6 SHAQ AND KOBE

Why study sports? The obvious answer—sports are interesting. Of course we are not saying that other topics examined in economics are not interesting. Well . . . maybe we should say this. Someone should at some point say that a few topics examined by economists—mind you, we are not naming names and we are just saying a few—are really not interesting. The topics are not interesting to us, our students, or probably most non-economists. We are not even sure these topics are interesting to most other economists.

So we are drawn to sports because we find this subject to be interesting. There is more to the story. As we noted at the onset, with sports you have numbers. Oodles and oodles and oodles—that is a scientific term which means "a whole bunch" or "lots and lots"—of numbers are generated in the world of sports. Each and every day a game is played somewhere. In that game people record the actions of each individual player. This record, or the data, can be used by economists to address an assortment of interesting and entertaining questions.[1]

What is the purpose of tracking all the data collected in sports? We talked about this in Chapter One. Still, we wanted to mention another great answer to this question which was provided by Allen Barra:

> "Stat Nerds" they snort contemptuously at me, and probably at you, too, if you're smart enough to have picked up this book—but the truth is that they depend as much on numbers as anyone else when it comes to making decisions. What else, after all, are you going to rely on? *What, in the final analysis, are statistics but a record of what a player does when you're not watching him?* And we don't have time to watch 99 percent of the players 99 percent of the time. (2002, p. 139, italics added)

Barra summarizes nicely the purpose behind statistics. Statistics tell us what a player is doing when we are not looking, which, as Barra notes, is most of the time. Furthermore, and more importantly, statistics help people make decisions.

SHAQ AND KOBE, THE SAGA BEGINS

What decisions are we talking about? To answer this query, we will discuss in detail two NBA stars we first mentioned in Chapter Five, Shaquille O'Neal (a.k.a. Shaq or Diesel) and Kobe Bryant. Both players came to the Los Angeles Lakers in 1996. Led by these stars, the Lakers captured titles in 2000, 2001, and 2002. In 2004 the team came close to a fourth title, losing in the NBA Finals to the Detroit Pistons.

The 2003–04 season, though, was not a happy time for the Lakers. Through the course of the season an apparent rift appeared in the Shaq-Kobe relationship. When the 2004 playoffs concluded the Lakers appeared to have a choice. The team could go forward with either Kobe or Shaq, but because the two players did not appear to be happy in each other's company, the team could not employ both. During the summer of 2004 the Lakers made their choice. Kobe was signed to a lucrative new contract and Shaq was traded to Miami. Looking back, though, who should the Lakers have chosen?

We should note that Kobe is six years younger than Shaq. So if both players were equally productive, the younger player would look like the better choice. However, if Shaq was significantly more productive than Kobe, perhaps the team would have been better off with the Diesel.

A bit of thought reveals that the team needed to assess the productivity of each player. Both are considered stars, but did each have the same impact on team wins? Is one player more important to the team than the other?

An answer can be found in the statistics tabulated for each player. The NBA tracks a host of player statistics that might help one decide between Kobe and Shaq. The difficulty with the abundance of data tracked, though, is determining the relative importance of each piece of information. To illustrate this point, consider each player's statistical production. Of these two players, Kobe scored more points, recorded more steals, and committed fewer turnovers. Shaq accumulated more rebounds and if we consider points scored per field goal attempt, appeared to be a more efficient scorer.[2] Given this information, who is better?

A FEW DIFFERENT ANSWERS

The answer to the question "Who is the best?" depends upon how you define "best." Best can be defined in terms of popularity, salary, height, shoe size, etc. For our purposes, we are going to focus on a player's contribution to team wins.[3] Consequently, when we say "Who is the best?" what we are actually saying is "Who is the most productive?"

We believe the statistics the NBA tracks can help us answer this question. It is important to note that we are not alone in this belief. Many people have developed measures[4] that are designed to tell us the answer to our query: Who is better, Kobe or Shaq?

The NBA Efficiency Measure

Let us start with the approach advocated by the NBA. A visitor to the NBA's official web site (NBA.com) will come across the following measure of an NBA player's efficiency:

Points + Rebounds + Assists + Steals + Blocks – Missed Field Goals – Missed Free Throws – Turnovers

If we use this measure we learn that in 2003–04 Shaq's value equaled 1,670 while Kobe's was 1,474. So from this, Shaq is worth almost 200 more than Kobe. One might ask, 200 more of what? Basically the NBA measure adds together the positive statistics a player accumulates and subtracts the negative. When you take this approach, you learn how many statistics each player has amassed.

We need to note that this approach is quite similar to Dave Heeran's (1994) TENDEX model and Bob Bellotti's (1992) Points Created measure.[5] Heeran notes that his TENDEX method was invented around 1960, so this basic metric has been around a while.[6] Still despite this history, is it true that the most valuable players produce the most statistics? Is it simply the objective of the players to accumulate stats?

We would think that players are trying to win, so we need to value these statistics in terms of that objective. Now if it is the case that all these statistics have the same impact on wins, then the NBA approach will serve us well. Unfortunately, it is not clear that this is the case. For starters, would one expect a missed field goal to have the same value as a missed free throw? Each free throw made is only worth one point, while made field goals can be worth two or three points. So missed field goals and missed free throws probably do not reduce a team's chances to win by the same amount.

What of the other stats? Are an assist and a point of equal value? How about a blocked shot and a rebound? As we will show, the answer is that these statistics are not all equal. In the end, metrics like the NBA Efficiency measure are very easy to calculate. Still, it is not clear that such a measure provides a very accurate evaluation of each player's performance.

Plus-Minus Moves from the Ice to the Hardwood

The statistics in basketball seem quite difficult to interpret. To see this point, consider baseball. One does not need an advanced degree in statistics to know that a home run in baseball is worth more than a single. Basketball, though, is a bit more difficult. How does one compare rebounding to scoring or steals to assists? The NBA data seem to contain a few "apples and oranges" that make constructing a single metric difficult. The difficulty in using the data the NBA tracks has led to the development of a plus-minus metric for the NBA.

We mentioned in Chapter One the performance measure developed by Wayne Winston and Jeff Sagarin.[7] In our discussion we argued that one cannot evaluate a performance metric by simply looking at how it ranks players relative to conventional wisdom. If one wishes to be critical, one has to work a bit harder. So here is our brief critique of this approach, which as you shall see, is completely free of any mention of the words "laugh test."

Okay, we have a confession. We do not have access to the specific Winston-Sagarin ratings. As far as we can tell, Winston and Sagarin skipped the journal publication route we generally follow and sold their method directly to Mark Cuban, owner of the Dallas Mavericks. And it is not surprising that Cuban does not want to share information he had to buy. What we do have is the Roland Ratings, a plus-minus measurement presented by Roland Beech.[8] We have reason to believe that what Winston and Sagarin did is similar to the work of Beech, but then again we cannot be sure. Still, paraphrasing Donald Rumsfeld, you critique the rating you have, not the rating you would like to have.

So what are the Roland Ratings? Beech looked at each player during the 2003–04 campaign, examining how the player's team did per 48 minutes the player was on the court versus the team's performance, again per 48 minutes, when the player was on the bench. For example, the 2003–04 Lakers scored 8.5 more points than their opponent when Shaq was on the court. When O'Neal was on the bench, the team scored 3.6 fewer points than its opponent. In other words, the team was winning with Shaq and losing when he sat. Given this analysis, Shaq's Roland Rating, or the difference between the team's performance with Shaq and without, was a net 12.1 points per 48 minutes played. The same analysis for Kobe reveals that the Lakers scored 6.1 more points than their opponent when Bryant was on the floor. The Lakers also outscored their opponent without Kobe, but the margin was only 0.3. So the net contribution of Kobe was 5.8. From this analysis, Shaq is better than Kobe.

For fans of hockey, a plus-minus statistic is quite familiar. Why would such a measure be used in hockey? The answer is that much of what happens in hockey is not tracked by any statistics. The lack of statistics has led people to a system that appears to link goals scored and goals allowed to individual players. Basically, if your team scores while you are on the ice, you get a plus. If the other team scores when you are playing you get a minus.[9]

Although we acknowledged that NBA statistics may be difficult to interpret, unlike hockey, basketball does have an abundance of statistics. And we will show that with a bit of work one can untangle the "apples and oranges" problem. So we are not sure whether the justification for plus-minus that exists in hockey also applies to basketball. Still, this measurement is quite interesting, and as noted by John Hollinger (2005), a columnist for ESPN.com and author of the *Pro Basketball Prospectus*, this is a wonderful instrument if interpreted correctly. Unfortunately, for our purposes, the plus-minus measure has one basic shortcoming which derails our efforts to answer the question: "Who is the best?"

This specific problem is identified by Roland Beech. On the specific web page listing the leaders in Roland Ratings is the following disclaimer: "These ratings represent a player's value to a particular team and are not intended to be an accurate gauge of the ability and talent of the player away from the specific team." Why is this disclaimer necessary? According to Hollinger, one would have trouble comparing the net plus-minus of two players on two different teams. He argues that how well a team performs with and without a specific player depends upon the team that employs the player, the specific teammates the player plays with, and the specific back-ups who take the player's place on the court when he is on the bench. Players on better teams tend to have higher plus-minus ratings. Players who play with better teammates also will have higher ratings. Finally, if a player has a quality back-up, his rating will tend to be lower.

If we want to compare players on different teams net plus-minus may not be that helpful.[10] And comparing players on different teams is ultimately what we need to do if we wish to know "Who is the best?" We would also add that ultimately, as we have noted, the plus-minus system for the NBA may not be necessary if we simply take the time to learn how the individual player statistics connect to team wins.

The Labor Theory of Value

Before we try to connect player statistics to team wins, let's spend a bit of time discussing . . . well, Marxism. We know that this is clearly an obvious direction to go in this story. Many readers were probably wondering when we were finally going to connect the writings of Karl Marx to the study of basketball. Although Marx died before the game of basketball was invented, clearly what Marx wrote in the 19th century provides many keen insights into player productivity in the NBA.

We are of course approximating humor. We don't really think Marx had any keen insights into basketball. Dean Oliver, though, has many. In *Basketball on Paper* (2004) Oliver introduces a number of ideas and tools that deepen our understanding of the game. A list of his contributions would include offensive score sheets,[11] a variety of measures of team offense and defense,[12] and an entertaining analysis of winning streaks.[13] All of this is just in the first 20% of his book.

Who does Oliver say is better, Kobe or Shaq? Via an extensive mathematical exercise that we will not even begin to describe, Oliver concluded that Kobe was the seventh "best" player in 2003–04 while Shaq was ranked fifteenth. From this, Kobe is the best.[14]

Oliver's methodology for evaluating players centers on what he calls "my personal Difficulty Theory for Distributing Credit in Basketball: The more difficult the contribution, the more credit it gets" (2004, p. 145). Again, the mathematics behind Oliver's methodology is more than a bit difficult. We would, though, like to address the underlying rationale.

How will Marx help us in this endeavor? One of the tenets of Marxian thought is the labor theory of value, which argues that the price of a good is determined by the amount of labor used to produce the good. To be fair, Marx took this concept from the work of David Ricardo, and Ricardo was influenced by Adam Smith. In other words, this is not strictly a Marxist idea. Still, it was Marx who used this concept to argue that the system of capitalism leads to the exploitation of labor, which is the fundamental idea underlying the economics of Marxism.

The problem with the labor theory of value is that it ignores the impact the wants and needs of consumers have on prices. Just because a good requires more labor, it does not follow that its price will necessarily be higher. For example, we have spent a fair amount of our labor writing this book. Hey, just reading the stuff on Marx was difficult. Given Marx's labor theory of value, we think the price of our book should be in the thousands. Yet this is not what our readers have been asked to pay for our work.

Soon after Marx published *Das Kapital*—yes, that is spelled correctly—economists like Alfred Marshall—we mentioned him in Chapter One—began to question the labor theory of value. Today, following the work of Marshall and others, we use the supply and demand model to explain prices. The supply of a good depends upon the resources, including but not limited to labor, that were used in making the good. Demand, though, depends upon how much people want the product. It is possible that as people learn about our musings on Marx, the demand people have for this book will decline, and eventually our work will find its way into the bargain bin.

The point we are making—and we do have a point—is that Oliver appears to be making the same mistake made by proponents of the labor theory of value. Now we are not saying that Oliver is advocating the overthrow of capitalism. Oliver, though, is arguing that the value of a rebound, point, etc. depends upon the difficulty of taking the action, which strikes us as a return to the labor theory of value. Although difficulty may be important, ultimately the game is about winning. Oliver's difficulty measurement does not connect player action to wins. And because we think players and teams are trying to win, it makes sense to value the actions the players take in terms of this objective.

The Market Approach

We now have seen three approaches based upon what we see the players do on the court, and we have problems with all three. Maybe the answer is not what happens on the court, but what happens in the marketplace.

As economists we tend to think markets work. We have good reason to come to this conclusion. The living standards enjoyed today in industrialized countries around the world can at least partially be attributed to societies using markets to allocate resources. The standard of living in industrialized countries, by virtually any measure, exceeds what we observe through much of human history. In essence, because markets encourage innovation and the efficient allocation of resources, people in industrialized countries live much better than people in the past could have ever dreamed was possible.

What does the market tell us about Kobe and Shaq? In 2003–04 Shaq was paid $26,517,858 while Kobe was paid $14,175,000. What do we learn from this? Perhaps all three of us should have spent a whole lot more time playing basketball as children. Forty million dollars for two people playing a game is simply amazing.

Once again, we digress. We see that in the marketplace, Shaq is considered the best. Are salaries, though, the best measure of a player's productivity? Let's go back to the point we have made repeatedly. Wages and wins are not highly correlated. In our view, the lack of a strong relationship between payroll and wins casts serious doubt on the proposition that a player's salary accurately captures the impact a player has on team wins. As we have argued before, and will again and again later in this book, it is entirely possible that mistakes are made when people in sports evaluate player value.

MODELING TEAM WINS IN THE NBA

The weak link between payroll and wins in basketball suggests that player evaluation is not perfect. Can we do better? We would like to think so, but then again, our view is no different from many sports fans. Sports fans in general believe that they can evaluate talent better than the professionals. Spend a few minutes listening to sports talk radio, or hanging out in a sports bar, and what will you hear? Endless debates about the relative merits of this and that player. Many fans of sports may not know where they left their car keys, but they "know" which players are the best and which are the worst.

Unfortunately one cannot create a statistical measure that will match perfectly every person's ranking of NBA players. So our research into the value of NBA players will offer answers that must contradict what fans already "know." Is Shaq better than Kobe? The NBA Efficiency measure, Roland's ratings, and the marketplace all say Shaq is the best. Dean Oliver says it is Kobe. Ask many fans of the NBA and you will hear an impassioned defense for Shaq or Kobe that could easily steal hours from your life. People may not know the size of the national debt, the rate of crime in their city, or the details behind the troubles in the Middle East, but on the topic of which player is best, all the statistical analysis anyone can offer is unnecessary. The answer is already "known."

As we move forward in our discussion of player productivity we wish to be clear about where we are coming from and what we hope to achieve. Sports provide an abundance of data on worker productivity. Such data can be used to address a host of interesting questions. Before the questions can be addressed, though, one has to make sense of the data. We wish to develop a measure of productivity that accurately captures the value of a player's performance. Beyond accuracy, it would also be nice to have a measure that is both simple and complete. Once we have a measure that is accurate, simple, and complete, this will be employed in our study of various questions that we find to be interesting. "Who is the best?" is one of these questions.

The Simple, and Occasionally Misleading, Correlation Coefficients

Before we explain our approach, let's begin with a simple statistical exercise. In Table 6.1 is listed the simple correlation coefficient between team winning percentage and ten different statistics that are tracked for NBA players.[15] What is a correlation coefficient? The correlation coefficient tells us how strong a relationship exists between two variables. The coefficient can be negative or positive, and ranges—in terms of absolute value—between 0 and 1. If the correlation coefficient is 1, then a perfect relationship exists between two variables. If it is 0, then there is no statistical relationship between two variables. One last note before we discuss Table 6.1. A positive correlation coefficient means that two variables move together. When one rises, the other tends to rise also. A negative coefficient means that two variables move in opposite directions. When one rises, the other tends to fall.

Now that we know the basics of the correlation coefficient, what do we learn from Table 6.1? The first lesson is the lack of a really strong correlation between any one factor and team wins. None of the reported correlation coefficients exceed, in absolute terms, one-half. This suggests that you cannot look at any one factor and say, "See, that is why the team won."

The second lesson we learn is that just looking at the correlation between any two factors can be very misleading. Consider the relationship between offensive rebounds and team wins. The correlation coefficient between offensive rebounds and wins is –0.20, which implies an increase in offensive rebounds actually leads to a decline in wins.

TABLE 6.1

Correlation Coefficients for Various NBA Statistics and Winning Percentage

Variable	Correlation Coefficient
Defensive rebounds	0.46
Missed field goals	–0.46
Assists	0.43
Points scored	0.41
Turnovers	–0.39
Personal fouls	–0.22
Offensive rebounds	–0.20
Steals	0.14
Blocked shots	0.11
Missed free throws	0.05

NOTE: Ranking based on the absolute value of the correlation coefficient.

Bob Bellotti, creator of the aforementioned Points Created measure, examined the relationship between where a team ranks in wins and where each team ranked in a variety of statistical categories.[16] He found that offensive rebound differential, or the difference between how many offensive rebounds a team and its opponent accumulates, was the statistic with the lowest correlation with team wins. Dean Oliver came to the same conclusion when he looked at how often teams both won a specific statistical battle and also won the game.[17] As Oliver notes, 80% of the teams with the highest field goal percentage in a game also won the game. In contrast, only 46% of teams with the most offensive rebounds in a game were victorious. From this analysis, both Bellotti and Oliver conclude that offensive rebounds must not be as important as other factors in determining wins.

If we examine the simple correlation coefficients reported in Table 6.1, the analysis of Bellotti and Oliver is confirmed. Our analysis shows that the correlation coefficient between wins and offensive rebounds is –0.20. Just as Oliver noted, teams that lead in offensive rebounds are more likely to lose.

What lesson do we learn from this analysis? If we were to interpret the correlation coefficient literally, a step we would emphasize was not taken by Oliver and Bellotti, we could imagine a revolutionary change in coaching in the NBA. If more offensive rebounds lead to fewer wins we should observe coaches in the future telling players to avoid rebounding their teammates' missed shots. Future coaches might be observed telling their players, "When your teammate takes a shot you should get back on defense very quickly. This way, even if there is a long rebound, there is less of a chance it might end up in your hands. Remember, offensive rebounds do not help us win, so avoid these at all costs." Of course, before we see an NBA coach screaming at his players for rebounding their teammates' missed shots, we might wish to consider an alternative explanation for this negative relationship.

For a team to collect an offensive rebound someone must first miss a shot. As teams miss more shots, offensive rebounds likely increase. When we examine the relationship between wins and offensive rebounds, without holding missed shots constant, what we are likely observing is the relationship between team wins and missed field goals. Because missed shots lead to fewer wins, and more missed shots lead to more offensive rebounds, we end up seeing more offensive rebounds result in fewer victories.

This story highlights the importance of regression analysis. If we wish to understand the value of any one factor in terms of wins, we must hold constant the impact of all other factors.[18] If we do not do this, the lessons we teach might lead coaches to tell their players, "Leave your teammates' missed shots alone!"

Building a Better Model

We have seen that there is no one statistic that can tell us why teams win or lose. We have also seen that our analysis of the relationship between wins and each statistic can be easily misunderstood. Such results might lead one to conclude, as NBA coaches and members of the media often suggest: basketball is not about the numbers.

As we note in Chapter One, though, you can't know who won the game if you don't look at some numbers. Well, that is not entirely true. You could wait to see who was happy or sad when the game ended, although for legendary Pistons coach Chuck Daly that method may not work. Daly never looked that happy, even when his team won the NBA championship. Obviously, as Allen Barra argued, statistics are crucial to understanding what happens in the games we enjoy. The problem is making sense of what is being collected.

We think one can make sense of the various statistics the NBA collects to evaluate players with a relatively simple model of team wins. The specific model we employ actually is just a variation on the work of Dean Oliver and John Hollinger.[19] Their work relies upon a very powerful concept in the study of player productivity in the NBA, "the possession."[20] Here is how Hollinger introduced the idea of possessions:

> Possessions are the basic currency of basketball. No matter what the team does with the ball—scores, turns the ball over, or misses a shot—the other team gets it when they are done. The objective of basketball is to score more points than the other team; put that in terms of possessions, and the goal is to score as many points per possession as possible while limiting the opponent to as few points per possession as possible. (2002, p. 1)

So Hollinger, and Oliver as well, argues that wins are determined by how many points a team scores per possession relative to the opponent's ability to elicit points from its possessions. Before we apply this statement to our study of productivity, though, we need to explain exactly how possessions are defined.

As both Oliver and Hollinger note, the number of possessions a team employs in a game can be calculated with four factors (listed below for additional emphasis): field goal attempts, free throw attempts, turnovers, and offensive rebounds.[21] These four elements comprise the four basic actions a team can take once it has acquired the ball. A team can turn the ball over, thus ending the possession. If a team avoids a turnover, it will have to take a field goal attempt, a free throw attempt, or perhaps both.[22] If a team misses this shot, it can prolong the possession by capturing the offensive rebound.

How Teams Employ a Possession

Field Goal Attempts
Free Throw Attempts
Turnovers
Offensive Rebounds

Possessions employed tell us what a team did once it acquired the ball. It does not tell us, though, how the ball was acquired. To address this issue we have to go beyond the work of Oliver and Hollinger. Basically, there are three actions a team can take to get the ball: force the opponent to commit a turnover, rebound an errant shot by the opponent, or take possession of the ball after the opponent has scored via a field goal or free throw attempts. These three actions are captured via the following five statistics.

How Teams Acquire the Ball

Opponent Turnover
Defensive Rebound
Team Rebound
Opponents Made Field Goal Attempt
Opponent Made Free Throw Attempt

Of these statistics, rebounding needs just a bit more explanation. If an individual player rebounds an errant shot by the opponent, this is called a defensive rebound. If a team takes possession of the ball after an errant shot, but no individual player is responsible, then this is called a team rebound.[23] In the endnotes we offer a lengthy discussion of how we estimate for each team how many team rebounds actually gave the team possession of the ball.[24] As we explain, team rebounds that change possession are not reported by the NBA, but can be estimated. The other four statistics are tracked by the NBA, so with these measures in hand, we can now determine the number of times a team acquires the ball.[25]

As Hollinger and Oliver emphasize, the number of possessions each team employs basically equals the number of possessions used by the opponent. Repeating Hollinger: "No matter what the team does with the ball—scores, turns the ball over, or misses a shot—the other team gets it when they are done" (2002, p. 1). Likewise, the number of possessions a team employs must equal the number of possessions a team acquires.[26]

The importance of possessions employed and possession acquired can be illustrated if we think about the general method often used to evaluate offense and defense in the NBA.

Table 6.2

Teams with the Highest Offensive Efficiency in 2004–05

Team	Rank: Points Scored per Possession Employed	Points Scored per Possession Employed	Rank: Points Scored per Game	Points Scored per Game
Phoenix	1	1.12	1	110.4
Miami	2	1.08	4	101.5
Seattle	3	1.08	11	98.9
Sacramento	4	1.07	2	103.7
Dallas	5	1.07	3	102.5
Minnesota	6	1.05	16	96.8
LA Lakers	7	1.05	12	98.7
San Antonio	8	1.05	18	96.2
Boston	9	1.05	5	101.3
Toronto	10	1.04	7	99.7
Washington	11	1.04	6	100.5
Milwaukee	12	1.03	15	97.2
Denver	13	1.03	8	99.5
Houston	14	1.03	20	95.1
Cleveland	15	1.03	17	96.5

People often label the team that scores the most per game as the best offensive team and the team that surrenders the fewest points per game as the best defensive team. Hollinger and Oliver note that such analysis ignores game pace. Basically teams can play at different speeds. The Phoenix Suns in 2004–05 played at a faster pace than other NBA teams. So the Suns and their opponents used more possessions per game, and consequently, the Suns and their opponents tended to score more than teams that played at a slower pace.

Because teams can play at a different pace, in other words, average different numbers of possessions per game, points scored per game is not the best measure of offensive ability. To see this point, let's look at the top teams during the 2004–05 season in terms of offensive efficiency (points scored per possession employed) and defensive efficiency (points surrendered per possession acquired).

If we look at Table 6.2, we see that the Phoenix Suns were the best offensive team in both efficiency and scoring per game. Beyond Phoenix, though, we see why scoring per game can be misleading. The offenses of both Minnesota and San Antonio are significantly underrated when one looks at scoring per game. Seattle and Houston also had offenses that would be underrated by the traditional metric.

A similar story is told in Table 6.3, where the best defensive teams are ranked for 2004–05. San Antonio was the best defensive team in both efficiency and points al-

TABLE 6.3

Teams with the Highest Defensive Efficiency in 2004–05

Team	Rank: Points Allowed per Possession Acquired	Points Allowed per Possession Acquired	Rank: Points Allowed per Game	Points Allowed per Game
San Antonio	1	0.96	1	88.4
Chicago	2	0.97	7	93.4
Detroit	3	0.98	2	89.5
Houston	4	0.99	3	91.0
New Jersey	5	1.00	6	92.9
Memphis	6	1.00	4	91.1
Miami	7	1.01	8	95.0
Denver	8	1.01	17	97.5
Dallas	9	1.01	14	96.8
Philadelphia	10	1.01	19	99.9
Indiana	11	1.01	5	92.2
Cleveland	12	1.02	11	95.7
LA Clippers	13	1.03	12	96.5
Minnesota	14	1.03	9	95.3
New Orleans	15	1.03	10	95.5

lowed per game. Beyond San Antonio, the rankings again diverge. Perhaps the best story can be told about Denver. In terms of defense, the Nuggets were seventeenth in points allowed per game. Denver's defensive efficiency, though, was eighth in the league. Hence, in terms of defense, the Denver Nuggets were the most underrated team in 2004–05. A very different story is told when we look at Denver's offense. In terms of points scored per game, Denver is listed as the eighth-best team in Table 6.2. The Nuggets, though, were only thirteenth in offensive efficiency. Consequently, if we only considered points scored and allowed per game one would argue that Denver needs to focus more on defense than offense in 2005–06. The efficiency measures, though, teach the exact opposite lesson.

All of this is interesting—we think—but how does this help us evaluate individual players? Let's walk through what we know and what we have learned about wins in the NBA.

Wins are determined by how many points a team scores and allows. This obvious point was made in Chapter One. At the end of the game the team with the most points gets to be happy and the team with the fewest points needs to find something else to make them happy. Now we might be tempted to stop right here. If we know how many points a player scores and surrenders, don't we know the player's contribution to wins? Unfortunately, we really do not know how many points an individual player allows. Even if we had such information, is a player's value captured entirely by noting his ability to score and play defense? If you believe this is true, then what you are saying is that the NBA game is really five games of one-on-one basketball. If my five guys tend to win their individual battles, then my team wins. Basketball, though, is not a collection of five one-on-one contests but one game of five-on-five. If we focus solely on scoring and defense, we ignore the impact of rebounds, turnovers, and steals. In fact, if the NBA measured productivity by focusing solely on scoring and defense, the players would only focus on these two facets of the game and ignore rebounding, passing, and effective ball-handling. As we will see in Chapter Ten, research on player salaries suggests—well, we get ahead of ourselves. For now, we will simply say that we think there is more to player productivity than scoring and defense and we will have to go beyond the obvious observation that wins are determined by points scored and points allowed.

Points scored are determined by how often a team has the ball and its ability to convert possessions into points. In other words, points scored are determined by the number of possessions the team employs and the team's offensive efficiency. We hope this statement is just as obvious as what we said about wins and scoring. In 2004–05 Phoenix led the NBA with 98.9 possessions employed per game. Phoenix also led the NBA in offensive efficiency, averaging 1.12 points per possession employed. If we multiply possessions employed by points per possessions—98.895 × 1.116—we see that the Suns averaged 110.4 points per game. In other words, how many points you score is determined by how many points you score per possession and how many possessions you have at your disposal. The same painfully obvious observation can be made about points allowed. The number of points allowed is determined by defensive efficiency—points allowed per possession acquired—and the number of possessions acquired.

Now why do we bother with such obvious statements? Well, if points scored are determined by offensive efficiency and possessions employed, and points allowed are determined by defensive efficiency and possession acquired, we now know something more about wins. It must be the case that wins are determined by four factors: offensive efficiency, possessions employed, defensive efficiency, and possessions acquired. However, because possessions employed equals possessions acquired, these two factors cancel each other out. Therefore, at the end of the day, we have a very simple model of team wins which we summarize in the following sentence: *Wins are solely a function of offensive and defensive efficiency.*[27]

We would emphasize, Hollinger and Oliver have already made this statement. Neither writer, though, decided to avail himself to the wonders of regression analysis. If we regress team wins on each team's offensive and defensive efficiency, or each team's points scored per possession employed and points allowed per possession acquired, we learn that 95% of wins can be explained by the team's efficiency measures.[28] More importantly, we can use this regression to determine the value of almost every statistic tabulated for the individual and the team.[29]

The Value of Each Statistic

From our regression we can determine the value of an additional point scored, point allowed, possession employed, and possession acquired.[30] We report these values in Table 6.4. From our analysis, each additional point a team scores, holding all else constant, increases wins by 0.033. Yeah, we know, who likes decimals. Let's think about it this way. If a team scores 100 more points in a season, and nothing else changes, the team can expect to win about three more games. If a team allows 100 more points, and again nothing else changes, a team can expect to lose about three more games. A similar argument can be made for possessions employed and possessions acquired.

With these values in hand, we can now estimate the value of a player's actions associated with scoring, acquiring and maintaining possession of the ball, as well personal fouls and blocked shots. Let's say a few words about the specific statistics we can now value in terms of wins.

- Scoring statistics

Three-point field goals: From our regression we learn that each additional point scored creates 0.033 wins. One might think that a shot from beyond the arc must be worth three times this value. Unfortunately, to take the shot you must use a field goal attempt. This is a key point in our evaluation of players. When a shot is made, a resource, specifically a shot attempt, has been used. The cost of this resource must be noted. A possession employed costs a team 0.034 wins, and a field goal attempt is worth one possession. Consequently, the net value of making a three-point shot is worth 0.066 wins.[31] One should note that when an opponent makes a three-point field goal it costs the team the same number of wins.

Two-point field goals: This is the same story as a three-point field goal. The net value of a two-point shot, once one accounts for the value of two points and the cost of the shot attempt, is 0.033 wins. Again, an opponent making a two-point shot subtracts virtually the same number of wins.

Free throws made: A made free throw gives a team one point, but costs the team a free throw attempt. If you are reading the endnotes as we go along you know that a free throw attempt is only worth a fraction of a field goal attempt. Our results in-

TABLE 6.4

The Value of Points and Possessions in Terms of Wins

Variable	If each variable increased by one, and nothing else changed, wins would change by . . .	If each variable increased by 100, and nothing else changed, wins would change by . . .
Point scored	+0.033	+3.3
Point allowed	–0.033	–3.3
Possession employed	–0.034	–3.4
Possession acquired	+0.034	+3.4

dicate that each free throw attempt, by itself, costs a team 0.015 wins. When one takes into account the value of the point and the cost of the free throw attempt, we see that a made free throw adds 0.018 wins. Again, a made free throw by the opponent costs the team the same number of wins.

Missed field goal: When a player misses a shot he has used a resource without generating any return. So a missed field goal costs a team the value of a field goal attempt,[32] or 0.034 wins.

Missed free throw: Like a missed field goal, a missed free throw results in a loss of a resource with no corresponding gain. So a missed free throw cost a team the value of a free throw attempt, or in other words, this costs a team 0.015 wins.

- Possession statistics

Offensive rebounds and turnovers: We noted that a field goal attempt is worth one possession employed. An offensive rebound erases the negative consequence of a missed field goal. In other words, it allows a team to continue to employ its possession. Hence the value of an offensive rebound is 0.034 wins. A turnover, though, costs a team possession of the ball and a loss of 0.034 wins.

Defensive rebounds, team rebounds, turnovers by the opponent, and steals: If the opponent does not make a shot, the team can acquire the ball via a defensive rebound, team rebound, or by forcing a turnover. Each of these actions is worth a possession acquired, or from the estimation of our model, generates 0.034 wins. The value of a steal can be derived from the value of an opponent's turnover. Stealing the ball is one method a team can use to force the opponent to commit a turnover, so the value of one steal is equal to the value of one turnover by the opponent. In other words, one more steal is worth 0.034 wins.

- Personal fouls and blocked shots

Personal fouls: When a player has violated specific rules of the game he is charged a personal foul.[33] Our measurement of possessions employed or acquired did not explicitly include this statistic. Still, with a bit of work, we can estimate the impact of committing a basketball crime. There are two approaches you can take:

1. If you regress the opponent's free throws made on personal fouls you learn that each personal foul is worth about one free throw made by the opponent.[34] Consequently, the value of a personal foul can be considered to be approximately the same as the value of a made free throw by the opponent, which we have already said costs a team 0.018 wins.

2. There is another way to include a player's propensity to commit crimes on the basketball court in our player evaluation. We begin by simply noting the percentage of team personal fouls committed by the player. We can then multiply this percentage by the number of opponent's free throws. What do we get for this? Well, we now have estimated the number of free throws made by the opponent that we can credit (or blame) on a specific player. This is the actual approach we took in the evaluation of individual players.

Blocked shots: Like personal fouls, blocked shots are not part of possessions employed or possessions acquired. Once again, though, we can connect this statistic to a factor included in our model. Specifically, we have learned that each additional two-point field goal made by the opponent leads to a 0.033 reduction in team wins. If we regress the opponent's two-point field goals made on blocked shots, we learn the value of a player rejecting a shot.[35] Specifically, each blocked shot reduces the opponent's two-point field goals made by 0.65; consequently, we estimate each additional blocked shot leads to a 0.021 increase in team wins, or 65% of 0.033 wins.[36]

To summarize, each statistic's value, in terms of wins,[37] is listed in Table 6.5.

We now have a value for every action a player takes on the court, except assists. Assists are like personal fouls and blocked shots. An assist is not part of our calculation of possessions employed or acquired. Although assists impact how efficiently a team elicits points from its possessions, once we know a team's offensive efficiency assists do not provide any additional information. In other words, if a team scores 1.1 points per possession employed with 10 assists per game, and another team scores 1.1 points per possession employed with 20 assists per game, neither team is better off. Once you know offensive efficiency, assists do not provide any more information. And since we know offensive efficiency when we estimate our wins model, adding assists would not further our ability to explain wins. Consequently, we might feel comfortable evaluating player productivity without acknowledging assists. After all, baseball has measures of productivity such as slugging percentage and on-base percentage that do not incorporate all the statistics

Table 6.5

The Value of Various NBA Statistics in Terms of Wins

Various Statistics Tracked for Players and Teams	If each variable increased by one, and nothing else changed, wins would change by . . .	If each variable increased by 100, and nothing else changed, wins would change by . . .
SCORING STATISTICS		
Three-point field goals made	+0.066	+6.6
Opponent's three-point field goals made	–0.066	–6.6
Two-point field goals made	+0.033	+3.3
Opponent's two-point field goals made	–0.032	–3.2
Free throws made	+0.018	+1.8
Opponent's free throws made	–0.018	–1.8
Missed field goals	–0.034	–3.4
Missed free throws	–0.015	–1.5
POSSESSION STATISTICS		
Offensive rebounds	+0.034	+3.4
Turnovers	–0.034	–3.4
Defensive rebounds	+0.034	+3.4
Team rebounds	+0.034	+3.4
Opponent's turnovers	+0.034	+3.4
Steals	+0.034	+3.4
PERSONAL FOULS AND BLOCKED SHOTS		
Personal fouls	–0.018	–1.8
Blocked shots	+0.021	+2.1

baseball tracks. So we might feel comfortable using a measure of productivity that ignores one statistic the NBA tabulates.

Unfortunately, the data tell a different story. As we detail in the next chapter, assists clearly matter. The more assists a team accumulates, the more productive its players will be. How do we know this? Well, we connected a player's unassisted productivity to team assists. Of course, we get ahead of ourselves. How do we measure a player's unassisted productivity?

UNASSISTED WINS PRODUCTION

Let's continue with our story of Kobe and Shaq. We wish to know if the Lakers should have kept the Diesel or built the team anew around Kobe. To answer this question, we first need to measure each player's unassisted wins production, or the production of wins these players offered in 2003–04 without any consideration of assists.

The basic steps are as follows: To determine a player's value, we begin with his player statistics—which are comprised of scoring, his ability to gain and maintain possession, personal fouls, and blocked shots. We then make a few adjustments involving primarily the position played and the statistics that are only tracked for the team. As we note, following these steps reveals that Kobe's unassisted wins production was 10.7, while Shaq's unassisted production was worth 14 wins. How do we get to this answer? Let's offer a few details of each step.

Step One: Determine the value of a player's statistics. We begin with the value of statistics tracked for the individual player. Estimating our simple model of team wins allowed us to determine the value of a player's scoring, his ability to acquire and maintain possession of the ball, his propensity to commit personal fouls, and the value of blocked shots. In terms of scoring we have learned the value of three-point and two-point field goals made, missed field goals, and made and missed free throws. If we simply multiply each player's production of each of these statistics by the value in wins we noted in Table 6.5, we see that Kobe's scoring ability was worth 3.8 wins. Shaq, who did not take a single three-point shot attempt and is a notoriously poor free throw shooter, produced 5.4 wins from his scoring. Why was Shaq more valuable? As we noted above, the number of points O'Neal created from his shots from the field exceeded the point production Bryant elicited from his field goal attempts.

Although both players are prodigious scorers, their real value comes from their ability to gain and maintain possession of the ball. When we talk about a player's impact on possession we are talking about offensive and defensive rebounds, steals, and turnovers. Bryant was able to add 10.1 wins from his impact on team possession. Again, though, his productivity was eclipsed by O'Neal, whose accumulation of these statistics was worth 20.5 victories.

The last two player statistics we consider are associated with crimes and rejections. Specifically, Shaq's ability to block shots offsets his personal fouls. Kobe, who does not block many shots, was unable to eliminate the impact of his crimes on the court.

If we put the value of scoring, possession, personal fouls, and blocked shots together for each player, though, it looks like O'Neal is easily the better player. O'Neal's player statistics were worth 26.0 victories while Bryant's were valued at 11.8 wins. In other words, as Table 6.6 summarizes, just in terms of player statistics, Shaq was worth more than twice as much as Bryant.

Step Two: Position adjustment. So even an old Shaq is better than a young Kobe? The story is not quite that simple. We need to say a few words about the positions on the court. Shaq is a center. That places him in the frontcourt with a power for-

Table 6.6

Evaluating the Player Statistics for Kobe Bryant and Shaquille O'Neal, 2003–04

Aspect of Performance	Kobe's Value	Shaq's Value
Scoring	3.8	5.4
Gaining and maintaining possession	10.1	20.5
Crimes and rejections (personal fouls and blocks)	–2.1	0.1
Scoring + Possession + Crimes and Rejections	11.8	26.0

ward and a small forward. Kobe is a shooting guard, which places him in the back court with the team's point guard. When we analyze player productivity we learn one clear lesson. Because responsibilities vary across positions, the productivity of a player depends upon the position the player plays.

Let's consider the guards. These players are primarily responsible for handling the ball. When compared to frontcourt performers, these players accumulate a relatively large number of turnovers. Furthermore, guards tend to be shorter players and play farther from the basket, which means these players gather few rebounds. In contrast, the bigger players in the front court play closer to the basket and handle the ball less. So frontcourt players get more rebounds and commit fewer turnovers. All of this means the average frontcourt player produces more than the average backcourt player.

Now if we did not consider this in our analysis, the measurement of productivity we offer would clearly indicate that most of the wins on the team were created by the frontcourt players. As a consequence, if NBA teams paid attention to our work, they might only want to hire front-court players. The problem with this approach is that we think basketball requires all five positions. In other words, we don't think teams would be better off taking their back-up center and playing him at point guard. In fact, given our unscientific observation that many of the game's giants seem to have trouble walking and dribbling the ball, we are fairly certain placing a back-up center at point guard would result in many more turnovers than what we see from an average point guard.

As economists, we would argue that backcourt and frontcourt players are complements in production, in other words, these players work together to produce wins. Backcourt players handle the ball more, because this job must be done and the guards are relatively better at completing this task. Frontcourt players rebound, because this job must also be done and forwards and centers have an advantage with respect to hitting the boards. We would argue that all these players are necessary to produce wins. Therefore, player evaluations must be weighted by the position the player plays.[38]

What does all this mean for our evaluation of Kobe and Shaq? As we stated, to truly assess their impact, we need to measure their value in the context of the position each player plays. The average center in the NBA in 2003–04, if he was on the court the same amount of time as Shaq, would have produced 17.3 wins. O'Neal produced 26 wins, and if we compare this to the production of an average center, we see that Shaq produced 8.7 wins more than the average player at his position.

If we turn to Bryant we would consider the average shooting guard. The average shooting guard would have produced only 6.4 wins. Kobe's statistics were worth 11.8 wins. Consequently, compared to the average shooting guard, Kobe produced 5.3 more wins than the average player at his position. So Shaq's relative wins production was a bit less than 9, while Kobe's relative wins produced was a bit more than 5. When we look at each player relative to his position, we see that the productivity difference between Shaq and Kobe is no longer quite as great as our strict analysis of player statistics suggested.

You will note we still have two steps to go to reach our final calculation of wins produced. At this point we would emphasize, the final steps do not tend to alter our rankings of the players. As we will mention below, a player's ranking by our measure is almost entirely determined by his statistical production and the position he plays. Still, if we want to move from a player's *relative* wins production to his *total* wins production, there are two more steps.

Step Three: Moving from relative wins toward total wins. Determining each player's relative wins production is revealing, but what we really want to know is how many total wins can we attribute to each player.[39] To move from relative wins to total wins, it is useful to think about this at the level of the team. An NBA team plays 82 regular season games. So an average team will win 41 games. The Lakers in 2003–04 won 15 more games than the average team. Quickly, how many games did the Lakers win? Obviously if the average team wins 41, and a team won 15 more than average, then we are saying that team won 56 games. To move from relative wins to total wins, one simply adds the average to the relative value.

This same logic applies to players. If we wish to move from Shaq's production relative to the average center, to Shaq's total wins production, we simply have to add the average player's production of wins to Shaq's relative output. Now this might seem like we are taking one step forward and one step back. Remember, though, that the average center, or if we look at Kobe, the average shooting guard, is not the same as the average player.

How many wins will the average player produce? If an average team wins 41 games, and it takes five players to play basketball, then an average player who plays all the time will produce 8.2 wins. Now both Shaq and Kobe played only 62% of the available minutes at their respective positions. So an average player who is on the court 62% of the time would produce 5.1 wins. This number is added to both Shaq and Kobe's *relative* wins production. When we do this, we determine each player's *total* wins production. As we mentioned, this adjustment has no impact on either player's ranking. We are making the same adjustment to each player, so the argument that Shaq is more productive than Kobe still remains.

Step Four: Adjusting for team statistics. We are just about finished. So far we have not discussed the various statistics tracked for the team. These include three-point and two-point field goals made by the opponent, turnovers by the opponent that are not steals, and team rebounds.[40] For the most part these are measures of defense that we do not track for individual players.

Before we say how we incorporate these factors, let's make a brief comment about how defense is assessed in the NBA. We often hear that this player or that player is good at defense. Such players, therefore, must be difficult to score upon. Given that we hear such accolades, it must be the case that someone has tracked how many times an opponent scores when a specific player is playing defense. After all, without this kind of data, how would you know? Can you tell if a player is good at defense just by staring real hard at the player? If staring worked, why are we keeping any of these other numbers?

As Barra notes, we keep numbers because we can't watch all the players all the time. If we follow that argument, then people who claim that one player is better than another defensively need to tell us where they found the time to constantly watch these players.[41] The problem is even more complicated because the NBA now allows zone defenses, which means players are no longer technically assigned the responsibility to guard specific players. In the end, we think assessing defense would be difficult by just staring at the players. However, if anyone has actually collected the data, these numbers could then be easily incorporated in our player evaluation.

While we wait for each player's defensive measures, we have constructed what we call the team's statistical adjustment. We then follow a convention we have observed and personally employed in the economics literature. Specifically we allocate the impact of the team statistical adjustment according to the minutes each player was on the court.[42]

What matters in this calculation is the team's measure relative to the average team. The Lakers were slightly better with respect to our team statistics than the

TABLE 6.7

Evaluating the Unassisted Wins Produced: Kobe Bryant and Shaquille O'Neal, 2003–04

Steps	Aspect of Performance	Kobe's Wins Production	Shaq's Wins Production
Step 1	Scoring + Possession + Crimes and Rejections	11.8	26.0
Step 2 & Step 3	Adjustment for averages	1.4	12.2
Step 4	Adjustment for team statistics	0.3	0.3
	UNASSISTED WINS PRODUCED: Step 1 – Step 2 + Step 3	10.7	14.0

average team. Consequently we end up adding to each player's production value, as determined in steps one through three, each player's contribution to the Lakers' team statistical adjustment.[43] Specifically, incorporating the team statistical adjustment for Bryant and O'Neal involves adding about 0.3 to both Kobe's and Shaq's total wins production. In general, the team statistical adjustment is quite small for each player and therefore this adjustment does not substantially alter our rankings of players across teams. To illustrate this point, the correlation coefficient between player production unadjusted for team statistics and then adjusted for team statistics is 0.99. In simple words, whether you adjust for the team statistics or not, the player rankings are essentially the same.

We summarize all of our steps in Table 6.7. We began with the value of each player's statistical production. This value was then weighted in steps two and three by the two averages we noted above. For simplicity, we added these steps together. Finally, we adjusted for team statistics, resulting in our final measure of unassisted wins production.

After completing all these steps we learn that Shaq was worth 14 wins and Kobe contributed 10.7. As we said, the older Shaq was slightly better than the younger Kobe. Now we must note, we do not believe the Lakers followed any of these steps. Given that our book is being published two years after the decision was made, unless the Lakers have access to time travel, this was probably not exactly how these players were evaluated. Still, our analysis indicates that if the Lakers did follow these methods they might have come to the same conclusion. A younger, slightly less productive Kobe, could be thought of as a better bet than an older, slightly more productive Diesel. This will also be true once we account for assists, a step we take in the next chapter.

Summarizing All of Our Steps

Before we move to the next chapter, though, let's review what we have learned thus far. We start at the very beginning. To determine a player's wins production you:

1. Regress team wins on offensive efficiency—points scored per possession employed—and defensive efficiency—points allowed per possession acquired.
2. From this regression, determine the value of a collection of statistics tabulated for the individual player and team, in terms of wins.
3. The player statistics can be separated into the following: scoring, possession, personal fouls, and blocked shots. If we multiply each player's accumulation of each statistic by its corresponding value in terms of wins, we can determine the value of each player's statistical production.
4. We argued that position matters, so each player's statistical production needs to be considered relative to what the average player at his position would produce.
5. The previous step gives us a player's relative wins production, but we want total wins. To move from relative wins to total wins, simply add the number of wins an average player would produce. It is important to note that this step does not alter how we rank the players.
6. We also need to adjust for the statistics only tabulated for the team. These are allocated according to the amount of time the player was on the court. Such an adjustment is generally quite small and also tends not to alter our ranking of players.

After all these steps what do we learn? Once again we repeat ourselves: Where we rank players according to our measure is driven almost entirely by each player's statistical production relative to the position the player plays.

See, pretty easy stuff. Okay, not so easy stuff. We promised simple and accurate, and so far we don't seem to have simple. We will make this simple in the next chapter (we promise). For now, though, let's talk about accuracy.

THE ACCURACY OF OUR METHODS

How accurate is this approach? We have already said that our model explains 95% of team wins. Unfortunately, this basic statement has little meaning for those not versed in regression analysis. To put the accuracy of our methods in perspective, we measured the wins produced by each player employed by the NBA for the

TABLE 6.8

Evaluating the Accuracy of Wins Produced, 2003–04 Regular Season

Teams	Summation of Player Wins Produced	Actual Team Wins	Difference in Absolute Terms
San Antonio	60.4	57	3.44
Detroit	56.7	54	2.75
Indiana	56.6	61	4.41
Minnesota	55.8	58	2.21
Sacramento	54.6	55	0.38
Dallas	53.1	52	1.15
LA Lakers	51.7	56	4.31
Memphis	47.8	50	2.23
New Jersey	47.5	47	0.52
Houston	45.9	45	0.90
Milwaukee	43.8	41	2.85
Denver	43.7	43	0.73
Miami	42.3	42	0.28
New Orleans	40.7	41	0.26
Seattle	39.3	37	2.31
Golden State	39.1	37	2.10
Portland	37.9	41	3.10
Utah	37.6	42	4.41
New York	37.1	39	1.89
Boston	36.8	36	0.82
Philadelphia	34.3	33	1.27
Cleveland	33.9	35	1.06
Toronto	33.1	33	0.09
Phoenix	30.6	29	1.64
Atlanta	28.5	28	0.55
LA Clippers	28.5	28	0.53
Washington	25.7	25	0.68
Chicago	23.7	23	0.70
Orlando	22.0	21	0.96
		AVERAGE ERROR	1.67

2003–04 season. We then summed wins produced by each player for each team. How does our summation of player wins produced compare to actual team wins?

The answer is reported in Table 6.8. The average difference between the summation of player wins produced and team totals is 1.67 wins.[44] How does it do for the Lakers? The team won 56 games, yet our model predicts only 51.7 victories. The difference of 4.3 wins is actually one of the largest we observe. The team the Lakers played in the finals, the Pistons, had a predicted win total equal to 56.7. Remember our model is based on offensive and defensive efficiency. Given these results, perhaps people should not have been surprised when the Pistons defeated the Lakers in five games. Although playoffs are not a perfect test for determining the identity of the best team, our analysis of player production indicates that contrary to popular perception, the Lakers were not necessarily better than the Pistons in the regular season and should not have been heavy favorites prior to the 2004 NBA Finals.

So we may not have simple, but it looks like we have accurate. Of course, having an accurate model can provide much joy, but simple and complete would certainly increase our happiness. And that is what we will work toward next.

7 WHO IS THE BEST?

In introducing our approach to measuring productivity we stated our goals. We wanted a metric that was accurate, simple, and complete. So far we are batting one for three. If this were baseball, we would be all-stars. Unfortunately, one for three is a lousy average in the life that exists outside of baseball. So we take the field in this chapter with the goal of producing a model that is not only accurate, but also simple and complete.

A SIMPLE MODEL OF UNASSISTED PRODUCTIVITY

To build a truly simple model we need to return to our simple statement describing wins: *Wins are solely a function of offensive and defensive efficiency.* In general, what do we see when we look at an NBA team's level of efficiency? In 2003–04 the average team managed to score one point per possession employed, and conversely, allow one point per possession acquired. Over the years we examine (1993–94 to 2004–05) this ratio tended to hover around one, hitting a high of 1.05 points per possession in 1994–95 and a low of 0.99 points per possession in 1998–99. In general, though, one can argue that the average team gets one point per possession.[1]

Why is this important? If each possession yields one point, then the value of a point scored equals the value of each factor that comprises possessions employed and possessions acquired. In other words, the value of scoring one point must equal, in absolute terms, the value of a field goal attempt, offensive rebound, turnover, defensive rebound, and steal. We have also learned that a free throw attempt is worth a bit less than half a point, while personal fouls and blocked shots are worth a bit more than half a point. Knowing all this, we can create a very simple model of unassisted productivity. Basically a player's unassisted productivity can be calculated as follows:

Points + Total Rebounds + Steals + ½ Blocked Shots – Field Goal Attempts – ½ Free Throw Attempts –Turnovers – ½ Personal Fouls

MAKING YOUR TEAMMATES BETTER, THE VALUE OF AN ASSIST, AND OTHER SHORT STORIES

Our very simple model is missing both a catchy label and recognition of a player's assists. The next step in our discussion is to correct both shortcomings. Before we take this step, though, let's discuss the story that great players improve the performance of their lesser teammates.

Making Your Teammates Better?

There is a standard argument offered about what makes a player truly great. Truly great players don't just play well, they also make their teammates better players. Following this line of reasoning, Michael Jordan was not just a great player because he scored, rebounded, and generated steals, but also because he was able to lead a team of lesser players, often called the Jordanaires, to six championships in eight seasons.

Is it true that Jordan made his teammates better? We have noted that Jordan not only was a record-setting performer on the court, but also may have established the NBA record for retirements, exiting the game on three occasions. The first retirement occurred after the 1993 NBA Finals. After leading the Bulls to championships in three consecutive seasons, Jordan decided to give baseball a try. Eventually Jordan learned that greatness on the diamond was not likely to happen. As a result, after a bit less than two years, Jordan again returned to basketball. Although Jordan's time in baseball was not successful, it did provide a wonderful opportunity for us to see the impact MJ had on the Bulls. The Bulls in 1992–93 won 57 regular season games. Of these 57 wins, we estimate Jordan produced nearly 25 victories.[2] With this level of productivity learning to hit curveballs, people expected the Bulls to fade considerably.

Surprisingly, though, this did not happen. In 1993–94 the Bulls managed to win 55 games. Jordan was replaced on the Bulls roster by two players, Pete Myers and Steve Kerr. It's possible that Myers and Kerr were able to offer a contribution similar to Jordan. Okay, possible, but not likely and indeed, that is not what happened.

We estimate that the difference between Jordan and these two players was about twenty wins. So something seems quite odd here. How can losing one of the greatest players to ever play the game have so little impact on a team's won-loss record? Although the statistics say Jordan was worth more than twenty wins, the won-loss record suggests the number is closer to two.

To answer this question, we examined the Bulls roster in 1993–94 and 1992–93. The results suggest a few answers. Part of the answer lies in the ability of the Bulls to elicit wins from its offensive and defensive efficiency. In 1992–93 the Bulls won 57 games, but the model predicts 58.1. In 1993–94 the Bulls won 55 games, but the model says the team should have won 49.4. In other words, from a statistical perspective, the Bulls were nearly nine games worse without Jordan. So the data tell us that the Bulls should have been twenty wins worse without Jordan. Reality says the team was only two wins worse. About half of the difference between twenty and two can be explained by the 1993–94 team getting more wins out of its statistics then we might expect.

What of the other half? The media often referred to the Bulls as Jordan and the Jordanaires. Although it is certainly the case that Jordan was the Bulls' best player, Chicago's success was due to more than Jordan. In 1992–93 the Bulls received nearly 27 wins from Scottie Pippen and Horace Grant. Although these players were not the equal of MJ, each was clearly an above average performer.

In 1993–94 the Bulls were led by these "other" two stars. Both Pippen and Grant, without MJ, suddenly played much better. How much better? We can see this if we look at Pippen and Grant on a per-minute basis. In 1992–93 both Pippen and Grant were above average NBA players. In 1993–94, though, both were quite a bit better. To illustrate the difference, had each player maintained their per-minute productivity from 1992–93 the next season, these two would have produced eleven fewer wins in 1993–94. In sum, Pippen and Grant both went from being good players with MJ, to being among the very best in 1993–94. Specifically, Pippen was the most productive small forward, and the sixth most productive player overall. Grant ranked fifteenth overall in the league, and among power forwards, placed fifth.

Now we want to emphasize that this story is purely anecdotal. Still, this anecdotal evidence suggests something odd about Jordan's performance. People often say that the truly great players in basketball can make their teammates better. Yet both Pippen and Grant played much better without his Airness. Does this mean Jordan is not a great player? Before we jump to such a silly conclusion, let's consult a bit of economic theory.

The Law of Diminishing Returns

There are two fundamental laws to the economics of a business. The Law of Demand we mentioned in Chapter Five. The other is the Law of Diminishing Returns. This law simply states that if a firm keeps hiring more workers, and nothing else about a firm's manufacturing process changes, the productivity of each worker must decline. After all, if more workers have less machinery and land to work with, then the workers must be less productive. In basketball this can be illustrated by one simple statement: "There is only one ball!" When Jordan has the ball, Pippen and Grant do not have the ball. So if you add Jordan, a certain number of shot attempts and rebounds that would go to Pippen and Grant, now go to Jordan.

To further illustrate this point, consider a team comprised of the top five players at each position in 1993–94. Such a team would have John Stockton (22.0 wins produced) at point guard, Nick Anderson (13.3 wins produced) at shooting guard, Scottie Pippen (20.4 wins produced) at small forward, Dennis Rodman (29.6 wins produced) at power forward, and Shaquille O'Neal (26.8 wins produced) at center.[3] These players combined to produce 112 wins. If all these players were on the same team, though, their wins produced could not exceed the length of the regular season, or 82 victories. Hence, if we put all five players on the same team someone would have to play worse.

This simple example illustrates a basic lesson economic theory teaches. If you add more productive players to your team, you can expect either the productivity of the new players, or the productivity of existing players, to decline. According to simple economic theory, it must be a myth that great players make their teammates better.

Now we wish to clarify exactly what we are saying. It is possible that having a great scorer who attracts the attention of defenses opens up some easier shots for other players. It is also true that passing, which is noted by the tracking of assists, also enhances the productivity of teammates. What our simple story illustrates, though, is just the idea that there is only one ball, and therefore the total productivity of one player often comes at the expense of other members of the team.

Of course we will not simply appeal to theory in making this argument. Is there any more evidence of our contention beyond our simple analysis of the Chicago Bulls from the early 1990s?

Finally, the Value of an Assist

To do better, we need to understand what determines a player's level of productivity. So far we know much about the measurement of player performance. We know

TABLE 7.1

What Explains Current Per-Minute Productivity in the NBA?

Factors we found to be statistically related to current per-minute productivity	How the factor is measured (more details in endnotes)
Player's talent and ability	Per-minute productivity last season
Player health	Games played
Player's level of experience	Two variables, one for young players, another for old players
Coaching ability	The head coach's lifetime winning percentage
Stability of a team's roster	Roster stability measure (detailed in Chapter Five)
Productivity of teammates	Wins produced by teammates, per-minute played
Team assists	Assists totaled by teammates, per-minute played

that a player increases his value via scoring, rebounding, etc., and he decreases his value by spending shot attempts and committing turnovers. Now we need to work on an explanation. Specifically what we wish to know is what factors cause a player to be more productive, and which factors lower his productivity.

It is important to note that we measured productivity with the simple unassisted model we listed above. We actually did a bit more, measuring productivity, via our simple unassisted model, on a per-minute basis. With this measure in hand, we then tried to understand why a player achieved the per-minute production we observed. Once again, we employed regression analysis. Specifically we regressed a player's per-minute performance on a variety of factors we believed could explain performance.[4] Certainly this list of factors would begin with a player's talent and ability. This we can capture by noting the player's past productivity. What will cause a player's performance to deviate from what we observed in the past?

We began with a sample of player performance that began with the 1993–94 campaign and ended with the 2003–04 season.[5] With sample in hand, we then regressed[6] current player performance on the factors we listed in Table 7.1. The first factor listed is past productivity, which is clearly the dominant factor. Past productivity alone explains 72% of the variation in current performance. When we include additional factors, our explanatory power only rises to 76%. As we expected, what a player did in the past is the key factor one needs to understand if you wish to predict current performance.

Beyond past productivity, though, we did consider six additional factors. From our model we learned that player health matters. Specifically, the more games a player plays, the greater his per-minute productivity.[7] We also learned that being an older player hurts performance. Unexpectedly, though, we did not find much evidence that younger players systematically get better. At least, the statistical evidence that players get better early in their careers was weak.[8] Coaching ability, which we measured via the head coach's life-time winning percentage, was also found to be important. Coaching experience, though, was not found to be statistically important.[9] Finally, the stability of a team's roster, which was the same factor we employed in our study of gate revenue, was found to statistically impact performance. The more stable a team's roster from year to year, the better the team's players will perform.

All of this is very interesting, but our main focus is the productivity of a player's teammates and the impact of assists. As our story of Jordan suggests, the productivity of a player's teammates matters. If a player is blessed with productive teammates, which we measured via the number of per-minute unassisted wins his teammates produced, then we can expect a player's performance to suffer.[10] So the Law of Diminishing Returns does apply to the NBA.

What about assists? Again, when we constructed our measure of productivity based upon scoring per possession, assists did not fit into our story. In fact, we were prepared to tell a clever story for why assists are not important. Unfortunately, as is often the case when we look at the numbers, the data told a different tale. Specifically, the last factor we included in our model of per-minute productivity was the number of assists a player's teammates accumulated per-minute played.[11] We found clear evidence that the more assists a team accumulates the better the players on the team will perform. In other words, assists matter.

We were also able to use our results to determine the specific value of an assist. After a bit of work,[12] we found that each additional assist was worth about 0.67 points, or about 0.022 wins. In other words, for every 100 assists a player accumulates, his teammates' productivity rises by 2.2 wins. With this information, we can now complete our simple model. Again, we choose to simplify. We could go with the precise valuation of an assist we estimated, but we found our rankings of players were unaffected if we simply said an assist was worth half a point.[13] Hence, our final simple model of player productivity, which we will call Win Score,[14] is as follows:

Points + Total Rebounds + Steals + ½ Blocked Shots
+ ½ Assists – Field Goal Attempts – ½ Free Throw Attempts
– Turnovers – ½ Personal Fouls

So now we have a measure that incorporates assists, giving us a metric that is simple, accurate, and complete. Plus we think it has a catchy label.

EVALUATING EFFICIENCY WITH NBA EFFICIENCY

At first glance, though, this might look like the NBA Efficiency model. It certainly is as easy to use as the NBA's metric. Beyond ease of use, there are other similarities.[15] Because points and possessions are virtually equal, it is then true, as the NBA Efficiency model asserts, that points, rebounds, steals, and turnovers are worth the same. Differences lie in our inclusion of personal fouls and our argument that a blocked shot and an assist are not equal in value to the statistics associated with scoring and possession.

The crucial difference, though, is seen in how we value field goal and free throw attempts. We have already noted that the NBA Efficiency model treats a missed field goal and missed free throw the same. Certainly the value of missing these different types of shots is not the same in terms of points scored, or more importantly, in terms of wins. Although this is an important issue, the bigger issue is the impact of made shot attempts. Whether a player makes or misses a shot, a resource is used when a shot attempt is taken. According to the NBA's method, though, the cost of the shot attempt is not imposed if the shot goes in. Consequently, if a player is evaluated according to the NBA model, he only needs to make 25% of his three-point shots for the benefit of these shots to equal the costs the NBA actually charges. To illustrate, consider a player who takes four three-point shots and makes one. As a result, his NBA Efficiency measure will rise by three, because this is the number of points he scored; and fall by three, because this is the number of missed shots the player accumulated. So we see that if a player converts 25% of his shots beyond the arc, then the value of the points he accumulates equals the cost of his missed shots. If he shoots better than 25%, his NBA Efficiency value will rise. For two-point attempts, the break-even point is 40%. Any player who exceeds this threshold on two-point shots will increase his NBA Efficiency value as he increases his shot attempts.

The story of Antoine Walker illustrates our point. According to the NBA Efficiency model, Walker was the 35th most productive player in the NBA in 2004–05. Given that more than 450 players played that season, if we believe the NBA model, Walker was ranked in the top 10% of all players. A key reason for Walker's lofty ranking was his scoring totals. With an average of 19.1 points per game, he also ranked in the top 40 among scorers. Although Walker achieved a high scoring average, a bit of inspection reveals he was not a very efficient producer of points. In the 2004–05 campaign, 35 players took more than 300 shots from the three-point range. Walker took 341, and with a three-point field goal percentage of 32%, his accuracy from this distance among the 300 plus shooters ranked 34th, or second to last. His two-point field goal percentage was also relatively poor. Walker was one of twenty players who took at least 1,000 shots from two-point range. Given a shooting percentage of 45%, he ranked fifteenth—out of twenty—in accuracy among prolific shooters from two-point range. So Walker shot relatively poorly from both inside and outside the arc. Still, his percentages exceeded the thresholds imposed by the NBA model, and consequently Walker earned high marks in NBA Efficiency despite his inefficient scoring.

What happens when we view Walker through the lens of the productivity model we employ? The Win Score measure we propose imposes the cost of the shot attempt regardless of whether or not the shot is made. As a result, a player must connect on at least 50% of two-point shots and 33% of three pointers for the benefit of shooting to equal the cost. Walker failed to achieve these levels; consequently, his Win Score was below the average player at his position. Specifically, Walker posted a Win Score of 493.5 in 2004–05, while an average player at his position playing his minutes would have posted a Win Score of 635. So the NBA Efficiency model, which does not value shot attempts correctly, argues that Walker is an above average performer. When we take into account the cost of Walker's many field goal attempts, we see that Walker is actually below average.

One should note that in evaluating Walker we looked at his performance relative to the average at his position. As we have previously emphasized, the position a player plays determines the relative worth of his performance. To see this again, consider the average per-minute value of Win Score at each position. From 1993–94 to 2004–05 the average center had a per-minute Win Score of 0.22, while the power forwards averaged 0.21. Small forwards only averaged 0.15, while shooting guards and point guards offered an average of 0.13. Although frontcourt players generally post higher Win Score values, it again does not mean that these players are worth more than guards. Again, centers cannot typically play point guard. Given the realities of basketball you need to consider a player's performance relative to the average at his position if you wish to compare players at different positions.

Of course, if you just wish to see if a specific player improved or declined, then Win Score is perfectly suitable to the task. In other words, if you wish to compare a player to himself the simple model unadjusted for position played is fine. You can also use the Win Score model if you wish to compare players playing the same position.

If you wish to address the issue of "Who is best?" we need to make comparisons across positions. And as long as we are going to make an effort, why not go all the way and think about each player's production of wins? Now that we know the value of an assist, we can construct each player's assisted wins production, or what we will just call Wins Produced.[16] With this metric in hand, we can now return to our story of Shaq and Kobe as we progress toward identifying the best player in the NBA.

SHAQ AND KOBE, THE SEQUEL

When we left our story we had learned that without considering assists, Shaq had produced 14 unassisted wins in 2003–04. Kobe's unassisted wins production was 10.7. Kobe was credited with 330 assists that season, surpassing Shaq's total of 196. It would seem that once assists are noted Kobe would erase some of the distance between his level of productivity and O'Neal. One must remember, though, that players are evaluated relative to their position. Shooting guards tend to accumulate more assists relative to centers. So Kobe's advantage in assists will be muted substantially.

As seen in Table 7.2, once assists are noted, Kobe's wins production did rise to 12.2. Shaq also is more productive once assists are included in our calculations. His wins production rose to 15.4. Thus the difference between the two players is still basically the same with and without assists. Shaq is still a bit more productive, and Kobe is still quite a bit younger.

We should emphasize that the accuracy of our methods is unchanged. The summation of player wins with and without assists is the same. When we say that with assists Kobe and Shaq were better, we should add that players who do not accumulate many assists, relative to the positions they play, look worse once assists are incorporated in our analysis.

TABLE 7.2

Evaluating Wins Produced: Kobe Bryant and Shaquille O'Neal, 2003–04

Steps	Aspect of Performance	Kobe's Wins Production	Shaq's Wins Production
	Scoring	3.8	5.4
	Gaining and maintaining possession	10.1	20.5
	Crimes and rejections (personal fouls and blocks)	–2.1	0.1
	Assists	7.4	4.4
Step 1	Scoring + Possession + Crimes and Rejections + Assists	19.1	30.4
Step 2	Adjustment for averages	6.7	14.7
Step 3	Adjustment for team statistics	–0.3	–0.3
	WINS PRODUCED: Step 1 – Step 2 + Step 3	12.2	15.4

With the productivity of Shaq and Kobe accurately measured, let's return to the summer of 2004. At that time the Lakers made their choice. Shaq was traded to the Miami Heat, and the Lakers became Kobe's team. Unfortunately for Kobe, the Lakers did not have a good season in 2004–05. Making matters worse, Shaq's new team suddenly became quite successful. Did the Lakers make the wrong choice? To answer this question, let's see what really happened in 2004–05.

Shaq's Story

In 2003–04 Shaq produced 15.4 wins for the Los Angeles Lakers. He left the Lakers and joined a Heat team that had only won 42 games. In 2004–05, though, O'Neal's new team improved to 59 victories. Consequently, one might think O'Neal was worth 17 wins to his new team. As we mentioned in our discussion of plus-minus, evaluating a player in terms of how a team is with and without his services is problematic. Of course we now have a measure of each player's wins production that can tell us what Shaq meant to the Heat.

Before we discuss our results, we want to introduce one more performance metric. Shaq and Kobe played virtually the same number of minutes in 2003–04, so a comparison of total wins production was valid. When one discusses players who play different minutes, though, one needs to consider productivity per time spent on the court. Specifically, we wish to consider each player's wins production per 48 minutes played. So far in this book we have minimized our use of acronyms. We do not want to keep saying "wins production per 48 minutes played" so for the rest of the book we will simply use "WP48."

How do we calculate WP48? We begin with a player's production of wins. We then divide Wins Produced by minutes played. This calculation gives you a very small number, which we multiply by 48 to give us WP48. As with much in life, an example would help. Shaq produced 15.4 wins in 2,464 minutes in 2003–04. If you divide 15.4 by 2,464, you get a really, really tiny number.[17] If you multiply this tiny number by 48 you get 0.300. As a result we learn that per 48 minutes Shaq's statistical output was worth about .3 wins. Kobe Bryant produced 12.2 wins in 2,447 minutes. Follow the same calculations and we see that Kobe's WP48 was 0.239, or a bit less than one-fourth a win per 48 minutes played.

The next question is: What does this mean? If a baseball player had a batting average that was 0.239, that would not be good. The average Major League Baseball player hit 0.266 in 2004, so 0.239 would be thought of as bad. Of course, WP48 is not a batting average. Still, the same lesson applies. We need to know the average WP48 to know whether Shaq and Kobe were good or bad.

To understand average wins production in the NBA, let's begin by saying that

Table 7.3

Connecting Player Wins to Team Wins: The Miami Heat, 2004–05

Miami Heat 2004–05	Wins Produced	WP48
Shaquille O'Neal	15.9	0.306
Dwyane Wade	12.2	0.197
Damon Jones	10.6	0.197
Udonis Haslem	10.1	0.181
Eddie Jones	7.4	0.124
Shandon Anderson	2.2	0.092
Christian Laettner	1.7	0.111
Alonzo Mourning	1.1	0.223
Wesley Person	0.3	0.062
Malik Allen	0.1	0.011
ZhiZhi Wang	0.0	0.017
Steve Smith	0.0	0.012
Qyntel Woods	0.0	–0.052
Dorell Wright	–0.1	–0.266
Keyon Dooling	–0.6	–0.023
Michael Doleac	–0.9	–0.036
Rasual Butler	–0.9	–0.035
SUMMATION OF PLAYER WINS	59.1	
ACTUAL WINS	59	

the average team wins half its games. So in each regulation game, which is 48 minutes long, the average team will produce 0.500 wins. Basketball is a game of five-on-five, so an average player over 48 minutes will produce one-fifth the wins production of an average team. In other words, the average player will have a WP48 of 0.100. From all this we see that Shaq was three times more productive than the average player. Kobe was more than twice as productive, per 48 minutes, as the average player in the NBA. In other words, Shaq and Kobe were both very good in 2003–04.

What about 2004–05? This is Shaq's story, so let's look at his impact on the Heat. We measured the Wins Produced and WP48 of each player Miami employed in 2004–05. Our analysis is reported in Table 7.3, where the players are ranked in terms of wins.

From Table 7.3 we see that Shaq offered the Heat virtually the same level of productivity he gave the Lakers. In 2003–04 O'Neal produced 15.4 wins. In 2004–05 he led the Heat with 15.9 Wins Produced. His WP48 was also quite similar in each season, rising from 0.300 in 2003–04 to 0.306 in 2004–05.

It is important to note that although Shaq was the most productive player with

Miami, he was not a one-man team. Three other players, Dwayne Wade, Damon Jones, and Udonis Haslem, each reached double digits in victories produced. Overall Wade was the third most productive shooting guard in the league, D. Jones ranked sixth among point guards, and Haslem was the tenth highest rated power forward. In fact, 83% of the Heat's 59 wins can be traced to the productivity of O'Neal, Wade, D. Jones, and Haslem.

Let's put this productivity in perspective. In 2003–04 Shaq played with a star-laden Lakers team, whose statistical production was worth about 52 wins. Of these wins, 44 wins can be traced to the productivity of the teams four stars: Shaq, Kobe, the Mailman—Karl Malone—and the Glove—Gary Payton. In 2004–05 Shaq was virtually the same player. His teammates with the Heat also offered a similar level of productivity to O'Neal's teammates in Los Angeles. Dwayne Wade, D. Jones, and Haslem offered nearly 33 wins. In 2003–04, Kobe, Payton, and Malone offered 29 wins. From all this we see that in both seasons Shaq played on one of the better teams in the league.

Kobe's Story

Let's now move on to Kobe's story. Our analysis of Shaq and Kobe in 2003–04 suggested the Lakers could not be faulted for building around Bryant. We are writing in the summer of 2005, so we already know how the 2004–05 season played out. The Lakers, without Shaq, only won 34 games and completely missed the playoffs.

So what happened to Kobe and the Lakers? We have already observed Bryant's productivity in 2003–04. Kobe produced 12.2 wins, or a bit more than 20% of the Lakers' overall win total. In 2004–05 Kobe produced nearly 30% of the Lakers' wins. Of course, 20% of 56 is a bit more impressive than 30% of 34. As we note in Table 7.4, Kobe did play worse in 2004–05. His WP48 declined from 0.239 to 0.175. Unfortunately, even if Kobe had maintained his 2003–04 productivity, the Lakers would have won fewer than four more games. This might have allowed the team to post a better record than the cross-town rival LA Clippers, but the team would have still missed the playoffs.

Clearly the problems the Lakers experienced in 2004–05 were not entirely about Kobe playing worse. If we look at the productivity of the players the Lakers lost from 2003–04, and compare this output to what the team added for 2004–05, we start to see a bigger problem. In the summer of 2004 the Lakers lost three stars likely destined for the Hall of Fame, the aforementioned Shaq, Mailman, and Glove. These three players combined for about 32 wins in 2003–04. The ten players new to the Lakers in 2004–05 only produced about 23 victories. Furthermore, none of the new players who played substantial minutes for the 2004–05 Lakers

TABLE 7.4

Connecting Player Wins to Team Wins: The Los Angeles Lakers, 2004–05

LA Lakers 2004–05	Wins Produced	WP48
Kobe Bryant	9.8	0.175
Lamar Odom	8.4	0.173
Caron Butler	5.2	0.091
Jumaine Jones	4.6	0.122
Chris Mihm	3.3	0.084
Chucky Atkins	2.7	0.045
Luke Walton	1.8	0.115
Sasha Vujacic	0.1	0.017
Devean George	0.1	0.015
Tony Bobbitt	0.0	0.152
Vlade Divac	–0.1	–0.049
Brian Grant	–0.3	–0.012
Brian Cook	–0.3	–0.012
Kareem Rush	–0.4	–0.192
Stanislav Medvedenko	–1.1	–0.120
Tierre Brown	–1.1	–0.051
SUMMATION OF PLAYER WINS	32.9	
ACTUAL WINS	34	

were as productive per 48 minutes as the future Hall-of-Fame players the team lost. So the story of the Lakers' decline is driven by the departure of several stars the team had employed.

We still might ask, though, what happened to Kobe? One might think the key to Kobe's decline was the departure of Shaq, but we think it was more about Gary Payton. Payton has consistently been one of the best point guards in the game. When Payton left, the job of starting point guard went to Chucky Atkins. Atkins is not really a pass-first point guard, but primarily plays the role of designated three-point shot specialist. Without a traditional point guard, Bryant became the de facto ball handler. The result was Bryant's turnovers per game rose from 2.6 in 2003–04 to 4.1 in 2004–05. The increase in turnovers is the primary reason Bryant's overall productivity declined.

Should the Lakers have kept Shaq and let Kobe go? Our analysis suggests that Kobe might have remained a top shooting guard had the Lakers bothered to keep the Glove, or at least replaced Payton with a traditional point guard. Without the acquisition of a true point guard in the future, we might expect Kobe's turnovers to remain high, and his overall contribution to continue to suffer.

Before moving on, let's observe that Kobe's story highlights a key aspect of any statistical measure of productivity: One cannot end the analysis when one has measured the value of player performance. Knowing the value of each player is only the starting point of analysis. The next step is determining why the player is productive or unproductive. In our view, this is where coaching should begin. We think we can offer a reasonable measure of a player's productivity. Although we have offered some insights into *why* players are productive, ultimately this question can only be answered by additional scrutiny into the construction of a team and the roles a player plays on the floor.

WHO IS THE BEST?

As much as we love the Shaq and Kobe stories, it is time to move on to a more important issue. Let's finally address the question "Who is the best?"

This is the one question that often seems to lead to the most passionate debate among sports fans. Again fans of sport may care very little about the major issues confronting the nation or the world. But if you say to a fan of Allen Iverson that AI may not even be the best player on the 76ers, now you are just asking for an argument. At times sports talk radio appears to be a medium devoted almost entirely to people screaming about why the player they love is better than the player loved by someone else.

As we have stated earlier, it is with some trepidation that we enter this debate. We wish to make it very clear what we are saying. We are defining "best" in terms of productivity. As we demonstrated, Shaq produced more wins than Kobe in 2003–04 and 2004–05. By our definition, this means Shaq has been better in the past and Kobe has been worse.

The Most Productive Player in 2004

Our story of Shaq and Kobe began in the 2003–04 season, and this is where we will begin our examination of the best players in the NBA. Our review of the Lakers of that season revealed that the best player on that team was Shaq. Was he the most productive player in the league?

To answer this question, let's turn to the voting for the Most Valuable Player in the league.[18] The MVP of the league can be thought of as the best player, although it is not clear that is how each sports writer defines the award. In fact, it is not entirely clear how this award is defined. Still, the MVP should certainly be one of the better players in the league, so it is useful to begin our inquiry with the opinion of the sports writers who vote for this prize.

TABLE 7.5

Analyzing the Contenders for the 2004 MVP Award

Player	Team	Voting Points	Rank: Wins Produced	Rank: NBA Efficiency	Wins Produced	NBA Efficiency	WP48
Kevin Garnett	Minnesota	1,219	1	1	30.5	2,717	0.453
Tim Duncan	San Antonio	716	3	4	19.7	1,849	0.374
Jermaine O'Neal	Indiana	523	44	10	8.8	1,681	0.151
Peja Stojakovic	Sacramento	281	11	2	15.2	1,862	0.224
Kobe Bryant	LA Lakers	212	18	27	12.2	1,474	0.239
Shaquille O'Neal	LA Lakers	178	9	12	15.4	1,670	0.300
Ben Wallace	Detroit	24	2	19	20.4	1,602	0.321
Jason Kidd	New Jersey	17	10	37	15.3	1,370	0.300
LeBron James	Cleveland	11	77	23	6.4	1,483	0.099
Sam Cassell	Minnesota	4	20	11	12.0	1,674	0.203
Dirk Nowitzki	Dallas	4	37	3	9.2	1,861	0.151
Baron Davis	New Orleans	4	60	44	7.7	1,327	0.137
Andrei Kirilenko	Utah	2	4	9	17.8	1,684	0.295
Michael Redd	Milwaukee	1	43	26	8.8	1,475	0.140
Yao Ming	Houston	1	21	8	11.8	1,687	0.211
Carmelo Anthony	Denver	1	177	34	2.0	1,383	0.032

In 2004 sports writers had little trouble naming the league's MVP. Of the 123 writers voting, 120 cast their first place vote for Kevin Garnett.[19] Again, we are not sure how one defines this award. Still, when 98% of sports writers reach the same conclusion, it suggests that Garnett was considered a pretty good player in 2003–04. What does our analysis reveal?

Throughout this book we have noted that sports writers and our statistical analysis often arrive at very different conclusions. In fact, as the subtitle of our book suggests, the purpose of this book was to expose the myths of modern sports. Our analysis, though, indicates that for this one issue we must agree. In terms of Wins Produced, Garnett was the most productive player in 2003–04.

Beyond Garnett, though, the voting by the sports writers and our analysis diverge. To see this point, we measured the productivity of more than 400 players who played during the 2003–04 campaign. We then proceeded to rank all these players in terms of both Wins Produced and NBA Efficiency. For the players who received votes from the sports writers, we report our analysis in Table 7.5.

What do we learn from this exercise? Of the sixteen players who received any votes from sports writers, only seven players were actually in the top sixteen in terms of Wins Produced; and three players, LeBron James, Baron Davis, and Carmelo Anthony, were not even in the top 10% of players in the league. In contrast, nine players receiving votes were in the top sixteen in NBA Efficiency. Furthermore, all players receiving votes were ranked in the top 10% of the NBA according to the NBA's measure. Such analysis suggests that the NBA Efficiency measure corresponds more closely to the viewpoint of the writers.

We wish to point out that this is not a surprising result. In the previous chapter we noted the similarity between the NBA Efficiency measure and Bob Bellotti's Points Created measure. Bellotti argued that his metric was very accurate. How did he reach this conclusion? In 1992 he observed:

> In the past eight years, the NBA's Most Valuable Player has finished either first or second that season in my Points Created rankings. In the past 14 years, the MVP has finished first or second 12 times in Points Created. In the other two years, the MVP finished third and fourth in Points Created, and in both years, the margin between the top three or four players was small. (p. 12)

Does the consistency between Points Created, NBA Efficiency, and the sports writers voting for league MVP establish the accuracy of these statistical methods? We would argue that accuracy depends upon your ability to connect your evaluation of players to team wins. Our ranking does not appear to be highly correlated with the media's views. Still, our ranking is based on a model that connects what the player does on the court to team wins. Consequently, when we argue that Kevin Garnett is the most productive, we are saying he is the most productive in terms of his ability to generate wins for his team. When we say Ben Wallace is the second most productive player in 2003–04, we base this on Wallace's statistical production being worth 20.4 wins according to our methods. And when we say Carmelo Anthony was not productive, we base this on Anthony's statistical production of 2.0 wins. Although Anthony is still a better player than any of us, and any sports writer we have read, his performance compared to other NBA players suggests he should not have been named on anyone's ballot for league MVP.

Let's make one final observation about our analysis of the 2004 MVP vote. It is interesting that members of the media occasionally argue that the league MVP is not necessarily the player who is statistically the best. Such arguments generally belittle statistical analysis and claim that sports writers are able to see the player who, despite the statistics, truly matters most to his team. Although this may be the sports writer's intent, our analysis suggests that this is not how sports writers vote. The NBA Efficiency measure, which may be flawed but is still a statistical measure, is still quite consistent with the sports writer's voting. Hence, at the end of the day, the voting for the MVP award appears to be at least somewhat about the statistics.

The Most Productive Player in 2005

At least this is the story we would have told before 2005. In 2004–05, though, the media's selection of MVP diverged from our rankings. The selection also surprisingly diverged even more from the NBA Efficiency measure. It appears that many sports writers did not vote for who they believed was the best player in 2005, but rather for the player they thought mattered most to his team.

To see this point, let's return to our story of Shaq. Without O'Neal the Lakers became quite a bit worse in 2004–05. In contrast, the Heat became one of the best teams in the NBA. This observation leads to the question, should Shaq have been the league MVP in 2004–05?

O'Neal did receive 58 first place votes, but this was not enough to win the award. Of the 127 sportswriters charged with selecting the 2005 MVP, 65 placed Steve Nash at the top of their ballots. Who is Steve Nash? Nash was the starting point guard for a Phoenix Suns team that improved from 29 wins in 2003–04 to 62 victories in 2004–05. This was the largest improvement posted by any NBA franchise in 2004–05, and given that Nash was considered the biggest star added to the roster, many writers concluded he was most responsible for the changes in the team's fortunes.

Was Nash the most productive player in 2004–05? He was more productive than Shaq, so if the choice was between these two players, the sports media were correct. Still, Nash was not the most productive player in the NBA. In fact, point guard Jason Kidd, who did not receive a single vote for MVP, was easily the most productive player at Nash's position. Kidd's 19.9 Wins Produced, though, only ranked third in the league.

So who was the best in 2004–05? Interestingly, as noted in Table 7.6, the NBA Efficiency model and our model agree on the identity of the best player in 2004–05. Once again, it was Kevin Garnett, who again produced 30 wins.

Despite the inability of the NBA Efficiency model to identify the player chosen by the media as MVP, the NBA's model was still quite consistent with the sports writers' voting. Of the sixteen players who received votes, thirteen were ranked in the top sixteen by the NBA Efficiency model. Only nine of the sixteen players identified by sports writers were in the top sixteen in Wins Produced. Like our analysis of the 2004 voting, the evaluation of sports writers seems to be more consistent with the NBA Efficiency approach.

When it comes to Kevin Garnett, though, the sports writers seemed to ignore the statistical measures. Garnett did not receive any first place or second place votes for league MVP. In fact, only seven writers even put him on their ballot. Yet

Table 7.6

Analyzing the Contenders for the 2005 MVP Award

Player	Team	Voting Points	Rank: Wins Produced	Rank: NBA Efficiency	Wins Produced	NBA Efficiency	WP48
Steve Nash	Phoenix	1,066	9	16	16.1	1,656	0.301
Shaquille O'Neal	Miami	1,032	10	11	15.9	1,784	0.306
Dirk Nowitzki	Dallas	349	7	3	17.2	2,194	0.274
Tim Duncan	San Antonio	328	5	14	17.8	1,670	0.389
Allen Iverson	Philadelphia	240	36	7	10.0	1,865	0.152
LeBron James	Cleveland	93	2	2	21.7	2,259	0.307
Tracy McGrady	Houston	44	13	8	14.2	1,850	0.214
Dwyane Wade	Miami	43	23	12	12.2	1,784	0.197
Amare Stoudemire	Phoenix	41	14	4	13.5	2,141	0.225
Ray Allen	Seattle	41	53	23	8.6	1,517	0.135
Kevin Garnett	Minnesota	15	1	1	30.0	2,621	0.462
Gilbert Arenas	Washington	4	21	13	12.3	1,761	0.181
Vince Carter	New Jersey-Toronto	3	29	15	10.9	1,665	0.185
Shawn Marion	Phoenix	1	4	5	18.6	2,073	0.284
P.J. Brown	New Orleans	1	35	34	10.1	1,371	0.172
Marcus Camby	Denver	1	18	47	12.8	1,284	0.304

our model estimates that Garnett led the league in Wins Produced, suggesting he had a pretty good year in 2004–05. Why did the defending MVP not attract more attention from sports writers in 2005?

The answer seems to lie in the changing fortunes of Garnett's team, the Minnesota Timberwolves. In 2003–04 Garnett's team won 58 games and entered the NBA playoffs as the number one seed in the Western Conference. As we have observed in the selection of Steve Nash, playing for a winning team seems to attract the attention of voters. In 2004–05, Garnett did not have this advantage as the fortunes of his team declined. When the 2004–05 season concluded the Timberwolves only had 44 wins, a total that left the team entirely out of the sixteen-team playoff field.

Why did Minnesota perform worse in 2004–05? To answer this question we turn to Table 7.7 where the Timberwolves of 2004–05 are compared to 2003–04. The results reveal that Kevin Garnett was virtually the same player in 2003–04 and 2004–05. His WP48 when he was voted MVP was 0.453. The next season his WP48 actually rose slightly to 0.462.

So what happened? We would note that unlike the Lakers, the Timberwolves decline was not tied to the players the team lost. All the players the team lost from 2003–04 produced less than zero wins. The players added were more productive,

TABLE 7.7

Connecting Player Wins to Team Wins:
The Minnesota Timberwolves, 2004–05 vs. 2003–04

Minnesota 2004–05	Wins Produced	WP48	Minnesota 2003–04	Wins Produced	WP48
RETURNING PLAYERS			RETURNING PLAYERS		
Kevin Garnett	30.0	0.462	Kevin Garnett	30.5	0.453
Fred Hoiberg	6.5	0.247	Fred Hoiberg	8.3	0.220
Wally Szczerbiak	3.7	0.069	Wally Szczerbiak	1.0	0.077
Sam Cassell	3.5	0.111	Sam Cassell	12.0	0.203
Ervin Johnson	0.2	0.027	Ervin Johnson	1.4	0.067
Ndudi Ebi	0.1	0.112	Ndudi Ebi	–0.2	–0.236
Michael Olowokandi	–0.3	–0.012	Michael Olowokandi	0.0	0.001
Trenton Hassell	–0.5	–0.012	Trenton Hassell	2.8	0.059
Mark Madsen	–0.8	–0.062	Mark Madsen	–0.5	–0.018
Troy Hudson	–1.2	–0.033	Troy Hudson	–0.4	–0.037
Latrell Sprewell	–2.4	–0.047	Latrell Sprewell	1.4	0.022
Returning Players WP & WP48	*39.0*	*0.110*	*Returning Players WP & WP48*	*56.3*	*0.154*
PLAYERS ADDED			PLAYERS LOST		
Eddie Griffin	5.5	0.175	Oliver Miller	1.2	0.110
Anthony Carter	1.0	0.062	Gary Trent	0.1	0.098
John Thomas	–0.6	–0.054	Anthony Goldwire	–0.2	–0.023
			Keith McLeod	–0.2	–0.163
			Quincy Lewis	–0.5	–0.025
			Darrick Martin	–0.8	–0.229
Players Added WP & WP48	*5.8*	*0.101*	*Players Lost WP & WP48*	*–0.5*	*–0.010*
SUMMATION OF PLAYER WINS	44.8		SUMMATION OF PLAYER WINS	55.8	
ACTUAL WINS	44		ACTUAL WINS	58	

adding 5.8 victories. From this we see that the story for Minnesota is not tied to changes in their roster. The decline we observe must be connected to the players who were with the team both seasons.

Statistically the decline in the Timberwolves' output was eleven wins, as the summation of player wins declined from approximately 56 to about 45 victories. Most of this decline can be traced to one player, Sam Cassell. Cassell posted twelve wins in 2,838 minutes in 2003–04, making him the third best point guard in the league. Injuries limited both his minutes and performance the next season. Consequently, Cassell's wins production fell to 3.5. Hence, half of Minnesota's decline can be attributed to Cassell's performance worsening.

One can also see changes with respect to other players. Although Fred Hoiberg improved from a WP48 of 0.220 in 2003–04 to 0.247 in 2004–05, he played 532 fewer minutes. So Hoiberg playing less minutes ended up costing Minnesota about two wins. Trenton Hassell and Latrell Sprewell, two below average players in 2003–04, played even worse in 2004–05. The decline observed in these two players cost the team seven additional victories. Although the team added better players, and also received additional wins from Wally Szczerbiak, the declines associated with Cassell, Hoiberg, Hassell, and Sprewell caused the team to worsen considerably.

Although one can go through the team on a player-by-player basis and track down the change in team fortunes to the individual players responsible, such an exercise will not change the basic story. Kevin Garnett was essentially the same player in 2004–05 as he was in 2003–04. Still, the sports media did not quite see it this way. Such evidence suggests that the media does not appear capable of separating an evaluation of a player from the evaluation of a team.

This is a key point we would make about evaluating players. Teams win games. We can, with a bit of work, link the team's fortunes to individual players. Our research reveals, though, that good players can reside on bad teams. For example, Kevin Garnett was a very good player in 2004–05, producing 30 wins. Unfortunately, his teammates went from producing 25 wins in 2003–04 to contributing only 15 wins the next season. Although Garnett was the most productive player in the NBA in both 2003–04 and 2004–05, the decline in his teammates' productivity caused the perception people had of Garnett's performance to decline. Despite the change in perceptions, we would still argue that Garnett was the best player in the NBA in 2003–04 and 2004–05.

Twelve Years of "Best" Players

So Garnett was the "best" player in 2003–04 and 2004–05. What about in other seasons? Let's look at twelve years of player data, beginning with the 1993–94 season. In Table 7.8 we list, for each of these seasons, the player who the sports writers selected as MVP, the player who led the regular season in Wins Produced—which we identify as "Most Productive"—and the NBA Efficiency leader. For the player identified as the leader in Wins Produced and NBA Efficiency, we identify in parentheses where this player placed in voting for MVP.[20]

Table 7.8 reveals that there were three seasons—1994–95, 1999–2000, and 2003–04—where the top-ranked person in Wins Produced, NBA Efficiency, and MVP voting was the same player. In four other seasons—1993–94, 1997–98,

TABLE 7.8

Twelve Years of the "Best" Players in the NBA

Year	Most Valuable Player	Most Productive Player	NBA Efficiency Leader
2004–05	Steve Nash	Kevin Garnett (11)	Kevin Garnett (11)
2003–04	Kevin Garnett	Kevin Garnett (1)	Kevin Garnett (1)
2002–03	Tim Duncan	Kevin Garnett (2)	Kevin Garnett (2)
2001–02	Tim Duncan	Ben Wallace (10)	Tim Duncan (1)
2000–01	Allen Iverson	Shawn Marion	Shaquille O'Neal (3)
1999–00	Shaquille O'Neal	Shaquille O'Neal (1)	Shaquille O'Neal (1)
1998–99	Karl Malone	Jason Kidd (5)	Shaquille O'Neal (6)
1997–98	Michael Jordan	Dennis Rodman	Karl Malone (2)
1996–97	Karl Malone	Grant Hill (3)	Karl Malone (1)
1995–96	Michael Jordan	David Robinson (2)	David Robinson (2)
1994–95	David Robinson	David Robinson (1)	David Robinson (2)
1993–94	Hakeem Olajuwon	Dennis Rodman (11)	David Robinson (2)

1998–99, 2000–01—we would note that these three rankings reached a completely different conclusion, indicating that differences exist with respect to these evaluations.

As we argued when we examined 2003–04 and 2004–05, there seems to be greater consistency between the MVP voting and the NBA Efficiency rankings relative to what we observe between the media's rankings and Wins Produced. In ten of the twelve seasons we examined, the MVP in the league was one of the top three players in NBA Efficiency. In contrast, for two seasons the leader in Wins Produced was not named on a single ballot for MVP. In three other seasons, the most productive player did not place higher than tenth in MVP voting. As we stated earlier, there is a clear difference between popular perception and our statistical analysis of wins. We would note once again, our measure of performance is well connected to team wins. As a result, one might question the validity of popular perception.

Beyond the discrepancy between perception and our measurement, what else do we learn from our list of most productive players? Point guard Jason Kidd was the only player to lead the league in Wins Produced and also play in the backcourt. In other words, the biggest players always tend to be the most productive. It is important to note that how we calculate wins assumes that the number of wins produced at each position across the league is the same. In other words, if you add up all the wins produced by the centers in the league it will equal the number of wins created by all the point guards. This will not be true on any particular team, but it is true for the league. Yet, despite the equality of wins across positions, big men dominate the top of our rankings.

The reason for this result is "the short supply of tall people"—yes, we still love saying that. Because big men are relatively scarce in the population, the supply of these players is quite small. As we noted when we discussed the work of Gould, when the supply of athletes is relatively small, teams are forced to employ players that are not as talented. Consequently, the variation in player performance tends to be very large. When this happens, the best players perform well above the average. What does all this mean for our player rankings? The best power forwards and centers will perform further from the average at their position. The best guards will perform closer to the average at their position. When you rank players relative to position average—which we do—the very top of your rankings will be dominated by frontcourt performers.

In 2005 Shaq finished second in voting for MVP. People claimed in the summer of 2005 that it was absurd that a player of O'Neal's obvious skills was only able to secure one MVP prize over the course of his illustrious career. On this point, though, our rankings and the sports writers agree. Although Shaq has consistently been one of the top players in the league, the year he was named MVP was the only year he led the league in Wins Produced. It is interesting that given the lack of talent at the center position, a player like Shaq has been unable to consistently distance himself far enough from the average at his position to claim the highest ranking in Wins Produced. Still, this is the story the data tell.

Who Is the Best? One Answer

So who is the best? Over the past ten years, our answer is Kevin Garnett. Let's spend a few moments reviewing Garnett's career. Although he was named MVP in 2004, Garnett's team has never come close to winning an NBA championship, an accomplishment many feel is a prerequisite to be considered the best in the game. Consequently, Garnett is not known for finding ultimate success on the hardwood. In fact, his career might be best known for what has happened to Garnett off the court.

Garnett has made headlines in his career for two accomplishments. In 1995 he became the first player in twenty years to make the jump from high school to the NBA. This move began a wave of players going from high school directly to the NBA, a practice that has ended with the age limit imposed by the 2005 collective bargaining agreement between the league and its players.

The 2005 collective bargaining agreement was not the first impacted by Garnett. In 1997 Garnett signed an unprecedented $126 million, six-year contract, with the Timberwolves. Primarily because of this contract the NBA became the first major North American sports league to actually impose a salary cap. Whereas the NBA and NFL had previously enacted caps on team payrolls, in 1999 the NBA

Table 7.9

Ten Years of Kevin Garnett

Year	RANK Wins Produced	RANK NBA Efficiency	Wins Produced	WP48
2004–05	1	1	30.0	0.462
2003–04	1	1	30.5	0.453
2002–03	1	1	31.5	0.455
2001–02	3	2	23.0	0.347
2000–01	6	2	18.2	0.273
1999–00	4	2	20.6	0.305
1998–99	9	7	10.1	0.272
1997–98	9	5	16.8	0.250
1996–97	25	23	12.0	0.193
1995–96	50	74	8.1	0.169
AVERAGES			20.1	0.326

enacted a cap on individual player salaries, preventing players from gaining a contract like the one offered Garnett.[21]

Beyond his impact on labor relations, Garnett has also been extremely productive. As detailed in Table 7.9, Garnett led the NBA in Wins Produced for three seasons and placed in the top ten every season from 1997–98 to 2004–05. If one compares our ranking to the NBA Efficiency rankings, we see a great deal of similarity. So for at least Garnett, the NBA's measure and our measure tend to agree.

Still, is Garnett the best? Garnett produced 200 wins over his first ten years, a total that leads all players across this time frame. To put this in perspective, Shaq only produced 168 win in this time period. Tim Duncan comes close to Garnett's per year average of 20 wins, averaging 19.6 wins from 1997–98 to 2004–05. In fact, Duncan's WP48 was 0.335 over his first eight seasons, which slightly exceeds Garnett's career production. Therefore we could argue that Duncan is the best. Actually, if we consider Shaq's career up until the 2004–05 season, his WP48 was 0.344. So we guess one could claim he is also the best. Still, if the question is "Who is the best?," you have to pick a criterion. Our criterion is most Wins Produced since 1995–96, and by this measure, Garnett is the tops. As we will see in the next chapter, though, we are not married to our criteria or our answer.

How about "The Answer"?

President Harry Truman reportedly once asked for one-armed economists. His request was motivated by the tendency economists have for saying "On the other hand . . ." As economists we suffer from this affliction. We just stated that Garnett is the best in terms of Wins Produced, but then quickly note that if we look at

WP48 we could make a case for Tim Duncan or maybe Shaquille O'Neal. Such wishy-washiness might lead one to believe that if you tweaked the numbers enough our answer could be just about anyone.

Let's address this concern by looking at "The Answer," Allen Iverson. We observed in Chapter Five that Iverson's production for the entire 2003–04 campaign was worth less than one win. We also noted that this was his worst season, and as we report in Table 7.10, whether one considers Wins Produced or NBA Efficiency, this is the conclusion you reach.

So Iverson was at his worst in 2003–04. When was he at his best? According to Wins Produced and the NBA Efficiency model, 2004–05 was his best campaign. The sports writers, though, tell a different tale. In 2000–01 the writers gave Iverson the league's MVP award. This particular season may illustrate best the greatness and weakness of Iverson. That season AI led the NBA in both points scored and steals per game. In other words, by these two metrics, it appeared that Iverson dominated the game at both ends of the court. Furthermore, his team finished with 56 wins, the best record in the Eastern Conference and the second best mark in the league. If these were the only numbers one looked at, you might conclude that Iverson was at least one of the best players in the league.

Unfortunately there are other numbers. We have already noted Iverson's propensity to commit turnovers. Unlike other seasons, he did not lead the league in this category, although his 3.3 turnovers per game did rank fifth. His prodigious scoring is also suspect, since his shooting efficiency was again quite low. From beyond the arc he only converted 32% of his shots. His range from two-point range was only 44%. As we said before, Iverson achieves his scoring totals by taking a large number of shots. His 25.5 field goal attempts per game represented nearly a

TABLE 7.10

Nine Years of Allen Iverson

Year	Rank: Wins Produced	Rank: NBA Efficiency	Wins Produced	WP48
2004–05	36	7	10.0	0.152
2003–04	227	111	0.9	0.020
2002–03	72	15	6.2	0.086
2001–02	160	45	2.6	0.047
2000–01	91	52	5.2	0.083
1999–00	188	44	1.7	0.029
1998–99	47	18	5.6	0.136
1997–98	40	20	9.2	0.140
1996–97	187	37	1.5	0.023
AVERAGES	116.4	38.8	4.8	0.081

third of the shots Philadelphia took per game that season. If this were baseball, a sport where efficiency is king, people would have trouble arguing that Iverson is one of the best players. Simply stated, his efficiency measures are below average. Consequently, when we look at all the numbers we see that Iverson's MVP season was not one of his best. And this is the answer you reach whether you consider the NBA Efficiency metric or Iverson's Wins Produced.

At the end of the day, by some numbers Iverson is truly great. By other numbers, though, he is very far below the average player. When you summarize the great and the not-so-great into one metric, the net value of Iverson during his career is a bit below the average NBA player. We would add that not only is Iverson not one of the best players in the league, he has generally not been the most productive player on his own team. Only in the 1997–98 campaign did he lead his team in Wins Produced.[22]

CATCHING A DRAFT IN 1996

Let's tell one more Iverson story before moving on. In 1996 Philadelphia took Iverson with the first choice in the NBA draft. Was this a wise choice? To answer this question, let's examine the first round of that draft.

In Table 7.11 we examine how the players chosen in the first round fared across the first nine years of their careers. In this table we report where the player was taken in the draft and where the player ranks in career Wins Produced, NBA Efficiency, and salary. Finally, we report Wins Produced, WP48, and career earnings for each player.

What stands out in this table? The first item of interest is that these 29 players earned over $1 billion in their careers after the 2004–05 campaign. On average each player has earned more than $35 million. Clearly, being an NBA player is a fairly lucrative job. Of course each year less than 500 people in the world get to have such a job. Given the population of people living in the United States and the world, odds are heavily against any person achieving his dream of playing hoops in the NBA.

Beyond noting the amazing amounts of money these athletes earn, how would the draft have been played out if NBA decision makers (a) knew how many wins each player would produce in the first nine years of their career and (b) actually considered Wins Produced in making decisions?

Given these two conditions, Philadelphia would have selected with the first pick its own native son, Kobe Bryant. Bryant, following in the footsteps of Kevin Garnett, was only seventeen years old when the 1996 draft was held. Coming straight

Table 7.11

Reliving the First Round of the 1996 NBA Draft: Career Performances from 1996–97 to 2004–05

Name	Draft Position	Rank Career Wins Produced	Rank Career NBA Efficiency	Rank Career Salary	Wins Produced	WP48	Career Salary
Allen Iverson	1	11	6	1	42.9	0.081	$79,812,640
Marcus Camby	2	4	10	10	68.5	0.230	$49,197,240
Shareef Abdur-Rahim	3	3	1	2	80.8	0.156	$78,421,760
Stephon Marbury	4	7	3	3	60.0	0.112	$77,625,320
Ray Allen	5	2	5	4	87.0	0.172	$77,037,360
Antoine Walker	6	12	2	5	29.3	0.053	$76,471,080
Lorenzen Wright	7	14	11	13	25.4	0.078	$39,754,720
Kerry Kittles	8	9	14	8	52.2	0.148	$55,580,373
Samaki Walker	9	17	19	20	15.7	0.100	$14,980,633
Erick Dampier	10	15	13	11	25.0	0.083	$43,434,380
Todd Fuller	11	28	23	23	–2.1	–0.040	$4,975,240
Vitaly Potapenko	12	26	17	14	–1.1	–0.005	$33,643,060
Kobe Bryant	13	1	4	6	90.0	0.197	$73,929,240
Predrag Stojakovic	14	8	9	16	54.2	0.157	$26,827,900
Steve Nash	15	5	7	12	67.9	0.178	$40,160,120
Tony Delk	16	18	18	19	11.2	0.047	$16,536,680
Jermaine O'Neal	17	10	8	9	46.0	0.147	$54,798,640
John Wallace	18	21	21	22	0.2	0.002	$10,352,799
Walter McCarty	19	29	20	21	–6.4	–0.030	$14,082,495
Zydrunas Ilgauskas	20	13	12	7	26.4	0.105	$73,364,000
Dontae Jones	21	25	29	25	–0.8	–0.410	$2,439,736
Roy Rogers	22	22	24	24	0.0	0.000	$3,298,140
Efthimios Rentzias	23	24	28	29	–0.4	–0.138	$903,360
Derek Fisher	24	16	16	17	17.0	0.054	$22,393,200
Martin Muursepp	25	23	25	28	–0.1	–0.003	$1,839,320
Jerome Williams	26	6	15	15	64.4	0.242	$29,216,180
Brian Evans	27	20	26	27	1.0	0.042	$1,845,325
Priest Lauderdale	28	27	27	26	–1.5	–0.134	$1,890,200
Travis Knight	29	19	22	18	3.0	0.032	$18,220,000
				TOTAL	855.8	—	$1,023,031,141
				AVERAGES	29.5	0.115	$35,276,936

to the NBA from high school, there was a fair amount of uncertainty about his future prospects. The game we are playing here is one where the decision maker knows exactly what these players would do in the NBA. If the people drafting these players knew the future, and if career Wins Produced were the criterion used to make the selection, then Bryant would have been chosen number one.

Of course people did not have perfect foresight. Bryant was ultimately selected thirteenth by the Charlotte Hornets, who traded him to the Los Angeles Lakers. As we noted, there he teamed with Shaq to win three titles. That story we have told. What other stories can we tell about the 1996 draft?

Following the condition of perfect foresight, the players following Bryant in the draft would have been Ray Allen, Shareef Abdur-Rahim, Marcus Camby, and Steve Nash. Allen Iverson would have been selected eleventh, one spot before the aforementioned Antoine Walker was chosen.

What if decision makers could see the future but used the NBA's Efficiency metric to rank the players? By this measure, Abdur-Rahim would have been selected first, followed by Walker, Stephon Marbury, Kobe Bryant, and Ray Allen. Under this scenario, Iverson would have been chosen sixth. Interestingly all these players have received the maximum salary the NBA's rules allow. Each of the six players earned more than $70 million through the 2004–05 season, with the differences in compensation due entirely to differences in each player's actual draft position. The NBA imposed a strict rookie salary scale in the 1995 collective bargaining agreement, which set the salary each of these players earned the first three years of their respective careers. One should note that Zydrunas Ilgauskas is the only other maximum salary player on this list. Injuries have limited his playing time, hence in terms of Wins Produced and NBA Efficiency he only ranks thirteenth and twelfth, respectively.

Despite the case of Ilgauskas, NBA Efficiency and career salary are highly correlated in our sample. The simple correlation coefficient between these two measures is 94%. Although the initial salary paid these players was set by their draft position, the money these players earned after three years, which for most players is the bulk of their career salary, was set by decision makers in the NBA who had seen these players play. The strong correlation between NBA's performance metric and career salary suggests that decision makers evaluate talent in a fashion consistent with the NBA Efficiency measure. Consequently, players like Walker and Iverson, who are prolific yet inefficient scorers, are paid very well by the NBA although their measured contribution to team wins is relatively meager.

We will return to this story in Chapter Ten, where we examine in detail the link in the NBA between salary and performance. For now, though, let's take our Wins Produced metric for a ride and see what other stories it can tell.