

The Effectiveness of Platooning

by

David W. Smith

June 25, 1998

Platooning in baseball is really a consideration of the handedness of batters and pitchers. The conventional wisdom is that batters have an advantage when they bat from the side opposite the one the pitcher throws with. This advantage is generally expressed as the consequence of having breaking balls come toward the batter, making them easier to follow than when they are going away. A second advantage for a batter concerns the release point of the pitcher. For example, when a batter and pitcher are of the same hand, then the line from the release point to the plate is very close to the batter for the whole distance to the plate. When they are of opposite hands, then the batter has a better view of the pitch.

My analysis will consider two basic questions. First: does handedness advantage have any effect on batter performance? Second: do managers make decisions based on the perceived handedness advantage? I examined every play of every game from 1977 to 1997, except for 19 games that were not available. My sources are the data bases of Retrosheet, The Baseball Workshop, and Total Sports (see appendix for more details). Table 1 is a summary of the games examined:

Table 1. Games and Plate Appearances (1977-1997)

League	Games	PA
AL	22,947	1,763,433
NL	20,409	1,553,263
Total	43,356	3,316,696

The basic analysis is to separate the plate appearances into the four possible matchups, as shown in Table 2.

Table 2. Plate Appearances by Handedness (1977-1997)

Matchup	PA	%
LHB LHP	226582	6.8
RHB LHP	779625	23.5
LHB RHP	1139977	34.4
RHB RHP	1170512	35.3

It is not surprising that these four combinations occur in very unequal proportions, but what matters more is the level of offensive performance. There are, of course, many ways of evaluating performance, but one which is frequently used and easy

to calculate is the sum of on base average plus slugging average. Those values for the various handedness combinations are in Table 3.

Table 3. OPS (on base plus slugging) by Handedness (1977-1997)			
Matchup	OBA	SA	OPS
LHB LHP	.346	.364	.710
RHB LHP	.364	.408	.772
LHB RHP	.379	.404	.783
RHB RHP	.338	.384	.722
Total	.359	.395	.754
Matchup	OBA	SA	OPS
Advantage	.373	.406	.779
Disadvantage	.339	.381	.720

The differences are clear, with OPS being 59 points higher when the batter has the handedness advantage. This 59 point gap is a difference of about 8 percent.

An important thing to consider in a long-term study such as this is that the overall average may obscure interesting patterns of differences between seasons. This possibility is addressed in Figure 1, which shows the OPS for batter advantage situations, disadvantages, and the ratio between the two. Perhaps surprisingly, although the OPS values vary a bit over the 21 seasons, there is very little change in the ratio between them.

The second of my large questions involved managerial decisions. In this context the decision is the manager's choice of which players get in the game. Simply put, can we find evidence that managers make lineup decisions based on the handedness of the players?

The first part of the answer is in Figure 2, which has four lines on it. The top line is the key one; it is the ratio of plate appearances in which the batter has the advantage to those in which he does not. A value of 1 would mean that the two occurred equally. We see that there are many values much higher than that, several about 1.5 with a high value of 1.57 in 1990 and an average of 1.37. However, the most surprising feature to me is that the value is so different over the 21 seasons. The line is not completely smooth, but there is a clear pattern of increase in this ratio with a pretty broad peak from 1984 to 1991 followed by a steady decline since then. I can offer two suggestions to explain this pattern. The first is that the handedness proportions of batters and pitchers changed a lot during this time so that the chance of the advantage situation changed. The second is that managers have changed the way they make lineup decisions so that getting a batter advantage was seen as very

important from 1984 to 1991, but not in the years before or since.

The other lines in this figure should help us sort this out. The bottom two lines are the fraction of plate appearances by left-handed batters and against left-handed pitchers for each year (the values for right-handers are simply 1 minus these values). The 21 year average is that 41% of plate appearances were by left-handed batters and 30% of plate appearances were against left-handed pitchers. We can use these percentages to make a prediction of the expected frequency of advantage and disadvantage matchups. For example, if there were absolutely no consideration given to handedness, then left-handed batters should have faced left-handed pitchers 12.5% of the time, instead of the 6.8% of the time we saw before. I calculated the expected frequencies of the four matchups and then constructed the predicted ratio of batter advantage appearances to batter disadvantage appearances based on them. These values are the remaining line on the graph. There is very little difference in this ratio across the years, as is expected from the bottom two lines. Therefore, one of my possibilities, that of changing proportions of right and left-handers is clearly ruled out. Remember that my other choice was that managers were making lineup decisions on rather different bases during this period.

Before going any further, I made two modifications to the basic data. First I removed all plate appearances by pitchers since I presume that pitchers are not chosen for a game based on which side of the plate they bat from. In any event, removing them made almost no difference in the values I have already reported (data not shown). The second modification is a major one and gets at the most difficult part of any platoon analysis, namely what to do about switch-hitters. I decided that the cleanest thing to do was to simply remove them completely and redo the calculations. If switch-hitters follow the normal pattern, then they always have the handedness advantage (we have documented 339 times in these 21 years that switch-hitters batted the unexpected way, most of which are against knuckle-ball pitchers). Let's repeat most of the above analysis with the pitchers and switch-hitters removed.

Table 4 gives the numbers of plate appearances and percentages of the four kinds of matchup for the altered data set.

Table 4. Plate Appearance by Handedness, with Pitchers and Switch-hitters Removed (1977-1997)

Matchup	PA	%
LHB LHP	218,888	8.2
RHB LHP	593,105	22.2
LHB RHP	742,811	27.8
RHB RHP	1,118,887	41.8

Using OPS once again as the performance measure for this new group, we get Table 5.

Table 5. OPS (on base plus slugging) by Handedness, with Pitchers and Switch-hitters Removed (1977-1997)			
Matchup	OBA	SA	OPS
LHB LHP	.351	.370	.721
RHB LHP	.374	.426	.800
LHB RHP	.388	.425	.813
RHB RHP	.345	.393	.738
Total	.364	.407	.771
Matchup	OBA	SA	OPS
Advantage	.381	.425	.806
Disadvantage	.346	.389	.735

Recall that there was an 8% increase for batters with the handedness advantage overall, but when the pitchers and switch-hitters are removed, it jumps to nearly 10%. This is a reasonable result, since it says that the non-switch-hitters are more severely damaged by the handedness disadvantage. However, also recall that when we looked at all batters, the OPS was .779 and in this data set we have a value of .806, a difference of some 4% which implies that the switch-hitters overall perform at a lower level. More on this point a little later.

To be parallel to the earlier analysis, we should look at the yearly pattern; Figure 3 shows us that this result was very constant from 1977 to 1997.

There was one other figure I presented before, which had the actual and predicted occurrence of plate appearances in which the batter had the handedness advantage. The counterpart graph with the pitchers and switch-hitters removed in Figure 4. Once again the top line is proportion of actual advantage to disadvantage appearances and this result is very different from what we saw before. When we considered all batters, we had ratios above 1.5 with a distinct peak in the middle. On this graph there is a slight peak in the center and a clear decline in recent years, but overall, the pattern has been much more constant, with an average of almost exactly 1. The bottom two lines are the proportion of plate appearances involving left-handed batters and pitchers. In this group 36% of plate appearance were by left-handed batters and 30% were against left-handed pitchers. The value for the left-handed pitchers is the same as before, but there is a significantly lower proportion of left-handed plate appearances when the switch-hitters are removed. The constancy of the pitcher proportion may argue that the choice of a pitcher is not determined very much by the handedness of the opposing

batters. The predicted values once again show little change from year to year.

Before I end there is one more topic to develop, to which I briefly referred above. That topic is the overall ability of switch-hitters. Table 6 compares switch-hitters to non-switch-hitters in two different ways.

Table 6. Comparison of Switch-hitters to Non-switch-hitters (1977-1997)			
Switch-hitters			
	OBA	SA	OPS
Batting Left	.362	.365	.727
Batting Right	.336	.353	.689
Total	.354	.361	.715
 Non-switch-hitters			
	OBA	SA	OPS
Batting Left (against All)	.379	.413	.792
Batting Right (against All)	.355	.404	.759
Batting Left (against RHP)	.388	.425	.813
Batting Right (against LHP)	.374	.426	.800
(Last two lines repeated from Table 5 for ease of comparison)			

The conclusions are surprising. Even without the handedness advantage, the non-switch-hitters do much better than their switching brethren. When the one-way swingers have the handedness advantage, which is the fairest comparison to the switchers, then they perform at nearly 100 OPS points higher. Perhaps the value of switch-hitting is more in perception than reality.

So, what conclusions can we draw from all of this? I see three prominent ones:

1. Batters do consistently better when they have a handedness advantage, but this improvement is less than 10%
2. The proportions of plate appearances by left and right-handers, both batters and pitchers, has changed very little over the past 21 seasons. However, the frequency of batters

having the handedness advantage in any given plate appearance varied greatly from 1977 to 1997, with three distinct phases of increased chance, plateau, and decreased chance.

3. Switch-hitters account for most of the platoon effect in terms of player usage. When the switch-hitters are removed from the analysis, the remaining players are used in a way much closer to that predicted randomly. However, as a group, switch-hitters perform at a distinctly lower level than non-switch-hitters, even when the latter have the handedness advantage.

And finally, a question based on conclusion 2: why has the pattern of platooning varied so much? Does this represent a trend, such as the greatly altered use of relief pitchers? There have been a large number of different managers during this time, so it is hard to see something systematic like the LaRussa effect on setup men and closers. Suggested explanations for this phenomenon are invited!

Appendix

The data used in this study come from three sources: Retrosheet (1977-1983), The Baseball Workshop (1984-1996), and Total Sports (1997). More detail about Retrosheet can be found on the Internet at www.retrosheet.org.

SEE NEXT PAGE

Note added in August of 1998.

The focus of this paper was on platooning and not on switch-hitting. However, the discussion after my SABR presentation and conversations later have dealt largely with the topic of switch-hitters. There is one item in particular which was not in the original paper, but which I now add. That item is the percentage of plate appearances by switch-hitters each season. Figure 5 shows an extraordinary difference over the 21 seasons, especially from 1977-1987, when the percentage jumped from just over 10% to just under 20%. This near-doubling is surprising and may reflect intentional actions on the part of managers in trying to increase the number of switch-hitters on their teams. Some have suggested this as a Whitey Herzog effect, since he had such success with Cardinals teams beginning in 1981 that had a number of switch-hitters. Whatever the cause of the increase, the pattern is clear and dramatic. The previously unexplained peak in Figure 2 now seems to be a consequence of the changing switch-hitter use.

OPS Values and Ratio, All Batters

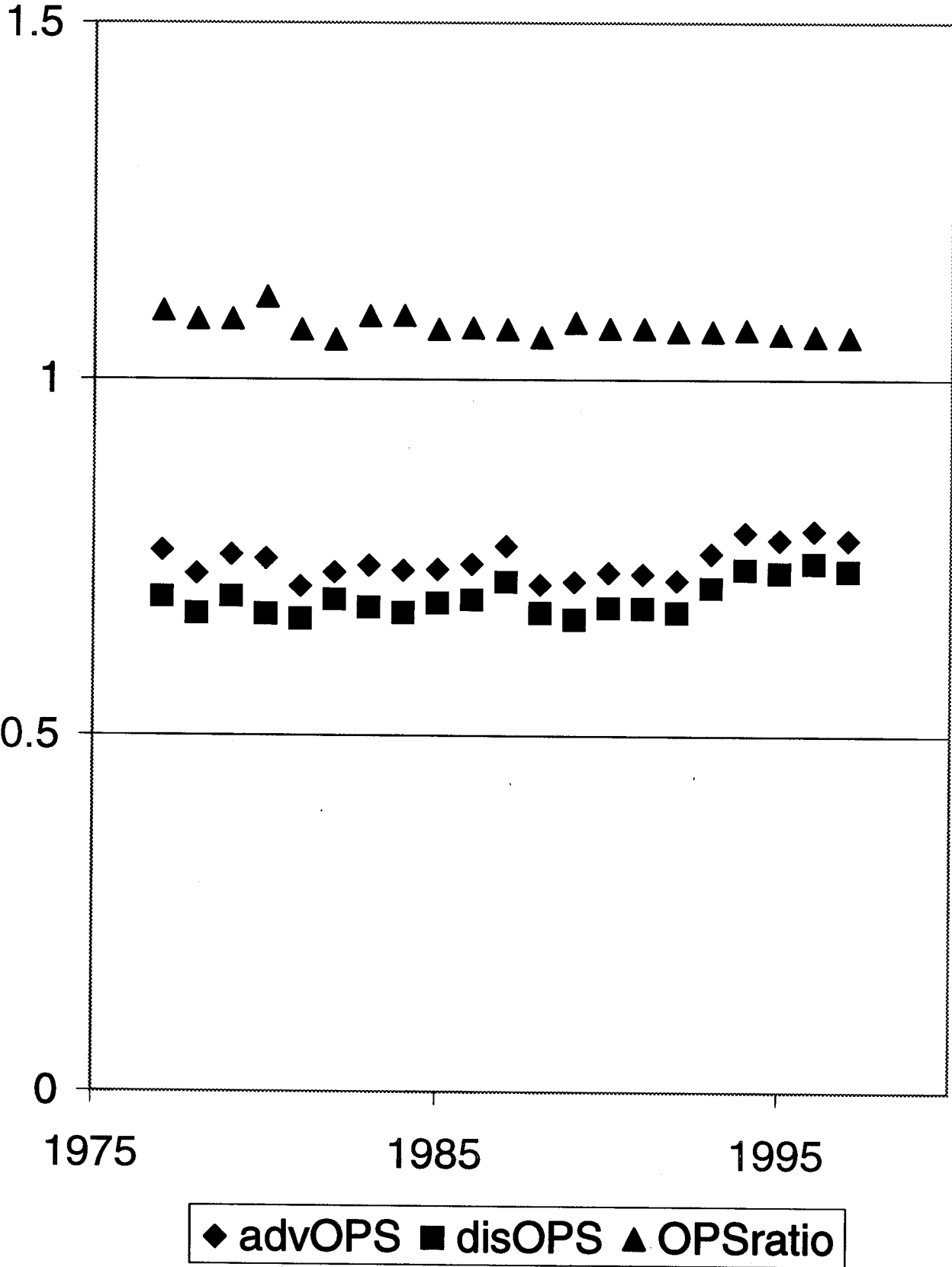


Figure 1.

Handedness Proportions, All Batters

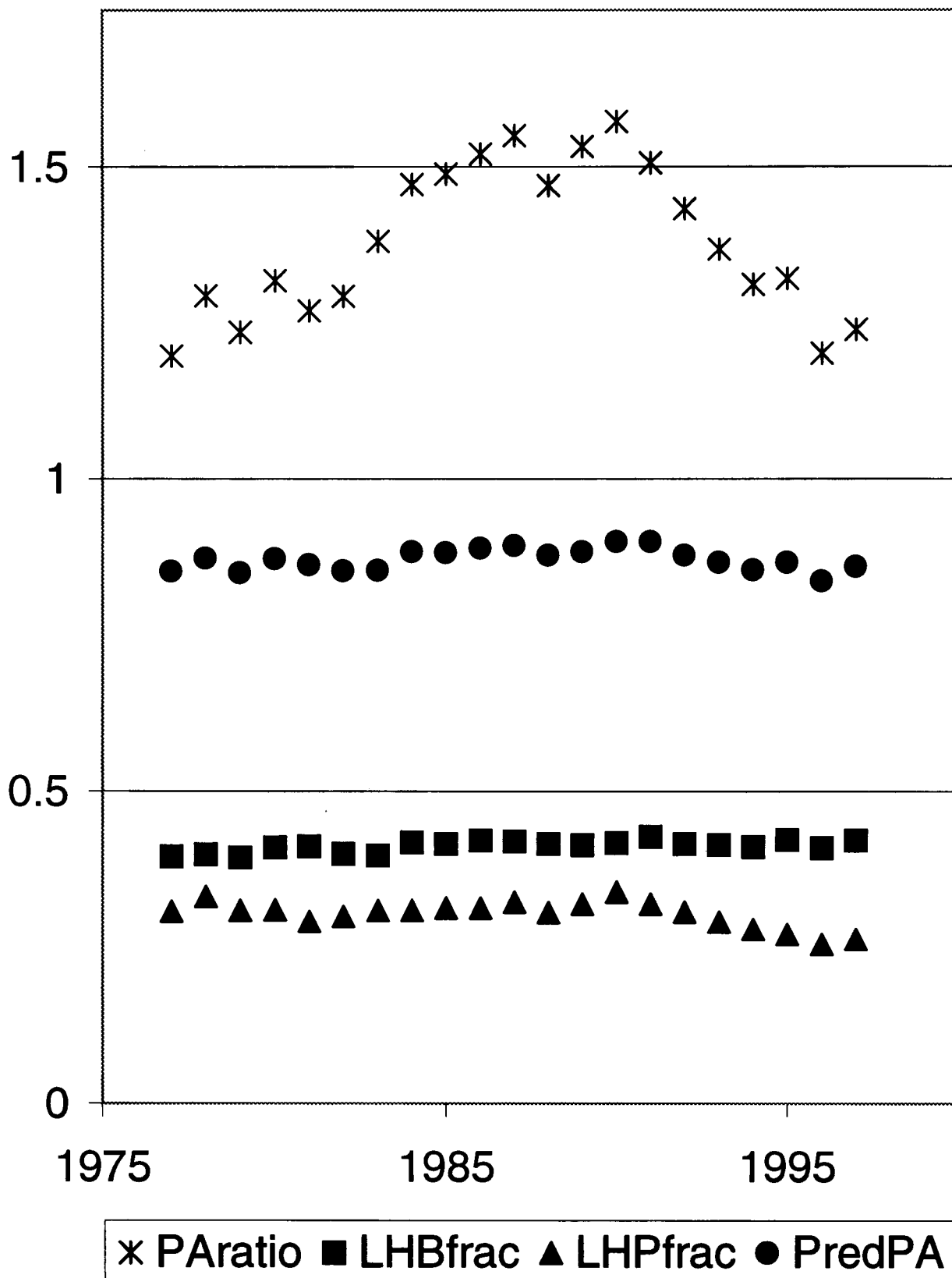


Figure 2.

OPS Values and Ratios, Pitchers and Switch-Hitters Removed

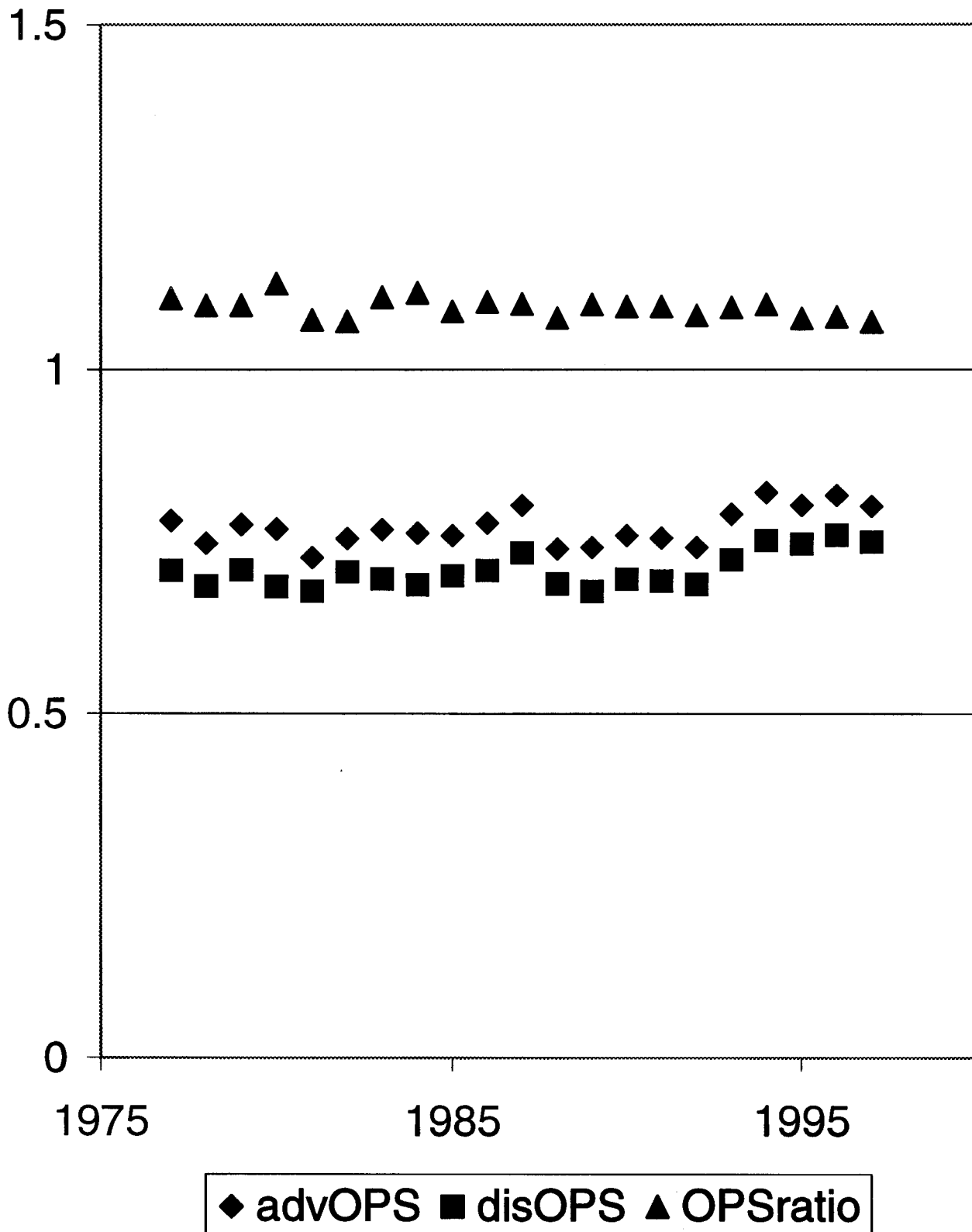


Figure 3.

Handedness Proportions, Pitchers and Switch-Hitters Removed

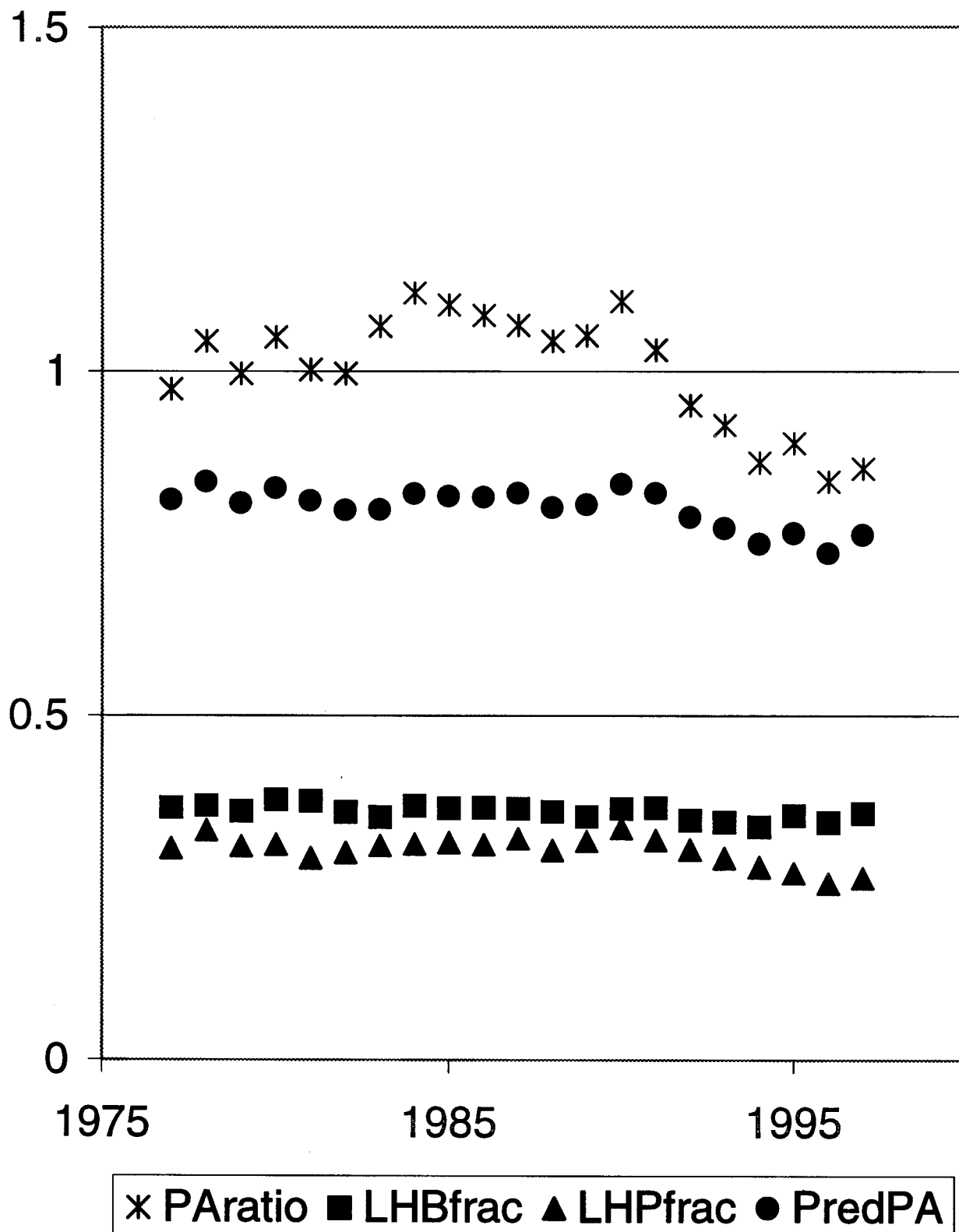


Figure 4.

Percentage of Plate Appearances by Switch-Hitters, 1977-1997

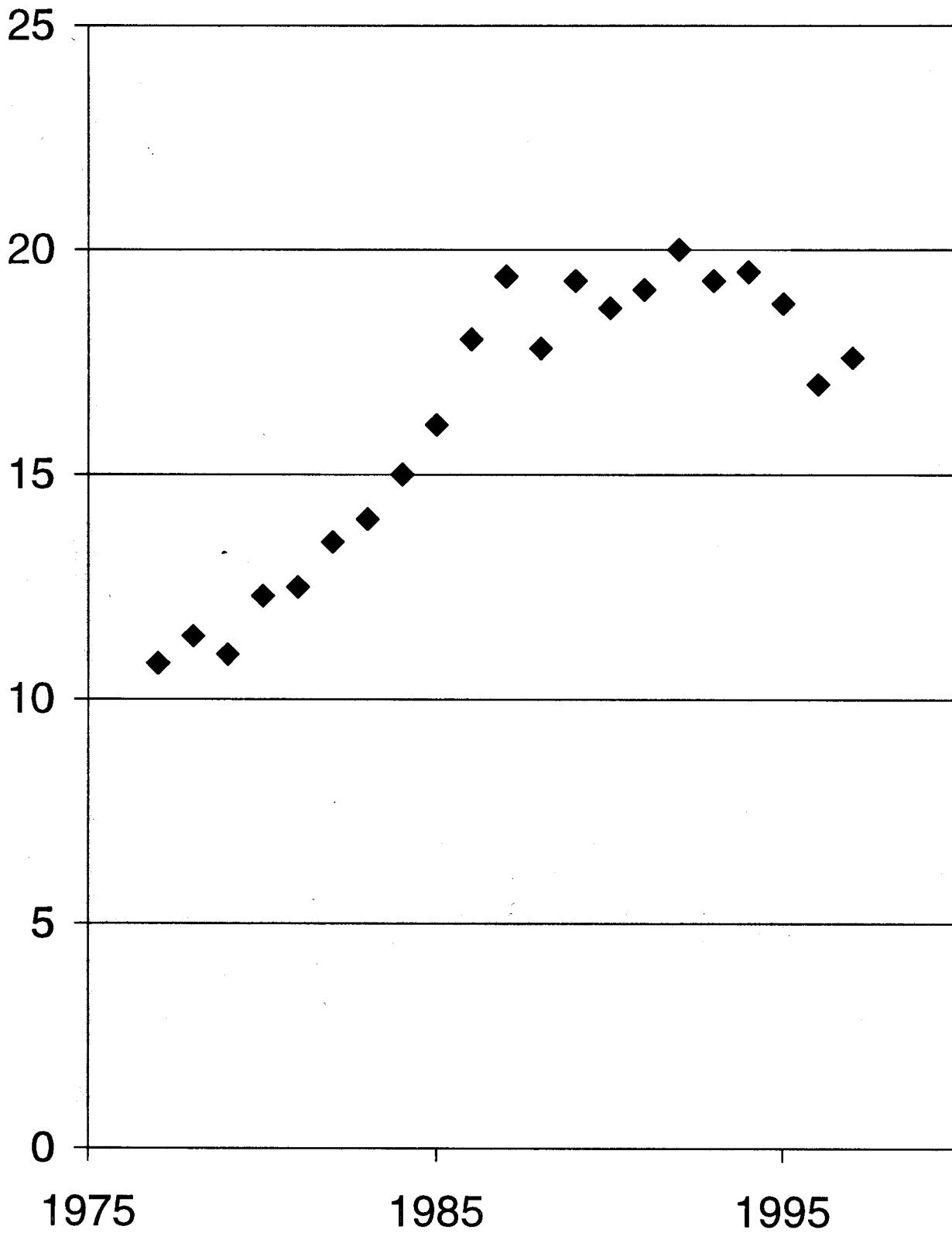


Figure 5.