

“BALL DON’T LIE”: AN ANALYSIS OF LONG TERM CONTRACTS IN THE NBA

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Introduction

- Why choose the NBA?
- From a personal perspective: I have been playing basketball for over 13 years and I am a huge fan of the game and the many implications the game holds
- From a research standpoint: The NBA has lengthy guaranteed contracts spanning 1 to 7 years
 - Compare to NFL and MLB: shorter contracts and (generally) smaller salaries

Why look at long term contracts?

- We may be able to apply the results from this study to the labor market as a whole
- For example, if we find evidence of a decline in performance after a player signs a contract, we can apply this to sectors of the labor market that employ primarily long-term workers

Long Term Contracts: Definitions

- Ex post behavior: behavior changes after the start of a new contract (usually a decline)
- Ex ante behavior: behavior changes at the end of a contract cycle and before a new contract cycle is set to begin (usually an increase)
- This paper will look at both- first year effect and contract year phenomenon

Framework

- There are two sides to long-term contracts: Investment in employees and employee effort
- Through investment in employees, firms hope to boost employees' human capital and therefore, boost their productivity
 - Typically done through on the job training
- However, long-term contracts may play a role in employee effort
 - May be less inclined to work as hard due to job security

Framework

- Therefore, we can look at an employee's performance as the function:
 - Performance=(Effort, Learning, Stress)
- With stress accounting for an employee's outside experiences that may negatively impact his/her performance
 - Examples: Children sick, husband/wife laid off, family emergencies, etc.

Consider: Tenure in Universities

- Tenure defined as “the guarantee of lifetime employment in substantially the same position after some initial probationary period” (McGee 1991)
- Professors pre-tenure: High levels of stress, low to high levels of learning, high levels of effort
- Professors post-tenure: lower levels of stress, high levels of learning, low to high levels of effort
- Is tenure a good thing?

Human Capital/Learning

- Human capital/learning is critical in the field of sports, particularly in basketball
- Learning teammates playing styles and coaches' styles are essential to a team's success
- Think- San Antonio Spurs
 - Tim Duncan, Tony Parker, Manu Ginobili

Assumptions

- Players in the first year of their contracts face low stress, low effort, and low learning
 - Note: exceptions
- Players in the middle years of their contracts face low stress, low effort, and high learning
- Players in the last year of their contracts face high stress, high effort, and high learning

Other Studies

- Berri and Krautmann (2007) find evidence of decreased performance in the first year of players' new contracts but do not find evidence of increased performance at the end of players' contracts
 - Utilizes Player Efficiency Rating (PER) created by John Hollinger
 - $PER = (PTS + TREB + STL + BLK + AST) - (TO + FGMS + FTMS)$
- Pedicilli (2015) does not find evidence of change in performance (ex ante or ex post behavior)
 - Also utilizes PER
 - Finds significance of player characteristics like age, experience, familiarity with team, etc.

Other Studies

- Maxcy, Fort, and Krautmann (2002) reject the idea that MLB players demonstrate changes in performance as a result of contract terms
 - Mixed performance measures including skill (either slugging percentage or strikeout to walk ratio), performance compared to average performance over 3 years, etc.
 - Believe that their results imply that the current structure of labor contracts in the MLB possibly deters ex post strategic behavior
- Woolway (1997) finds evidence of ex post behavior in MLB players
 - Creates a production function for MLB teams, made up of a combination of scoring, defense, and speed
 - data points to an overall decline in marginal product (victories) after signing the multi-year contracts

Other Studies

- Krautmann and Solow (2009) find evidence of first year effect
 - Players less likely to sign a long-term contract in the near future display a statistically significant reduction in performance compared to expectations
 - Players perform to expectations when they are close to signing a new contract
 - Use shirking as dependent/performance variable
- Stiroh (2007) finds evidence of both first year effect and contract year phenomenon in NBA players
 - A team's wins are positively correlated with the number of players in their contract years and negatively correlated with the number of players that just signed multi-year contracts
 - Uses many different performance measures, including points, assists, rebounds, etc.

Breaking Down NBA Contracts

- Contracts span between 1 and 7 years (7 being very rare- think Kobe Bryant)
- Contracts can be renegotiated after 3 years of the contract have passed (contracts under 4 years cannot be renegotiated)
- Teams can release players from their contracts if a player wants to retire
- Majority of NBA contracts are fully guaranteed

Breaking Down NBA Contracts

- Some contracts have an Early Termination Option
 - Players can choose to terminate their contracts early
- Some contracts have Player Option
 - This allows players to extend their contracts for one additional season after the scheduled end date

Collecting Data

- Collected the data for all players for each of the seasons from the 2005-2006 season to the 2014-2015 season (basketball-reference.com)
- Narrowed the list down to players who have played in 9 or 10 out of the 10 seasons
- Found contract/salary information for each player (Spotrac.com)

Collecting Data

- Player stats include:
 - Average points per game
 - Average rebounds per game (both offensive, defensive, and total)
 - Average assists per game
 - Average blocks per game
 - Average turnovers per game
 - Average minutes played per game
 - Games played
 - Games started
 - Field goal percentage (for 2 pointers and 3 pointers)
 - Freethrow percentage
 - Age

Collecting Data

- Other player statistics:
 - Base Salary
 - Year of contract
 - Time of contract
 - Experience

Summary Statistics

	Observations	Mean	Standard Deviation	Minimum	Maximum
Player ID	1,286	66.9269	38.3232	1	133
Year of Contract	1,286	2.40747	1.3809	1	7
Time of Contract	1,286	1.74028	0.86831	1	3
Points Per Game	1,286	11.7236	6.33924	0	35.4
Field Goals Attempted Per Game	1,286	9.446423	4.7954	0	27.2
Rebounds Per Game	1,286	4.70085	2.73771	0	14.5
Assists Per Game	1,286	2.582271	2.12548	0	11.7
Blocks Per Game	1,286	0.541524	0.528299	0	3.2
Steals Per Game	1,286	0.832426	0.445869	0	2.8
Turnovers Per Game	1,286	1.589891	0.821211	0	5.7
Age	1,286	27.8871	4.03608	18	39
Experience	1,286	6.81026	3.77991	0	19
Base Salary (by millions)	1,286	6.84647	5.36161	0.048854	30.45381

Performance Variable

- I chose average points per game as my main performance variable
- My reasoning: Scoring is arguably the most important statistic in determining a team's success
- Why not PER?
 - Critics argue that it puts equal emphasis or weight on each performance measure

Figure 1

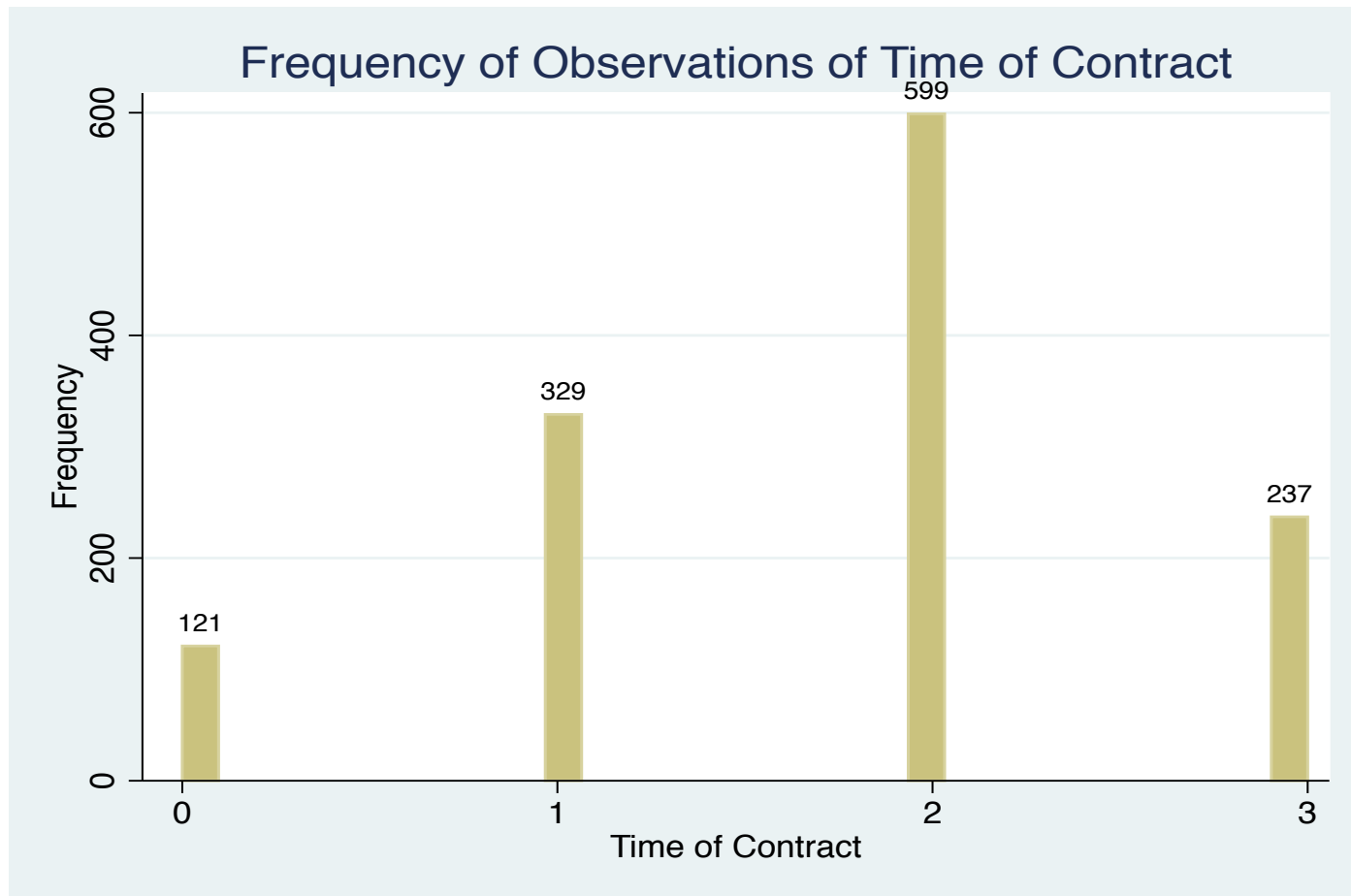


Figure 2

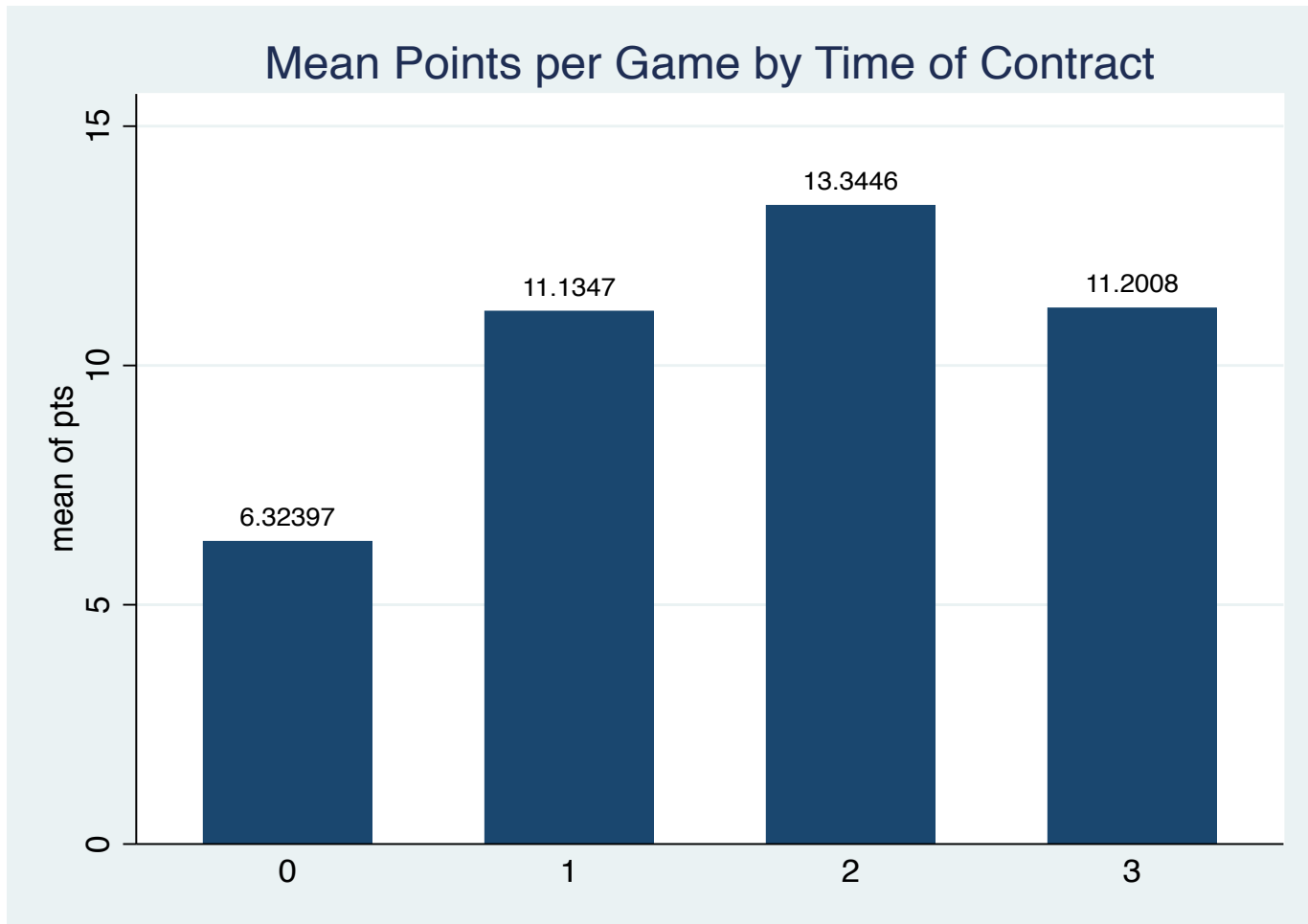


Figure 3

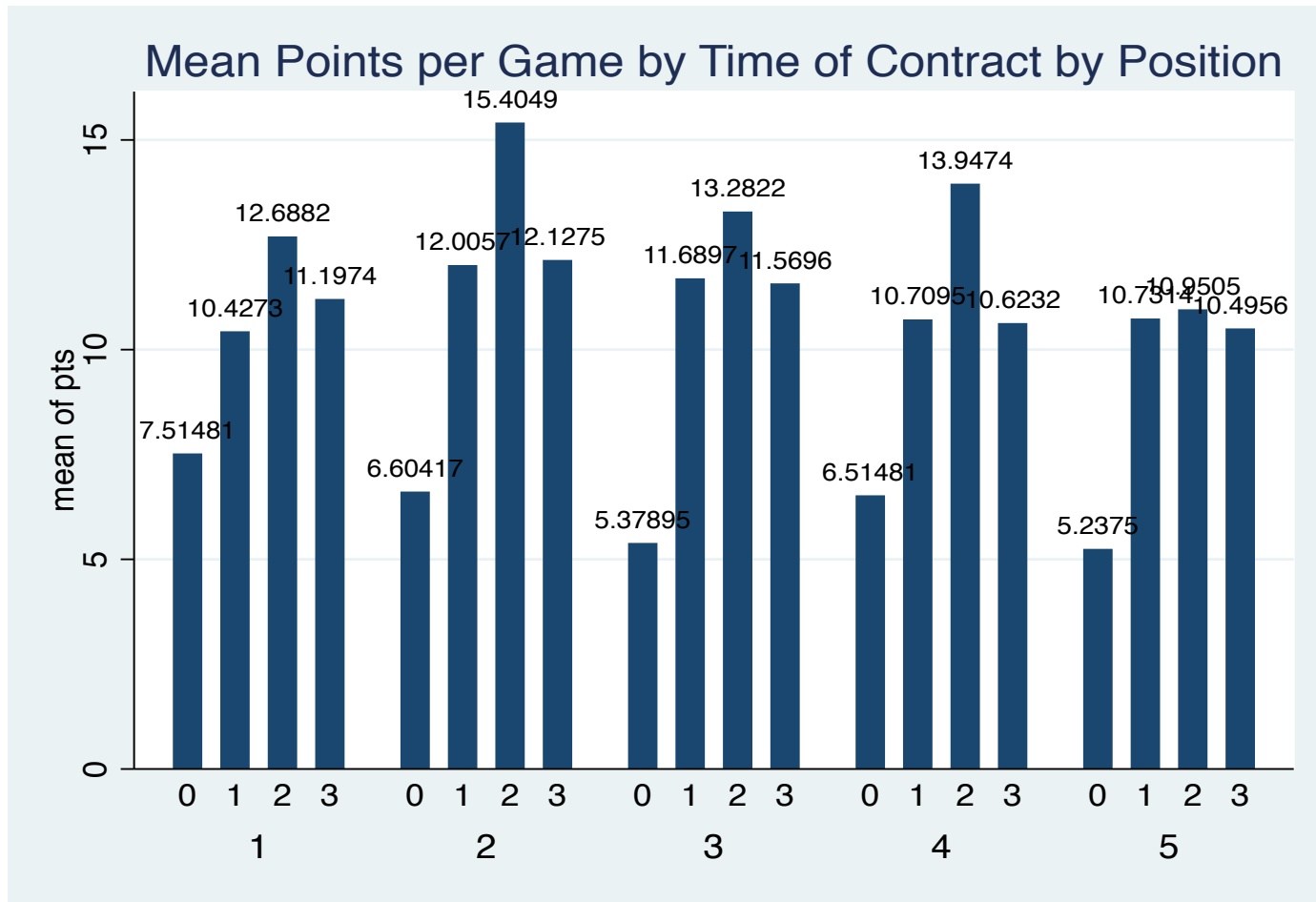


Figure 4

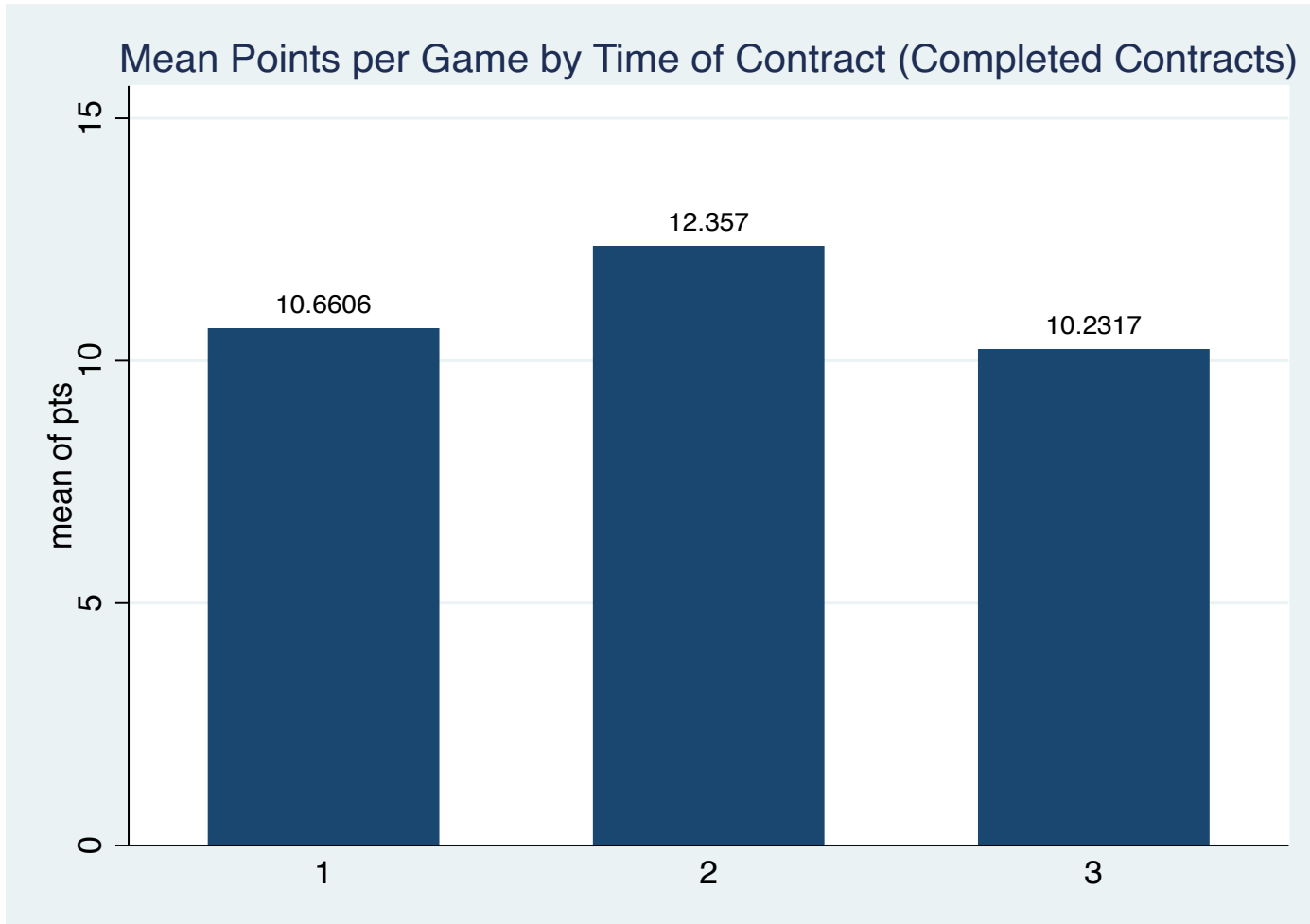


Figure 5

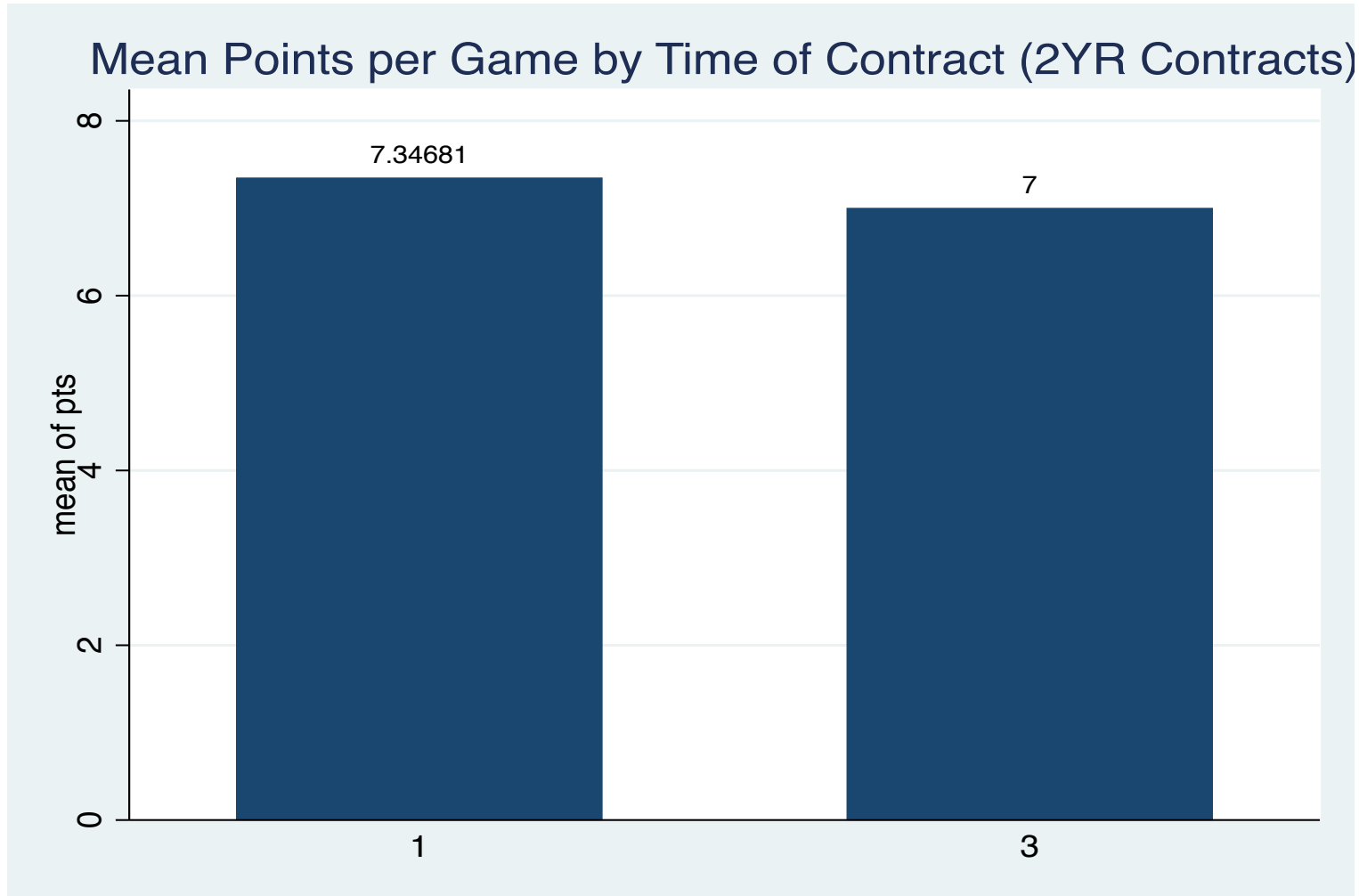
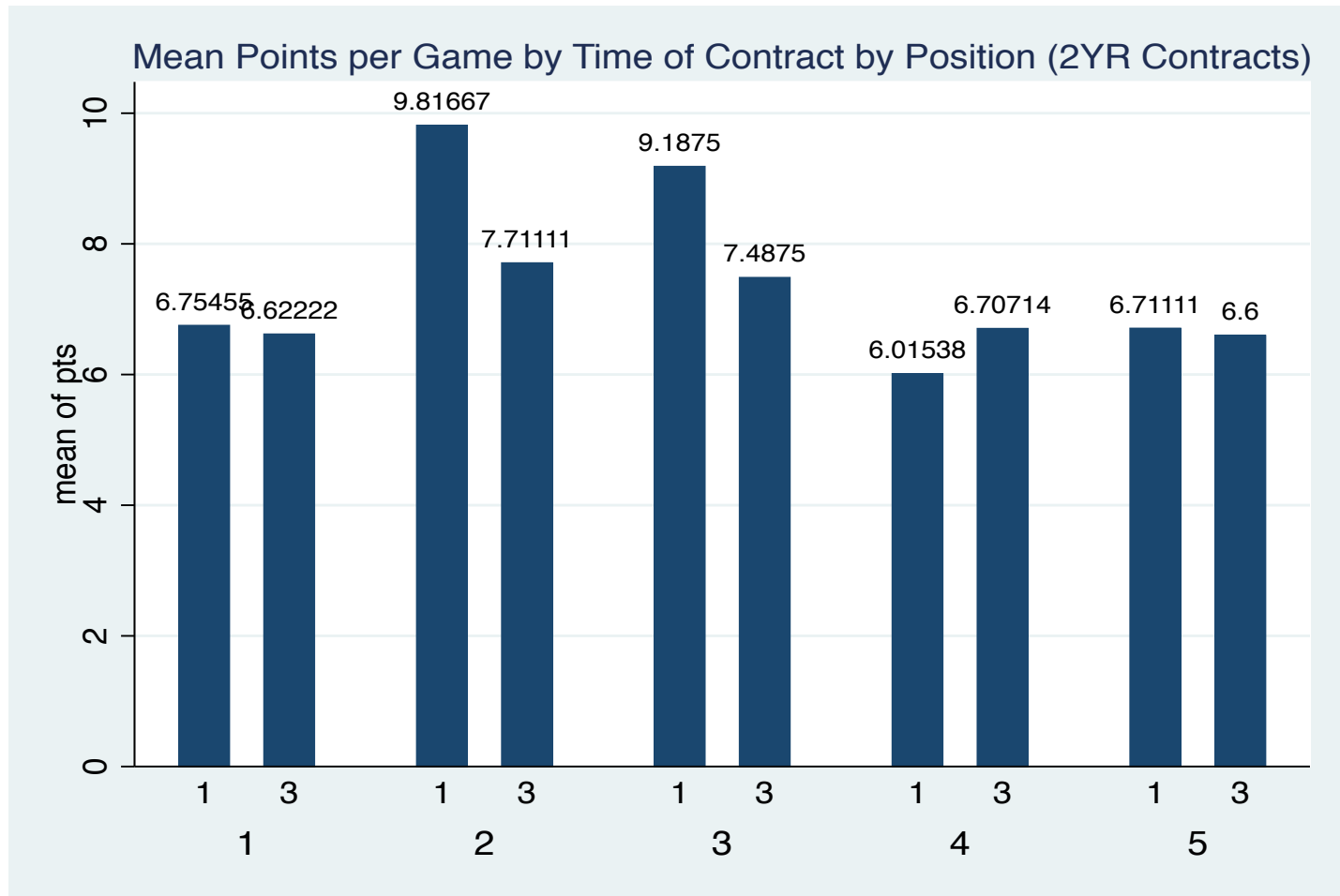


Figure 6



What the Graphs Tell Us

- Players tend to perform best in the middle years of their contracts
 - Perhaps due to lower stress and higher learning/human capital with the team?

Empirical Model

- $PERF_{it} = \beta_{Dummy1}(Dummy1) + \beta_{Dummy2}(Dummy2) + \beta_{Dummy3}(Dummy3) + \alpha_n + \beta_{LaggedPoints}LaggedPoints_{i(t-1)} + \beta_{Age}Age_{it} + \beta_{Experience}Experience_{it} + \varepsilon_{it}$

Variables	(1) Age and Experience	(2) Regression 1 Completed Contract Cycles	(3) Regression 1 Completed Contract Cycles (Drop)	(4) Position Dummies*	(5) No Experience or Age
Single Year Contract Dummy	-1.343** (-2.98)	Omitted		-3.802*** (-7.34)	-1.947*** (-4.21)
First Year of Contract Dummy	-0.250 (-0.82)	0.0826 (0.23)	0.243 (0.63)	-0.0236 (-0.05)	-0.183 (-0.58)
Middle Year of Contract Dummy	0.689* (2.49)	0.605* (1.97)	0.655* (2.00)	2.114*** (4.56)	0.892** (3.13)
Last Year of Contract Dummy	Omitted	Omitted	Omitted	Omitted	Omitted
Lagged Points	0.105*** (3.33)	0.0927* (2.05)	0.0818 (1.58)	0.0663* (2.41)	0.182*** (5.99)
Experience	0.314 (0.44)	6.666*** (4.74)	7.147*** (3.71)	1.147*** (10.83)	
Age	-0.637 (-0.90)	-6.778*** (-4.88)	-7.249*** (-3.80)	-1.040*** (-10.17)	
Point Guard Position Dummy				Omitted	
Shooting Guard Position Dummy				1.612*** (3.40)	
Small Forward Position Dummy				-0.361 (-0.74)	
Power Forward Position Dummy				-0.133 (-0.29)	
Center Position Dummy				-2.116*** (-4.25)	
Constants	30.64* (2.12)	153.8*** (5.54)	163.2*** (4.28)	31.71*** (13.64)	15.12*** (8.69)

Extensions

- As an extension, I decided to take a brief look into other performance variables
- For each of these regressions, I drop the single year contracts and only use completed contract cycles
- I also use a similar regression, with fixed player effects, dummy variables for time of contract, lagged performance measures, and age and experience
- Performance variables looked at:
 - Rebounds
 - Assists
 - Blocks

Variables	(1) Rebounds	(2) Assists	(3) Blocks
First Year of Contract Dummy	-0.0185	0.112	0.0377
Middle Year of Contract Dummy	0.155	0.156	0.0342
Last Year of Contract Dummy	Omitted	Omitted	Omitted
Lagged Performance Measure	-0.00993	0.0566	0.00380
Experience	2.476**	2.320***	1.190***
Age	-2.480**	-2.285***	-1.194***
Constants	59.34***	47.20***	25.42***
Observations	563	563	563
R-squared	0.8503	0.8878	0.8716

Time of contract does not appear to have a significant effect on a player's rebounds, assists, and blocks.

Summary

- My study finds no evidence of a first year effect or a contract year phenomenon.
- Players perform best (scoring-wise) in the middle years of their contracts.
- From the function earlier, this could imply that the combination of low levels of stress and higher learning (with low effort levels) outweigh the other combinations