Performance Measurement Precision and Asymmetric Spillovers in Major League Baseball

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Employees’ collective bargaining generally excludes supervisors that oversee unionized employee operations. Supervisors in this sense are management, and thus separately negotiate their terms by which they will be compensated or evaluated. However, in the face of their separately agreed upon oversight, the choices and behaviors of supervisors could impact the productivity of supervised employees. While clear changes to policy related to rules, incentives, and expectations of supervisory decisions are likely to be included within collective bargaining, other changes may be less salient and therefore overlooked. For example, a change in the method or level of enforcement of existing policies could induce behavioral changes in motivated agents, resulting in unintended consequences for employees that redistribute productivity and labor income.

These issues can arise in professional sports like Major League Baseball, where umpires bargain separately from players through their own union, and have the role of enforcing rules and policies of the league. While the rules themselves – such as the definition of a ball or a strike – are collectively bargained with the players’ union, league oversight of enforcement of these rules is sometimes left out of player-level negotiations, subject only to agreement with umpires.

Specifically, recent technological changes to monitoring of the umpire-called strike zone increased its overall size (Mills 2017). This expansion largely took place low in the strike zone, where batters have the most difficulty making productive contact. This expansion also provided the incentive for pitchers to throw to this region more often in response. Overall, this work found that umpire behavior played a significant role in shifting the level of offensive production downward throughout the league. While this result is largely zero-sum with respect to wins produced by pitchers relative to batters, it is possible that asymmetric effects across players with heterogeneous batting or pitching skill types has resulted in heterogeneous impacts on player productivity within pitchers and within batters. A redistribution of productivity would likely result in a reallocation of labor income in the players’ labor market, something that should be of considerable interest to the players’ union.

In this work, we therefore estimate the heterogeneity in changes to batter productivity stemming from this change to umpire monitoring and strike zone enforcement. We specifically test whether the known changes to the strike zone have led to a reallocation of productivity across batters using a spatial regression model that identifies pitch run values across the strike zone, how these change over time, and how individual players respond to those changes. This model is constructed using seven seasons of pitch-level data from MLB’s Statcast, paired with game-level information from Retrosheet and contract data from Cot’s Contracts. We find that differences ability to hit pitches lower in the zone are associated with heterogeneous changes to productivity during the period of strike zone changes. These declines are associated with reductions in pay for those players most affected, leaving important implications for team and league management, as well as negotiating the role of rule enforcement mechanisms in a broader collective bargaining process.