Invited Article

The Golden Anniversary of "The Baseball Players' Labor Market"

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Rottenberg's "The Baseball Players' Labor Market" holds the original ideas behind many threads of the sports economics literature. Most well known, the article contains both the invariance proposition (IP) and the uncertainty-of-outcome hypothesis. But there is also a rather complete specification of attendance demand and much more. Given this, it is strange that the IP has been "morphed" into the Coase theorem in portions of the sports economics literature. Rottenberg deserves better than footnote status, and an insightful empirical test is lost in this transformation. This article documents this and tests the IP directly on an occurrence missed so far in the literature (but also documented by Rottenberg) to point out the continued importance of the IP, even up to the golden anniversary of its original publication.

Keywords: *sports economics; Rottenberg; competitive balance; uncertainty of outcome; transactions costs*

Simon Rottenberg's (1956) seminal piece "The Baseball Players' Labor Market" is enjoying the golden anniversary of its appearance in the *Journal of Political Economy*. Unfortunately, Professor Rottenberg will miss the chance to celebrate this anniversary; he died in January 2004.

Most well known from this seminal piece are the invariance proposition (IP) and the uncertainty-of-outcome hypothesis (UOH). But a host of other interesting observations that currently occupy sports economists also originally appear in that article. Only a few readers would trace the roots of the questions they address to any other source (e.g., those investigating tournament effects, market efficiency from related betting markets, and performance-enhancing drugs come to mind).

So it is somewhat puzzling to find that currently, the IP is at best just a footnote citation en route to a characterization under the Coase theorem (CT; Coase, 1960).

JOURNAL OF SPORTS ECONOMICS, Vol. 6 No. 4, November 2005 347–358
DOI: 10.1177/1527002505281226

This "morphing" is problematic for at least two reasons. First, Rottenberg deserves better, especially from sports economists. He published the idea first, and its subsequent importance leads me to nominate him as the father of sports economics. Second, this morphing of the IP rushes past important insights concerning the role of transactions costs gained from direct empirical tests of the IP.

An attempt to justify these claims is what follows. In the next section, the ideas that appear in "The Baseball Players' Labor Market" (Rottenberg, 1956) are reviewed and briefly related to subsequent developments in the literature. Rather than list the entire bibliography, I leave it to readers to see where Rottenberg (1956) has touched their work. Section 3 covers the morphing of the IP into the CT. A test of the IP on the earliest reserve rule, imposed in 1880 (and ignored to date but documented by Rottenberg), is undertaken to show what might be lost in the morphing. Conclusions round out the article in section 4.

WHAT ROTTENBERG SAID

The following are all direct quotes from Rottenberg (1956) and underlie significant portions of the sports economics literature. Not wanting to impose any particular order of importance, I present the ideas in the order in which they first appear in the work.

> 1. In the [baseball] labor market, monopsony is more frank and explicit and less imperfect than in the more common case, in other industries, of covert antipirating agreements. (p. 242)

Rottenberg (1956) spells out the monopsonization of baseball talent that occurs because of the reserve clause in greater detail later in the article (pp. 252-253). Depending on bargaining power (star importance, holdout possibilities, the costs of discontent, and available substitutes), players are paid somewhere between their nonsports wage and their marginal revenue product (MRP). Subsequent work on monopsony exploitation is a mainstay in the sports economics literature. And this includes estimating the impacts of salary discrimination and eventually analysis of matching markets and strategic performance incentives.

Rottenberg (1956) also suggests that not all of the difference between MRP and wage is exploitation. Players are like oil wells (pp. 253-254). Some pay off and some do not. Players who do not pay off are "dry wells" who were paid more than they were worth; players who become productive major leaguers provide a return on the overall investment that includes the duds. From this perspective, the difference between MRP and actual salaries includes exploitation and recouping the costs of all investments. And, of course, there is a line in the literature following this original observation as well.

> 2. Every team admitted to organized baseball has "territorial rights" in the city in which it is located. . . . Each team, therefore, monopolizes its own territory within organized baseball, and this monopoly right is a marketable commodity. (p. 243)

That teams have monopoly major league positions in their territories, protected by league rules, seems almost too obvious to mention, unless it is an original first observation. And there is a substantial literature on market power due to territorial protection by leagues, antitrust, and team movement (the "marketable commodity" portion of the observation).

> 3. A rich club, therefore, is one located in an area where attendance at baseball games is high; a poor club is one whose attendance is low. (Rottenberg, 1956, p. 246)

This is the original statement distinguishing larger revenue and smaller revenue owners, because it is based on attendance (hence revenues) rather than just on population. Building models of league behavior and outcomes that incorporate this distinction is commonplace in the literature.

> 4. Attendance at baseball games, as a whole is a function of the general level of income, the price of admission to baseball games relative to the prices of recreational substitutes, and the goodness of substitutes. Attendance at the games of any team is a positive function of the size of the population of the territory in which the team has the monopoly right to play; the size and convenience of location of the ball park; and the average rank standing of the team during the season in the competition of its league. It is a negative function of the goodness of leisure-time substitutes for baseball in the area and of the dispersion of percentages of games won by the teams in the league. (Rottenberg, 1956, p. 246)

This is quite a complete specification of attendance demand, even today. There are elements in common with all demand specifications (income, price, substitutes, population, and quality, i.e., team winning percentage). But there are also elements that have driven particular analysis in sports (ballpark factors and travel cost and the closeness of competition). There is also an introduction at this stage to the UOH, which Rottenberg (1956) elaborates shortly, in his reference to "closeness of competition."

> 5. To bring the process of unequal distribution of talent to a halt, it was thought necessary to devise the reserve rule. . . . A number of different measures suggest themselves for testing the quality of distribution of player ability among teams. A simple test is one which counts the number of times each team has won its league pennant. . . . By this simple test, it can be seen that the reserve rule has not distributed players among teams perfectly equally. (p. 247)

This type of analysis of self-regulation in sports is commonplace today. One simply looks at one of the many measures of balance using the "before and after" method. And assessment of the "many measures" is itself a significant part of the

sports economics literature. Rottenberg (1956) was just pointing out that the then "accepted wisdom" concerning the reserve clause was just not empirically justified. He later developed the IP as the reason why (see below).

> 6. The [draft] system appears to give the advantage of first choice to the teams in any classification which need talented players the most. The advantage, however, is largely illusory. (p. 249)

Rottenberg (1956) laid out why the draft would be ineffectual, but he had to use the minor league draft in place at his writing, because the free agent draft did not exist until 1965. Essentially, any player at a particular level for a specified number of years could be drafted to a higher league at a stated minimum price. Of course, faced with losing players at that price, teams just sold players to their highest valued use; only players worth the draft price remained available, so nearly nobody was drafted. This anticipates the application of the IP to the free agent draft in later works in the literature.

> 7. If players are willing to sell their services for such a [low minor league] wage and under such circumstances, it is perhaps because they derive very large psychic income from playing the game and because, on the average, the players in the lower leagues overestimate the probability that they will excel in play and be chosen to receive a higher salary with a team of a higher-classification league. (p. 251)

Rottenberg's (1956) discussion around this particular quotation sets out the underpinnings of the social issues involved with very high player salaries with a wide dispersion. Wide dispersion could draw large numbers of players hoping to earn the highest salaries, depressing average salaries in the meantime because nearly no players actually will be successful in this pursuit. The problem of youth overinvestment in sports is not much of an extension. As Rottenberg points out, the psychic value of a sports career enters in, but so does an overestimation of the chances of making it big, revealed by the astonishing drop-off in the lower levels of the minor leagues. And Rottenberg documents that drop off (p. 251).

> 8. The question may be asked whether it is sensible to assume that baseball team owners are rational maximizers of money quantities. (p. 252, footnote 45)

Rottenberg (1956) tackles whether owners maximize revenue or not. He argues that team prices represent a large amount of capital to subject to loss for the "pure joy of being associated with the game" (p. 252, footnote 45). And he also outlines the economics of perennial losers as a result of profit maximization and market size (p. 255, footnote 48). Of course, the argument over profit versus other maximization is an old one, and it continues on, most recently in articles that analyze the impacts of revenue sharing when owners maximize something other than profit.

9. But in baseball, no team can be successful unless its competitors also survive and prosper sufficiently so that the differences in the quality of play among teams are not "too great." (p. 254)

Rottenberg (1956) now gets to the heart of the UOH. Earlier in the article, he noted that there must be equal "size" among competitors if any are to be successful (p. 242) and that "uncertainty of outcome" shifts demand functions to the right (p. 246). At this later stage of the article, he elaborates how the UOH works in practice. Rich teams will not buy all of the good players, because in the short run, diminishing returns set in, and in the long run, scale diseconomies occur. It is this last point that captures the UOH. *Size* means quality relative to the other teams in the league, and diseconomies ensure that "the differences in the quality of play among teams are not too great." Thus, Rottenberg laid out the foundations of subsequent theoretical articles that incorporate relative competition. And testing the UOH is typically part of any solid estimation of attendance demand.

10. The position of organized baseball that a free market, given the unequal distribution of revenue, will result in the engrossment of the most competent players by the wealthy teams is open to some question. It seems, indeed, to be true that a market in which freedom is limited by a reserve rule such as that which now governs the baseball labor market distributes players among teams about as a free market would. (p. 255)

At long last, here is the IP. Rottenberg (1956) proceeds to describe the owner decision process that generates the same outcome either under the reserve clause or under a free market for players. The distribution of resources is invariant to the property rights over the rents generated by these resources. A predominant question in the subsequent literature is whether changes in the property rights to players' services altered the outcome on the field, either during the regular season, or during the playoffs.

But Rottenberg (1956) also says the same thing by addressing what types of mechanisms will cause the allocation of talent to change (pp. 256-257). Revenue sharing, 100% pooled and equally shared, will do the trick but also creates the incentive to field poor teams (a crucial concern to the National Football League, in which revenue sharing is the most extensive in sports). A ceiling on actual individual salaries (not at all like the current version of salary caps that actually are payroll limits) may work but must be enforced, because there will be nonsalary ways for players to take out their true value to owners (perquisites, long-term contracts). Franchises could be distributed so the size of the product is the same by population per team. But Rottenberg comes back to his important specification of demand to point out that this will only ameliorate the issue. There still will remain variation on the basis of the rest of the determinants of demand. Finally, roster limits will also change the distribution of talent. The subsequent literature had the advantage that

these types of mechanisms actually have been put in place in pro sports leagues. Those who have done these analyses surely find Rottenberg's original observations very familiar.

> 11. If players were not indentured to teams but were free to accept the offers of the highest bidders, would the amount of investment in the training of players and the quality of play fall? (p. 256)

Rottenberg (1956) answers the question plainly. If talent investment was worth the cost with the reserve clause, it would be worth it if the reserve clause were removed. Just as under the reserve clause, the gainer will do the investing; the cost of training will just be shifted from owners to players. Players will pay for training partly directly by incurring training expenses but also indirectly by "paying" owners to train them by taking lower wages. Actually, this is just the IP in another application: The allocation of training costs is invariant with respect to whether owners or players collect the value of training. This concern was common in work analyzing the impact of the Bosman decision on world football.

There you have it: 11 anchors for an immense amount of subsequent work in the sports economics literature. The most well known are the IP and the UOH, but there is also a rather complete specification of attendance demand that surely must rank as nearly as important given the amount of subsequent work. I leave it to readers to assess the impacts on their work. For my own part, I find my work echoing all the items except 7 and 11. And it typically follows something Rottenberg (1956) said almost to the letter.

THE MORPHING OF THE IP

Given all of the foregoing, it is curious that some authors have morphed the IP into the CT. There are two reasons why this should be corrected. The first is to give Rottenberg (1956) his due. He was the first on the scene with one of the truly great pieces of economic thinking. The second reason is that morphing the IP into the CT misses an additional hypothesis test relevant to the role of transactions costs in sports league outcomes. I take these in turn.

I was driven to write this note on the basis of two "real world" occurrences within the past few months. First, I had to correct someone at a Web log (or blog) named The Sports Economist (http://thesportseconomist.com) about the originator of the idea. Second, I read this from the recent winner of the Milton Friedman Essay Contest at the University of Chicago's Graduate School of Business (Yu, 2005):

> Owners vehemently resisted free agency, fearing the disproportionate flow of premium talent towards the larger baseball markets. According to [name omitted for purposes made clear shortly] however, free agency's transfer of property rights would leave the allocation of players unaffected.

If you filled in the blank with "the IP" or "Rottenberg," you are wrong. It is "Coase," and the author began the analysis in the essay with this: "Interestingly enough, the economics of baseball offers a lucid backdrop form which to glean the insights of the Coase Theorem." This particular graduate student essay serves only to emphasize that the IP has indeed been morphed into the CT, and almost exclusively in the sports economics literature itself.

Early on, Neale (1964) does not even cite Rottenberg (1956). But the idea of a league's joint production process clearly came first in Rottenberg (pp. 254-255): "Two teams opposed to each other in play are like two firms producing a single product." And Neale also talks about a "league standing" effect that echoes Rottenberg's UOH.

But it is in the early 1970s that the morphing begins in earnest. Demsetz (1972), writing about the general applicability of the property rights approach, gave us this: "No matter who owns the right to sell the contract for the services of a baseball player, the distribution of the players among teams will remain the same" (p. 17). He cites Rottenberg (1956) but makes this mysterious claim: "The reasoning employed by Rottenberg is similar but not identical to the above argument" (p. 17, footnote 4). Demsetz argues that Rottenberg's reasoning was based on the UOH (the previous enumeration should make it clear that this simply is not the case). Demsetz then makes his morphing contribution: "An application of Coase's analysis to the problem suggests that the reserve clause should have no effect on the identity of the team for which a player plays" (p. 18). For Demsetz, Coase (1960) trumps Rottenberg, but there is no difference in the description he attributes to the former.

Not everybody tried to morph the IP into the CT in the earliest literature. The IP was cited and accommodated in the earliest theoretical developments by El Hodiri and Quirk (1971) and Quirk and El Hodiri (1974). And for Demmert (1973), interested in policy impacts, the IP was a launching pad. Because the free agent draft was in place for Demmert, he moved the IP discussion forward to that mechanism. But by and large, the morphing of the IP continued apace through the 1970s. Canes (1974) cites Rottenberg (1956) but then puts the entire matter into a Coasian characterization. Holohan (1978) is the first to literally name the morphing with the term *Rottenberg-Demsetz* (despite the 16-year span between them). Only Hunt and Lewis (1976) stick with Rottenberg in the later 1970s.

Daly and Moore (1981) contribute heavily to the morphing. Like Demsetz (1972), they relegate Rottenberg (1956) to footnote status. They sum up the literature to the date of their writing with "the Coase Theorem assures us that the ownership of property rights should not alter the allocation of resources" (p. 78). Their point is that adding transactions costs can provide important analytical and empirical insight. Why this requires a subservient IP is not clear, but in their portrayal, the attribution to Coase (1960) follows Demsetz rather than Rottenberg. And so it went through the 1980s. Lehn (1982) cites Rottenberg but refers to a "Rottenberg-Coase" characterization in subsequent footnote references. Scully (1989) acknowledges

Rottenberg (p. 6) but then goes on to cast his investigation of the reserve clause in Coasian terms (p. 84).

Into the 1990s, Daly (1992) continues where he left off with Moore (Daly & Moore, 1981) in an even more blatant morphing (and an ironic one, given that the title of the work is "The Baseball Players' Market Revisited"). He first credits Rottenberg (1956) and then argues, "Rottenberg's invariance proposition is a particular application of the Coase theorem" (p. 15). As with the earlier work with Moore, Daly's point is that adding transactions costs can provide important analytical and empirical insight. But the choice of wording could easily be mistaken to mean that Rottenberg followed Coase!

And on the transactions-cost issue, let us be fair to Rottenberg (1956). His IP never once relates the presence of transactions costs, because there were none at the time of that writing. Players were traded and sold between a very few owners, under brisk competition among players, in a very clear contractual setting. And surely it is invalid to criticize the IP on the grounds that Rottenberg failed to see how transactions costs would matter much if players were literally free to move.

But despite there being no reason in this logical development to subjugate Rottenberg (1956) to Coase (1960), it continued anyway through the 1990s. Although some flew Rottenberg's banner (Fort & Quirk, 1995; Quirk & Fort, 1992; Rascher, 1997; and Vrooman, 1995, 1996a, 1996b, all cite Rottenberg but not Coase), others continued the morphing (Hadley & Gustafson, 1993; Hylan, Lage, & Treglia, 1996).

And nothing is different today. Vrooman (2000) cites Rottenberg (1956) but not Coase (1960). But the morphing of the IP is complete in another work. Cymrot, Dunlevy, and Even (2001) title their article "'Who's on First': An Empirical Test of the *Coase Theorem* [italics added] in Baseball." They claim in a footnote (p. 595) that Rottenberg "anticipated" Coase and refer to the IP as the "weak version" of the CT. The "strong form" adds that the resulting outcome is indeed efficient.

But a complete statement of the weak form, predating Coase (1960) by 4 years and providing a cornerstone in the sports economics literature, is more than just "anticipation." If the CT is a key for researchers in other areas, then it must be so for the IP and subsequent researchers in sports economics.

But there is more to this than just scholarly cap doffing. The morphing of the IP skips over an important opportunity to empirically test both it and the role of transactions costs. Suppose we test the IP directly for what it is and fail to reject it. Such a finding suggests that transactions costs do not come into play. This could be either because they are inherently small or because the league under investigation has implemented devices to reduce transactions costs to the point at which they are not statistically detectable. Of course, rejecting the IP through direct testing would require an additional explanation, and the transactions-cost approach would seem a likely important contributor.

But we do not have to rest with just the observation that direct tests of the IP are insightful. Let us return to another of Rottenberg's (1956) observations, ignored

these many years, and do a direct test of the IP. In the historical review part of his article, Rottenberg quotes sources noting that a form of reserve rule was adopted by the National League (NL) in 1880 (p. 248). Because the NL formed in 1876, this suggests a direct before-and-after test of the IP that has not previously been performed. Recognizing full well that there are many measures of competitive balance, the well-known ratio of actual to "idealized" standard deviations of winning percentage (*RSD*) is used for regular-season balance. The number of championships and victory margins are used for postseason play. The data and results are shown in Table 1.

The sample is divided so that the 5-year period before the reserve rule includes 1880 (the year the measures were approved) and the 5-year period after the reserve rule begins in 1881 (the year the measures would have effect). In the "before" period, the average *RSD* was 2.915. In the "after" period, the average *RSD* was 2.910. It appears safe to say that balance during regular-season play was unchanged, and the data fail to reject the IP.

Turning to championship results, Chicago, Boston, and Providence won all championships in both periods (although Chicago did win one more and Boston one fewer championship in the after period). For a second time, the data fail to reject the IP. However, the average victory margin for the champion appeared to have declined significantly in the after period (nearly 23%, from 7.4 games to 5.7 games). It would seem that this evidence rejects the IP, and in a way, that is appealing to transactions-cost explanations, because this measure of balance improved.

But this conclusion ignores that the 1880 performance of Chicago, with a .798 winning percentage, is a record that stands to this day. Over the entire 25-season, NL stand-alone period (1876 to 1900), no other team ever even broke the .700 barrier. Indeed, breaking the .700 barrier is rarer than a triple play; it has happened once in the NL (Pittsburgh, 1902) and six times in the American League (New York, 1927, 1939, and 1998; Philadelphia, 1931; Cleveland, 1954; and Seattle, 2001).

If we throw out 1880 as an anomaly and recalculate, the average victory margin in the before period is 5.5 compared with 5.7 in the after period, a difference of less than 4%. And the result is not surprising, because the average margin of victory in the NL during its stand-alone period (1876 to 1900) was about 5.6. So, for a third time, the data fail to reject the IP. In sum, the evidence suggests that either transactions costs were inherently quite small or the NL had already evolved rules that rendered them statistically undetectable. And we would not know that unless we tested the IP directly in the first place.

CONCLUSIONS

Many threads in the sports economics literature can trace their origins to Simon Rottenberg's (1956) "The Baseball Players' Labor Market," currently celebrating its golden anniversary. The article contained both the IP and the UOH. But it also

TABLE 1: The Invariance Proposition and the Original Reserve Rule, 1880

Team	*1876*	*1877*	*1878*	*1879*	*1880*	*1881*	*1882*	*1883*	*1884*	*1885*
Boston	.557	.700	.683	.643	.476	.458	.536	.643	.658	.411
Buffalo				.590	.293	.542	.536	.536	.577	.339
Chicago	.788	.441	.500	.582	.798	.667	.655	.602	.554	.777
Cincinnati	.138	.263	.617	.538	.263					
Cleveland				.329	.560	.429	.512	.567	.313	
Detroit						.488	.506	.408	.250	.380
Hartford	.691	.534								
Indianapolis			.400							
Louisville	.455	.583								
Milwaukee			.250							
New York	.375							.479	.554	.759
Philadelphia	.237							.173	.348	.509
Providence			.550	.702	.619	.560	.619	.592	.750	.482
St. Louis	.703	.467								.333
Syracuse				.314						
Troy				.253	.494	.464	.422			
Washington										
Worcester					.482	.390	.214			
Actual *SD*	.233	.147	.156	.170	.172	.088	.136	.152	.177	.177
Season length (games)	64	59	60	79	83	84	84	98	112	111
ISD	0.062	0.065	0.065	0.056	0.055	0.055	0.055	0.051	0.047	0.048
RSD	3.742	2.266	2.422	3.015	3.129	1.600	2.479	2.994	3.746	3.730
Average *RSD*					2.915					2.910
Winner	Chicago	Boston	Boston	Providence	Chicago	Chicago	Chicago	Boston	Providence	Chicago
Margin	6	7	4	5	15	9	3	4	10.5	2
Average margin					7.4					5.7
Average margin without 1880					5.5					5.6

NOTE: *ISD* = idealized standard deviation for a perfectly balanced league, equal to $0.5 / \sqrt{(n)}$; *RSD* = *SD* / *ISD*; margin = games back for the second-place team.

offered quite a complete specification of attendance demand and offered a host of other lines of inquiry that now occupy sports economists.

Thus, it is surprising that the IP has been morphed by some researchers into an application of the CT. But this is a disservice to an important piece of logic that is both the weak form of the CT and a cornerstone of sports economics. And this morphing also glosses over an important hypothesis test offered by direct tests of the IP. This is demonstrated by the direct test of the earliest reserve rule in this article.

Perhaps all of this is just overblown. A sympathetic view is that most principles students are exposed to the CT and may not ever venture into the area of sports economics and the earlier contribution of Rottenberg (1956). And from the perspective of knowing economics, it is the logic that matters, not the originator. From this perspective, the morphing of the IP could just be an attempt to bring a sports topic into the mainstream of analysis by fitting it within the later Coasian framework (a form of collective inferiority complex?). Or perhaps the morphing is just the result of an enthusiastic attempt to stress the importance of introducing transactions costs into the analytical framework. Or maybe it is nothing more than an attempt to pay the respect due to such a powerful theorem and a truly great economist, Ronald Coase.

But sauce for the goose is sauce for the gander. The fact of the matter is that the weak form came first from Rottenberg (1956). And it is the rock-solid foundation of much of the analysis in sports economics. Eventually, we may exhaust the insights found in "The Baseball Players' Labor Market." But here's hoping that we always remember the power of the ideas found there, thanks to Simon Rottenberg. At least this sports economist will continue to call it Rottenberg's IP rather than just an application the weak form of the CT.

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