Moneyball Revisited: Evidence from the German Bundesliga

Daniel Weimar, University of Duisburg-Essen
Pamela Wicker, German Sport University Cologne
Joachim Prinz, University of Duisburg-Essen

Economics

Thursday, May 29, 2014

20-minute oral presentation
(including questions)
(Conference Center A)

Abstract 2014-030

In the Moneyball publication, Lewis (2003) made the assumption that the labor market in baseball undervalues specific skills. This assumption was tested empirically by several researchers (Hakes & Sauer, 2006, 2007). The test procedure is typically two-fold. The first step is to test the effect of the specific performance measure on a player’s salary using individual level data. In a second step, the effect of the performance measure on the performance of the team is analyzed using organizational level data. If the effect of a performance measure on team performance is higher than on individual salary, it can be argued that this performance measure is undervalued by the labor market. In baseball, this assumption could be supported for several performance measures (e.g., on-base discipline, hitting for average, and plate discipline) in several seasons before the Moneyball publication (Hakes & Sauer, 2006, 2007).

Turning to soccer, previous research examined a variety of salary determinants including human capital (e.g., age, experience), performance (e.g., goals scored, tackling rate), and popularity (e.g., Facebook likes, non-sport press citations; Franck & Nüesch, 2008, 2012; Frick, 2007; Lehmann & Schulze, 2008; Lucifora & Simmons, 2003; Prinz, Deutscher, & Weimar, 2012). Recently, another factor was added to the income equation being referred to as effort (diligence; Wicker et al., 2013). Effort was measured by the number of intensive runs (>20 km/h; RUN) and the total distance run per match (in km; DIST). The measurement of players’ routes and speed is possible due to technical innovations in camera systems. Those measures are available by the German Football League (DFL) for every game; the DFL also determines the threshold for intensive runs. Previous research found no significant effect of RUN and DIST on changes in players’ market values (salary data are not available in the German Bundesliga; therefore, market values are used as proxies). Only the interaction term of RUN with the tackling rate had a significant positive effect on market values; RUN squared even had a negative impact. These findings suggested that effort does not determine salaries. The purpose of this research is to perform the second step of the above procedure. The study has the following main research question: How does effort influence team performance in the German Bundesliga?

In the literature, theoretical support for an influence of effort on pay can be found. Following Lazear and Shaw (2007), individual working at a very high level of intensity should be compensated at a very high level. Empirical evidence regarding the effect of effort on pay is relatively scant in the general labor market literature. A few studies showed that effort measured by absenteeism, unpaid overtime work, or working more than others is associated with wages or the contractual situation (e.g., Engelandt & Riphahn, 2005; Givord & Wilner, 2009). The sport literature has largely neglected this topic of research with a few exceptions (Wicker et al., 2013), particularly at the organizational level. One of the main reasons for the scarcity of literature is the problem of disentangling effort and ability.

The present research uses data from the 2011/12 and 2012/13 Bundesliga seasons since effort data have only been available since the 2011/12 season. Individual information and market value data were retrieved from transfermarkt.de, performance and effort data were made available from the DFL website. The sample consists of 1224 observations on a team-game basis resulting from 624 matches and two observations per game. The final sample had to be reduced by 18 observations because effort measures were not available for one game day. Also, 202 observations were excluded due to sending-offs leaving 1008 cases for the analysis (504 home teams and 504 away teams). The present study tries to overcome the problem of disentangling effort and ability by using measures (DIST, RUN) that represent effort and not ability: As a result of endurance training, every professional soccer player should have the ability to run a certain distance per match (DIST). Moreover, he should be able to perform a certain number of intensive runs (RUN) every game. The threshold of 20km/h is lower than the average speed of the current marathon world record. Thus, if a marathon player is able to run approximately two hours at that speed, a soccer player should be able to perform some intensive runs which only last a few seconds at the same speed.
The dependent variable WIN captures whether the observed team won the observed match (1=yes). In addition to effort, the study also controls for other human resource variables (age, tenure, height, value, nationality) and match characteristics (home game, derby, attendance, yellow cards, shots on target, tackles, ball touches, crosses, failed passes) that could potentially influence team performance. This is important in an effort to isolate the effect of effort. Following Leard and Doyle (2011), no traditional production function can be applied in sport since the performance of a team strictly depends on the opponent. Hence, the raw variables are included as relatives to the opponent. Therefore, difference measures are used for most variables (e.g., difference in market values to control for the quality of teams). Given that some players do not play the full match time, the human resources measures are weighted by playing time (difference in age of players weighted by playing time) and most of the match characteristics are values per player (e.g., difference in the number of yellow cards per player). A binary probit model is preferred since the latent variable is assumed to be normally distributed. The presence of two observations per game may bias the results. To mitigate this problem, Leard and Doyle (2011) suggest using separate estimates for the home and the away team or a random selection of one observation per game. Both opportunities are considered. The models include fixed effects for teams and game days. Since DIST and RUN are highly correlated, separate estimates are provided to avoid multicollinearity issues.

The descriptive results show that every player runs on average 11.1km per game and performs 55.2 intensive runs. The results in the first set of models indicate that DIST has a significant positive effect in all four models (overall sample, only home teams, only away teams, and random selection of teams). In the second set of models, the effect of RUN is positive in all models, but only significant in the first two models (overall sample, only home teams). The discrete effects indicate that the winning probability of the team with the lowest values for DIST is far lower (4.5%) than the winning probability of the team with the highest DIST value (76.6%). The differences are smaller for RUN (20.8% vs. 45.5%). The findings show that the two effort measures have a significant positive effect on team performance in six out of eight models. Given that their impact on players’ market values was insignificant or even negative (Wicker et al., 2013), we find support a Moneyball phenomenon in soccer in the sense that effort may be undervalued by the soccer labor market.