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Summer 2004

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Ralph C. Anzivino
Marquette University Law School, ralph.anzivino@marquette.edu

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Repository Citation
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The Correlation Between Team Payroll and Competitive Performance in Professional Sports Leagues

By Ralph C. Anzivino

At the beginning of every sports season, most fans' anticipation runs high and their expectations run wild. Every fan of course hopes his team will be the world champion. How much of the fan's enthusiasm, however, should be tempered by the amount of money that has been spent (or not spent) on the team's payroll? Each team's payroll for the upcoming season is generally public knowledge. It's a simple matter to compare each team's total payroll with the other teams in the league. As expected, there is a large range in total team payroll from the teams at the top of the range to the teams on the bottom of the range.

This article examines the correlation, if any, between a team's total payroll and its competitive performance within its league and among the leagues. The analysis will examine the National Football League (NFL), the National Hockey League (NHL),

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Team Payroll and Competitive Performance

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the National Basketball Association (NBA) and Major League Baseball (MLB). Eighteen different correlations will be calculated and studied.

The 18 correlations are designed to measure whether being in the top quartile of payrolls provides a competitive advantage or whether being in the bottom quartile of payrolls provides a competitive disadvantage. All the correlations/comparisons are presented such that the league with the highest rating (a #1) provides the greatest advantage or the greatest disadvantage in being competitive.

The correlations include a comparison between those teams in the top quartile of total team payroll for a particular season and whether those teams finished the season in the top or bottom quartile by record;[1] had a winning or losing record; qualified for the "final four"; and won the world championship for that particular season. In addition, for a team in the bottom quartile of total team payroll for a particular season, a comparison was made to determine whether those teams finished in the bottom or top quartile for the season by record; had a losing or winning record; qualified for the "Final Four"; and won the world championship for that particular season.

Simply stated, if a team is in the top or bottom of the range of total team payrolls, what is the relative chance of that team finishing in the top or bottom quartile by record for the season; having a winning or losing record; getting to the "Final Four" and winning a world championship? The question is how much of the season's outcome is preordained by total team payroll?

Each league's approach to team payrolls

The four professional sports leagues have each taken a different approach to their teams' payrolls.[2] Three of the four leagues attempt to link total payroll costs to some mathematical formula. The three leagues have had varying degrees of success.

The NFL uses what is described as a "hard cap." The NFL "hard cap" has been in effect since the 1994 season. The amount of the total payroll cap is calculated by multiplying a varying percentage specified in the collective bargaining agreement times the league's defined gross revenue.[3] The total number of teams is then divided into the total payroll cap to determine each team's individual cap.

For the 2003-04 season, the individual teams ranged from the New Orleans Saints $85,886,810 to the Cleveland Browns $56,016,540. The NFL team cap for the 2003-04 season was $75 million.[4] Teams are permitted to exceed the cap, but only in very limited circumstances. No teams exceeded the cap for the 2003-04 season.

The NBA has what is generally referred to as a "soft cap." The NBA "soft cap" has been in effect since the 1994-95 season. NBA teams are permitted to exceed the cap if they qualify under certain exceptions defined in the collective bargaining agreement. The exceptions generally apply to players that meet specific requirements. For example, the Larry Bird exception permits a team to sign its own free agent to a contract that would cause the team to exceed the payroll cap.[5] The league's total payroll cap is set at a varying percent of the previous season's basketball-related income and divided by the number of teams to calculate each team's individual cap.[6]

For the 2002-03 season, the NBA

individual team cap was $40.271 million[7] and 16 teams[8] exceeded the cap. For those teams that exceeded the cap without qualifying under one of the exceptions, the league imposes a luxury tax in the amount of 100 percent of the amount in excess of the cap.[9] In addition to the luxury tax, the NBA uses an escrow system to control costs.[10] For the 2002-03 season, the individual team payrolls in the NBA ran from the Portland Trailblazers $105,203,033 to the Los Angeles Clippers $42,768,280.

Major League Baseball does not have a cap or formula that connects league revenues and team payrolls. Rather, MLB uses a "competitive balance tax" as it is called in the collective bargaining agreement or a "luxury tax" as it is generally known in the sports world. The luxury tax has been in effect since the 1995 season. The luxury tax is assessed at a varying rate per season against the amount that a team exceeds the pre-agreed spending limit in the collective bargaining agreement for the particular season.[11]

For the 2002-03 season, the MLB luxury tax was 17.5 percent[12] and the pre-agreed limit was $117 million.[13] Only the New York Yankees exceeded the pre-agreed limit and paid the luxury tax. For the 2003 season, the range of total team payrolls in MLB ran from the New York Yankees $149,710,995 to the Tampa Bay Devil Rays $19,630,000.

The NHL has no payroll caps and no luxury tax. The current collective bargaining agreement expires on Sept. 15, 2004. The league has indicated that its No. 1 priority is to agree with the player's union on some formula for player "cost certainty."[14] It is rumored that the league wants an NFL "hard cap" approach[15] and the players, at best, might consider the MLB approach of a luxury tax.[16]

For the 2002-03 season, the range of individual team payrolls in the NHL ran from the New York Rangers $79,686,085 to the Minnesota Wild $20,743,750.

A snapshot among the leagues of the disparity between the highest and lowest team payrolls for the seasons noted above is as follows:

COMPARISON OF HIGHEST AND LOWEST TEAM PAYROLLS BY LEAGUE

League	Highest	Lowest	Difference
1. MLB	149.7M	19.6M	130.1M
2. NBA	105.2M	42.8M	62.4M
3. NHL	79.7M	20.7M	59.0M
4. NFL	85.9M	56.0M	29.9M

Number of seasons analyzed

The first determination was to decide the number of seasons to analyze in each league. Nine seasons were analyzed in the NHL from the '94-'95 season through the '02-'03 season. Nine seasons cover all the seasons under the current NHL collective bargaining agreement that expires this year. Nine seasons were analyzed in MLB from the 1995 season through the 2003 season. Nine seasons cover all the seasons under the current MLB collective bargaining agreement.[17] Nine seasons were also analyzed in the NBA from the '94-'95 season through the '02-'03 season. Albeit the NBA has had a payroll cap for 20 years,[18] but seasons were analyzed to be consistent with the NHL and MLB. Finally, 10 seasons were analyzed for the NFL from the 1994 season through the 2003 season. Ten seasons cover all the seasons under the current NFL collective bargaining agreement.[19]

Top-quartile payroll – top-quartile season record

If a team is in the top quartile of team payroll in its league, what is the probability of that team finishing the season in the top quartile by season record? The top quartile for the NFL, NBA and MLB were determined by their win/loss record for each season. For the NHL, total points were used to rank the teams. For each league, Chart 1 depicts the correlation.

CHART 1: Top-quartile payroll – top-quartile season record

1. NHL	54.5 percent
2. MLB	49.3 percent
3. NBA	42.9 percent
4. NFL	32.9 percent

The NHL has the highest correlation between team payroll and season finish. The odds are better than 50-50 in the NHL that if a team is in the top quartile by payroll it will finish in the top quartile by record as well. It's the only league where the probability is greater than 50 percent. MLB is almost an even chance at 49.3 percent and the NBA is modestly below the 50 percent mark at 41.3 percent. Notably, the NFL has the lowest correlation between total team payroll and team finish. Factors other than money play an increasingly larger role in a team's performance as one progresses in the chart from the NHL to the NFL.

Bottom-quartile payroll – top-quartile season record

If a team is in the bottom quartile of team payroll in its league, what is the probability of that team finishing the season in the top quartile by record? Chart 2 depicts those probabilities in each league.

CHART 2: Bottom-quartile payroll – top-quartile season record

1. NHL	6.1 percent
2. NBA	7.9 percent
3. MLB	10.1 percent
4. NFL	21.5 percent

The NHL provides the least opportunity for a team in the bottom quartile of payrolls to finish the season in the top quartile by record. Teams in the bottom quartile of payroll in the NFL have the best chance to finish the season in the top quartile by record.

Inter-league comparison (top quartile v. bottom quartile) – top-quartile season record

A comparison can be drawn in each league between teams in the top quartile of payrolls with teams in the bottom quartile and the relative probability of finishing the season in the top quartile by record. Chart 3 illustrates the relative comparisons

A team in the top quartile by payroll in the NHL has a drastically better chance (54.5 percent) of finishing the season in the top quartile by record than a team in the bottom quartile by payroll (6.1 percent) by a nearly 9/1 margin. There are also significant advantages in the NBA (5.4/1) and MLB (4.9/1) for a

CHART 3: Inter-league comparison of the relative chances of a team in the top quartile of payrolls with a team in the bottom quartile — finishing the season in the top quartile by record

	Top payroll	Bottom payroll	Relative chances
1. NHL	54.5 percent	6.1 percent	8.9/1
2. NBA	42.9 percent	7.9 percent	5.4/1
3. MLB	49.3 percent	10.1 percent	4.9/1
4. NFL	32.9 percent	21.5 percent	1.5/1

team in the top quartile by payroll over a team in the bottom quartile. By contrast, in the NFL, a team in the top quartile of payrolls has a slightly better chance (32.9 percent) of finishing the season in the top quartile by record than a team in the bottom quartile of payrolls (21.5 percent) by a margin of 1.5/1.

Top-quartile payroll – winning season

If a team is in the top quartile of team payrolls in its league, what is the probability of that team having a winning season? A winning season is defined as a team that finishes in the top half of the league by a winning percentage (NBA, MLB, NFL) or points won (NHL). In terms of quartiles, a team that finishes in the first or second quartile in a season would qualify as having a winning season.

Understandably, a team could have a winning season and not reach its expectations or potential, but the goal in this section is to measure the correlation between individual team payroll and winning. For each league, Chart 4 depicts the correlation between being a team in the top quartile by payroll and the team's probability of having a winning season.

CHART 4: Top-quartile payroll – winning season

1. MLB	76.8 percent
2. NHL	74.2 percent
3. NBA	68.3 percent
4. NFL	55.7 percent

MLB has the highest correlation between a team's payroll and whether it will have a winning season. The correlation is approaching 80 percent for MLB. Even the NFL shows a better than 50-50 chance of having a winning season if a team is in the top quartile of payrolls. Notably, all the leagues show a high correlation between being in the top quartile of payrolls and having a winning season. Clearly, there is a high correlation between spending and winning in all the leagues.

Bottom-quartile payroll – winning season

If a team is in the bottom quartile of team payroll in its league, what is the probability of that team having a winning season? A winning season is defined as a team that finishes in the top half of the league by a winning percentage (NBA, NFL, MLB) or by points won (NHL). In terms of quartiles, a team that finishes in the first or second quartile in a season would qualify as having a winning season. For each league, Chart 5 illustrates the correlation between being a team in the bottom quartile of the payrolls and its probability of having a winning season.

CHART 5: Bottom-quartile payroll – winning season

1. MLB	20.3 percent
2. NBA	27.0 percent
3. NHL	27.2 percent
4. NFL	45.6 percent

No team in the bottom quartile of payrolls in any of the leagues has a 50-50 chance of having a winning season. It is most difficult in MLB for a team in the bottom quartile of payrolls to have a winning season. The NFL provides an almost even chance for a team in the bottom quartile of payrolls to have a winning season. Overall, the probabilities of having a winning season for a team in the bottom quartile of payroll in the NHL, NBA and MLB are significantly low.

Inter-league comparison (top quartile v. bottom quartile) – winning season

A comparison can be drawn in each league between teams in the top quartile of payrolls with teams in the bottom quartile and the relative probability of finishing the season with a winning record. Chart 6 illustrates the comparison.

CHART 6: Inter-league comparison of the relative chances of a team in the top quartile of payrolls with a team in the bottom quartile — having a winning season

	Top quartile	Bottom quartile	Relative chances
1. MLB	76.8 percent	20.3 percent	3.8/1
2. NHL	74.2 percent	27.2 percent	2.7/1
3. NBA	68.3 percent	27.0 percent	2.5/1
4. NFL	55.7 percent	45.6 percent	1.2/1

MLB provides the greatest advantage for a team in top quartile of payrolls over a team in the bottom quartile of having a winning season. The advantage is nearly 4/1. The NHL (2.7/1) and NBA (2.5/1) advantage is approaching 3/1 of a top-quartile team over a bottom-quartile one. In the NFL, a top-quartile team has a slightly better chance (55.7 percent) than a bottom-quartile team (46.8 percent) of having a winning season by a margin of 1.2/1. Clearly, total team payroll plays a significant role in a team's chances of having a winning season within a league and among the leagues.

Top quartile payroll – Final Four appearances

If a team is in the top quartile by team payroll, what is the probability of that team making it to the Final Four in the playoffs? A Final Four appearance is not a championship, but it is certainly a measure of outstanding performance. Each league has between 28 and 32 teams competing for a championship; A Final Four appearance is a mark of excellence. For each league, Chart 7 depicts the correlation.

CHART 7: Top-quartile payroll – relative chance to make the Final Four

1. MLB	30.4 percent
2. NHL	30.3 percent
3. NBA	28.6 percent
4. NFL	10.1 percent

MLB shows the highest correlation between a team's payroll and whether it

will qualify for a Final Four appearance. In actuality, there is only a small difference between MLB, the NHL and the NBA regarding a team's chances of getting to the Final Four. The three leagues each hover around a 30-percent chance. Interestingly, the correlation between a top-quartile team by payroll and a Final Four appearance is three times greater in MLB, the NHL and the NBA when compared with the NFL.

Factors other than money are in greater play in the NFL. For example, in the NFL the playoffs involve only a single game and in the other leagues a series is played. The chances for an upset outcome are necessarily greater where only a single game is determinative.

Another way to illustrate the Final Four data is to ask how many of the Final Four positions have been filled by teams in the top quartile of payrolls? There are 36 (Final Four) positions in the NFL, NBA and MLB (9 seasons X 4) and 40 positions in the NFL (10 seasons X 4). The actual number of teams from the top quartile of payrolls that have qualified for the Final Four are 21 in MLB; 20 in the NHL; 18 in the NBA and 8 in the NFL. Chart 7A depicts the correlation.

CHART 7A: Top-quartile payroll – percent of Final Four appearances

1. MLB	58.3 percent
2. NHL	55.6 percent
3. NBA	50.0 percent
4. NFL	20.0 percent

MLB has the largest number of teams from the top quartile of payrolls making the Final Four. Notably, in MLB, the NHL and the NBA, 50 percent or more of the Final Four teams are the teams with the highest payrolls.

Bottom-quartile payroll – Final Four appearance

If a team is in the bottom quartile of team payrolls, what is the chance of that team making it to the Final Four in the playoffs? For each league, Chart 8 depicts that correlation.

CHART 8: Bottom-quartile payroll – relative chance to make the Final Four

1. MLB	2.9 percent
2. NBA	4.8 percent
3. NHL	6.1 percent
4. NFL	15.2 percent

MLB offers the least opportunity (2.9 percent) for a team in the bottom quartile of payrolls to make the Final Four. The chances are somewhat better in the NBA (4.8 percent) and the NHL (6.1 percent). The NFL clearly offers the best opportunity.

Another way to display the data is to ask how many of the Final Four positions have been filled by teams in the bottom quartile of payrolls? There are 36 Final Four positions in the NFL, NBA and MLB (9 seasons X 4) and 40 Final Four positions in the NFL (10 seasons X 4). The actual number of teams from the bottom quartile of payrolls that have qualified for the Final Four are two in MLB; three in the NBA; four in the NHL and 12 in the NFL. Chart 8A shows the correlation.

CHART 8A: Bottom-quartile payroll – percent of Final Four appearances

1. MLB	5.6 percent
2. NBA	8.3 percent
3. NHL	11.1 percent
4. NFL	30.0 percent

Inter-league comparison (top quartile v. bottom quartile) – Final Four

A comparison can be drawn in each league between teams in the top quartile of payrolls with teams in the bottom quartile regarding their chances of making the Final Four. Chart 9 depicts the comparison.

CHART 9: Inter-league comparison of the relative chances of a team in the top quartile of payrolls with a team in the bottom quartile — making the Final Four

	Top quartile	Bottom quartile	Comparison
1. MLB	30.4 percent	2.9 percent	10/1
2. NBA	28.6 percent	4.8 percent	6/1
3. NHL	30.3 percent	6.1 percent	5/1
4. NFL	10.1 percent	15.2 percent	Even chance

MLB shows the greatest disparity (advantage) between a top-quartile team by payroll and a bottom-quartile team's chances of getting to the Final Four. The disparity is 10/1 in MLB. There are also very significant advantages in the NBA (6/1) and the NHL (5/1). Notably, whether a team is in the top or bottom quartile in the NFL, that team has an equal chance of making the Final Four. Remarkably, over the past 10 seasons, teams in the bottom quartile (15.2 percent) have made it to the Final Four more often than teams in the top quartile (10.1 percent).

Top-quartile payroll – eventual champion

If a team is in the top quartile of team payroll, what is the probability of a top-quartile team winning the world championship? For each league, Chart 10 depicts the correlation.

CHART 10: Top-quartile payroll – eventual champion

	Quartile's chances	Team's chances[20]
1. MLB 7 teams/9 seasons	77.8 %	9.7 %
2. NHL 6 teams/9 seasons	66.7 %	8.3 %
3. NBA 4 teams/9 seasons	44.4 %	6.3 %
4. NFL 3 teams/10 seasons	30 %	3.8 %

MLB has the highest correlation between a high payroll and a team's chances of winning the world championship. In seven out of the last nine seasons, the World Series winner came from a team in the top quartile of payrolls. The NHL has had six teams from the top quartile of payrolls win the Stanley Cup in the last nine seasons. The NBA has had four teams from the top quartile win the world championship in the last nine years. Finally, three teams from the top quartile have won the Super Bowl in the last 10 seasons.

Bottom-quartile payroll – eventual champion

If a team is in the bottom quartile of team payroll, what is the probability of a bottom-quartile team winning the

world championship? For each league, Chart 11 depicts the correlation.

CHART 11: Bottom-quartile payroll – eventual champion

		Quartile's chances	Team's chances[21]
1. NHL	(0 teams/9 seasons)	0 %	0 %
2. MLB	(1 team/9 seasons)	11 %	1.39 %
3. NBA	(1 team/9 seasons)	11 %	1.59 %
4. NFL	(2 teams/10 seasons)	20 %	2.5 %

No team in the bottom quartile of payrolls has won the Stanley Cup in the past nine seasons. Only one team in the past nine seasons in both the NBA (Houston Rockets) and MLB (Florida Marlins) has won the world championship while being in the bottom quartile by payroll. Two teams in the NFL (New England Patriots and Green Bay Packers) in 10 seasons won the Super Bowl while being in the bottom quartile of payroll.

Inter-league comparison (top quartile v. bottom quartile) – eventual champion

A comparison can be drawn among the leagues between teams in the top quartile of payrolls with teams in the bottom quartile regarding their chances of winning the World Championship. Chart 12 depicts the comparison.

CHART 12: Inter-league comparison of the top quartile by payroll with the bottom quartile and the relative chances of winning a world championship.

	Top quartile	Bottom quartile	Comparison
1. NHL	66.7 %	0 %	None
2. MLB	77.8 %	11.1 %	7/1 Advantage
3. NBA	44.4 %	11.1 %	4/1 Advantage
4. NFL	30.0 %	20.0 %	1.5/1 Advantage

Teams in the top quartile by payroll in the NHL have the greatest advantage over a bottom-quartile team in terms of winning a world championship. A team in the top quartile of payrolls has a 7/1 advantage in MLB; 4/1 advantage in the NBA and 1.5/1 advantage in the NFL over a team in the bottom quartile of payrolls.

Bottom-quartile payroll – bottom-quartile record

In addition to studying the correlation between total team payroll and winning, the converse also needs to be examined. If a team is a bottom-quartile team for total team payroll, what is the probability of that team finishing the season in the bottom quartile by record? Similar to calculating a team's winning record, the NFL, NBA and MLB were examined for their win/loss record for each season. For the NHL, total points were used to rank the teams. For each league, Chart 13 depicts the correlation between a team being in the bottom quartile of payrolls and the probability of finishing the season in the bottom quartile by record.

CHART 13: Bottom-quartile payroll – bottom-quartile record

1. NHL	54.5 percent
2. MLB	46.4 percent
3. NBA	44.4 percent
4. NFL	31.6 percent

The NHL has the highest correlation between bottom-quartile payroll and bottom quartile by record. The odds are better than 50-50 in the NHL that if a team is in the bottom quartile of payroll it will finish in the bottom quartile for a season record. Both the NBA and MLB are very close to a 50-50 probability of a bottom-quartile finish. All three leagues show a significant correlation between a bottom-quartile payroll and bottom-quartile finish. Notably, the NFL has the least correlation between bottom-quartile payroll and a bottom-quartile finish.

Top-quartile payroll – bottom-quartile record

If a team is in the top quartile of teams for total payroll, what is the probability of that team finishing the season in the bottom quartile of teams by record? This obviously is the fan and management's worst-case scenario. The money has been paid to acquire the talent, but the team's record for the season shows them in the bottom quartile for performance. How often do high-paying teams end up in the bottom quartile by record? Chart 14 depicts the relationship.

CHART 14: Top quartile payroll – bottom quartile by record

1. NHL	7.6 percent
2. MLB	8.7 percent
3. NBA	14.3 percent
4. NFL	24.1 percent

The smallest chance for a team in the top quartile of payrolls to finish the season in the bottom quartile for record is in the NHL. The chances are also relatively small in MLB and the NBA. Overall, the chances are not very great that a team in the top quartile by payroll will finish the season in the bottom quartile for record. The greatest chance for a team in the top quartile of payrolls to finish the season in the bottom quartile for record is in the NFL.

Inter-league comparison (bottom quartile v. top quartile) – bottom-quartile season record

A correlation can be drawn among the leagues between a team in the bottom quartile by payroll with a team in the top quartile and their relative probability of finishing the season in the bottom quartile by record. Chart 15 illustrates the relationship.

The NHL has the greatest disparity when comparing the chances of a bottom-payroll team to a top-payroll team's chances of finishing the season in the bottom quartile by record. The chances are more than 7/1 greater in the NHL. The chances are more than 5/1 in MLB and more than 3/1 higher in the NBA. In the NFL, the chances of a team in the bottom quartile of payroll finishing the season in the bottom quartile for record is only slightly greater (1.3/1) than a team in the top quartile of payroll. Payroll does not appear to be a dominant factor in determining team performance in the NFL.

Unquestionably, in the other leagues a team's chances of finishing the season in the bottom quartile for record is significantly linked to a team's total payroll.

Bottom-quartile payroll – losing season

If a team is in the bottom quartile of team payroll, what is the probability of that team having a losing season? A los-

CHART 15: Inter-league comparison of the relative chances of a team in the bottom quartile of payrolls with a team in the top quartile — finishing the season in the bottom quartile by record

	Bottom quartile	Top quartile	Relative chance
1. NHL	54.5 %	7.6 %	7.2/1
2. MLB	46.4 %	8.7 %	5.3/1
3. NBA	44.4 %	14.3 %	3.1/1
4. NFL	31.6 %	24.1 %	1.3/1

ing season is defined as a team that finishes in the bottom half of the league by winning percentage (NBA, MLB, NFL) or points won (NHL). In terms of quartiles, a team that finishes in the third or fourth quartile in a season would qualify as having a losing season. For each league, Chart 16 depicts the correlation between a bottom-quartile payroll team and its probability of having a losing season.

CHART 16: Bottom-quartile payroll – losing season

1. MLB	79.7 percent
2. NBA	73.0 percent
3. NHL	72.7 percent
4. NFL	54.4 percent

The MLB has the highest correlation between a team's payroll and whether it will have a losing season. The correlation for MLB is 80 percent. All the leagues show a high correlation between a bottom-quartile payroll and a losing season. The NFL has the lowest correlation, but even that correlation is greater than 50-50 for a losing season. There is a strong correlation between low team payroll and a losing season.

Top-quartile payroll – losing season

If a team is in the top quartile of team payroll in its league, what is the probability of that team having a losing season? Chart 17 depicts the relationship.

CHART 17: Top-quartile payroll – losing season

1. MLB	23.2 percent
2. NHL	25.8 percent
3. NBA	31.8 percent
4. NFL	44.3 percent

By varying margins, a team in the top quartile of payrolls is significantly insulated from having a losing season. MLB provides the greatest insulation from having a losing season. The NHL and the NBA also provide significant insulation for a team in the top quartile of payrolls from having a losing record. The NFL provides the least insulation from having a losing season.

Inter-league comparison (bottom quartile v. top quartile) – losing season

A correlation can be drawn among the leagues between a team in the top and bottom quartile by payroll and their relative probability of suffering a losing season. Chart 18 illustrates the relative significance.

CHART 18: Inter-league comparison of the relative chances of a team in the bottom quartile of payrolls with a team in the top quartile — having a losing season

	Bottom quartile	Top quartile	Relative chances
1. MLB	79.7 %	23.2 %	3.4/1
2. NHL	72.7 %	25.8 %	2.8/1
3. NBA	73.0 %	31.8 %	2.3/1
4. NFL	54.4 %	44.3 %	1.2/1

The MLB provides the greatest insulation among the leagues between a top and bottom payroll team's chance of having a losing season. The chances of a bottom-payroll team having a losing season are more than 3/1 greater in MLB. Significantly, the chances of having a losing season are more than 2/1 greater in both the NHL (2.8/1) and the NBA (2.3/1). In the NFL, a team in the bottom quartile by payroll has a slightly better chance (54.4 percent) than a team in the top quartile (44.3 percent) of having a losing season by a margin of 1.2/1. Teams in the bottom quartile by payroll have a significantly increased chance of having a losing season when compared to teams in the top quartile by payroll in all the leagues, except the NFL.

Conclusion

The primary purpose of this article was to determine the correlation, if any, between total team payroll and competitive performance. The author's method was to calculate 18 different correlations to measure the relative effect on competitive performance of team payroll within each league and the comparative effect among the leagues. Those are two distinctly, separate issues. The first issue is whether a team with a high payroll has a competitive advantage over a team with a low payroll and if so, is it a significant advantage? The second issue is what is the comparative advantage among the leagues, if any, between a high payroll and a low payroll team?

The first issue is whether a team with a high payroll has a competitive advantage over a team with a low payroll? The answer is unequivocally yes, but the extent of the advantage will vary by league. Chart 3 indicates that in *all* the leagues, a team with a high payroll has a greater chance to finish the season in the top quartile by record than a low-payroll team. The advantage is relatively modest in the NFL (1.5/1), but becomes increasing significant in the NHL (4.9/1); in the NBA (5.4/1); and MLB (8.9/1). Similarly, Chart 15 indicates that in *all* the leagues, a team with a low payroll has a greater chance to finish the season in the bottom quartile than a high-payroll team. The disadvantage is relatively modest in the NFL (1.3/1), but becomes increasingly significant in the NBA (3.1/1), MLB (5.3/1)

In *all* the leagues, a team with a high payroll has a greater chance to finish the season in the top quartile by record than a low-payroll team.

and the NHL (7.2/1). Chart 6 indicates that in *all* the leagues, a team with a high payroll has a greater chance to have a winning season than a low payroll team. The advantage is relatively modest in the NFL (1.2/1), but becomes increasingly significant in the NBA (2.5/1), the NHL (2.7/1) and MLB (3.8/1).

Similarly, Chart 18 indicates that in *all* the leagues, a team with a low payroll has a greater chance to have a losing season than a high payroll team. The disadvantage is relatively modest in the NFL (1.2/1), but becomes increasingly significant in the NBA (2.3/1); the NHL (2.8/1) and in MLB (3.4/1). Chart 9 indicates than in three of the four leagues, a team with a high payroll has a much greater chance to get to the Final Four than a low-payroll team. In the NFL, the low-payroll teams have actually made it to the Final Four slightly more often (16.5 percent) than the high-payroll teams (11.4 percent). However, the advantage is quite significant in the NHL (5/1), the NBA (6/1) and in MLB (10/1) for making the Final Four.

Finally, Chart 12 indicates that in *all* of the leagues, a team with a high payroll has a much greater chance to win the world championship than a low-payroll team. In the NHL, no team in the bottom quartile of payroll has won the Stanley Cup under the current collective bargaining agreement. In the other leagues, the advantage is relatively modest in the NFL (1.5/1), but becomes increasingly significant in the NBA (4/1) and in MLB (7/1). In sum, there is no question that high-payroll teams have a competitive advantage over low-payroll teams. Further, except for the NFL, the advantage is very significant, anti-competitive and unhealthy for the fans and the leagues.

The second issue is how are the four leagues' comparative competitiveness affected by the disparity in team payrolls? Does high payroll likely mean high success and does low payroll likely mean low success among the leagues? The six inter-league comparisons (Chart 3, 6, 12, 15 & 18) were designed to measure the relative advantages for a high-payroll team and the relative disadvantages for a low-payroll team among the leagues.

The NHL and MLB are clearly the two leagues in which team payroll and performance have the highest correlations. Each league ranked highest in three of the six correlations. A top-quartile team by payroll in the NHL has the greatest chance (Chart 3) to finish the season in the top quartile by record and the greatest chance to be the eventual champion (Chart 12). A bottom-quartile team by payroll in the NHL has the greatest chance (Chart 15) of finishing the season in the bottom quartile by record. A top-quartile team by payroll in MLB has the greatest chance (Chart 6) of having a winning season and the greatest chance (Chart 9) of qualifying for the Final Four. A bottom quartile team by payroll in MLB has the greatest chance (Chart 18) of having a losing season.

Paradoxically, in the NFL, the low-payroll teams have actually made it to the Final Four slightly more often than the high-payroll teams.

The remaining 12 comparisons were also split between MLB and the NHL. MLB had seven[22] of the highest correlations between team payroll and performance and the NHL had five.[23] On balance, MLB slightly edges out the NHL for the highest correlation between team payroll and competitive performance. The NBA is third and the NFL clearly shows the lowest correlation between team payroll and performance.

In sum, the size of a team's payroll primarily preordains success or the lack thereof, in MLB and the NHL and to a significant extent in the NBA. In the NFL, the size of a team's payroll appears to be a nominal factor in predicting a team's competitive performance.

Ralph C. Anzivino is a professor of law at Marquette University Law School and a member of the Marquette University Sports Law Institute. His e-mail is rcanzivino@aol.com.
The author thanks Joseph Behlmann, a student at the law school, for his valuable support in gathering the raw data on payroll and team performance for each league.

Endnotes

1. On quadrant classification, occasionally a number of teams had the same winning percentage (NFL, NBA, MLB) or points (NHL) and a group of them would straddle two quadrants (i.e. between 1st or 2nd, etc.) In such a case, teams were placed in the same quadrant as their salary quadrant to normalize the statistical impact.

2. Except as noted, the primary source of the payroll numbers is Professor Rodney Fort, *Sports Economics: Sports Economics Data & Bibliography*, PULLMAN.COM, *at* http://users.pullman.com/rodfort/PHSportsEcon/. The numbers for the 2003-04 NFL season are taken

from Len Pasquarelli, Saints, 'Skins Top Spenders, ESPN.COM, Nov. 21, 2003, at http://sports.espn.go.com/nfl/columns/story?columnist=pasquarelli_len&id=1667338 (last visited May 13, 2004). The Montreal Canadiens payroll for the NHL's 1998-99 season was obtained from Montreal Canadiens 1998-99 Salaries, ANGELFIRE.COM, at http://www.angelfire.com/ok/wetice/stuff/ payroll9899.html (last visited May 13, 2004). All MLB statistics were compiled from the Opening Day payroll totals. All NFL statistics were taken from total payroll amount. In the event of conflicting data sets, the number closest in date to the beginning of the season was used to reflect the team's status at the beginning of the season. Professor Fort's Web page did not contain NHL payroll information for both the 1996-97 season and the 1997-98 seasons. Those numbers were compiled by adding the individual player salaries (available on Fort's Web site) for those seasons.

3. 2002 NFL COLLECTIVE BARGAINING AGREEMENT, Article XXIV, Sec. 4, at 95, *available at* http://www.nflpa.org/Agents/main.asp?subPage=CBA+Complete [hereinafter NFL CBA] (last visited May 13, 2004).

4. http://www.andrewsstarspage.com/12-14cba.htm

5. *See generally*, 1999 NBA COLLECTIVE BARGAINING AGREEMENT, Article VII, Sec. 6, at 100, *available at* http://www.nbpa.com/cba/cba.html [hereinafter NBA CBA] (last visited May 13, 2004); http://itrs.scu.edu/instructors/gokamoto/webpage/garret/Lakers/lakers/capfaq.html

6. *See generally*, 1999 NBA COLLECTIVE BARGAINING AGREEMENT, Article VII, Sec. 2(a)(1), *available at* http://www.nbpa.com/cba/cba.html [hereinafter NBA CBA] (last visited May 13, 2004).

7. Ira Podell, "NBA Salary Cap Down First Time Ever," *Fort Worth Star-Telegraph*, July 17, 2002, *available at* http://www.dfw.com/mld/dfw/sports/basketball/3676859.htm?1c (last visited May 13, 2004).

8. *CBA: The NBA Model* and REWSSTARSPAGE.COM, Dec. 7, 2003, *at* http://www.andrewsstarspage.com/ 12-21cba.htm (last visited May 13, 2004).

9. The luxury tax acts as both a guard against both player costs and a revenue sharing tool. The luxury tax kicks in when league-wide player salaries reach a certain threshold (61.1 percent). If the league-wide average exceeds such a limit, then teams over the threshold must pay dollar-for-dollar the amount of money they are over the cap. Teams that are under this threshold receive a full share of the luxury tax. For a more detailed discussion of the NBA system, see Rosenbaum, The Brave New World of the NBA Luxury Tax at http://www.uncg.edu/bae/people/rosenbaum/luxurytax1.pdf.

10. Starting during the 2001-02 season, the league implemented an escrow system. Essentially, 10 percent of every player's paycheck is deposited in the league escrow account. To keep player costs at less than 55 percent of Basketball Related Income (BRI), the league uses the escrow account. If player salaries exceed 55 percent of BRI, the owners keep the overage from the escrow account and the players get the remainder. If player salaries do not exceed 55 percent, the money is returned to the players.

11. 2003 MLB COLLECTIVE BARGAINING AGREEMENT, Article XXIII, Sec. B (2-3), at 80, *available at* http://us.i1.yimg.com/us.yimg.com/i/spo/mlbpa/mlbpa_cba.pdf [hereinafter MLB CBA] (last visited May 13, 2003).

12. *Id.* at Article XXIII, Sec. B (3)(a).

13. *Id.* at Article XXIII, Sec. B (2).

14. *See* Andy Bernstein, "NHL Locks in on Controlling Player Costs; Linking Payrolls to Revenue is League's Priority in Labor Plan," *Sports Business Journal*, Sept. 15-21, 2003, at 1; Andy Bernstein, "NHL Puts Loss for Last 9 Years at $1.5B; League Mounts Campaign to Make Case for Controlling Player Costs," *Sports Business Journal*, Sept. 29 – Oct. 5, 2003, at 1.

15. *Id. See also* Associated Press, *More Labor Negotiations Set for Late May*, ESPN.COM, April 29, 2004, http://sports.espn.go.com/nhl/news/story?id=1792392 (last visited May 13, 2004).

16. *Id. See also* Andy Bernstein, "Union Boss Challenges Leagues, Teams," *Sports Business Journal*, Sept. 29 – Oct. 5, 2003, at 23 (interview with NHLPA head Bob Goodenow).

17. Major League Baseball, *Labor Timeline*, MLB.COM, *at* http://www.mlb.com/NASApp/mlb/mlb/news/ mlb_news.jsp?ymd=20020827&content_id=113918&vkey=news_mlb_nd&fext=.jsp (last visited May 13, 2004).

18. Larry Coon, *NBA Salary Cap / Collective Bargaining Agreement FAQ*, FULLSPORTPRESS.COM, *at* http://www.fullsportpress.com/salarycapfaq.html (last visited May 13, 2004).

19. NFL CBA, *supra* note 2, at Article XXIV, Sec. 2.

20. In order to calculate each team's chance it would be necessary to divide the total chance of its quartile (say 11.1 percent) by the total number of teams in the quartile. The total in each quartile was eight teams for MLB, the NFL and the NHL and seven in the NBA.

21. In order to calculate each team's chance it would be necessary to divide the total chance of its quartile (say 11.1 percent) by the total number of teams in the quartile. The total in each quartile was eight teams for MLB, the NFL and the NHL and seven in the NBA.

22. Charts 4, 5, 7, 8, 10, 16 & 17.

23. Charts 1, 2, 11, 13 & 14.