quite been seen before. Rather than glance at a few simple statistics to evaluate a player, coaches and fans alike began cross utilizing these new analytics to paint a bigger picture of success (and failure) on the baseball diamond.

The rise of sabermetrics has helped in painting a more accurate picture of a player's worth based on numbers alone, has helped small-market teams able to compete even without the massive salaries of bigger teams, and has made the sport more enjoyable to watch for many fans. On the contrary, some argue that sabermetrics have made baseball too numbers-focused, and are killing America's most favorite pastime. This thesis analyzes the rise of sabermetrics over the late 20<sup>th</sup> and early 21<sup>st</sup> centuries and its impact on the overall popularity of Major League Baseball. I will consider the timeline of the implementation of sabermetrics in relation to team attendance, payroll, and success in the regular and post-season to evaluate the positive effects of statistics on baseball.

## Methodology

The driving research question for this project was “how do sabermetrics positively affect fan experience in Major League Baseball?” In searching for the answer to this question, the main method of data collection consisted of accumulating a definitive timeline of the creation and use of sabermetrics in the MLB and cross analyzing this timeline with the success of all 30 teams in terms of division placement, postseason success, total attendance, and payroll per season. Data was collected using raw data from *The Baseball Almanac* and entered into a comprehensive spreadsheet to visualize trends and patterns. Qualitative data on fan experiences with certain teams was also collected using online forums, social media, and opinionated team-specific articles. Studying and cross analyzing these results allowed for a tangible sense of “success” and “popularity” to be determined in answering the research question.

All attendance and payroll data were taken from The Baseball Almanac. Payroll numbers used are based on the total 40-man roster including all players on the active, injured, or reserve lists per season. Attendance records are compared to league-specific average rather than of the entire league due to historical rule differences between the two leagues that may sway popularity and attendance. Data ends in 2019 due to the shortened 2020 season, which had zero attendance all season due to COVID-19 protocols. 2021 is also not shown due to different states’ legislation on attendance protocols leading to ballparks having differing attendance allowances for most of the season. Payroll records begin in 1984 due to salary data before this time being less detailed. Because the Sabermetric Revolution did not become mainstream until



after this time, and major payroll disparity did not become an issue until the 90s, payroll data from before this time is largely inconsequential to this thesis.

Unless otherwise stated, all charts and graphs are from the spreadsheet, with data taken from The Baseball Almanac. Any records of payroll, win-loss record, and postseason success from 2020-2022 stated is also taken from the Baseball Almanac though it is not expressed in the spreadsheet.

Link to spreadsheet: [https://jwuwildcats-my.sharepoint.com/:x/g/personal/j02219223\\_jwu\\_edu/ERyAXylkiWVPnn79-myBpmQB573azLccMtF9bl8Et2ClbA?e=Hn2YxC](https://jwuwildcats-my.sharepoint.com/:x/g/personal/j02219223_jwu_edu/ERyAXylkiWVPnn79-myBpmQB573azLccMtF9bl8Et2ClbA?e=Hn2YxC)

Citation: "MLB History Year-by-Year (1876-2023)." *Baseball Almanac*, <https://www.baseball-almanac.com/yearmenu.shtml>.

## Research Overview

Sabermetrics themselves have been studied from a mathematical standpoint for decades. Researchers have worked to measure the value of how well certain formulas can evaluate a player, and many have even worked to formulate their own equations they believe are more effective. There has also been research done on how attendance affects a team's performance or vice versa. There has been much discussion on how sabermetrics have changed baseball from a standpoint of managing, but there is little to no research on how sabermetrics have positively affected baseball in terms of team attendance, fan opinion, and win/loss records per season in relation to both payroll and a given team's use of analytics. Additionally, most of the conversation surrounding the effect of sabermetrics on baseball is purely opinion-based rather than research-based. Most of the published research relates solely to the Oakland Athletics and their use of sabermetrics during the early 2002 rather than looking at the matter from a broad standpoint spanning several decades and the league as a whole.

A thesis written by University of Tennessee at Chattanooga student Jacob Moorefield examined the use of analytics, specifically by the Oakland Athletics, and how many big businesses use a similar strategy to improve overall performance (Moorefield 1). This research concluded that the use of sabermetrics was able to help the Oakland A's construct a competitive roster that could compete with larger-market teams such as The Boston Red Sox and The New York Yankees, citing Oakland general manager Billy Beane's use of analytics to sign players as well as Oakland's ability to reach the playoffs (Moorfield 2-4).

Another study by Washington University in St Louis students Jason Chang & Joshua Zenilman investigates the impact that scouting players using the Moneyball strategy has had on

the length and price of free agent contracts. This study looked at certain statistics used to scout players as well as the qualities that determine the value of a player when it comes to offering them a Major League contract. Overall, this study found that using sabermetrics to evaluate players has had a lasting impact on how MLB players are assigned value in the free agency market and has resulted in value being less related to observable traits (Chang, 29-30).

While both studies contain research that will be touched on and covered in this thesis, neither take the extra step to find any possible correlation to sabermetric methods and success and popularity of Major League Baseball teams.

## History of Sabermetrics

In the world of sports, numbers are used to quantify everything. Whether it be to measure success, failure, or anything in between both on and off the field, statistics can be used to size up just about anything regarding sports, and perhaps no other sport has a heavier reliance on numbers than America's favorite pastime – baseball. Baseball statistics serve not only to benefit and entertain fans, but they can also help front offices and managers to make big decisions both on and off the field at all levels of the game. Baseball statistics, or Sabermetrics (named after the Society for American Baseball Research, or SABR) have evolved into something so complex that even most die-hard fans or players themselves do not fully understand the extent to which they can be used, but it took many years for this revolution of sorts to truly take off.

In 1859, the still young world of baseball would be forever changed by the publication of the first official box score in the *New York Herald*. While statistics had been sporadically documented and published over the previous years, Henry Chadwick is credited as the first person to put together a comprehensive box score that detailed several statistics from a Brooklyn Excelsiors vs Brooklyn Stars game (Pesca). The box score that Chadwick put together is much different from the ones we see today, but this box score is responsible for allowing baseball fans, for the first time, to get a bigger insight into games they were not attending beyond a simple statement of which team won. It was Chadwick who devised the term “strikeout,” a phrase that is obviously still widely used today (Pesca). Chadwick went on to become a leader in the world of baseball rules, working on many of the game's earliest rulebooks and even serving on the committees that devised said rules. Throughout this time, he

continued using his box score model, which continued to gain popularity and became the mainstream framework for keeping score of baseball games (Henry).

In 1906, Chicago sportswriter Hugh Fullerton, who would later play an instrumental role in uncovering the 1919 Chicago Black Sox scandal, boldly claimed that the Chicago White Sox would win the World Series over the heavily favored Chicago Cubs. Fullerton was among one of the only prominent baseball figures to make this prediction, which was based on his own independent application of baseball analytics (Neyer). While this feat did not garner much attention at the time, it was one of the first prominent instances of analytics being used to correctly make a prediction about a future event in the sport. In 2010, Fullerton also published an article in *The American Magazine* that detailed some of his research, which was primarily conducted manually using a stopwatch (Neyer). Around the same time, another baseball writer by the name of F.C. Lane boldly claimed in *Baseball Magazine* that batting average was a useless measure of success. He argued that it was misleading to count singles and home runs as equals, and even attempted to develop his own formula that contained different values for singles, doubles, triples, and home runs that would eventually serve as the framework for many modern baseball statistics, most notably Bill James's famous Runs Created statistic (Baumer 13-14).

In 1944, Brooklyn Dodgers' general manager Branch Rickey made a front office move the likes of which had never been seen before; he hired Allan Roth as baseball's first official statistician (Neyer). Much of Roth's work involved a heavier focus on on-base percentage, which he considered to be much more valuable than a player's batting average. His analytics, which were mainly based on this foundation, led to the Brooklyn Dodgers making several

instrumental moves, the most notable of which being moving Jackie Robinson to bat cleanup. Roth saw that Robinson's 1948 RBI percentage was higher than anyone else's on the team, but his position in the lineup did not give him many opportunities to do so. After he was moved to the cleanup spot in 1949, Robinson drove 124 Brooklyn Dodgers over home plate and won National League MVP (McCue).

In 1954, Rickey published a ten-page article in *Life* magazine, where he argued in favor of Roth's analytical approach and denounced many traditional methods of managing and running an MLB team. At the time, most people paid this approach no mind; however, this was one of the first times that sabermetric research was published in such a popular mainstream magazine (McCue). What stood out most in the *Life* article was a formula that Rickey and Roth had developed known simply as "The Equation," which contained eight different terms that attempted to completely sum up a player's performance. While this equation had a long way to go, several pieces of it would be later used as the framework of some of the most widely used sabermetrics today, such as the Offensive Performance Statistic (on-base percentage + slugging percentage), which were essentially represented in the first two terms of The Equation (Baumer, 14).

The next significant instance of analytics reaching a widespread audience came in 1964, with the publication of *Percentage Baseball*. Written by analytic enthusiast Earnshaw Cook, the contents of this book were able to reach a large national audience through a *Sports Illustrated* profile (Neyer). This was the first real book dedicated entirely to baseball statistics and the application of formulas and probability theory to the sport, but most of the information being so mathematically complex unfortunately made most of the book extremely hard to

understand or be taken too seriously (Deford). Several people in the baseball world, however, did take some of *Baseball Percentage* to heart, notably Davey Johnson, who went on to be an extremely successful manager (Baumer, 14). Johnson, and several other managers and GMs in baseball at the time, took particular interest in Cook's claims that on base percentage was wildly more important than batting average, a sentiment that is the foundation of many modern-day sabermetrics and theories.

Along with the 1970s came the rise of the information age. People were beginning to have access to endless information, and this would only become truer in coming decades as technology such as computers and phones became common in households. The rise of advanced analytic use in baseball grew exponentially along with this new age of technology and information. In 1969, the first comprehensive collection of MLB statistics, *The Baseball Encyclopedia*, was published, and while this book did not contain any sabermetrics itself, it would go on to inspire many statisticians, notably Bill James, to extrapolate its data to develop advanced analytics (Neyer). In 1971, the Society for American Baseball Research, or SABR, was founded (Schell). Since then, the members of SABR have worked to create a comprehensive database of all things baseball, from history to records to statistic, the latter of which became more prominent as the use of sabermetrics became more commonplace. It is from the acronym SABR that Bill James would coin the term "sabermetrics" in 1980, when the sabermetric revolution really took off (Neyer).

In 1977, Bill James, a writer and avid baseball fan, began putting out his self-published *Baseball Abstracts*, which ran annually until 1988 (Schnell). In these books, James took information from box scores and *The Baseball Encyclopedia* to evaluate players to analyze

players using sabermetric methods he created. The 1977 edition sold just 75 copies, but by 1978 James had 250 fans eager to purchase his latest edition. A very favorable *Sports Illustrated* article praising James' work during the 1981 season, and by 1982 his *Baseball Abstract* was being mass-marketed by a publishing company that picked up the works, and even sold in popular bookstores (Neyer). While this was far from the first publication on sabermetric research, this was the first work that was able to reach such a wide audience and truly begin to grab the attention of the world of baseball. This was partially due to how effortlessly James was able to explain his work, making it relatively simple to understand even to an average baseball fan, and due to the precision of much of his work (Brocklebank). By the early 1980s the age of analytics had started to truly take off, and it finally found a name in "Sabermetrics" thanks to Bill James and SABR (Schnell).

Another extremely influential (and popular) book on analytics came in 1984, when sports historian John Thorn and mathematician slash baseball fan-turned- sabermetrician Pete Palmer co-authored *The Hidden Game of Baseball*. This book expanded on many of James's views (as well as the work of Earnshaw Cook), arguing that most of the popular statistics commonly used were essentially useless in predicting wins and losses (Neyer). One of the most notable advancements made by *Percentage Baseball* was the popularization of the use of linear weights, which was essentially Palmer's refinement of F.C. Lane's early sabermetric work. Linear weights, essentially a way to assign value to certain events (such as a double being worth more than a single, but not as much as a home run), serve as the framework for many common sabermetrics today, such as FIP and wOBA (Slowinski). The pair went on to publish the first edition of *Total Baseball* in 1989, which worked to correct several mistakes they felt existed in



*The Baseball Encyclopedia*, as well as more accurate sabermetrics that were becoming more and more common. This work gained popularity very quickly, and by its fourth edition, Major League Baseball began endorsing it as its official encyclopedia (Neyer).

In 2002, the Oakland Athletics famously won the AL West with the third-lowest payroll in baseball, and after the loss of three extremely key players to the post-2001 season free agency (2002). In 2003, Michael Lewis's famous *Moneyball: The Art of Winning an Unfair Game* detailed how Billy Beane had used sabermetrics to scout and sign several very undervalued free agents who helped bring the A's success at a very low price (Lewis). While the *Moneyball* story has been dramatized over the years (especially after the 2011 Hollywood film adaptation), the Moneyball theory holds a lot of truth to it and helps small-market teams, notably the Tampa Bay Rays, to this day (Schnell).

Also in 2002, Bill James published *Win Shares*, a whopping 729 pages of sabermetric analysis on how to evaluate every player in major league baseball history by a single number each per season. While much of this work was slightly flawed in its analysis, it was essentially a more accurate representation of Pete Palmer's Total Player Rating formula and would go on to inspire the modern day Wins Above Replacement (WAR) formulas that have become extremely popular and widely used in modern day baseball (Neyer). 2002 was also the year Bill James gained the ultimate respect of the world of baseball when he was hired by the Boston Red Sox, not just as a sabermetrician but as a direct senior consultant to co-owner John Henry and GM Theo Epstein, who had been fascinated by James's work for many years. With James in this role, the Red Sox would go on to break an 86-year drought by winning the World Series just two

years later in 2004 (Neyer). With James retaining this role until 2019, the Red Sox won four titles in just fifteen years, winning again in 2007, 2013, and 2018 (Vareldzis).

While James's hiring by a Major League Baseball team made the most national headlines due to his fame in the rapidly growing analytics community, he was far from the first sabermetrician to accomplish this feat. For example, Eddie Epstein worked as a statistician with the Baltimore Orioles and then San Diego Padres from the late 80s to late 90s, around the same time Craig Wright was working for the Texas Rangers under the official "Sabermetrician" title, and of course there was Allan Roth back in the 40s and 50s (Neyer). By 2012, all 30 Major League Baseball teams had not only a sabermetrician working for them in some capacity, but an entire department dedicated to analytics (Schnell).

In a way, sabermetrics have become a household name in baseball perhaps even without the casual fan noticing. Advanced statistics such as OPS, WAR, WHIP, and many more have become so common in baseball that the average television broadcast shows a batter's slugging percentage - a manifestation of the work of several early statisticians who attempted to assign value to different events - right there with his batting average in a slash line. Many statistics that just a few decades ago were widely criticized for their complexity are now considered common knowledge in the sport.

## Results

### The Sabermetric Revolution and MLB Attendance Trends

Now that we have a general idea of the timeline of the implementation of Sabermetrics in Major League Baseball, we can take a closer look at how some of these events directly affected the success of certain teams, both in win percentage and total attendance at home games.

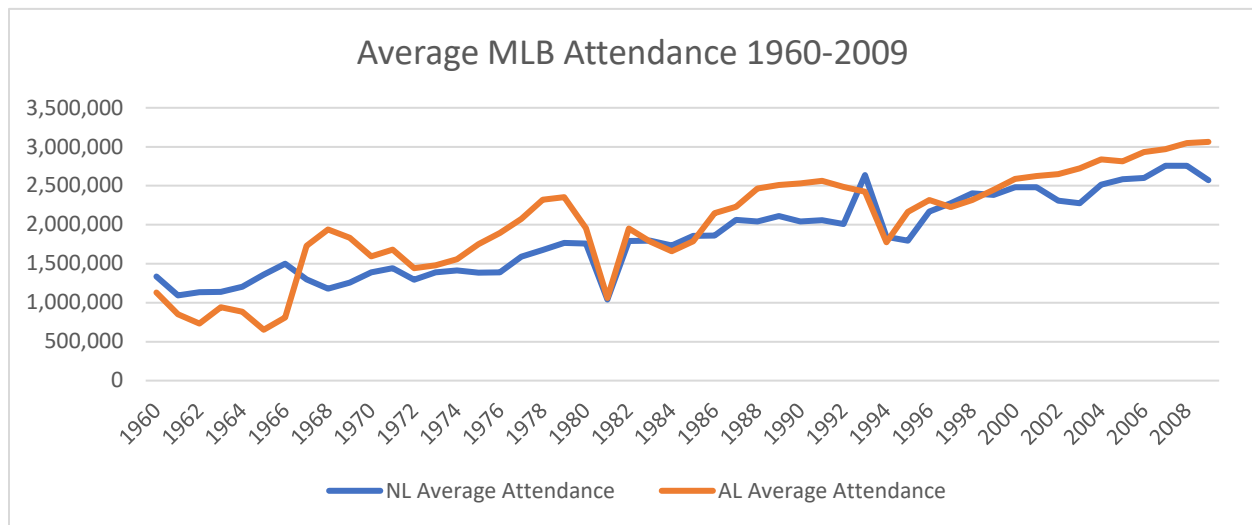


Figure 1

As seen in Figure 1, average attendance has generally increased at a gradual rate. Note that in 1981, as well as in 1994-1995, there were strikes that affected total games played, and total attendance due to there being less games to attend. We can see a steep increase in attendance, especially in the AL beginning in 1970, when SABR was founded, dropping back down in 1981 due to the strike (Weyrich).

We can also see a very steady increase in attendance in both leagues, especially the American League beginning in the mid 1990's as Sabermetrics were becoming more and more

popular, and it became more common for teams to employ sabermetricians. The AL gaining more attendance overall during this time can be explained by several key generally unpopular AL teams who were able to find success through sabermetric-based tactics, which will be explored more later.

It is important to note several factors that also likely had an influence on the rise in attendance. For starters, in 1960 there were just 16 clubs. As more and more clubs have been added over time, attendance obviously has risen due to there simply being more games to attend as new teams and new ballparks were added. The large jump in attendance that occurred around the late 1960s is largely attributed to the fact that by the 1970 season, there were 24 ball clubs in total. By 1995, the Arizona Diamondbacks and the Tampa Bay Devil Rays became the 29<sup>th</sup> and 30<sup>th</sup> MLB teams, and the number of teams has remained at 30 ever since. Because of this, we can infer that the steady increase in attendance from the mid 1990s to 2009 is independent of this factor (Lindholm).

Another factor that could potentially influence total attendance is stadium size. Many clubs have revamped or completely rebuilt their ballparks, especially during the Sabermetric age of around 1980 to present day. If, for example, a team's stadium capacity increased by 10,000 seats, their total attendance possibility for their 81 home games will increase by 810,000. However, this factor is largely inconsequential when looking at the data. While some teams have made their new stadiums bigger, or simply expanded the existing stadium to add more seats, many have actually decreased in capacity, usually in favor of saving in construction costs or increasing the size of the field itself. For example, The St Louis Cardinals' new Busch Stadium, opened in 2006, holds 46,000 fans, while the old Busch Stadium held much more at

60,000 fans per game (Cardinals). Teams like The Chicago Cubs and The Boston Red Sox also still play in their original stadiums; Wrigley Field was opened in 1914 and holds 41,600 fans, while Fenway Park was opened in 1912 and holds just 37,700 fans. When we look at all of these new stadiums, the theoretical maximum capacity actually has decreased in the last two decades, which makes it all the more remarkable that total attendance has only risen (Traub).

With these factors aside, it is only logical to assume that a fundamental change in the game itself was a big reason as to why attendance rose so much during the 1995-2009 period. This fundamental change was largely rooted in the rise in popularity and use of Sabermetrics in Major League Baseball. While it is not a change that cannot always be explicitly seen on the baseball diamond, it has ultimately made teams more watchable by making statistics-based tweaks to rosters and lineups, such as how Branch Rickey used Allan Roth's Sabermetric analysis of Jackie Robinson to move him to the cleanup spot, where he was able to produce at a much higher level (McCue).

### **Payroll Disparity in Major League Baseball**

Among the professional American sports leagues, Major League Baseball is the only sport to not have a salary cap, meaning teams can spend as much – or as little – money as they wish (Boylan). While this can benefit many teams whose ownership wants to push all the chips in and pay several big stars without worrying about a spending limit, this has also proven time and time again to prevent many teams from really being able to succeed in the post-season. Some clubs simply do not wish (or cannot afford) to spend as much money as their competitors. For decades, payrolls across the board in Major League Baseball did not differ too drastically,

even with the lack of salary cap. Somewhere around the mid 1990s, however, this began to change. Suddenly there were teams spending as much as double what the average team was, instead of just a few thousand more dollars, leading to a massive disparity in competitive balance between the now 30 MLB clubs. (Calandra).

With many teams still opting to spend league average or less, the payroll gap between high spending and low spending teams began to grow exponentially, making it seemingly impossible for low-spending teams to have any hope of competing with high spending teams like the New York Yankees. In the simplest light, the contract a baseball player receives is directly proportional to his performance on the team. If a team wants to include Mike Trout, for example, the price tag is going to be extremely high. However, if there is one thing that sabermetrics has taught us, it is that there is often much more to a player than meets the eye, and the analytics can give us a much more detailed evaluation of a player's performance – or more importantly, his potential. Michael Lewis's 2003 book *Moneyball: The Art of Winning an Unfair Game*, details a team that did just this. (Boylan).

### **Moneyball and the 2002 Oakland Athletics**

Not only have sabermetrics improved the game of baseball by making it more interesting to watch, but they have also enabled clubs with lower payrolls to still be able to compete at the same level as big-market teams. Many teams have varied drastically in the relative amount they spend depending on their chances of finding real success in a given season. With prospect development being such a big part of the sport, it is commonplace for teams to take a step back on the Major League stage while they wait for their top prospects to

develop in the Minors, hoping to spend money building a team around them when they make it to the big leagues. The most notable example of this in recent years was when the Baltimore Orioles cut their payroll by \$127,000,000 from 2018 to 2019 (Ginsburg).

	2016	2017	2018	2019
BAL Total Attendance	2,172,344	2,028,424	1,564,192	1,307,807
AL Average Attendance	2,336,365	2,290,907	2,161,376	2,039,521
Difference	-164,021	-262,483	-597,184	-731,714
W/L Record	89-73	75-87	47-115	54-108
W/L Percentage	0.549	0.463	0.290	0.333
Division Placement	T-2nd	5th	5th	5th
Playoffs	x	-	-	-
Playoff Depth	WC	-	-	-
Payroll	\$147,943,713	\$161,684,185	\$148,160,873	\$72,722,906
Average MLB Payroll	\$131,261,430	\$129,276,135	\$135,682,535	\$133,900,486
Difference	\$16,682,283	\$32,408,050	\$12,478,338	-\$61,177,580

Figure 2

As seen in figure 2, after making the playoffs in 2016, the Orioles suffered back-to-back last place finishes in 2017 and 2018. Instead of continuing to spend money only to be unsuccessful, they decided to take a massive payroll cut, offloading the majority of the money on the books by trading away their best players (along with their contracts) to more competitive teams in exchange for prospects they hoped would help them a few years down the line (Ginsburg).

It is commonplace for MLB teams to fluctuate between spending high and spending low, depending on the states of their roster and farm system at a given time. However, there are a few teams that have gone decades without spending any real money and have almost always had payrolls much lower than league average, one of the most notable being the Oakland Athletics.

From 1988-1990, the Athletics made it to the World Series each year, an achievable feat even by spending, at most, just \$5,000,000 more than the average team due to the relatively small payroll gap that still existed. As the rest of the league continued to spend more and more each year, the Athletics were left near the bottom of the pack. For example, the Athletics' payroll increased by roughly \$10,000,000 from 1990-2000, while league-average payroll jumped up by roughly \$40,000,000. Some teams were spending almost triple what Oakland was, and these numbers would only continue to grow. To put this in even greater perspective, Oakland's 1991 \$40,000,000 payroll was roughly the same as their 2022 payroll was – in 1991 they had the highest payroll in all of baseball, in 2022 they had the second lowest (Douglas).

In 2000 and 2001, the Athletics were able to reach the playoffs without a large payroll, mostly due to several players on the team who were paid very little but were the stars of the team: Johnny Damon (who was there only for 2001), Jason Giambi, and Jason Isringhausen (Au). Thanks to these players (and some others), plus a little bit of luck, the A's played in the American League Division Series for the second year in a row in 2001. After that season, all three of those aforementioned top players left in free agency, signing with richer teams: the Red Sox, the Cardinals, and the Yankees, respectively (Lewis, 22-23).

Heading into the 2002 season, no one expected Oakland to find any sort of success. They had just lost three key players that were seen as one of the only reasons they were able to reach the playoffs in 2000 and 2001, and their payroll was almost half the size of the league average \$65,000,000 and a whopping \$80,000,000 below the league-high New York Yankees' (Au). To top it off, general manager Billy Beane did not make any notable big signings in the offseason – at least not at first glance – to fill in the large gaps that were left by Giambi, Damon,



and Isringhausen. Oakland was not expected to come anywhere close to the 102 wins they had pulled off the season before, and most ESPN writers projected that they would have a mediocre second or third place finish in the division. Some did predict a first-place finish due to their surprising dominance the season before, but the overall consensus was that without replacing their three stars, especially Giambi, they simply would not be successful (Look). In a shocking turn of events, however, the A's won the division with 103 games and the third lowest payroll in baseball, a measly \$40,000,000. *Moneyball* details how Billy Beane and his team were able to achieve this feat using sabermetrics.

The 2002 Oakland Athletics captivated baseball fans across the nation. Not only was one of the poorest teams in baseball succeeding beyond what anyone could have expected, they seemingly could not lose. From August 13 to September 4, 2002 – arguably one of the most difficult and important stretches in a baseball season, when games begin to matter more and more as summer and the season draw to a close – they won 20 games in a row which, at the time, was an American League record (2002). Journalist and author Michael Lewis became so fascinated with this team that was managing to win so many games with such a low payroll and so few stars that he decided to find out just how Billy Beane pulled off such an incredible feat, and thus, *Moneyball* was born (Lewis, XI).

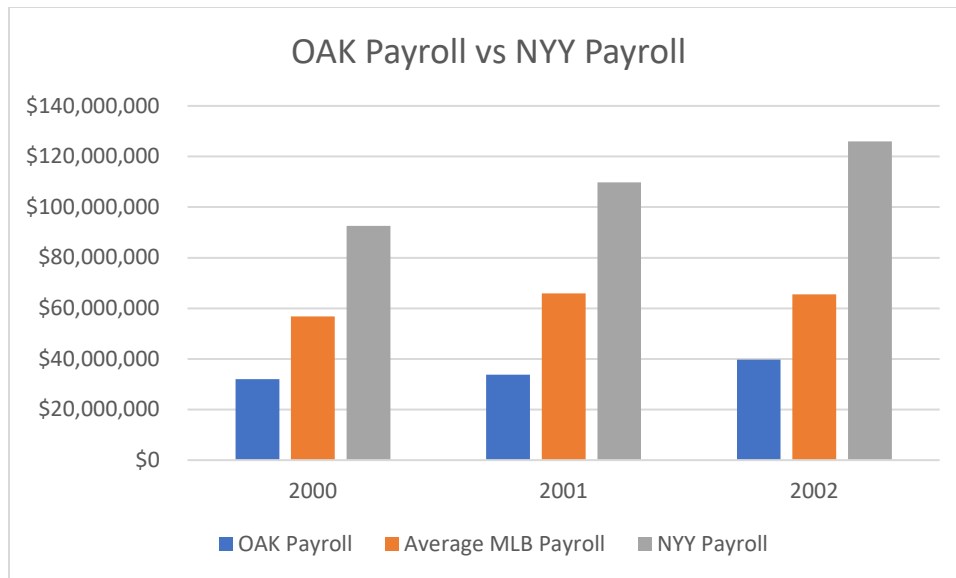
	2000	2001	2002
OAK Total Attendance	1,728,885	2,133,477	2,169,811
AL Average Attendance	2,262,557	2,346,071	2,207,891
Difference	-533,672	-212,594	-38,080
W/L Record	91-70	102-60	103-59
W/L Percentage	0.565	0.630	0.636
Division Placement	1st	2nd	1st
Playoffs	x	x	x
Playoff Depth	ALDS	ALDS	ALDS
Payroll	\$31,971,333	\$33,810,750	\$39,679,746
Average MLB Payroll	\$56,805,189	\$65,878,849	\$65,508,119
Difference	-\$24,833,856	-\$32,068,099	-\$25,828,373

Figure 3

	2000	2001	2002
NY Yankees Total Attendance	3,227,657	3,264,552	3,461,644
AL Average Attendance	2,262,557	2,346,071	2,207,891
Difference	965,100	918,481	1,253,753
W/L Record	87-74	95-65	103-58
W/L Percentage	0.540	0.594	0.640
Division Placement	1st	1st	1st
Playoffs	x	x	x
Playoff Depth	Won WS	WS	ALDS
Payroll	\$92,538,260	\$109,791,893	\$125,928,583
Average MLB Payroll	\$56,805,189	\$65,878,849	\$65,508,119
Difference	\$35,733,071	\$43,913,044	\$60,420,464

Figure 4

Lewis, like many others, was fascinated by the prospect that the Oakland Athletics, a team with consistently far below average home game attendance and payroll, were able to compete in the postseason (see figure 3) alongside powerhouses like the New York Yankees, who had far above average attendance and payroll (see figure 4).



*Figure 5*

As seen in figure 5, the lack of salary cap in the MLB allows richer teams like the Yankees, who have no problem spending money, to grow at an exponential rate, while clubs like Oakland's tend to grow at a slower, more linear rate. However, as seen in Figures 3 and 4, both teams were able to reach the playoffs all three of these years, something that is to be expected for a team with the highest payroll in baseball, but certainly not from a bottom of the pack club like the A's.

While Oakland's success during this period seemed to many like a fluke, or just dumb luck, it was, in fact, largely due to Beane's use of sabermetrics to draft and sign players as well as construct his 40-man roster. In losing Giambi, Damon, and Isringhausen, Oakland lost several key pieces in both their lineup and their bullpen, holes that fans knew were not going to be filled by ownership spending high on top free agents such as Barry Bonds or previous Oakland A's Giambi (Schwarz). However, Beane and his scouts were able to find buried treasure in the apparent pile of scraps that were left after the wealthy teams had taken their pick of the free

agent class. Beane saw potential in players that other teams overlooked or simply thought were no longer as effective as they once had been.

Before the age of statistics, players were scouted by what is known as “the eye test,” where scouts would simply watch several games and judge a player based on how they physically appeared to perform on the field. Billy Beane, and many others like him, preferred to heavily supplement this evaluation with advanced analytics. The Moneyball strategy relies on the theory that many players are undervalued by the market, meaning that the basic statistics most scouts would look at, such as batting average and amount of home runs for batters or ERA and win/loss record for pitchers, do not show nearly the full picture (Boylan). Players that are better than what the basic numbers show are theoretically going to perform much better than their price in free agency would suggest.

Using this strategy, Billy Beane signed former Red Sox Scott Hatteberg, prior to the 2002 season, perhaps one of his most famous deals of all time. The rest of the league thought Hatteberg’s career was over after he suffered an injury to his dominant arm right before hitting free agency. Because he had never been a flashy hitter, most teams viewed him simply as a decent catcher who was now extremely limited to play his position at all due to his injury. Beane, however, saw Hatteberg in a different light – “an efficient device for creating runs who could also catch” (Lewis 160). Beane signed Hatteberg to a deal worth less than one million dollars for the 2002 to play first base, a deal that would soon prove to be an extreme steal, as Hatteberg became an above average defensive first baseman, and finished third in the league in pitches seen per plate appearance (Lewis 171).

Many argue that the Moneyball strategy is overrated, and that it cannot bring teams any real success (Rego). Some also argue that the 2011 film *Moneyball* largely overdramatized reality. For instance, the movie does emphasize on the fact that Oakland had the 2002 Cy Young winner, Barry Zito, and AL MVP Miguel Tejada on their roster, two players that obviously had a large impact on the success of the A's in the 2002 season (Au). However, though Zito was on the 2002 roster, Oakland drafted him back in 1999, meaning that his first three years with the team, 2000, 2001, and 2002, they were able to pay him an extremely low salary because of arbitration rules and team control (Lewis, 22). 2002 being Tejada's breakout season was also, in part, credited to the Athletics' heavy emphasis on the sabermetric approach. The front office wanted to breed patient hitters, who would focus more on simply getting on base – a philosophy that was heavily emphasized by Bill James - by showing discipline at the plate rather than swinging for the fences with every pitch; Tejada even remarked "If I don't take twenty walks, Billy Beane send me to Mexico" (Lewis, 151). While this obviously was not the driving reason Tejada won MVP, it certainly played a part, as it did with the rest of the team. Additionally, a team having Cy Young or MVP winners does not necessarily mean that they are, as a whole, a good team. For example, the Los Angeles Angels, as previously mentioned, currently have two of the game's biggest stars in Mike Trout and Shohei Ohtani. Since 2016, Trout has won MVP twice and Ohtani once (Ohtani also finished in the top 5 in Cy Young voting in 2022), yet the team has not seen a winning season, let alone made the playoffs, since 2015 (Blengino).

While this strategy is certainly not guaranteed to bring a team to the postseason, it does help in finding somewhat of a solution to the payroll gap, which most experts can agree is one

of baseball's most pressing issues. The use of sabermetrics to build a roster that can compete despite a team's small budget can drastically raise the floor of that team's potential performance in a season; for example, this strategy allowed the 2002 Oakland A's to finish in first place despite being projected to finish in second or third (Look).

The use of sabermetrics in baseball has not only improved the success and attendance records of small market teams, it has also made big market teams arguably more exciting to watch as well. If you are a fan of a wealthy, successful team, you are likely going to look forward to series against worthy opponents in your division rather than against bad teams that will hardly put up a fight. If those bad team can get even marginally more talented, it overall makes games generally more watchable and entertaining for both sides.

### **Evaluating Players Using Sabermetrics: ERA vs. FIP**

Much of the Moneyball strategy, and the sabermetric approach in general, revolves around the theory that "traditional" statistics are far too simple to completely measure the abilities and success of a player. When signing Scott Hatteberg and others like him, Billy Beane was far less concerned with his batting average and home run count and was much more interested in his on base percentage and ratio of walks to strikeouts.

For example, when evaluating a pitcher, the traditional stats that are usually looked at are win/loss record, and earned run average, or ERA. Win/loss record for a starting pitcher is dependent on a pitcher getting the win for his team; in order to do this, he must pitch a minimum of five innings, and his team must gain the lead while he is pitching and then maintain this lead (Bravo). Earned run average, or ERA, is a slightly more complicated formula invented

by early statistician Henry Chadwick to essentially determine how many runs, on average, a pitcher will give up over the span of nine innings. The formula for this is: (Earned runs/innings pitched) x 9, and it is expressed as a number rounded to the nearest hundredth (Bailey). For example, a pitcher could have a 3.40 ERA, meaning that if he were to pitch the full nine innings of a game, we can expect him to give up 3.40 runs.

While these stats may seem like a decent way to determine the value of a pitcher, many sabermetricians find them to be very outdated and inaccurate in assessing the abilities of a pitcher. Win/loss record especially has been found to be very unreliable in isolating the ability of a pitcher. A pitcher could give up no runs over the span of eight innings, but if his team also does not score any runs and ends up losing once the relief pitcher comes in in the ninth, the starter could record a loss. Contrastingly, a starter could go out and give up seven runs in five innings, but if his team scores eight and keeps the lead, he will get a win despite a less than satisfactory performance (Gray). ERA has also been found to have issues as it does not consider factors that pitchers have no control over, such as the defense behind them or the unique dimensions of a given ballpark – a home run to the Yankee Stadium short porch or around Fenway Park's Pesky Pole would be easy flyouts in most stadiums (Zerillo).

This is where the sabermetrics come in:

$$FIP = ((13*HR) + (3*(BB+HBP)) - (2*K)) / IP + cFIP$$

In which HR is home runs, BB is bases on balls (walks), HBP is hit by pitch, K is strikeout, IP is inning pitched, and cFIP is league FIP constant, which is adjusted each year to resize FIP to a scale on-par with league average ERA, so the two can be compared (Grosnick). A common misconception by those who oppose the heavy use of sabermetrics is that we should not

replace the tried-and-true statistics that have existed for so long. The correct method, however, is to use advanced analytics to supplement the already existing ones to paint a full picture. In the case of ERA and FIP, FIP is used not as a replacement for ERA, but as more of a sequel, to be looked at and assessed after ERA (Grosnick). Ideally, FIP is used in tandem with ERA to determine how unlucky a pitcher is, and how accurate his ERA is to showcasing his true abilities. FIP essentially assigns value to events that the pitcher has direct control over, the obvious ones being walks, hit by pitch, and strikeouts. Home runs are included because if a ball is hit out of the park, there is no chance for a defender to make a play on it. Other hits are not included because once the ball is put in play, the pitcher has no control over if the players are able to properly field it (Weinberg).

Using ERA and FIP together can tell us a lot more about the raw skill of a pitcher when we remove factors that are beyond his control. If a scout were to just look at a pitcher's ERA and see that it is high, it could be assumed that the pitcher is not very good. However, if he had a FIP much lower than his ERA, it would show that much of his high ERA can be attributed to bad luck, or a below average defense behind him. Contrastingly, a pitcher could have a low ERA and a high FIP, which might indicate that much of the reason he is not letting up lots of runs is because he has an elite defense behind him that is able to bail him out on balls put in play (Weinberg). If we looked at just ERA or just FIP, we would be missing half the picture, as is the case with the use of all sabermetrics. When used correctly, however, we can much more effectively determine the success potential of a given player, which has been shown to help many GMs find hidden gems when constructing a roster. If Billy Beane simply looked at Scott Hatteberg's batting average, for example, he likely would not have deemed him worthy of a



contract. It was because he took the step further to look beyond the surface that he was able to do something special.

### **Sabermetrics and Attendance**

One of the most remarkable feats of the sabermetrics revolution has been its ability to increase attendance at MLB games, especially at the home ballparks of teams that have been known to rely heavily on sabermetrics.

For example, we can look at the Oakland Athletics' attendance records from 1998 to 2003. When looking at attendance for a given MLB team, one of the biggest factors that is going to affect these numbers is the ballpark itself. Major league ballparks vary drastically in their sizes, which affects maximum capacity per game, and, subsequently, total attendance per season. Oakland Coliseum (currently branded as RingCentral Coliseum), where the A's have played since 1966, currently boasts the largest capacity in the MLB with 56,782 seats available per purchase for each home game, comparatively the historical Fenway Park in Boston holds just 37,755 seats ("Biggest"). With each team playing a total of 81 games at home per season, theoretically Oakland could see a maximum yearly attendance of 4,599,342, while Boston could only reach a maximum of 3,058,155. Of course, neither team is generally going to come even close to this, but there are several factors that affect how close they do come.

Popularity of a team, of course, is a big factor, some teams are inherently more beloved than others. For example, teams like the Chicago Cubs and the Boston Red Sox have such long, rich histories of playoff runs and MLB legends that fans did not dwindle too much even when each team had World Series droughts so long that many of those fans never saw one in their

entire lifetime (Miller). Star power on the team is also a huge factor; for example the Los Angeles Angels can, again, credit a large portion of their attendance nowadays to the fact that their team includes two of the biggest stars in baseball in Mike Trout and Shohei Ohtani (Miller).

Generally, however, we can usually see an increase in attendance during period of success and a decrease during the more unsuccessful periods, all aforementioned factors aside for the most part.

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CLE Total Attendance	3,318,174	3,404,750	3,467,299	<b>3,468,436</b>	3,456,278	3,182,523	2,616,940	1,730,002	1,814,401	1,973,185	1,998,070	2,275,911
AL Average Attendance	2,122,721	2,234,523	2,298,169	2,286,874	2,262,557	2,346,071	2,207,891	2,191,745	2,340,422	2,360,452	2,458,741	<b>2,527,968</b>
Difference	1,195,453	1,170,227	1,169,130	1,181,562	1,193,721	836,452	409,049	-461,743	-526,021	-387,267	-460,671	-252,057
W/L Record	99-62	86-75	89-73	97-65	90-72	91-71	74-88	68-94	80-82	93-69	78-84	96-66
W/L Percentage	0.615	0.534	0.549	0.599	0.556	0.562	0.457	0.420	0.494	0.574	0.481	0.593
Division Placement	1st	1st	1st	1st	2nd	1st	3rd	4th	3rd	2nd	4th	1st
Playoffs	x	x	x	x	-	x	-	-	-	-	-	x
Playoff Depth	ALDS	WS	ALCS	ALDS	-	ALDS	-	-	-	-	-	ALCS

Figure 6

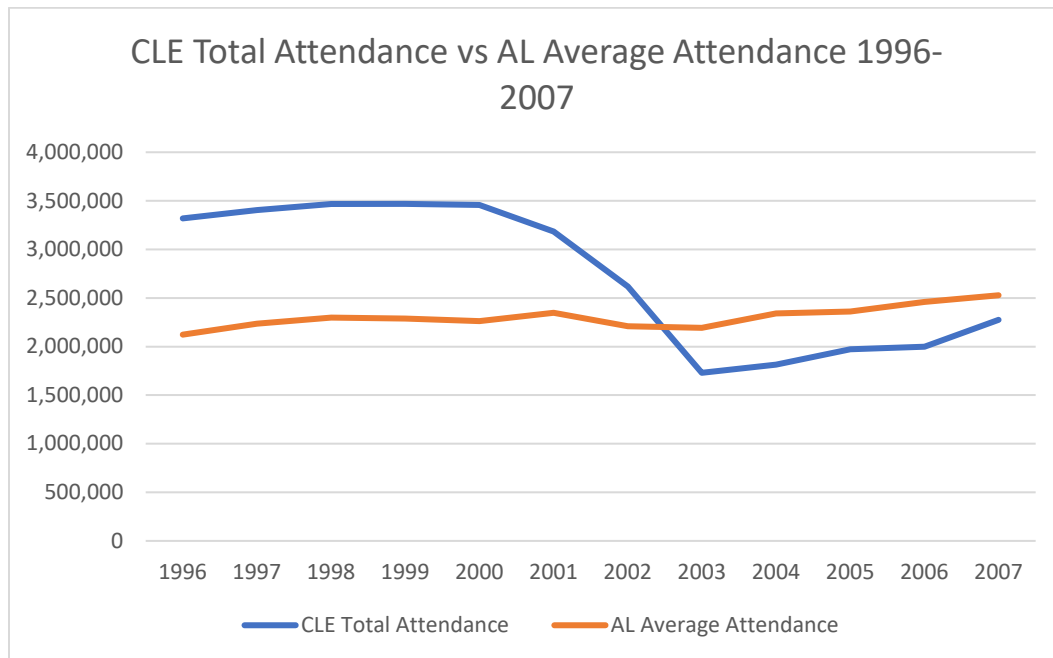


Figure 7

For example, we can see in figures 6 and 7 that from 1996-2001, the Cleveland Guardians had five postseason appearances and five first-place finishes in six years. During this

time, their attendance was well above league average. Beginning in 2002, the team went through a significant lull, sporting losing records four out of five seasons from 2002-2006. During this time, we see a significant decrease in attendance, dipping below league average and reducing by half from the 1999 season to the 2003 season. We can see the attendance beginning to gradually rise again following 2003, due to the team slowly but surely performing better. In 2007, when the Guardians made the postseason again, we can see the attendance start to rise at more rapid rate.

	1998	1999	2000	2001	2002	2003
OAK Total Attendance	1,232,343	1,434,632	1,728,885	2,133,477	2,169,811	2,216,596
AL Average Attendance	2,298,169	2,286,874	2,262,557	2,346,071	2,207,891	2,191,745
Difference	-1,065,826	-852,242	-533,672	-212,594	-38,080	24,851

Figure 8

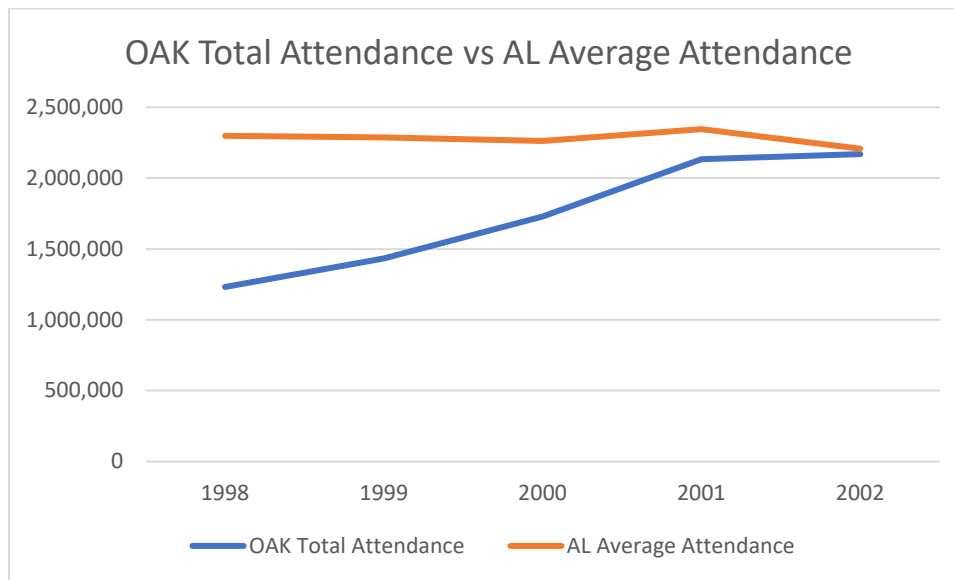


Figure 9

When we look at Oakland's total attendance from 1998-2003 (figures 8 and 9), we can see that their attendance increased steadily with each year, even to the point where their

attendance was above American League average in 2003, an uncommon sight due to the relative unpopularity of the Athletics and Oakland Coliseum, which is consistently rated the second-worst ballpark in all of Major League Baseball (Peterson).

Contextually, 1999, while it was not a year the team reached the playoffs, was Oakland's first winning season since 1992. This explains the 210,000 people increase in attendance from 1998-1999. As the team continued to succeed in 2000 and 2001, the attendance was also given a boost due to stars on the team such as Giambi, Damon, and Isringhausen. However, in 2002, when those three stars left, the attendance continued to rise. Typically, when an organization lets their three best (and most popular) players walk in free agency because they cannot afford to pay them and replaces them with what is essentially the leftovers that no other team wanted, fans are going to be upset. However, we can see here that their attendance grew from the season before. This is directly related to Oakland's use of sabermetrics to build their roster, giving fans something unconventional to be excited about.

During this period, the majority of people present at Oakland Coliseum were not attending A's games at the rates they were because they loved the stadium or were diehard fans. The Athletics also did not necessarily have any players who were considered "stars" throughout the league. These attendance records were a direct result of the fact that Oakland could not stop winning, and their winning ability was due to their use of Sabermetrics to construct a team that was able to compete despite an extremely low payroll.

Another example of a team that has seen an increase in attendance related to their use of sabermetrics in roster construction is the Tampa Bay Rays. Like the Athletics, the Rays are a generally unpopular team known for serial underspending. In fact, since they were founded in

1998, there has been just one season where their payroll was above league average – 2000, when their payroll was just \$6,000,000 above the league average \$57,000,000. The Rays' home ballpark, Tropicana Field, is also the only ballpark in the MLB that is typically rated lower than Oakland Coliseum, making the Rays a generally unfavorable candidate for high attendance records (Peterson). The Rays have only seen one season, their inaugural one, with an attendance record better than American League average (Augustyn). However, the Rays have also been known as one of the more sabermetric reliant teams in all of baseball over the last decade, a strategy that has allowed them to find much more success than expected, much like the early 2000s Athletics (Arthus).

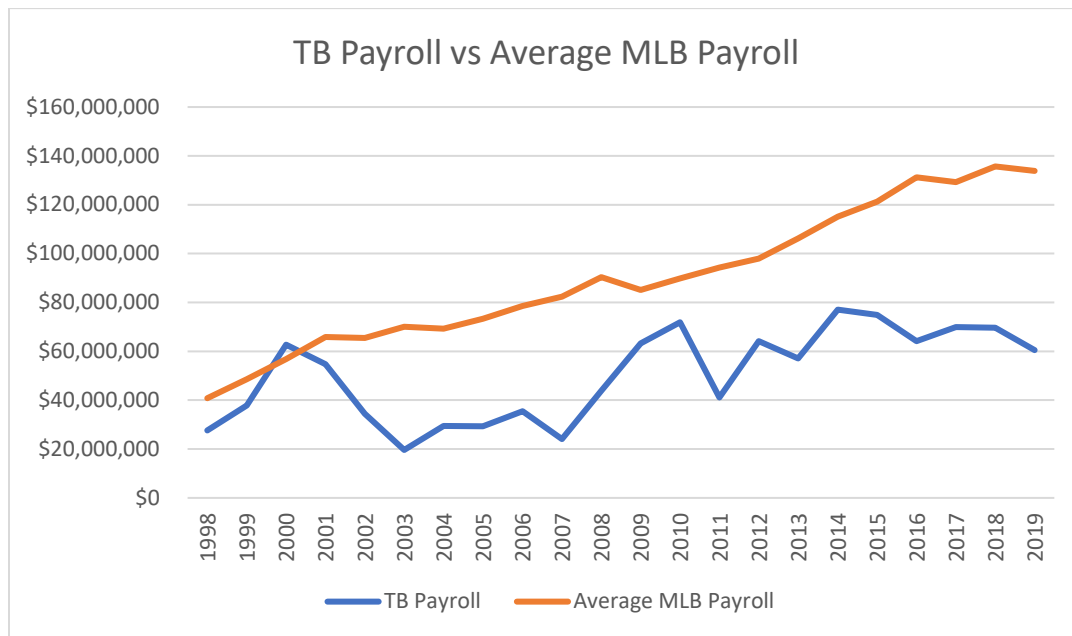


Figure 10

	2016	2017	2018	2019
TB Total Attendance	1,286,163	1,253,619	1,154,973	1,178,735
AL Average Attendance	2,336,365	2,290,907	2,161,376	2,039,521
Difference	-1,050,202	-1,037,288	-1,006,403	-860,786
W/L Record	68-94	80-82	90-72	96-66
W/L Percentage	0.420	0.494	0.556	0.593
Division Placement	5th	3rd	3rd	2nd
Playoffs	-	-	-	x
Playoff Depth	-	-	-	ALDS
Payroll	\$64,120,323	\$69,982,520	\$69,605,999	\$60,444,931
Average MLB Payroll	\$131,261,430	\$129,276,135	\$135,682,535	\$133,900,486
Difference	-\$67,141,107	-\$59,293,615	-\$66,076,536	-\$73,455,555

Figure 11

Though The Rays' payroll from 2017-2019 was consistently only about half of MLB average, they were able to see an increase in attendance as well as performance in the league and postseason (figure 10, 11). Though not pictured due to the shortened season and zero fan policy during the 2020 season, the Rays were able to make it all the way to the World Series in 2020, despite having a payroll that was only about 22% of their opponent's: a measly \$28 million compared to the Los Angeles Dodgers' \$125 (Thompson). While many critics of the Rays' heavy reliance on sabermetrics rather than spending argue that this approach is unsustainable and will never provide the team with real, consistent success, there is no denying that the strategy has brought Tampa Bay a lot of good throughout the last decade.

### Sabermetrics and Success: The Red Sox and Bill James

Sabermetrics have also been shown to help teams that do not necessarily have a low payroll. Before Bill James was brought on as senior advisor and sabermetrician for Baseball Operations, the Boston Red Sox had gone 86 long years without a championship season, despite having an above average payroll more often than not since the 80s and being an extremely

popular team with consistent high attendance and one of the most popular ballparks in baseball (Vareldzis).

	2000	2001	2002	2003	2004	2005	2006	2007
BOS Total Attendance	2,585,895	2,625,333	2,650,063	2,724,165	2,837,304	2,813,354	2,930,768	2,970,755
AL Average Attendance	2,262,557	2,346,071	2,207,891	2,191,745	2,340,422	2,360,452	2,458,741	<b>2,527,968</b>
Difference	323,338	279,262	442,172	532,420	496,882	452,902	472,027	442,787
W/L Record	85-77	82-79	93-69	95-67	98-64	95-67	86-76	96-66
W/L Percentage	0.525	0.509	0.574	0.586	0.605	0.586	0.531	0.593
Division Placement	2nd	2nd	2nd	2nd	2nd	T-1st	3rd	1st
Playoffs	-	-	-	x	x	x	-	x
Playoff Depth	-	-	-	ALCS	Won WS	ALDS	-	Won WS
Payroll	\$77,940,333	\$109,558,908	\$108,366,060	\$99,946,500	\$125,208,542	\$123,505,125	\$120,099,824	\$143,026,214
Average MLB Payroll	\$56,805,189	\$65,878,849	\$65,508,119	\$70,060,988	\$69,235,223	\$73,396,130	\$78,531,904	\$82,337,366
Difference	\$21,135,144	\$43,680,059	\$42,857,941	\$29,885,512	\$55,973,319	\$50,108,995	\$41,567,920	\$60,688,848

Figure 12

As seen in figure 12, while the Boston Red Sox consistently ended the season with winning records, attracted high attendance, and had an above average payroll, it was after Bill James's addition to the staff that they began finding success in the playoffs, even winning two championships in four years.

Working under newly appointed general manager Theo Epstein, another sabermetrics fanatic, these key front office moves were made in an attempt to stray from traditional methods and use a more analytical approach to win (McGrath). In a *New Yorker* article published in the midst of the 2003 season, James and Epstein's first season working together, Ben McGrath wrote that in taking the statistical approach and hiring James, Boston "have not merely sided with the brainiacs; they've enlisted the help of the founding nerd" (McGrath).

Bill James has often referred to baseball statistics as so complex that they resemble an extremely thick fog that contains an entire army. "The sentry returns and reports that there is no army out there, but the problem is, he has underestimated the density of the fog" (James). In other words, many people are quick to discredit analytics due to their surface level value. Many times, statisticians who notice patterns have a hard time differentiating between which

ones truly are just random and which ones appear persistently enough to mean something, and out of all the duos who truly understood these patterns, James and Epstein were among the best. One of their most famous, or rather, infamous, strategies was to eliminate the closer role. James argued that the role of closer, a team's best relief pitcher who is brought in in the ninth inning to protect the lead and nail down a victory, was unnecessary. Citing a computer simulation, James explained that, for example, putting your best relief pitcher in a bases loaded in the seventh inning situation with the lead on the line is much more effective than saving him for the protection of a three-run lead in the ninth (McGrath). Unfortunately, James was wrong.

According to James, much of this decision actually came from ownership wanting to save money - even sabermetric-savvy Bill James knows the value of a closer - and he cites the failure of the "Closer by Committee" debacle as one of the reasons he gained the respect and trust of the Red Sox organization, stating "Buddy, if you're going to play in Boston, you've got to take the heat" (James). James brushed this failure off, and helped Boston win a championship just the next year, largely in part to his (and Epstein's) philosophy that drawing walks and simply getting on base are wildly important, as they eliminate the possibility of what James often refers to as baseball's "only finite resource" - outs (McGrath). Rather than focus on home runs, batting average, and the rest of the stats that show a player at face value, James focused on getting on base by any means necessary, racking up the opposing team's pitch count while keeping his own team's down, and focusing on homegrown talent and veterans who come cheap but know the game like the back of their hand rather than expensive, young stars who hit the free agent market after a successful season (St. John).



Much of the issue with sabermetrics “not working” is not the numbers themselves, but the wrongful application of them. Clearly, when people like Bill James and Theo Epstein put them to good use, they can work wonders. James’ work in particular was fundamental in pushing Boston over the threshold to finally start winning championships. Another notable feat that undoubtedly played a role in the 2004 championship was James’s role in recruiting star pitcher Curt Schilling to sign with Boston. James wrote a letter to Schilling offering his own statistical research as to why, contrary to Schilling’s original belief, Fenway Park favors right-handed pitchers who produce a lot of fly balls (Cipriano). James also helped the front office recognize the importance of defense, largely influencing Epstein to trade Nomar Garciaparra at the deadline ahead of his impending free agency, receiving two defensively talented players in Doug Mientkiewicz and Orlando Cabrera in a four-way trade with the Chicago Cubs, the Minnesota Twins, and the Montreal Expos. After the trade deadline, the Red Sox finished the second half of the season with the best record in baseball (Cipriano).

### **Sabermetrics and Team Popularity: The Rays vs. The Marlins**

Many argue that Sabermetrics are simply not effective enough to truly help small-market teams, as there has yet to be a small market team in the Sabermetric age that has used analytics to win a World Series (Brocklebank). While the sabermetric approach may not be enough to win a team a World Series without spending more, there is no question that the strategy has greatly raised the floor of these teams’ potential performance. For teams in “rebuilding” phases or teams like the Rays that simply do not spend a considerable amount of money, sometimes all fans can ask for is a team that is watchable. Though a team may not be

winning it all very often (or at all), there is a drastic difference between a team that is already crawling to the finish line on pace for 100 losses in July, and a plucky team that at least has a dog in the fight come October. For some fans, the puzzle-like approach of seeing how ownership will go about constructing a roster each year is exciting as well. Fans on DRaysBay, a large online community for Rays fans, spoke in an article as to their reasoning for being diehard fans of a team that is often laughed at by the rest of the league. One fan stated that she became a fan by proximity when she moved to Tampa Bay, but it was the “creative thinking about how to deconstruct and then reconstruct baseball with all its moving parts” (Strom) that turned her into the obsessive fan she is today. Another fan stated that the Ray’s approach to the game “makes me have to grapple with what I thought I knew about the sport, and ways that maybe I can learn more and change with the times” (Strom).

Contrastingly, the Miami Marlins, another team that has consistently been low spending, tend to leave fans much more frustrated. The Marlins have seen success before, winning a World Series in 1997 and again in 2003, but they have not had a winning record since the 2009 season, and had five last-place finishes from 2011-2019 (Fernandez). Before the 2015 season, ESPN published a definitive master ranking of all 122 teams in the MLB, NBA, NHL, and NFL, and the Marlins came in at 155<sup>th</sup>. ESPN criticized the Marlins for relying too heavily on the now old-school strategy of scouting to identify prospects base on how they look to the naked eye (Great). An opinion piece published on popular online Marlins community Fish Stripes stated fans’ frustration with the Marlins for this exact reason – with such a large majority of baseball embracing the age of analytics, and the front office not keen to spend big, the Marlins have been left in the dust (Mullin). More complaints came during the 2015 season, when the

team's record dropped to the worst in all of baseball even after ownership had attempted to make moves in the offseason to propel the team to the postseason. However, fans felt that, as per usual, ownership was too cheap to acquire any big names in free agency, and "of course, when it did spend, it spent incorrectly" (Jong). By failing to adopt the sabermetric approach that many other small-market MLB teams have, the Marlins not only failed to find any success following their 2003 World Series win, but they also frustrated fans and saw major drops in attendance.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
MIA Total Attendance	1,524,894	1,520,562	2,219,444	1,586,322	1,732,283	1,752,235	1,712,417	1,651,997	811,104	811,302
NL Average Attendance	2,563,111	2,547,018	2,592,218	2,629,060	2,615,565	2,593,535	2,540,903	2,553,787	2,481,939	2,526,804
Difference	-1,038,217	-1,026,456	-372,774	-1,042,738	-883,282	-841,300	-828,486	-901,790	-1,670,835	-1,715,502
W/L Record	80-82	72-90	69-93	62-100	77-85	71-91	79-82	77-85	63-98	57-105
W/L Percentage	0.494	0.444	0.426	0.383	0.475	0.438	0.491	0.475	0.391	0.352
Division Placement	3rd	5th	5th	5th	4th	3rd	3rd	2nd	5th	5th
Playoffs	-	-	-	-	-	-	-	-	-	-
Playoff Depth	-	-	-	-	-	-	-	-	-	-
Payroll	\$55,641,500	\$56,944,000	\$118,078,000	\$39,621,900	\$47,565,400	\$84,637,500	\$70,464,500	\$115,348,302	\$98,826,644	\$72,449,404
Average MLB Payroll	\$89,815,333	\$94,282,186	\$98,021,906	\$106,258,270	\$115,132,347	\$121,276,151	\$131,261,430	\$129,276,135	\$135,682,535	\$133,900,486
Difference	-\$34,173,833	-\$37,338,186	\$20,056,094	-\$66,636,370	-\$67,566,947	-\$36,638,651	-\$60,796,930	-\$13,927,833	-\$36,855,891	-\$61,451,082

Figure 13

As seen in figure 13, The Marlins had ten straight losing seasons from 2010-2019, only had one year, 2012, with a payroll higher than league average, and generally saw several instances of substantial drops in attendance from year to year. Most notably, attendance decreased by almost 850,000 people from 2017 to 2018, remaining about the same in 2019. In these two years Miami saw attendance totals over 1.6 million people lower than NL average. When we compare the W/L records and attendance to a team that we know has heavily utilized sabermetrics, such as Tampa Bay, we can see that while the payroll numbers may be similar, the other numbers and trends are not. For example, in 2010, Tampa Bay actually had a lower payroll than Miami, but Miami finished last and saw a significant attendance deficit from NL

average. Tampa Bay finished with a winning record, made the postseason, and while their attendance was still lower than AL average, it increased from the year before and was much closer to average than Miami's. This is an example of how the use of sabermetrics may not be enough to single-handedly win a team a championship, but it can certainly improve team performance, and increase attendance by exciting fans rather than frustrating them.

## Discussion

### Implications

The results of this study indicate that the use of sabermetrics by an MLB team has the potential to not only raise the success level of that team, but also to increase attendance, popularity, and overall fan experience of that team.

The research shows that among teams with lower payrolls, there is a clear difference in win/loss records, attendance, and general popularity between a team that uses the sabermetric approach, and a team that does not, with the team that does take this approach finding greater success in all three areas. The research also shows an overall increase of attendance following the onset of the sabermetric revolution in the 1980s, showing that there is a tangible, positive effect to the use of advanced analytics.

This study supplements pre-existing research showing that, specifically, the 2002 Oakland Athletics found success using the Moneyball strategy, by showing that this strategy and the general application of sabermetrics in general have also caused an increase in success and team popularity among several MLB teams.

### Limitations

The main limitation of this study is that, when assessing success and popularity of a baseball team, there are virtually infinite factors that could have a possible effect on the matter. While the main factors thought to be driving influences were explained and, the influence of sabermetrics was isolated to the best possible ability, there is a possibility that there are other factors that could have had an influence in team popularity and average

attendance each year, especially when evaluating 30 teams over the course of more than 40 years.

Another limitation to this study is that prior to 21<sup>st</sup> century, payroll and attendance data was not kept as hyper-accurately as they are today. While the data used in this study were the most accurate available and were all used from the same source for consistency's sake, there is always the possibility that data predating the 1990s are not completely accurate.

### **Areas For Future Possible Research**

As sabermetrics continue to become more mainstream and the payroll disparity gap continues to widen, there is immense opportunity to examine if the trends examined in this study continue to be seen in the coming years of Major League Baseball. Focusing on one team throughout an extended period may also bring about more specific results, as it was shown in this study that some teams rely much more heavily on sabermetrics than others do.

A similar study that closely follows a sabermetrician throughout the course of a Major League Baseball season and the decisions they make based on analytics would also paint an extremely clear picture of use of sabermetrics in baseball.

## Conclusion

With the ever-growing issue of the payroll gap in a sport not regulated by a team salary cap, sabermetrics have entirely changed the game of baseball for the better. Whether it be for the player, the manager, or the spectator, the experience of everyone involved has improved in some way. The usage of advanced analytics has allowed undervalued players to have a chance to shine, whether it be by someone taking a chance on them to be an everyday player or being moved into a slot in the lineup that better suits their abilities. The Moneyball strategy has significantly helped owners get more bang for their buck and has allowed managers of these teams the chance to work with a more creative roster that can help the team find unexpected success. Sabermetrics helping to level the playing field have made the game more exciting for fans of all teams to watch and have given many of the analytic fanatics a new reason to be passionate about the sport.

When we look at the timeline of sabermetrics use in the MLB in relation to attendance, payroll, and general team success both in win/loss record and postseason performance, there is a clear correlation between the use of advanced analytics by a team, and both success and popularity of that team.

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