By the Numbers

Volume 17, Number 4 The Newsletter of the SABR Statistical Analysis Committee November, 2007

Review

Academic Research: Organizational Ties in MLB Management

Charlie Pavitt

The author reviews a recent academic study looking at baseball GMs to see how various organizational ties affect transaction frequency.

Jeffrey Q. Barden and Will Mitchell, Disentangling the Influences of Leaders' Relational Embeddedness on Interorganizational Exchange, Academy of Management Journal, 2007, Vol. 50 No. 6, pp. 1440-1461

The Academy of Management Journal is a prestigious outlet for scholars in business administration, and the inclusion of Barden and Mitchell's work herein testifies to the significance of their work to theory in that area. The specific issue under examination is the extent to which ties between different organizations, as instantiated either through relations between the organizations as a whole, such as long-term buyer-seller exchanges (the authors denote these as OO ties), through interpersonal ties among organizational leaders (LL ties), or through the relationship between one organization and that organization's former leader as part of a different organization (OL ties). These are the simplest kinds of organizational ties and serve as building blocks for OOL, OLL, and OOLL ties. The authors' four hypotheses all spring from the notion that the more potential ties that exist, the more interorganizational exchange will occur, such that OOLL ties lead to the more exchange than OOL and OLL; the former will in turn induce more exchange than OL and OO and the latter more than OL and LL.

And where else but baseball trades to test these hypotheses? Barden and Mitchell examined the likelihood of a player transaction in a given year based on 1657 "exchange(s) of exclusive contractual rights to players' services" (p. 1448) between 1985 and 2002; I presume these include trades and outright sales although the authors never explicitly state this. Fewer than three percent of the cases within that time span represented circumstances in which the same two teams had two or more transactions within a year (April 1 through March 30), so the authors decided to ignore those. General managers are considered the leaders and as such the pivotal figures in defining the type of organizational tie, such that, to use their examples, an LL relationship would consist of trades between Jim Beattie and Doug Melvin as GMs of the Orioles and Brewers when they had been trading partners when running previous teams and an OO relationship would consist of trades between two teams both of whom had different GMs the last time they traded.

In this issue

Results were generally although not always consistent with expectations. OOLL transactions were more likely than OOL and OLL; OOL more likely than OO and LL; OLL more likely than LL although not OL. In addition, OO ties were more likely than no ties at all but OL and LL not. Rather, ties between GMs accentuate organizational ties in OLL and OOLL relationships. This finding surprised both the authors and me. Barden and Mitchell attribute it to the influence of scouts and other front office figures to personnel decisions. They cite John Scheuerholz's reference in his and Larry Guest's book *Built to Win* refering to the GM as the "final filter" in team decision making. We must conclude that there are no recent examples of the Frank Lane/Bill Veeck relationship that flourished, for better or worse, in the 1950s.

Charlie Pavitt, chazzq@udel.edu

Informal Peer Review

The following committee members have volunteered to be contacted by other members for informal peer review of articles.

Please contact any of our volunteers on an as-needed basis – that is, if you want someone to look over your manuscript in advance, these people are willing. Of course, I'll be doing a bit of that too, but, as much as I'd like to, I don't have time to contact every contributor with detailed comments on their work. (I will get back to you on more serious issues, like if I don't understand part of your method or results.)

If you'd like to be added to the list, send your name, e-mail address, and areas of expertise (don't worry if you don't have any – I certainly don't), and you'll see your name in print next issue.

Expertise in "Statistics" below means "real" statistics, as opposed to baseball statistics: confidence intervals, testing, sampling, and so on.

Member	E-mail	Expertise
Shelly Appleton	slappleton@sbcglobal.net	Statistics
Ben Baumer	bbaumer@nymets.com	Statistics
Jim Box	jim.box@duke.edu	Statistics
Keith Carlson	kcsqrd@charter.net	General
Dan Evans	devans@seattlemariners.com	General
Rob Fabrizzio	rfabrizzio@bigfoot.com	Statistics
Larry Grasso	l.grasso@juno.com	Statistics
Tom Hanrahan	Han60Man@aol.com	Statistics
John Heer	jheer@walterhav.com	Proofreading
Dan Heisman	danheisman@comcast.net	General
Bill Johnson	firebee02@hotmail.com	Statistics
Mark E. Johnson	maejohns@yahoo.com	General
David Kaplan	dkaplan@education.wisc.edu	Statistics (regression)
Keith Karcher	karcherk@earthlink.net	Statistics
Chris Leach	chrisleach@yahoo.com	General
Chris Long	clong@padres.com	Statistics
John Matthew IV	john.matthew@rogers.com	Apostrophes
Nicholas Miceli	nsmiceli@yahoo.com	Statistics
John Stryker	john.stryker@gmail.com	General
Tom Thress	TomThress@aol.com	Statistics (regression)
Joel Tscherne	Joel@tscherne.org	General
Dick Unruh	runruhjr@iw.net	Proofreading
Steve Wang	scwang@fas.harvard.edu	Statistics

How Much is a Top-100 Prospect Worth?

Victor Wang

In the previous issue of BTN, the author reported on the expected performance and financial value of various rankings of the top 25 young prospects. Here, he updates his original study to the top 100 prospects.

Introduction

In the August 2007 edition of *By the Numbers*, I looked at the value of top baseball prospects from 1990-1999. I determined who the top prospects were by examining Baseball America's list of top 100 prospects[1]. From there, I broke the top prospects into four groups: hitting prospects ranked in the top 10, pitching prospects ranked in the top 10, hitting prospects ranked from 11-25, and pitching prospects ranked from 11-25. I then looked at the how much value those prospects produced in their first six full seasons in the majors. I chose to look at the first six full seasons because that is how long a Major League team has control of a player before that player reaches free agency. During that period, the Major League team has the ability to pay that player much less than what he'd earn on the open market.

A more detailed explanation of my methods is in the previous article. To determine the value of production of a prospect's first six seasons in the majors, I used WARP, a statistic developed by Baseball Prospectus. WARP measures a player's offensive and defensive value compared to a replacement level player's production. After that, I estimated how much a top prospect would save a team in salary in his first six years. To do this, I took a prospect's estimated salary from his first six years and subtracted that from how much a free agent would earn if he had the same production as the prospect. I converted the savings back into WARP and summed that with a prospect's WARP production to get a prospect's total value.

I found that despite the rate of attrition for top prospects, they still hold tremendous value given the savings they give a team. I decided to expand the study to see how much value the rest of the prospects in Baseball America's top 100 have. However, I made a few changes to player production estimations.

Changes

The first change was to switch from using WARP to Win Shares Above Bench (WSAB) to evaluate player production. The Win Shares statistic, developed by Bill James, is one the Hardball Times defines as "a very complicated statistic that takes all the contributions a player makes toward his team's wins and distills them into a single number that represents the number of wins contributed to the team, times three." WSAB takes Win Shares a step further by comparing the Win Shares a player produced to that of an average bench player.

This is very similar to WARP. However, WARP uses a much lower baseline than WSAB. Baseball Prospectus estimates a replacement level player as that of a player with a .150 winning percentage. So if a team were to play with all replacement level players, they would win approximately 15% of their games. Most analysts view a proper replacement level as between .350-.400 in terms of a player's winning percentage.

Because of WARP's low baseline, a non-linear formula is needed to find a player's free agent value. Baseball Prospectus uses what they call MORP[2] to account for this. In my original article, I used a linear formula with WARP to find a player's free agent value, which produced free agent values that are too low. Rather than use WARP and MORP to reproduce my findings, I decided to use WSAB. WSAB uses a higher baseline than WARP and in the opinions of many, this baseline is much more useful when measuring a player's value. Because of the baseline used by WSAB, a player's free agent value is estimated linearly.

The second change I made was to discount a player's production. All things being equal, you'd rather have an all star season now instead of an all star season four years in the future. My original article did not account for this when estimating a prospect's production. To convert a

[1] http://www.baseballamerica.com/today/prospects/features/26983.html

[2] http://baseballprospectus.com/glossary/index.php?mode=viewstat&stat=304

player's future production into present production, I used a discount rate of 8%. Rany Jazayerli uses this same figure in his draft study[3] when he discounted the player value of draft picks.

Method

I used the same method to come up with a prospect's value as in my original article with the exception of the changes I mentioned above. I broke prospects in each group into the same four subgroups as in my previous article. The subgroups are bust, contributor, everyday player, and star. A player was a bust if he averaged 0 or less Wins Above Bench (WAB, equal to WSAB/3) per year, a player was a contributor if he averaged between 0 and 2 WAB/year, a player was an everyday player if he averaged between 2 and 4 WAB/year, and a player was considered a star if he averaged over 4 WAB/year. For pitchers, I used these same four subgroups with one exception: I lowered the production necessary to be considered a star for pitchers to 3 WAB/year or more. Therefore, an everyday pitcher (middle of the rotation pitcher) was a pitcher who averaged between 2 and 3 WAB/year. I did this because pitchers tend to average less WAB/year over a period of time when compared to hitters. In fact, no pitcher in the study averaged over 4 WAB/year. The cost for a WAB in the free agent market for the 2007 off season was estimated to be $4.88 million/WAB using 10% annual inflation and financial data from the 2006 off season. The financial data was taken from Dave Studenmund's Win Shares article from the *Hardball Times Baseball Annual 2007*.

Table 1 – Hitters Ranked in Top 10, by Category

	Bust	Contributor	Everyday	Star
Number of Players	5	24	12	7
Chance of Occurring	10%	50%	25%	15%
WAB/Year	-0.093	0.875	2.81	4.72
PV Savings/yr ($MM)	-0.46	2.64	8.83	14.95

Table 2 – Pitchers Ranked in Top 10, by Category

	Bust	Contributor	Everyday	Star
Number of Players	8	16	1	1
Chance of Occurring	31%	62%	4%	4%
WAB/Year	-0.03	0.8	2.3	3.7
PV Savings/yr ($MM)	-0.03	2.4	7.3	11.6

Table 3 – Hitters Ranked in Top 10, Overall

WAB	10.9
DWAB	8.41
PV Savings	33.96

Table 4 – Pitchers Ranked in Top 10, Overall

WAB	4.3
DWAB	3.3
PV Savings	12.7

Tables 1 and 2 shows the Top 10 prospects, broken down by subgroup. Table 2 shows the overall return for all six years.

In those tables, the fourth row shows the total savings each subgroup averaged converted to present value and divided by six.

In Table 3 and 4, the row "WAB" is the total WAB a top-ten hitting prospect produced on average over his first six years. DWAB stands for Discounted Wins Above Bench and is just WAB using the 8% discount rate mentioned before. For those unfamiliar with WSAB and WAB, Alex Rodriguez led the MLB last year with 26 WSAB. That is equivalent to 8.7 WAB. C.C. Sabathia and Jake Peavy led all pitchers with 18 WSAB, which is equal to 6 WAB.

PV Savings are the total present value savings for a top ten hitting prospect. This is essentially the "surplus" value a prospect brings. If a team is trading a prospect, they need to receive an equal amount of surplus value in return or increase their chances of making the playoffs enough to equal the surplus savings they lose.

The following tables show the results for all other prospects. I broke hitters and pitchers down into four other groups: those ranked from 11-25, those ranked from 26-50, those ranked from 51-75, and those ranked from 76-100.

[3] http://www.baseballprospectus.com/article.php?articleid=4291

Table 5 – Hitters Ranked 11-25, by Category

	Bust	Contributor	Everyday	Star
Number of Players	15	35	14	6
Chance of Occurring	21%	50%	20%	9%
WAB/Year	-0.4	0.8	2.8	4.7
PS Savings/yr ($MM)	-1.4	2.4	8.6	14.8

Table 6 – PItchers Ranked 11-25, by Category

	Bust	Contributor	Everyday	Star
Number of Players	19	31	7	2
Chance of Occurring	32%	53%	12%	3%
WAB/Year	-0.03	0.7	2.4	3.6
PS Savings/yr ($MM)	-0.03	1.9	7.7	11.2

Table 7 – Hitters Ranked in Top 11-25, Overall

WAB	7.9
DWAB	6.1
PV Savings	23.5

Table 8 – Pitchers Ranked in Top 11-25, Overall

WAB	4.4
DWAB	3.4
PV Savings	13.3

Table 9 – Hitters Ranked 26-50, by Category

	Bust	Contributor	Everyday	Star
Number of Players	46	58	16	10
Chance of Occurring	35%	45%	12%	8%
WAB/Year	-0.14	0.9	2.9	5.2
PV Savings/yr ($MM)	-0.6	2.5	8.9	16.4

Table 10 – PItchers Ranked 26-50, by Category

	Bust	Contributor	Everyday	Star
Number of Players	26	41	11	2
Chance of Occurring	33%	51%	14%	2.5%
WAB/Year	-0.02	0.7	2.4	3.1
PV Savings/yr ($MM)	-0.2	1.9	7.6	9.8

Table 11 – Hitters Ranked 26-50, Overall

WAB	6.4
DWAB	5.0
PV Savings	19.6

Table 12 – Pitchers Ranked 26-50, Overall

WAB	4.4
DWAB	3.4
PV Savings	13.3

Table 13 – Hitters Ranked 51-75, by Category

	Bust	Contributor	Everyday	Star
Number of Players	53	44	17	3
Chance of Occurring	45%	38%	15%	3%
WAB/Year	-0.15	0.7	3.0	4.5
PV Savings/yr ($MM)	-0.6	2.0	9.5	14.2

Table 14 – Pitchers Ranked 51-75, by Category

	Bust	Contributor	Everyday	Star
Number of Players	39	54	6	2
Chance of Occurring	39%	54%	6%	2%
WAB/Year	-0.03	0.7	2.4	3.5
PV Savings/yr ($MM)	-0.3	2.1	7.6	11.0

Table 15 – Hitters Ranked 51-75, Overall

WAB	4.5
DWAB	3.4
PV Savings	13.4

Table 16 – Pitchers Ranked 51-75, Overall

WAB	3.4
DWAB	2.6
PV Savings	10.0

Table 17 – Hitters Ranked 76-100, by Category

	Bust	Contributor	Everyday	Star
Number of Players	49	51	11	3
Chance of Occurring	43%	45%	10%	3%
WAB/Year	-0.1	0.7	2.8	4.7
PV Savings/yr ($MM)	-0.5	2.2	8.6	15.0

Table 18 – Pitchers Ranked 76-100, by Category

	Bust	Contributor	Everyday	Star
Number of Players	46	53	5	2
Chance of Occurring	43%	50%	5%	2%
WAB/Year	-0.03	0.6	2.3	3.4
PV Savings/yr ($MM)	-0.3	1.9	7.3	10.6

Table 19 – Hitters Ranked 76-100, Overall

WAB	4.0
DWAB	3.1
PV Savings	11.8

Table 20 – Hitters Ranked 76-100, Overall

WAB	2.9
DWAB	2.2
PV Savings	8.2

Conclusions

The main findings from my previous article remain intact. Elite hitting prospects have tremendous value. Hitters ranked in the top 10 and top 25 have by far the highest value among other prospect groups. Pitchers, even elite pitching prospects, are very risky. The number of pitchers who turn in to stars or even middle-of-the-rotation starters is a lot lower than many would expect.

One result that changed from using WSAB was that pitchers rated from 11-25 are now more valuable than pitchers rated in the top 10. Also, pitchers rated from 26-50 have also been more valuable than top 10 pitchers. In fact, there has been basically no difference in performance between any of the groups of pitchers in the top 50. I think part of the reason for the poor showing of top 10 pitchers is the low sample size. If we look at some of the top ten lists after 1999 we see some successful pitchers including Josh Beckett, C.C. Sabathia, Ben Sheets, Justin Verlander, and Francisco Rodriguez. However, there are still pitchers like Jesse Foppert, Gavin Floyd, and Ryan Anderson throughout the list. Another reason for the poor showing of top 10 pitchers is that, put simply, pitchers are hard to project. This can be seen by the fact that hitters ranked from 51-75 have had more value than any group of pitchers.

Note that like my previous article, these numbers I have formed do not reflect a team's position on the win curve. It may be beneficial for a team to give up future value if they are "one player away." Also note that it is likely that these breakeven numbers overestimate the actual trade value of prospects. Due to the risk involved with prospects, there is probably a risk premium when it comes to trading prospects. While this premium would likely vary by general manager, it would be interesting to try and determine in future research what the average risk premium is when trading prospects for established major leaguers.

Table 21 – Pitcher Breakdown by Handedness

Subgroup	Righty WAB/yr	Lefty WAB/yr	WAB/yr	Righties	Lefties
1-10	0.83	0.46	0.71	18	8
11-25	0.86	0.40	0.74	44	15
26-50	0.71	0.84	0.74	64	17
51-75	0.63	0.36	0.57	78	24
76-100	0.51	0.42	0.48	72	34

One hunch I've had while researching top prospects is that lefty pitchers are overrated in comparison to righty pitchers. To see if there was any validity to this hypothesis, I broke down each pitching prospect subgroup into righty and lefty pitchers and found the average WAB for righties and lefties.

From Table 21, we can see that righty pitching prospects far outnumber lefties, which is no surprise. We also see that righties outperform lefties in 4 out of the 5 subgroups, with lefties only being superior in the 26-50 sub group. One surprise to see is that lefty pitching prospects

have about the same level of performance for each sub group except for the 26-50 group. Meanwhile, righties seem to follow a progression we would expect based on prospect rankings. However, when we break pitching prospects down by hand we start to deal with really small sample sizes, especially for lefties. I would take the numbers from the last table with a grain of salt.

In conclusion, the ranking of a hitting prospect seems to be a good indicator of future value. A pitching prospect's ranking has not had quite the same effect. There has been no separation in performance between pitching prospects rated in the top 50. In fact, pitching prospects ranked from 11-50 have performed slightly better than top 10 pitching prospects. However, there does appear to be a clear drop off in performance between top 50 pitchers and pitchers ranked from 51-100. Hitters in each sub group perform better than the pitchers in their sub group. In fact, hitters ranked 51-75 have performed better than any group of pitchers in the top 50. An expanded look at the performance of top 100 prospects has further reinforced my belief that teams should be using more of their pitching prospects to trade for established major league players. There is definite profit available for teams that acquire players in their arbitration years for top pitching prospects. In end though, it seems teams are starting to better understand the value prospects bring through performance and cost control.

Special thanks to Dave Studenmund for providing me WSAB data.

Victor Wang, atsbuy@yahoo.com ♦

Submissions

Phil Birnbaum, Editor

Submissions to *By the Numbers* are, of course, encouraged. Articles should be concise (though not necessarily short), and pertain to statistical analysis of baseball. Letters to the Editor, original research, opinions, summaries of existing research, criticism, and reviews of other work are all welcome.

Articles should be submitted in electronic form, either by e-mail or on CD. I can read most word processor formats. If you send charts, please send them in word processor form rather than in spreadsheet. Unless you specify otherwise, I may send your work to others for comment (i.e., informal peer review).

If your submission discusses a previous BTN article, the author of that article may be asked to reply briefly in the same issue in which your letter or article appears.

I usually edit for spelling and grammar. If you can (and I understand it isn't always possible), try to format your article roughly the same way BTN does.

I will acknowledge all articles upon receipt, and will try, within a reasonable time, to let you know if your submission is accepted.

Send submissions to:
Phil Birnbaum
88 Westpointe Cres., Nepean, ON, Canada, K2G 5Y8
birnbaum@sympatico.ca