Measuring Market Power in Professional Baseball, Basketball, Football and Hockey

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Forbes Magazine estimates of annual revenues, costs and team values for professional sports teams are used to derive market power measures for teams in four major professional sports leagues: the MLB, NBA, NHL, and the NFL. Two variants of the Lerner Index, one that reflects short-term operations for the past year and another reflecting the long-run net present value of the franchise are derived over the 2006-2016 period. Only the long-run measure provides estimates that are always consistent with theoretical requirements. Analysis of variance of long-run market power shows that local market factors and past team performance have less impact on market power than common league-wide effects. Team market power depends least on local team effects in leagues that have stronger revenue sharing policies. Price-cost margins are higher for professional teams in North American than for the most valuable European soccer teams, consistent with the stronger exemption from anti-trust law in the U.S.

Key Words: market power, Lerner index, anti-trust, revenue sharing, local markets, demand elasticity, Forbes

JEL: L43; L13; L83

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In 2015, the four largest professional sports leagues generated almost $28 billion in revenues with the NHL earning $4 billion, the NBA $4.8 billion, MLB $ 7.9 billion, and the NFL $11.1 billion. While individual teams compete with one another in games, they cooperate with one another in the generation of sales. All four leagues act as a single firm with the teams treated legally as if they were subsidiaries. Because firms are not obligated to open subsidiaries, the leagues can legally restrict entry of new teams. That differs from the European soccer leagues where the practice of relegation and promotion allow new teams to enter by winning their way into the top leagues.

As monopolies, we would expect the North American professional leagues would price their product above marginal cost without risk of future lost profitability from new entry. But do the 'subsidiary' individual teams have the same market power as the league or is their variation in market power across teams? If a team's ability to price is based on its local market, its success on the field, or the loyalty of its fan base, then there may be variation in market power across the teams. On the other hand, if individual team profits are shared in common, as would be the case with pooled net revenues that were equally distributed across teams, the league market power would be the same as the individual team market power. As a result, the team's market power will be divorced from its local market conditions and past competitive success depending on the extent of revenue sharing in the league.

This study presents two variations on the Lerner Index computed from *Forbes* Magazine's estimates of the revenues, costs and present values of U.S. professional sports teams. These price-cost margins are commonly used as indicators of the share of the consumer price that is the mark-up over cost. Variation in these indexes across teams within a league will show

how much the league insulates member teams from their own local market conditions or their competitiveness. Variation in price-cost margins across leagues will show which leagues have the greatest market power. Variation across time will show how market power varies over the business cycle.

All four leagues are characterized by an ability to set price above marginal cost. The stronger exemption from anti-trust laws in North America compared to European sports leagues are reflected in higher computed Lerner Indexes in all four leagues compared to comparable estimates for the most valuable European soccer teams. All the North American leagues gained market power in the recovery, and common macroeconomic factors across teams are the dominant factor explaining variation in market power over the 2006-2016 sample period. The highest price-cost margins are in the NBA and the NFL, the teams with the strongest revenue sharing policies. Local market factors are more important for team market power in the NHL and MLB where revenue sharing is less aggressive.

1. Background

Professional sports leagues in the United States have market power because they can legally collude to limit entry. As a result, they can set the number of games, control broadcasting, restrict ticket sales, and restrict sale of licensed memorabilia. However, Major League Baseball is the only league that has a nonstatutory exemption from the Sherman Anti-Trust Act thanks to a Supreme Court ruling that ruled baseball was not a business and therefore not subject to antitrust regulation (Federal Baseball Club vs. National League, 1922). The antitrust exemption was upheld in Toolson vs. New York Yankees, Inc. (1953). Because these rulings apply only to MLB, other professional leagues such as the NBA, NHL, and NFL are technically subject to antitrust law although there has been no definitive legal test. An argument favoring exemption

from antitrust law is that these leagues are viewed as single entities with subsidiaries rather than competing businesses. As individual entities, the leagues are viewed as a single firm allocating production across its subsidiaries rather than as a group of colluding firms (Farzin, 2015).[1] The anti-trust protection of the other leagues is sufficiently strong that Grow (2012) argues that even if the MLB exemption were to be reversed, its current practices are so similar to the other leagues that do not enjoy the added protection that monopoly power in MLB would be unaffected.[2]

Professional sports in the U.S. appear to have a stronger exemption from antitrust law than do professional leagues in Europe. Sports Governing Bodies ("SGBs") such as the British Premiership, the German Bundesliga, or the Italian Serie A administer rules that could violate European antitrust laws if the rules are believed to limit economic competition. However, the European Commission and the European Court of Justice have been willing to grant that professional sports leagues regulate competition among their members for noneconomic reasons (Farzin, 2015). However, all of the European soccer leagues have rules that force teams to place high enough in the league standings to retain their status in the top league. Teams that lose too many games are relegated to lower leagues while others are promoted from below. As a result, professional teams in Europe have less security against competition than is the case in the United States. These difference in rules regarding entry and exit may lower price-cost margins for European teams compared to teams in North America.

[1] While three of the leagues also have teams in Canada, the Foreign Antitrust Improvements Act of 1982 treats foreign firms as subject to U.S. antitrust laws, and so the Canadian teams can also be treated as subsidiaries.
[2] Some have argued that professional sports are a natural monopoly. For example, Che and Humphreys (2015) found that the only stable equilibria in their game theoretic model of sports leagues ended up with a single league, whether because the incumbent league raised salaries sufficiently to limit entry or because they merge with the rival league. However, this is not a natural monopoly but a monopoly that results from incentives in which the monopoly results from firm behavior. As Noll (2003) argues, the existence of divisions within leagues suggests that the league is not a natural monopoly.

2. Methodology

Abba Lerner (1934) showed that profit maximizing firms facing imperfect competition will set price such that

(1) $LI = \frac{P-MC}{P} = |\frac{1}{E^D}|$

where the Lerner Index (*LI*) is shown to be the ratio of the difference between price (*P*) and marginal cost (*MC*) as a ratio of the price. That ratio, in turn, is equal to the inverse of the absolute value of the elasticity of firm demand. Without market power, $P = MC$, $E^D \to -\infty$, and so $LI = 0$. The other extreme would have $LI = |E^D| = 1$ as would be the case if the team acted as a pure monopolist with no substitutes for its product and a marginal cost of generating revenue of 0. More generally, the elasticity of demand will be greater than 1 in absolute value as there are substitutes for the team's services (competing entertainment events, other media offerings, alternative licensed clothing). As a result, the team's Lerner Index will be greater than 0. The greater the Lerner Index, the greater the market power.

In practice, it may be difficult to observe marginal cost. However, if the production function is Cobb Douglas, marginal cost is proportional to average cost and so we may be able to approximate unobserved marginal costs with observed average costs, *AC*. That is also appropriate if the average costs are constant over a range of output so that $MC = AC$. In either case, equation (1) may be approximated by

(2) $LI = \frac{P-AC}{P} = \frac{-1}{E^D}$

The difficulty with applying equation (2) to measure market power of professional sports teams is that we do not observe quantity or price. Professional sports teams are multiproduct

firms producing a myriad of products including tickets, media access, memorabilia, and advertising. Developing a market power measure will require aggregating across all of these products.

Information provided by *Forbes* Magazine allows us to finesse this complication. *Forbes* has been providing annual estimates of the present value, operating revenues and total revenues of professional sports franchises. We can write the *Forbes* estimate of total revenue for team *j* in league *k* and year *t* as

(3A) $TR_{jkt} = P_{jkt} \cdot q_{jkt}$,

where P_{jkt} is the unobserved price and q_{jkt} is the unobserved quantity produced by that team. *Forbes* also reports the 'current value' of the franchise. We interpret that measure to be the present value of owning the stream of net earnings generated by the team:

(3B) $PV_{jkt} = \frac{P_{jkt} \cdot q_{jkt} - AC_{jkt} \cdot q_{jkt}}{i}$

under the assumption that the current net earnings for year *t* are expected to continue in perpetuity. In 3B), AC_{jkt} is the average cost of providing sports services and *i* is the interest rate.

Forbes also reports operating revenue, which can be viewed as current year profit defined by

(3C) $\pi_{jkt} = P_{jkt} \cdot q_{jkt} - AC_{jkt} \cdot q_{jkt}$

The Forbes financial estimates provide two ways to approximate the Lerner Index for each franchise in each year. The first variation uses (3A) and (3B). Multiply both sides of (3B) by an

estimate of the interest rate to get $i \cdot PV_{jkt} = P_{jkt} \cdot q_{jkt} - AC_{jkt} \cdot q_{jkt}$. Then divide both sides by (3A) to get a long-run measure of the price-cost margin for team *j*[3]

(4A) $LI_{jkt}^{LR} = i \cdot (\frac{PV_{jkt}}{P_{jkt} \cdot q_{jkt}}) = \frac{P_{jkt} \cdot q_{jkt} - AC_{jkt} \cdot q_{jkt}}{P_{jkt} \cdot q_{jkt}} = \frac{P_{jkt} - AC_{jkt}}{P_{jkt}}$.

In other words, we multiply an estimate of the interest rate to the ratio of the *Forbes* estimate of current franchise value relative to its current total revenue to generate an estimate of the Lerner Index. Because this measure incorporates the stream of future profits of the franchise, we view it as the long-run measure of the Lerner Index. This variation of the Lerner index can be estimated despite not observing either the team's price or quantity.

The second variation divides (3C) by (3A) to get[4]

(4B) $LI_{jkt}^{SR} = \frac{\pi_{jkt}}{P_{jkt} \cdot q_{jkt}} = \frac{P_{jkt} \cdot q_{jkt} - AC_{jkt} \cdot q_{jkt}}{P_{jkt} \cdot q_{jkt}} = \frac{P_{jkt} - AC_{jkt}}{P_{jkt}}$

This measure approximates the Lerner index by the ration of the team's operating revenue relative to its total revenue. Again, we are able to approximate the Lerner Index without separately observing either output or price. This measure relies only on the short-term gross and operating revenues for the team, and so we view it as a short-run estimate of the Lerner Index.

These two measures may differ from one another depending on how *Forbes* measures the present value of the team versus the team's operating income. The long-run measure will be more forward looking, incorporating future anticipated streams of revenue or future growth of

[3] Vrooman (2009), table 1, computes average values of the ratio of team value to revenue for the NFL, NBA, NHL, and MLB using *Forbes* 2006 data. His measure is $\left(\frac{PV_{jkt}}{P_{jkt} \cdot q_{jkt}}\right)$ in 4A) which he calls the league's 'risk adjusted revenue multiple'. Although he makes reference to presumed demand elasticities for the sport in explaining variation in the value of the revenue multiple across leagues, he does not use the value explicitly as a measure of market power.

[4] Brook and Fenn used this measure in testing for the existence of market power in the NFL from 1995 to 1999.

demand for the team's services which may not yet be captured by current revenue. The short-term measure will only reflect current revenue streams.

In addition, the *Forbes* measures are all estimates based on projections rather than direct access to firm financial information. The projections are based on various sources of information including revenue sharing provisions, purchase offers, arena contracts, media experts, and team provided information such as attendance, ticket sales, and salaries. As such, the *Forbes* data and hence our own measures will be subject to unknown errors. Nevertheless, both measures should respond to sources of shifting demand for the team's services. We can make an educated guess regarding their relative reliability by the extent to which they respond plausibly to demand shifts.

3. Revenue Sharing

Revenue sharing will lower the team's dependence on its own market. Instead, the team's market power will now reflect the extent to which the team's revenue depends on shared rents across all teams versus its own efforts. In the limit, if all revenues and costs are equally shared by the league, there would be no variation in market power across teams. Instead, the Lerner Index would be identical across all teams. Consequently, an indicator of the strength of the league's revenue sharing agreement will be if a team's market power is independent of its local market or past competitive success. Evidence supporting that conjecture was presented by Berri, Leeds, and von Allmen (2015) who showed that team performance was only weakly tied to team revenues. Winning 10% more games led to only 2.7% more revenue in baseball and basketball and less than 1% in football. Profit maximizing teams will lower salaries if the link between player salary and profit decreases, and as a result, profits for the league as a while rise.

However, as Vrooman (2000, 2009) explains, revenue sharing can lead to higher profit overall if team owners want to maximize profit and not won-loss record.

While all leagues use revenue sharing, the details differ. In the NFL, gate receipts are split 60% to the local team and 40% shared. Licensed deals (such as merchandizes & jerseys) and TV revenue are shared equally among all teams (Berri, 2015). There is less revenue sharing in the MLB. In the 2012-2016 Basic Agreement between the 30 Major League Clubs and the Major League Baseball Players Association (MLB, 2012), teams send 34% of each team's net revenue to the league, and these proceeds are shared equally among the teams. That means that higher earning clubs subsidize the lower earning clubs.

Perhaps the most aggressive revenue sharing plan is the one initiated by the NBA starting with the 2013-14 season. The plan calls for all teams to contribute roughly 50 percent of their annual revenue after expenses into a pool. Each team then receives an allocation equal to the league's average team payroll for that season from the revenue pool (Lombardo, 2012).

Hockey has the least aggressive revenue sharing program. As laid out in the NHL (2012) collective bargaining agreement, the Redistribution Commitment is only 6.055% of the league-wide hockey revenues. The richest 10 teams contribute 50% of the total based on the gap between their revenues and the revenues of the 11th richest team. Added to this is 35% of the gate revenue from the Stanley Cup Playoffs. These funds are then reallocated with the poorest teams getting the largest shares from the shared pool.

Evaluating the relative degree of redistribution, clearly the NHL has is the least redistributive and the NBA and the NFL are the most redistributive. As the degree of redistribution through revenue sharing increases, the team's dependence on its own revenues

diminishes. Consequently, we would expect that team market power would be most tied to the local market conditions and team performance in the NHL. In the NBA and the NFL, the team's market power will be tied more to the league market power rather than local market conditions.

4. Data

Lerner Indexes

We use the *Forbes* estimates of MLB, NBA, NFL and NHL team revenues, costs and present values from 2006 through 2016. The MLB has 30 teams, the NBA has 30 teams, the NFL has 32 teams, and the NHL has 30 teams. Consequently, our data set includes 330 observations from baseball, basketball, and hockey and 352 observations from football. Our long-run measure, LI_{jkt}^{LR}, defined by equation (4A), multiplies an assumed interest rate of 0.03 times the ratio of the *Forbes* estimate of the team's total revenue relative to its current value. Our findings are not sensitive to the choice of alternative interest rates. Our short-run measure, LI_{jkt}^{SR}, defined equation (4B), is the ratio of the *Forbes* estimates of operating revenue relative to total revenue.

Appendix Table 1 presents averages of the two computed Lerner indexes for each team in the 4 North American professional sports leagues. The long-run measures have the advantage that they are always positive and consistent with the theoretical assumption of profit maximization used to derive the Lerner Index. The short-run measures generate negative values for some years, and are negative on average for some teams over the 11-year period. Only the NFL has positive averages for all teams. In the NFL, the short- and long-run measures are correlated at 0.56. The leagues whose teams have negative values also have smaller or even negative correlations between the two measures. We presume the long-run measures are more

accurate both because they are consistent with the theoretical requirements and because it is likely that the *Forbes* estimate for the sales value of the team is more accurate than the *Forbes* estimate of annual team cost of operation. For that reason, we only use the long-run measures for our remaining analysis.

To illustrate the relative market power of the various professional leagues, Figure 1 presents the cumulative distribution of our long-run Lerner Indexes for the four North American Sports Leagues. We include estimates based on *Forbes* estimated valuations and revenues for the 30 most successful European soccer teams. All estimates are for 2015, the latest year for which we had consistent data for Europe and North America. The highest price cost margins are found in the NBA and the NFL, the leagues with the most aggressive revenue sharing systems. The NHL, the North American league with the least egalitarian redistribution policy, has the lowest price cost margins. But all four North American leagues have price-cost margin distributions that lie to the right of the European teams.

The higher price-cost margins for the MLB, NBA, NFL, and NHL are consistent with their presumed greater protection against antitrust laws. North American teams are protected from new entrants and do not face the possibility of forced exit through relegation. The relationship between revenue sharing and market power is not as clear. It is possible that more profitable leagues adopt more egalitarian tax and transfer systems. It is worth noting that the less profitable European leagues have also not used revenue sharing beyond sharing television revenues, perhaps an added reason for their lower price-cost margins.[5]

[5] Even the television revenues are not evenly split. For example, the Premiership divides 50% of television revenues equally, but the rest are distributed based on won-loss record and facility fees.

Figures 2 through 5 show how the cumulative distribution of team long-run market power changes over time. We present the distributions for 2006, 2011 and 2016. Only the NFL had a decline in market power during the Great Recession, albeit from enviably high price-cost margins. The other three leagues maintained market power between 2006 and 2011. The recovery period has been accompanied by strong growth in long-run market power for all 4 leagues.

Explanatory Variables

We selected variables that were commonly used to explain variation in team value in prior studies.[6] Table 1 presents the summary statistics for the city and team factors we use to explain variation in the Lerner Indexes. We have four categories of factors, team tradition, recent competitive success, business cycle, and local market conditions. Our aim is to assess the relative importance of these factors in shaping a team's market power and to examine their relative importance under more or less egalitarian redistribution policies.

Team tradition is measured by the year the team was founded, the number of championships, the number of championship final appearances, and the ratio of championship wins to appearances. Recent team success is measured by the prior season's won-loss percentage.[7] All these data were compiled from available on-line league records.

Both macroeconomic shocks the local economic climate are likely to affect team profitability. We control for macroeconomic shocks using annual dummy variables. The time period covered includes the Great Recession which should illustrate how each league fares in contractions and expansions.

[6] Scelles *et al* (2016) provide a review of 7 studies in addition to their own.
[7] We remove ties from the won-loss computation. Ties do not occur in baseball or basketball and are rare in football and hockey. Preliminary analysis that added a measure for ties did not affect the results.

Our local market conditions are measured by the metropolitan areas population and real per capita income. We include a dummy variable for Canadian teams to correct for differences in currency valuations. For U.S. cities, the population and per capita income measures come from the Department of Commerce, Bureau of Economic Analysis. The Canadian data were obtained from Statistics Canada.

5. Results

Table 2 reports the results of regressions explaining variation in the long-run measures of the Lerner Index. The most interesting simply perform the analysis of variation between common macroeconomic shocks, fixed team effects, and unobserved factors specific to the team. Across all 4 leagues, the dominant factor explaining variation in market power are time-varying macroeconomic factors common to all teams in the league. These factors would include the performance of the U.S. economy as a whole. As household incomes have risen with the recovery, all teams would have benefited from increased ticket sales, greater demand for sports merchandise, and greater advertising revenue. Compared to the prerecession levels in 2006, price-cost margins had risen by 4.5 percentage points in the NFL, 6.3 percentage points in MLB, and 10.5 percentage points in the NBA. In the NHL, price-cost margins were still at their 2006 levels as of 2016.

However, another source of common market power is the league itself which protects all teams from competition. The common shocks explain 74% of the variation in the NBA, the league with the most aggressive revenue sharing. It explains only 54% of the variation in the NHL, the league with the least aggressive redistribution policy.[8] Individual team effects explain

[8] Vrooman (2000, 2009) argues that revenue sharing could increase or decrease team profitability. If team owners are profit maximizers, revenue sharing will not change competitive balance but it will lower the value of winning

only 9% of the variation in market power across teams in the NBA, but 22% in the NHL and 31% in MLB. This suggests that the disadvantage of a small or unsupportive local market is most apparent in baseball and least apparent in the NBA.

The fourth columns in Table 2 attempt to identify the source of local team market power. We divide the factors into long-run team performance, recent won loss record, and the strength of the municipal economic environment. Surprisingly, team long- and short-run performance has a significant effect on price cost margins only in the NBA and (marginally) in MLB. In those leagues, teams with more championships have greater market power. But in the NFL and the NHL, team success does not affect market power. In addition, local market conditions do not shape market power in the NHL and the NFL although they do in the NBA and MLB. Examining the relative magnitude of the R^2 in columns 3 and 4 show that much of the team share of the variation in long-run market power is due to factors unrelated to the measures of team performance and local market conditions included in Table 2.

It may seem strange that so little of the variation in firm market power is explained by the strength of the local market or past team wins and losses when these variables were so important in explaining the value of European soccer teams (Scelles *et al*, 2016)) or North American professional team's values (Alexander and Kern, 2004; Scelles *et al*, 2013). The present value of the team does not imply market power. For example, teams in small market may have lower value and still have market power to price above marginal cost in their limited market. As another example, Alexander (2001) found that baseball teams set ticket prices at levels consistent with monopoly pricing, and yet the team ticket demand elasticities differed significantly across teams. Some of the small market teams (Cincinnati, Kansas City, Milwaukee, Minnesota) had

which will lower salaries and raise profits. If team owners are win maximizers, they will bid up the value of players which will lower profitability, even as the policy increases competitive balance.

relatively few substitutes for the entertainment dollar and so they had small demand elasticities thus the greatest implied market power on ticket sales despite having relatively low team value.[9] Meanwhile, high value teams such as the Dodgers, Cubs and Red Sox had much more elastic demand for their tickets because there were so many other entertainment substitutes.

6. Conclusion

North American professional sports leagues enjoy stronger exemptions from anti-trust legislation than is true in Europe. Using estimates provided by *Forbes* magazine, we generate measures of price-cost margins over the 2006-2016 period to examine the relative market power for the various leagues and how the market power varies over time. North American teams have more market power than European teams. Market power in North America is attributable more to common factors affecting all teams within a league and less to individual team athletic success or the size of the local market. The more aggressive is revenue sharing across teams, the less important is the local market and the more important is the league to the team's market power. In addition, leagues with stronger revenue sharing have higher price-cost margins.

[9] Recall that the Lerner index is inversely proportional to the absolute value of the elasticity of demand, $LI = \frac{-1}{E^D}$.

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Figure 1: Cumulative Distributions of Long-Run Price Cost Margins for 5 Professional Sports, 2016

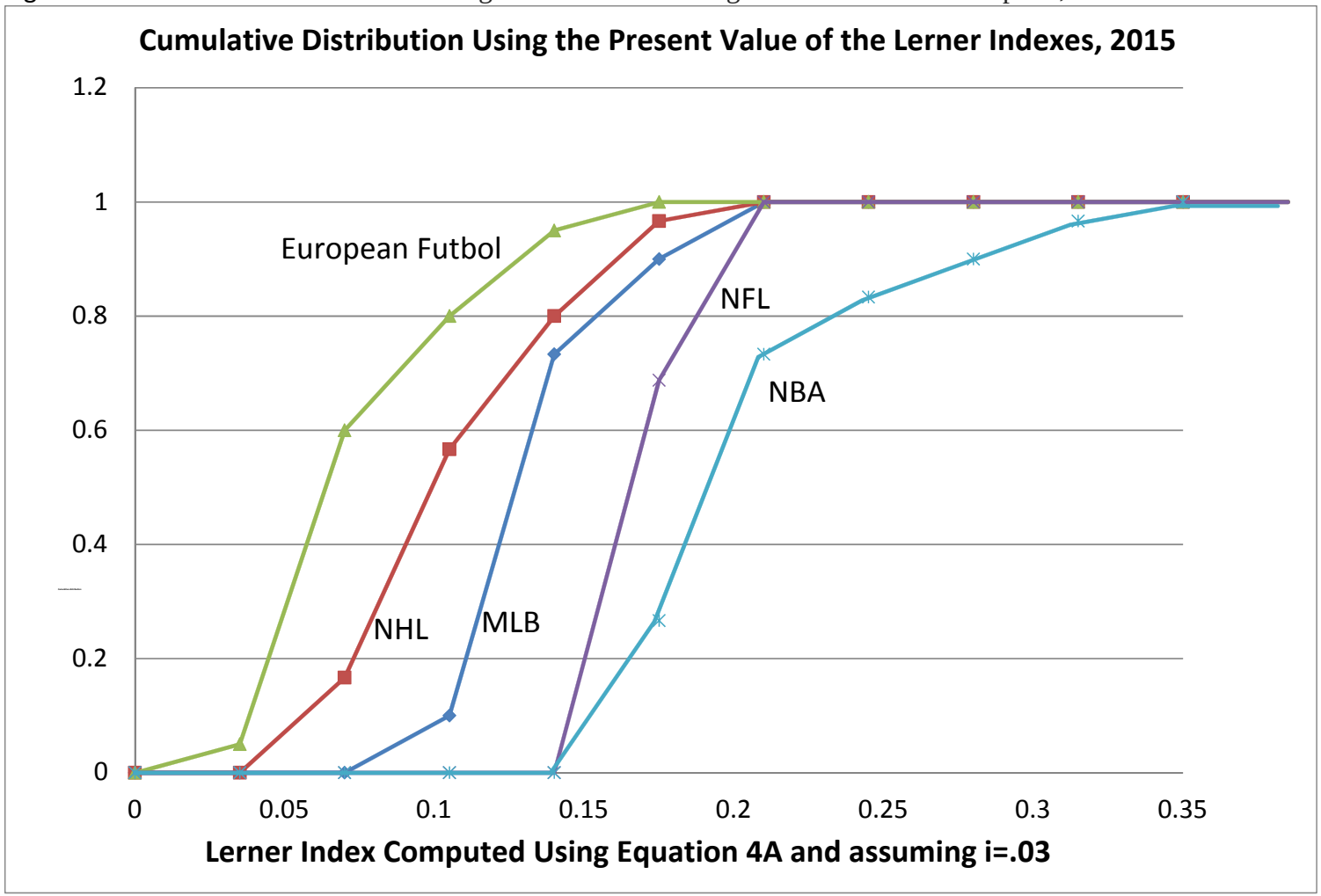

Figure 2: Cumulative Distributions of Long-Run Price Cost Margins for Major League Baseball, 2006, 2011, 2016

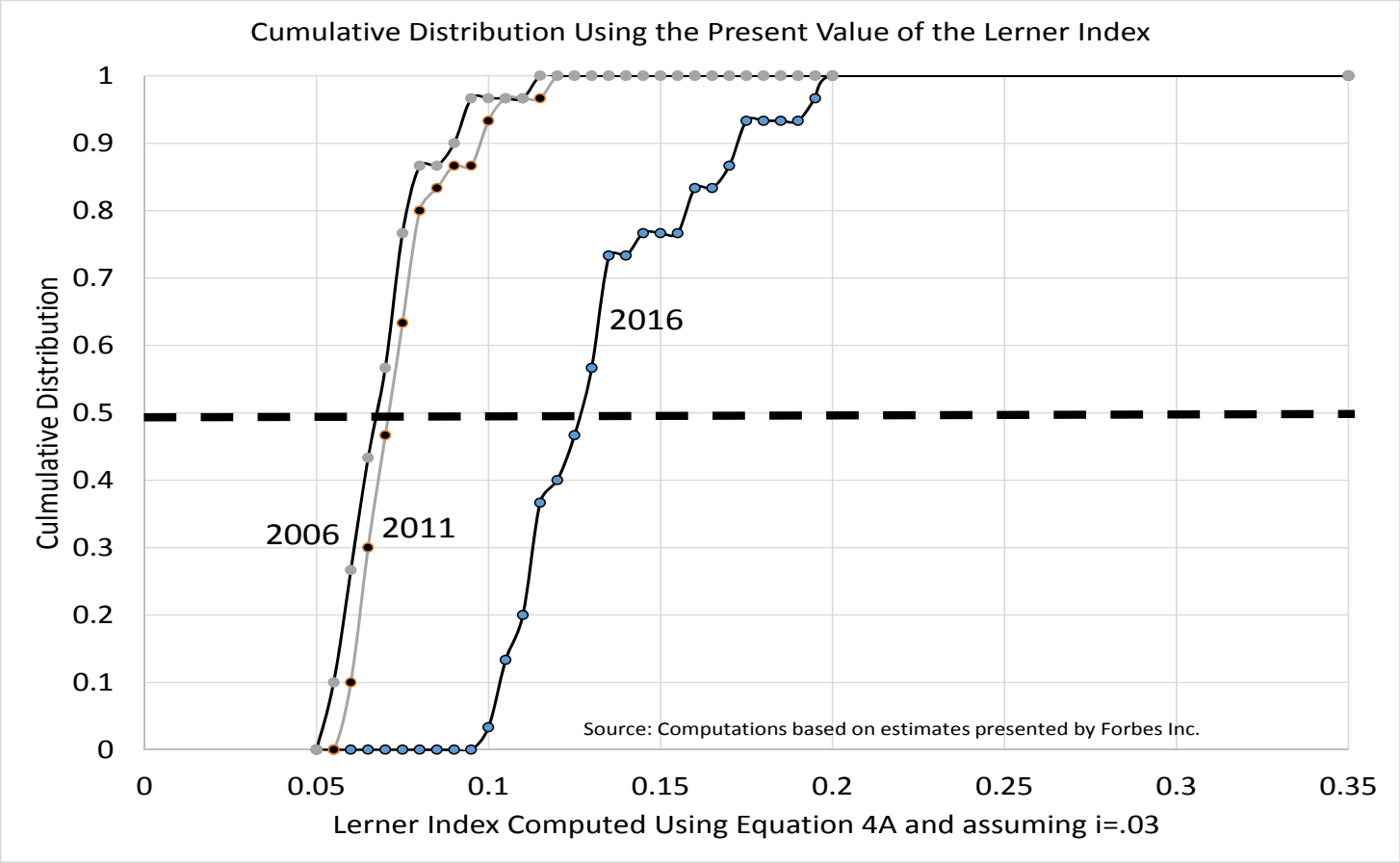

Figure 3: Cumulative Distributions of Long-Run Price Cost Margins for the National Basketball Association, 2006, 2011, 2016

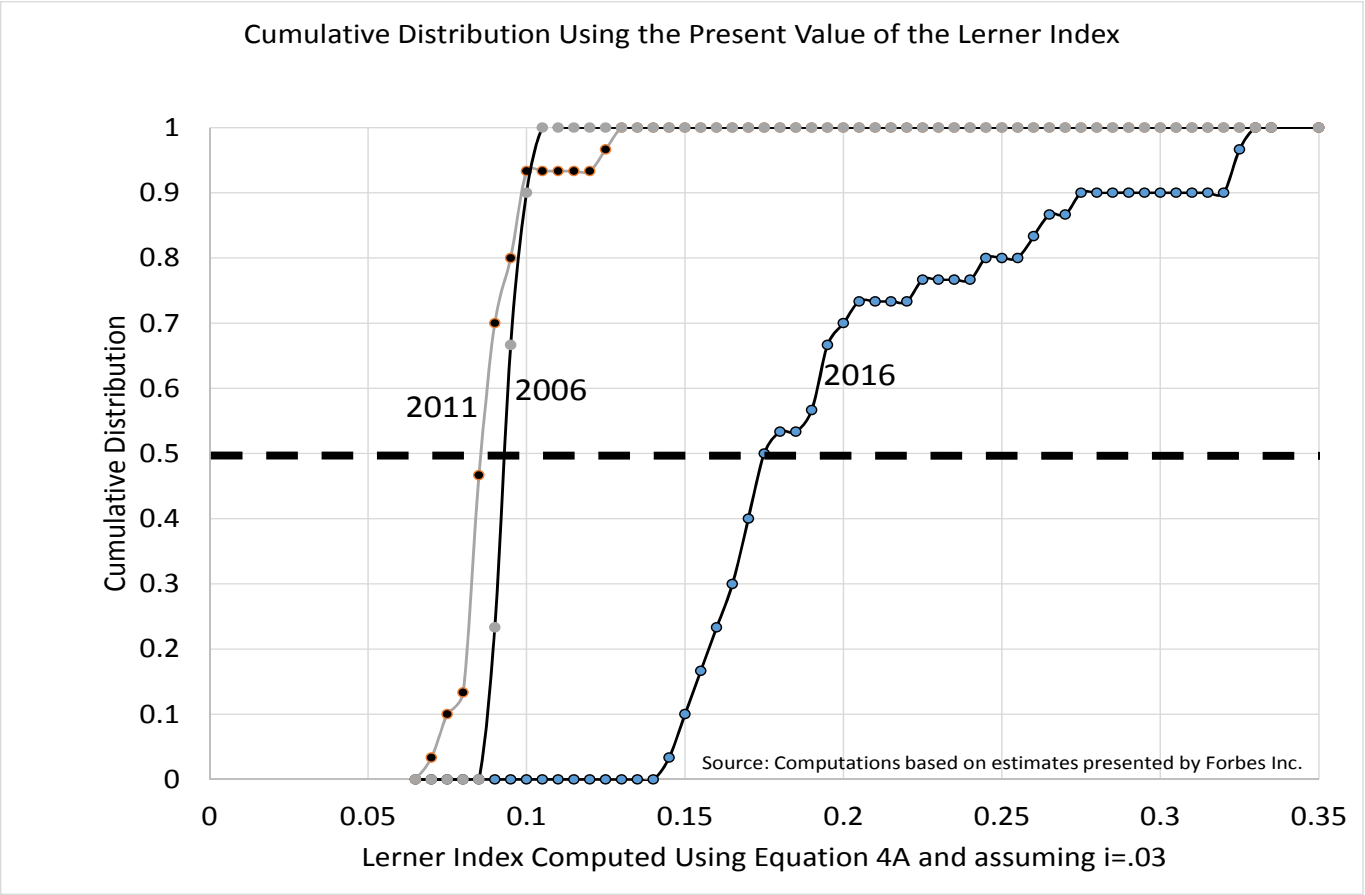

Figure 4: Cumulative Distributions of Long-Run Price Cost Margins for the National Football League, 2006, 2011, 2016

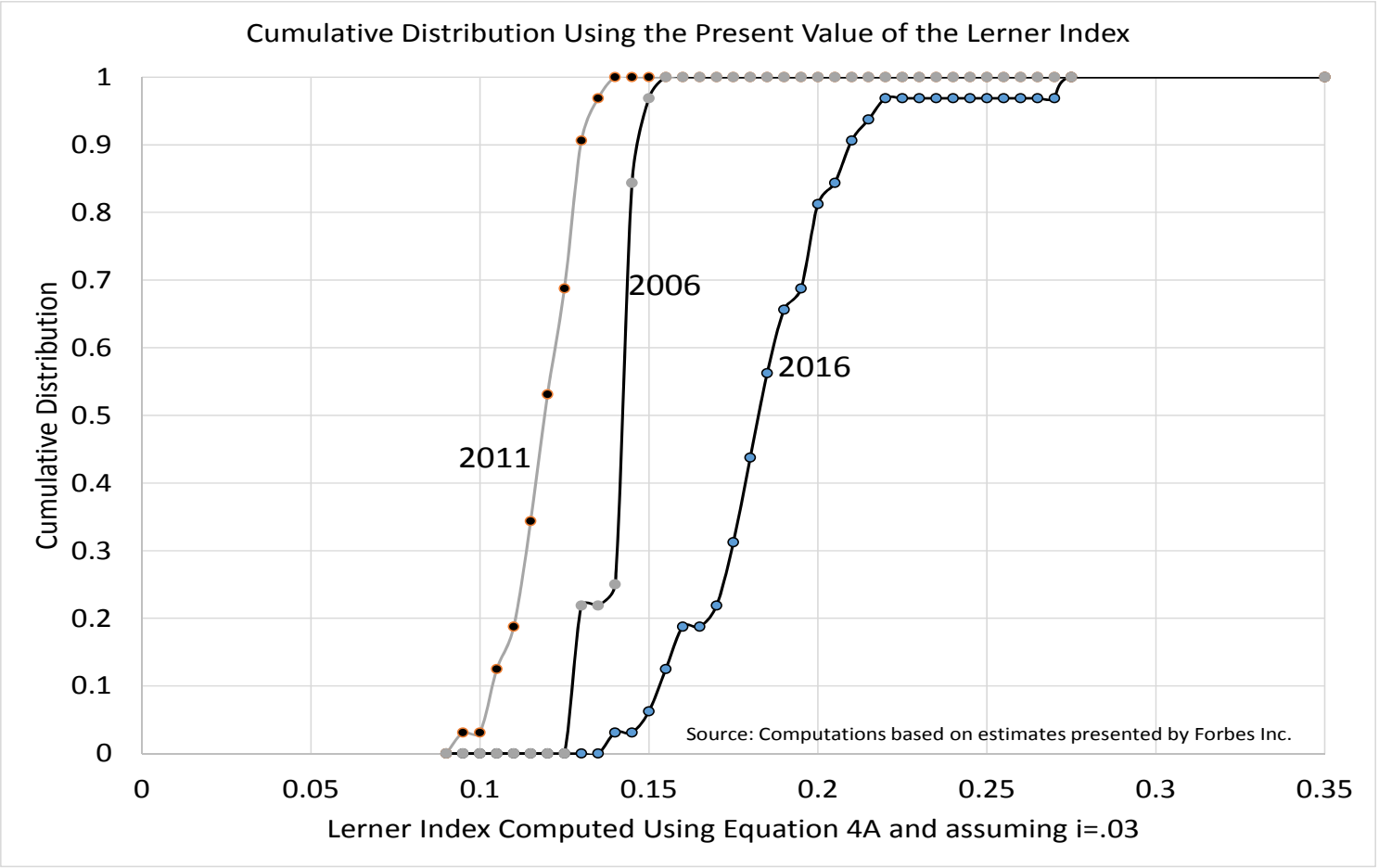

Figure 5: Cumulative Distributions of Long-Run Price Cost Margins for the National Hockey League, 2006, 2011, 2016

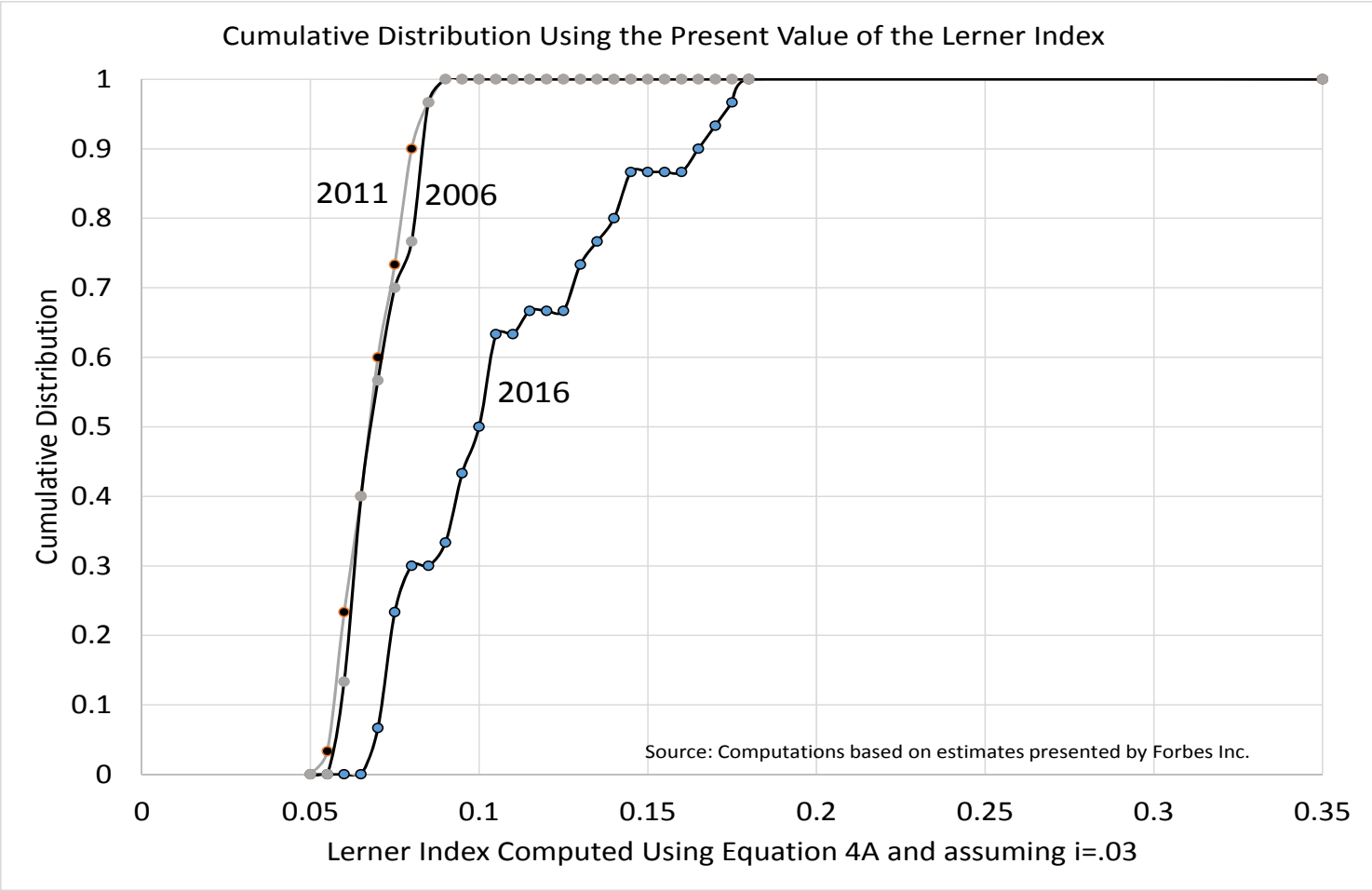

Table 1 Summary Statistics				
Team	MLB	NBA	NFL	NHL
LI_{jkt}^{LR} Lerner Index using present value	0.09	0.13	0.14	0.08
	(0.03)	(0.06)	(0.03)	(0.03)
Long Run				
Total championships	3.77	2.30	1.59	3.07
	(5.22)	(4.11)	(1.84)	(5.05)
Total appearances in championship final	7.47	4.57	3.19	6.13
	(8.31)	(6.44)	(2.56)	(8.12)
Year founded				
Short Run				
Winning percentage previous season	0.50	0.50	0.50	0.48
	(0.67)	(0.16)	(0.20)	(0.11)
Metro Market				
Population (log)	15.36	15.15	15.05	15.12
	(0.65)	(0.80)	(0.83)	(0.91)
Income per capita (log)	10.78	10.73	10.74	10.87
	(0.19)	(0.20)	(0.17)	(0.27)
N	330	330	352	330
years	2006 - 2016	2006 - 2016	2006 - 2016	2006 - 2016

Table 2 Regression explaining Variation in Long-Run Price Cost Margins, by North American Professional League, 2006-2016.																
Team	MLB				NBA				NFL				NHL			
Long Run																
Total championships				0.20				0.29**				0.10				0.04
				(1.17)				(2.47)				(0.43)				(0.28)
Total appearances in championship final				0.07				0.10				-0.01				-0.02
				(0.58)				(1.14)				(0.10)				(0.19)
Year founded				0.002				0.003				-0.008				0.006
				(0.43)				(0.22)				(1.09)				(0.26)
Short Run																
Winning percentage previous season				-0.67				1.61				-0.02				0.17
				(0.71)				(1.10)				(0.03)				(0.16)
Metro Market																
Population (log)				1.65**				1.23**				0.21				-0.24
				(3.80)				(3.38)				(0.76)				(0.82)
Income per capita (log)				0.38				1.00				1.23				-0.05
				(0.30)				(0.59)				(0.77)				(0.06)
Year Effects	√		√	√	√		√	√	√		√	√	√		√	√
Team Effects		√	√			√	√			√	√			√	√	
R^2	.57	.31	.88	.76	.74	.09	.84	.80	.61	.18	.80	.65	.54	.22	.76	.55
N	330	330	330	330	330	330	330	330	352	352	352	352	330	330	330	330
Test of long and short run team performance F(4, *T*-4) *T*= # of teams				2.64*				8.03**				0.57				0.13
Test of Metro Market variables F(2, *T*-2), *T* = # of teams				8.33*				10.31**				1.17				0.44

Notes: Dependent variable multiplied by 100 to scale the parameters.
All estimation corrected for clustering at the individual team level. t-statistics reported in parentheses.
* significance at the 0.1 level. ** significance at the 0.05 level.

Appendix Table 1 Average Price Cost Margin for Each Professional Sports Team from 2006 - 2016

MLB			NBA		
Team	Long-run	Short-run	Team	Long-run	Short-run
NY Yankees	0.138	-0.023	LA Clippers	0.168	0.177
LA Dodgers	0.134	0.016	Boston	0.162	0.296
Boston	0.114	0.057	Golden State	0.162	0.096
San Francisco	0.112	0.114	LA Lakers	0.154	0.252
Chicago Cubs	0.11	0.116	NY Knicks	0.151	0.183
NY Mets	0.093	0.036	Brooklyn	0.146	-0.124
St. Louis	0.092	0.118	Chicago	0.144	0.172
Anaheim	0.092	0.039	Dallas	0.137	0.036
Washington	0.09	0.162	Portland	0.129	0.058
Philadelphia	0.089	0.008	Miami	0.127	0.481
Texas	0.087	0.052	Houston	0.127	0.22
Seattle	0.087	0.054	Orlando	0.124	0.035
Atlanta	0.087	0.097	Cleveland	0.123	0.474
Detroit	0.086	-0.029	Toronto	0.123	0.172
Houston	0.086	0.136	Sacramento	0.123	0.049
Chi. White Sox	0.085	0.101	Oklahoma City	0.12	0.102
Baltimore	0.084	0.1	Memphis	0.119	0.026
Pittsburgh	0.081	0.141	Washington	0.119	-0.018
Arizona	0.08	0.046	Detroit	0.118	0.031
Minnesota	0.079	0.111	Atlanta	0.118	0.004
Cincinnati	0.078	0.083	Utah	0.117	0.083
Toronto	0.078	0.033	Phoenix	0.115	0.158
San Diego	0.077	0.143	Indiana	0.113	0.013
Milwaukee	0.076	0.089	Charlotte	0.113	-0.053
Kansas City	0.076	0.089	Minnesota	0.112	0.034
Colorado	0.075	0.098	San Antonio	0.111	0.099
Cleveland	0.075	0.109	Philadelphia	0.11	-0.042
Oakland	0.074	0.13	Denver	0.108	0.156
Miami	0.071	0.131	Milwaukee	0.108	0.001
Tampa Bay	0.071	0.114	New Orleans	0.105	0.069
Average	0.089	0.082		0.127	0.108

Notes: Long-run measures are computed using equation 4A), $LI_{jkt}^{LR} = i \cdot (\frac{PV_{jkt}}{P_{jkt} \cdot q_{jkt}})$.

Short –run Measures are computed using equation 4B), $LI_{jkt}^{SR} = \frac{\pi_{jkt}}{P_{jkt} \cdot q_{jkt}}$.

Appendix Table 1 Average Price Cost Margin for Each Professional Sports Team from 2006 - 2016 (continued)

NFL			NHL		
Team	Long-run	Short-run	Team	Long-run	Short-run
NY Giants	0.161	0.167	Anaheim	0.232	0.06
Dallas	0.155	0.289	Winnipeg	0.215	0.044
NY Jets	0.155	0.156	Columbus	0.18	-0.032
Washington	0.151	0.269	Philadelphia	0.147	0.162
New England	0.15	0.256	Carolina	0.146	-0.05
Chicago	0.149	0.2	Pittsburgh	0.135	0.077
Houston	0.148	0.215	Toronto	0.127	0.53
Indianapolis	0.147	0.168	San Jose	0.125	0.13
San Francisco	0.147	0.112	Detroit	0.111	0.173
Philadelphia	0.146	0.18	Washington	0.103	-0.008
Miami	0.145	0.089	NY Islanders	0.102	-0.018
Baltimore	0.142	0.152	Edmonton	0.098	0.089
Denver	0.141	0.132	Calgary	0.094	0.032
Green Bay	0.141	0.124	Arizona	0.086	-0.097
Pittsburgh	0.14	0.108	Buffalo	0.082	-0.043
Seattle	0.138	0.07	Boston	0.077	0.144
Kansas City	0.136	0.136	St. Louis	0.074	-0.039
Los Angeles	0.136	0.114	Nashville	0.073	-0.031
Minnesota	0.136	0.063	Dallas	0.066	-0.005
Tampa Bay	0.135	0.192	Ottawa	0.066	-0.075
Carolina	0.135	0.112	Colorado	0.064	-0.015
Tennessee	0.133	0.143	Tampa Bay	0.064	-0.015
Cleveland	0.132	0.11	New Jersey	0.062	-0.016
Arizona	0.131	0.13	Minnesota	0.062	-0.029
San Diego	0.129	0.138	Montreal	0.059	0.56
Cincinnati	0.129	0.135	NY Rangers	0.054	0.441
Atlanta	0.129	0.095	Chicago	0.053	0.208
Oakland	0.127	0.091	Florida	0.048	-0.06
Detroit	0.127	0.03	Vancouver	0.042	0.072
New Orleans	0.126	0.13	Los Angeles	0.031	0.062
Jacksonville	0.119	0.149			
Buffalo	0.119	0.132			
	0.139	0.144		0.096	0.075

Notes: Long-run measures are computed using equation 4A), $LI_{jkt}^{LR} = i \cdot (\frac{PV_{jkt}}{P_{jkt} \cdot q_{jkt}})$.

Short –run Measures are computed using equation 4B), $LI_{jkt}^{SR} = \frac{\pi_{jkt}}{P_{jkt} \cdot q_{jkt}}$.