

Team Payroll and Team Performance in the NBA

Steven Van Sluytman & Professor David Gray, University of Ottawa

Abstract

The relationship between team payroll and team performance has long been a topic of interest in the economics of sports. The existing studies in the scientific literature dealing with the effect that team payroll has on a team's win-loss percentage frequently involve Major League Baseball (MLB) and European Soccer as applications. These studies can provide team management with decision-making information and shed light on their strategies.

This study adds insightful research to the trendy topic's stock of information by using the National Basketball Association (NBA) as its application. This study estimates the statistical association between team payroll and team performance by following similar methodologies found in the scientific literature. This study also discusses the change in collective bargaining agreements in the 2010-11 season of the NBA and estimates its effect on a team's ability to 'buy a winner'.

Collective Bargaining Agreements (CBAs)

There have been two CBAs during the 10 seasons of the NBA analyzed in this study. The CBAs contain clauses that players and teams must abide by when making contractual agreements. The first CBA commenced in season 2005-06 and ended in season 2010-11. The second CBA commenced in season 2011-12 and will continue until 2020-21 with an option to terminate in 2016-17.

The change in CBAs impacted the structure of the league's luxury tax on teams, which is a tax paid by teams with payrolls higher than a certain threshold. Under the first CBA, teams paid a flat tax (or penalty) of one dollar for each dollar they spent above the threshold. Under the second (or current) CBA, a progressive tax structure is applied to teams above the tax threshold. The increments of the progressive tax are reported in the following schedule:

Spending above the Tax Threshold	Tax Rate on Bracket
\$0M - \$4.99M	\$1.50-for-\$1
\$5M - \$9.99M	\$1.75-for-\$1
\$10M - \$14.99M	\$2.50-for-\$1
\$15M - \$19.99M	\$3.25-for-\$1

Research Questions

The null hypotheses that this study seeks to either reject or fail to reject are the following:

- There is no statistical association between team payroll and team win-loss percentage.
- There is no effect specific to CBAs with respect to team payroll and team win-loss percentage.
- There is no effect specific to the New York Knicks with respect to team payroll and team win-loss percentage.

Methodology

This study uses a balanced panel data set that consists of 30 teams over 10 seasons (2005-06 to 2014-15) to yield a total of 300 observations. Statistical and econometric techniques (least squares) are employed in STATA to estimate the statistical association between a team's payroll and its regular season win-loss percentage.

Contact Information

For any questions regarding this study's data or methodology, please contact Steven Van Sluytman through LinkedIn or email: svans096@uottawa.ca.

Table 1. Quintiles of Average Team Payroll and their respective Average Games Won (Descriptive Statistics)

Quintile	Collective Bargaining Agreement #1 2005-06 to 2010-11				Collective Bargaining Agreement #2 2011-12 to 2014-15			
	Team Payroll (USD x 1,000,000)	% Change	Games Won (82-Game Season)	% Change	Team Payroll (USD x 1,000,000)	% Change	Games Won (82-Game Season)	% Change
Q1	58.5	-	34	-	61.5	-	32	-
Q2	66.1	13.0%	41	20.6%	68.0	10.6%	40	25.0%
Q3	69.7	5.4%	39	-4.9%	72.4	6.5%	41	2.5%
Q4	73.5	5.5%	44	12.8%	77.3	6.8%	48	17.1%
Q5	88.1	19.9%	47	6.8%	87.7	13.5%	44	-8.3%

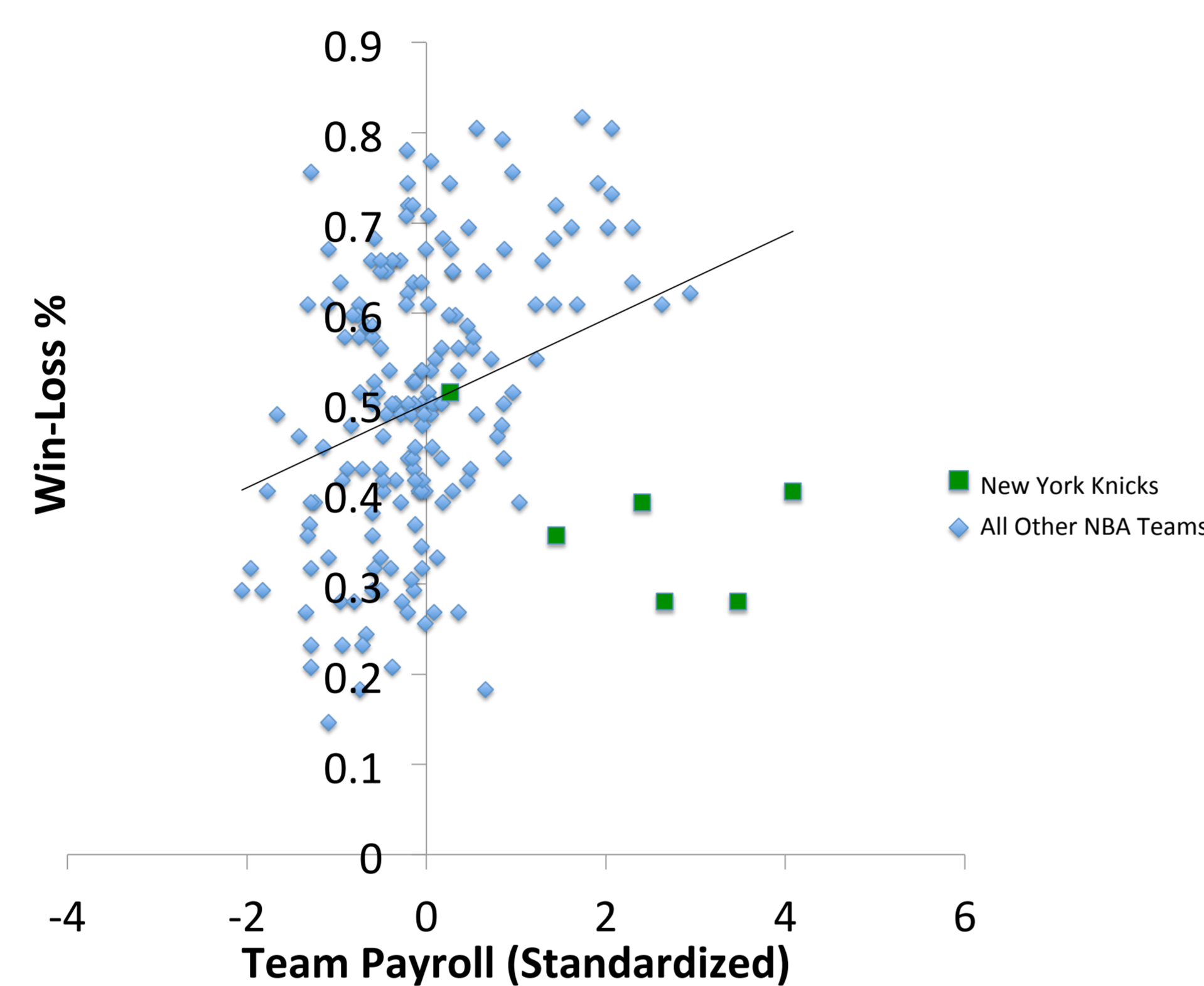


Figure 1. Relationship between Team Payroll and Team Win-Loss Percentage during CBA#1

Note: $R^2 = 0.09245$

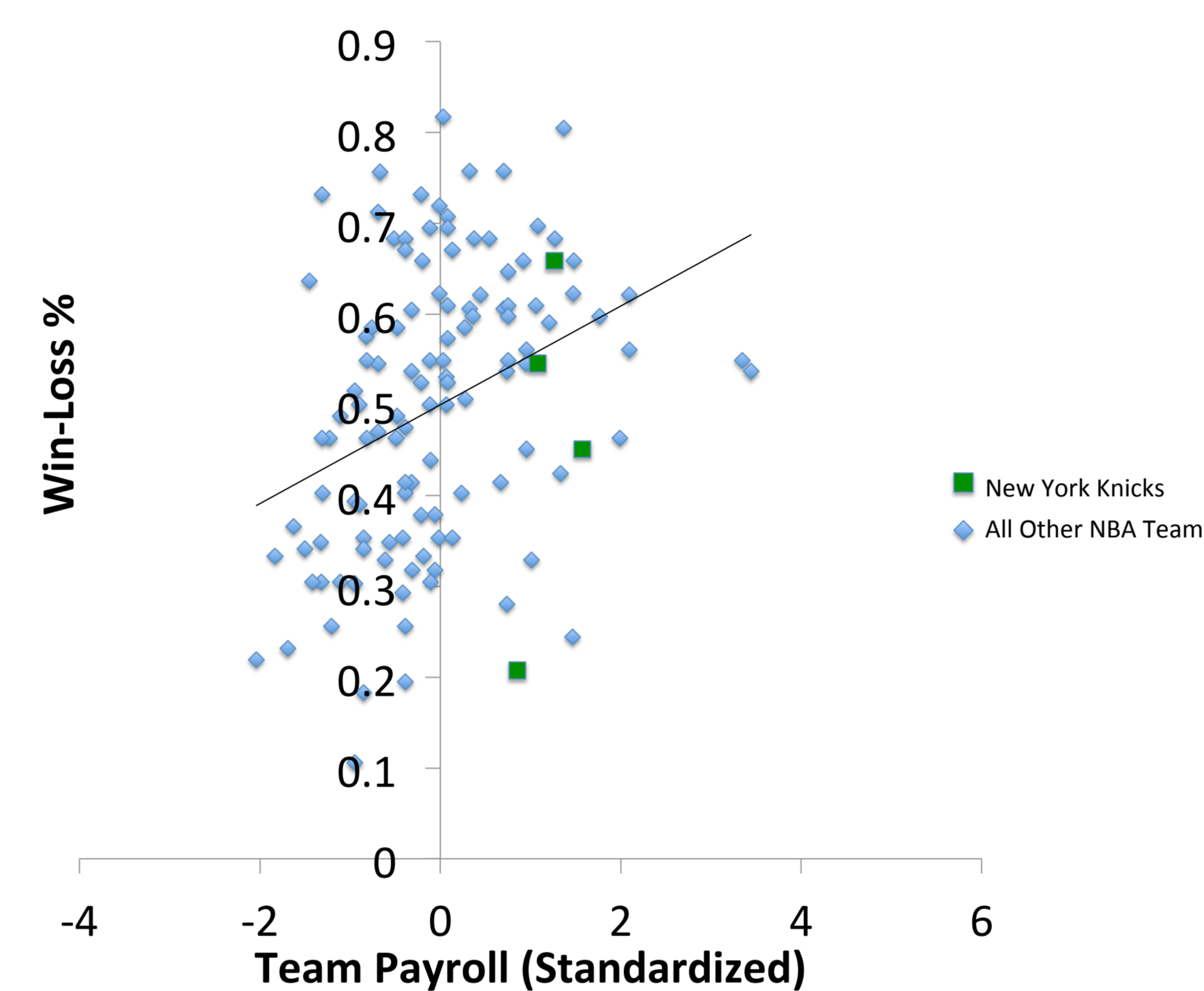


Figure 2. Relationship between Team Payroll and Team Win-Loss Percentage during CBA#2

Note: $R^2 = 0.12229$

Table 2. Regression Output of Team Performance and Team Win-Loss Percentage

Regressor	Estimated Coefficient	Standard Error	t-Statistic	P> t
Team Payroll (standardized ⁹)	0.079***	0.012	6.54	0.000
CBA (dummy variable)	-0.008	0.017	-0.49	0.625
CBA x Team Payroll (interaction variable)	-0.021	0.018	-1.18	0.239
New York Knicks (dummy variable)	-0.098	0.115	-0.85	0.398
New York Knicks x Team Payroll (interaction variable)	-0.101**	0.045	-2.26	0.025
New York Knicks x CBA x Team Payroll (interaction variable)	0.106	0.085	1.25	0.212
Constant Term	0.511***	0.011	47.79	0.000

Notes:

*** Statistically significant at the 0.01 level (2-tailed)

** Statistically significant at the 0.025 level (2-tailed)

⁹ Team payroll values have been standardized at the season level by mean-deviating and dividing by the standard deviation (known as Z-scores)

1. 300 observations and 293 degrees of freedom

2. $R^2 = 0.190$

3. $F(6,293) = 11.45$, Prob > F = 0.000

Results

Results from least squares analysis presented in Table 2 show that there is a statistically significant relationship between team performance and team payroll. Because the values of the team payroll variable are standardized, the interpretation of Team Payroll's coefficient in Table 2 is as follows: Increasing a team's payroll by one standard deviation (where the standard deviation is measured using all 30 teams' payrolls in the team's current season of play) increases the respective team's win-loss percentage by 7.7 percentage points (approximately 6 regular season games), holding all other factors constant.

The change in the collective bargaining agreement (CBA) in 2011-12 does not have a statistically significant relationship with a team's ability to 'buy a winner': a result also reported in Table 2. Although the change in CBAs does not have a statistically significant relationship with a team's ability to 'buy a winner', it does result in fewer teams' appearing as outliers, as seen in Figures 1 and 2. This reduction in the presence of outliers is likely due to the increased disincentive to spend above the luxury tax threshold, as was intended.

Table 2 includes dummy and interaction variables for the New York Knicks to account for the team's being an outlier throughout the first CBA. The interaction variable's coefficient is statistically significant at the 0.05 level.

Conclusion

The model for this study deliberately uses parsimonious equations in order to avoid using choice variables on the right side of the equation. In order to discern a causative effect, one would need an exogenous indicator of discretionary spending on payroll: an economic event whose impact we seek to investigate is difficult to empirically identify. An extended research project would seek portions of team payroll where the owner, if he or she wanted, could allocate spending to 'buy a winner'.

This pilot study also creates other questions for extended research; perhaps the relationship between team performance and team payroll should include a quadratic term. The quadratic term is intuitive under an assumption that having numerous highly paid players on one team negatively affects team chemistry and ball movement, as highly paid players can have a propensity to demand more possessions of the basketball. This specification generates a tighter fit of the data in Figures 1 and 2 and confirms the diminishing returns in the results in Table 1.

Acknowledgements

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