The effects of the three-point rule in individual sports: Evidence from chess

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May 2016

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Abstract

We examine the effects of the three-point rule in individual sports. We consider chess in which most tournaments use the standard rule while some tournaments use the Bilbao rule, which is identical to the three-point rule in soccer: We observe the same pairs of chess players playing under both rules, a research design that fits fixed-effect models. We find the Bilbao rule makes games 33 percent more decisive, mostly to white players' advantage who win 50 percent more games. We identify two mechanisms why the Bilbao rule works: It encourages players to play longer and discourages them from using drawish openings. These results suggest incentive schemes like the three-point rule work in individual sports in which efforts and financial rewards are directly linked and game dynamics and strategic interactions among teammates and with opponents are less complex.

Keywords: scoring systems, three-point rule, individual sports, chess, fixed effects model

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Introduction

Sports use particular scoring systems to, among others, induce players to compete harder and make the games more exciting, but are they optimally designed incentive schemes? Draws, often without a single goal, were common in soccer so that the Fédération Internationale de Football Association (FIFA) replaced the two-point rule with the three-point rule, which increases the rewards for a win from two to three points. Most chess games among elite players are draws, some are short draws, which disappoint fans and tournament organizers. In basketball and American football, however, ties are rare because of the sports' high-scoring nature and the variety of ways players can score different points.

Intuitively, awarding more points for a win encourages aggressive plays and makes games more decisive but empirical evidence on the effects of the three-point rule in soccer is mixed, which raises the question of whether one extra point for a win is powerful enough an incentive to change players' behavior.[1] Moschini (2010), Aylott and Aylott (2007), and Dilger and Geyer (2009), for example, find the three-point rule increases the number of goals and decreases the proportion of drawn games; Guedes and Machado (2002), however, find the rule works for only underdog teams; Palacious-Huerta (2004) show that it does not seem to affect the average number of goals. Lee

[1] This line of literature relates to that on the use of tournaments and piece-rate incentive contracts in organizations to elicit greater employee efforts (Lazear and Rosen, 1981; Lazear, 2000; Shearer, 2004).

and Parinduri (2015), using regression discontinuity design that resembles randomized experiments, find the effects of the three-point rule are subtle: It does not make games more decisive or increase the number of goals but it increases the second-half goals of losing first-half teams.

Perhaps the three-point rule matters more, provides stronger incentives, in individual games like chess in which players' efforts are easily observed and directly linked to financial rewards.[2] In team sports, game dynamics and strategic interactions among teammates and with opponent players are more complex. Some soccer players in a team, for example, may not respond to the three-point rule as strongly as their coaches want them to (which makes the rule less effective) or they may free ride on the efforts of their teammates—problems that do not exist in chess.[3] A leading soccer team may turn defensive to maintain the lead and still win; a chess player whose position is better cannot just maintain the lead—if she wants to win the game, she has to keep fighting until her opponent resigns.[4] Soccer players' salaries do not exclusively depend on whether their team wins a game or becomes the champion; financial rewards are not equally distributed among players either

[2] As far as we know, no theoretical papers analyzes whether the three-point rule matters in individual games like chess, but theoretical papers on soccer show its effects are also subtle (see, for example, Guedes and Machado (2002), Brocas and Carrillo (2004), Moschini (2010), and Haugen (2008)).

[3] Alchain and Demstez (1972), for example, show that workers have incentive to shirk in team production if the marginal products of the workers are inseparable.

[4] Chan, Courty, and Lee (2009) show, in team sports, once a team enjoys a comfortable margin of victory, the team's efforts may drop.

(players' contracts may differ from one another). A chess player gets the entire prize money for herself if she wins a tournament.

In this paper, using fixed-effect models, we examine the effects of the three-point rule in chess by exploiting variations in rules used by tournament organizers. Most organizers have always used the standard rule, which rewards one point for a win, 0.5 for a draw, and zero for a loss; but recently several organizers have used a new rule called the Bilbao rule, which rewards three points for a win, one for a draw, and zero for a loss. (The Bilbao rule therefore resembles the three-point rule in soccer: It increases the value of a win from the value of one draw to that of three draws.) We control for factors that may affect players' behavior and their participation in tournaments that use the Bilbao rule, which include player-, round-, and year fixed effects. Hence, we compare similar games (i.e., games played by the same pairs of players, in the same rounds relative to the last round, whose ratings and numbers of wins (at the start of the round) were similar, and so on) that differ only in one respect: Some games are played under the standard rule while others the Bilbao rule. If we see the outcomes of games under the Bilbao rule differ from those under the standard rule, we can attribute the difference to the Bilbao rule's extra point for a win.

We find the Bilbao rule induces players to fight harder: It makes games 33 percent more decisive, mostly to white players' advantage who win 50 percent more games. We do not find evidence that the Bilbao rule increases black players' likelihood of winning or losing games, probably because, in

games played by top grandmasters, black players initially try to neutralize white players' first mover advantage and only fight to win when white players make inaccurate moves. However, as white players play more aggressively, the Bilbao rule is likely to press black players to work harder to secure a draw. Overall, therefore, the Bilbao rule induces players to play fighting chess and makes games more decisive.

We identify two mechanisms why the Bilbao rule works. It makes players play longer (by four to five moves, about 10 percent longer): Players work harder, take more risks of making errors, and, when opportunities arise, try to squeeze a win. The rule also discourages players from using drawish openings (by about 23 percent if we define drawish openings as ones with 40 percent draws in past games), which makes games more likely to be imbalanced and double-edged.

We contribute to the literature by examining the effects of the three-point rule in individual sports using chess data, which allows us to control for many factors that may confound identification.[5] We show the three-point rule induces chess players to fight harder and makes chess games more likely to be decisive. Therefore, modifying scoring systems of sports, if it adds sufficiently strong incentives, may change players' behaviour—results that give hopes to league officials who want to make their leagues more competitive.

[5] So far, the discussions of the effect of the Bilbao rule have been confined to only blogs and newspaper articles (see, for example, Fernândez (2007) and McClain (2010)).

We proceed as follows. We discuss the Bilbao rule, empirical strategy, and data in the the next two sections. Then we discuss the results. The last section concludes.

Draws in Chess and the Bilbao Rule

Draws are a logical outcome of chess games: If a white and a black player in a chess game accurately play, the game is likely to end in a draw.[6] That is why draws are common in chess, especially among top players with similar ratings. In the 2016 Fédération Internationale des Échecs (FIDE) World Chess Candidates Tournament, which determined the challenger to the world champion Magnus Carlsen, 71 percent of the games were draws. Historically two in five games among players in the top 100, and one in two games among players in the top ten whose rating difference is at most 400 points, were draws (Sonas, 2011).

Fans enjoy watching hard-fought drawn games, but they loathe short unfought-draws agreed by players called grandmaster draws. From chess fans' perspective, a grandmaster draw is like a boxing match in which the boxers

[6] A draw occurs when a player has no legal move but is not in check (stalemate), players repeat the same position three times and one of them claims a draw (threefold repetition rule), players do not capture any piece or move any pawn in the last fifty moves and one of them claims a draw (the fifty-move rule), no player has enough materials to checkmate the other, or players agree to draw the game (a draw by agreement).

keep hugging each other, declare a truce before the first round ends, and leave the ring.[7] The problem is grandmaster draws are common: One in ten chess games among players in the top ten were drawn prior to move 25 (Sonas, 2011). A notorious example is the last game of the Man vs. Machine Match between Kasparov and Deep Junior in 2003. When Kasparov had chances to win the game, and the match, he offered a draw on move 23 to the disappointment of millions of fans watching the game (Ashley, 2003). (The Deep Junior team rejected the offer but the team returned it five moves later, which Kasparov accepted.) In the Kasparov-Anand Professional Chess Association (PCA) World Championship final in 1995, the first eight games were draws and only one of them lasted longer than 30 moves; when Kasparov led by three wins after 14 rounds (with six rounds remained), the following two games lasted only 20 and 16 moves, respectively; in round 18, Anand agreed to a draw after only 12 moves.

Players may agree to have grandmaster draws for some strategic reasons.[8] Leading players in a tournament may try to preserve their positions because the positions are tied to financial rewards. High-rated players may want to avoid the risk losing games against low-rated players because they would lose much rating points; lower-rated players may agree to short draws against high-rated players just to gain rating points or to secure grandmaster

[7] Some chess players, however, think draws should be allowed at any stage of the game (see, for example Association of Chess Professionals (2016)).

[8] See Tiong (2008) for a discussion of these strategic reasons.

norms.[9] Players may feel exhausted in the middle of a tournament and agree to short draws to give them more time to recuperate, or they may have nothing to play for in later rounds because tournament leaders are impossible to catch.

Members of the chess community have proposed solutions to the problem of short draws but one of the few that have been tried so far is the Bilbao rule, which increases rewards for a win.[10] It was first introduced as an experiment in the Bilbao Blindfold Chess World Cup in 2007 (ChessBase, 2007) to induce players to play attacking, and entertaining, chess and to discourage them from drawing games in tournaments' last rounds (to guarantee their standings in the tournaments and, hence, prize money). Under the standard rule, a win, a draw, and a loss are worth 1, 0.5, and 0 point, respectively; under the Bilbao rule, 3, 1, and zero points—the Bilbao rule therefore resembles FIFA's move from the two-point rule to the three-point rule. Under the standard rule, players trailed by just one point (i.e., a win) in the last few rounds of a tournament may find it difficult to catch tournament leaders (because the leaders could easily secure draws by agreeing to short

[9] A norm is an indicator of an excellent performance in a chess tournament. To be a grandmaster, a player has to secure several norms.

[10] Others propose to reward wins with money, forbid draws by agreement (Sofia rule), or forbid draw offers before a certain number of moves; others implore tournament organizers to invite only attacking players (see, for example, Leong and Leung (2005), Nunn (2005), ChessBase (2007), ChessBase (2008), Kasimdzhanov (2011), Shahade (2011), Shipov (2011), and Weeks (2007)).

draws or playing drawish openings); under the Bilbao rule, trailing players find it more easily to overtake leaders if they chalk up enough wins.

Empirical Strategy and Data

Empirical Strategy

We estimate the effects of the Bilbao rule on how players behave using the following fixed-effect model

$$y_{ijrty} = \alpha + \beta D_{ty} + \sum \gamma_{rty} Round_{rty} + \sum \delta_{i/j\,rty} Player_{i/j\,rty} + \xi_y + \varepsilon_{ijrty} \quad (1)$$

where y_{ijrty} is a measure of outcomes of a game between white player *i* and black player *j* in round *r* of tournament *t* in year *y*; D_{ty} is an indicator equals one if the game was played under the Bilbao rule; $Round$ is the round characteristics of the game, which include a set of dummy variables for each round relative to the last round of each tournament (i.e., ξ_r, dummy variables for the last round, the penultimate round, the third-last round, etc.) to allow games played in later rounds to have higher importance; $Player$ is the characteristics of the players, which include a quadratic function of player *i*'s rating and that of player *j*'s, the number of wins each player had at the start of the round, the difference between the number of wins each player had and the highest ranked player's at the start of the round, and player *i* and *j* fixed effects (ξ_i and ξ_j); ξ_y is year fixed effects; and ε is the error terms. (We cannot include tournament fixed effects as control variables because the Bilbao rule

has been used by the same tournaments during the period of analysis.)

Identification relies on the assumption that, after controlling for the round characteristics, player characteristics, and year fixed effects, the games are comparable except that some games were played under the Bilbao rule while some others were not. We therefore compare games played by the same pairs of players, whose ratings and numbers of wins (at the start of the round) were similar, in the same rounds relative to the last round, and so on. To the extent that we have controlled for important factors that might affect players' behavior and players' participation in tournaments that used the Bilbao rule, the coefficient of D_{ty} in equation (1), β, would tell us about the effects of the Bilbao rule on players' behavior and game outcomes.

We also explore whether the effects of the Bilbao rule in more important games— games in later rounds played by players who were still in contention to win tournaments—differ. We estimate

$$y = \alpha + \beta D + \theta Leaders + \vartheta LastRounds + \mu D * Leaders + \pi D * LastRounds + \rho D * Leaders * LastRounds + \sum \gamma Round + \sum \delta Player + \xi + \varepsilon \quad (2)$$

where $Leaders$ is an indicator equals one if a player had 0.5-win (or 1-win) difference from the leaders' and zero otherwise; and $LastRounds$ is an indicator equals one if a round was the last two (or three) rounds. The coefficients of the interaction terms would tell us whether the Bilbao rule matters more in crucial games between leaders than it does in less important

games among laggards.

Data

We get the data from *The Week in Chess* (TWIC), a weekly chess magazine that reports detailed information on games played in major chess tournaments around the world.[11] The data have information on players' ratings, tournament types and categories, outcomes of each game, number of moves in each game, and openings played by players. To ensure the data are accurate, we cross-check the TWIC data against game archives of chessgames.com, an online database of chess games.

To make the games comparable, we include games played in elite tournaments from 2006 to 2014 in which only top grandmasters played. (We exclude tournaments in earlier years because the Bilbao rule was used the first time in the Bilbao tournament in 2008.) We have five tournaments in the sample: Bilbao Masters, London Chess Classic, Tal Memorial, Dortmund, and Corus/Tata Steel. The Bilbao Masters and London Chess Classic used the Bilbao rule; the others the standard rule. The tournaments were either single or double-round robin; almost all used the classical time control.[12] We include

[11] The website is www.theweekinchess.com. We download the data on 17 June 2015.

[12] We exclude a few other elite tournaments (e.g., Linares, Mtel Masters, Zurich Chess Challenge, Norway Chess, Grenke Chess Classic, Sinquefield Cup, Gashimov Memorial, Biel Chess Festival, and Capablanca Memorial) because they were knock-out type tournaments, discontinued early on, recently introduced, or Category 18 or lower.

only editions of tournaments that used the classical time control (we exclude the London Chess Classic in 2013 and Tal Memorial in 2014 because they used rapid or blitz time controls).[13] The average players' ratings of these five tournaments were all above 2700 (Category 19 and above) except for Dortmund 2008 and London Chess Classic 2009 whose average ratings fell a few points below 2700. There are 1,723 games in the sample, about one in six were played under the Bilbao rule (see Table 1).

[Insert Table 1 here]

In the basic specifications, we use the outcomes of games to measure players' willingness to play attacking chess: *decisive games*, *white wins*, and *white's points*. The first two are dummy variables equal one if a game is decisive and white player wins, respectively; *white's points* is the point awarded to white players under the standard rule. If players play more aggressively, white and black players are more likely to play double-edged games, which leads to decisive games. In particular, if white players purposely play to win, there may be more white's wins, and white players will get more points. (Because black players have no first-mover advantage, they usually play to equalize and only later to win if white players play inaccurate moves.)

[13] In classical time control, each player has 90 minutes to make the first 40 moves and 30 minutes extra for the rest of the game and 30 seconds per move starting from move one. *Rapid time* controls refer to short time control (for example, 25 minutes with a ten-second increment after each move). *Blitz time* controls refer to very short time control (for example, three minutes with a two-second increment after each move).

We also use the length of games to measure how hard players try to press for a win. We use three measures of outcomes: *number of moves*, *30 moves or more*, and *40 moves or more*. The first is the number of moves by white players; the second and the third are dummy variables equal one if a game has 30 and 40 moves or more, respectively. We use *30 moves or more* as a measure of outcome because it indicates games are played long enough; we use *40 moves or more* as a measure of outcome because it indicates players hit the first time control (at move 40).

We also use the types of openings played by players as a measure of outcome—whether they are drawish or double-edged. Opening moves in chess are pivotal to game outcomes. Some openings are very safe for white: They lead to quiet and uncomplicated games, but they are drawish; other openings are more aggressive, which may lead to double-edged games in which white players keep a slight advantage and black players fight to equalize, though the latter may take over the initiatives if white players make errors. Whether a white player chooses a particular opening depends on how he thinks black would respond to that opening, which the player analyzes before the game is played. (Every chess player has access to all games his opponent played in the past, which gives him some ideas on whether the opponent is an expert of an opening and the opponent's likely choice of variation in the event that he plays that particular opening.) Therefore, if a white player wants to push for a win, he needs to avoid drawish openings; he needs to use an aggressive opening that his opponent has no expertise in.

We use the percentage of drawn games in the past as a measure of whether an opening is drawish. We use three measures: *percentage of drawn games more than 40%, 45%, and 50%*, the latter is the most drawish. (All are dummy variables; for example, *percentage of drawn games more than 40%* is a dummy variable equals one if an opening leads to more than 40% draws in the past.) To construct these variables, for each of the openings used by players in games in our data, we find out its percentage of drawn games in the past on chessgames.com, and set, for example, *percentage of drawn games more than 40%* equals one if the opening has more than 40% draws in the past.[14] (The website archives games played since the mid-15th century.)

If the Bilbao rule induces players to play more aggressively, we expect to see the followings in the data: (1) games are more decisive and white players win more games, (2) games are longer, and (3) players are less likely to use drawish openings.

The summary statistics in Table 2 indicates these effects. Under the Bilbao rule, games were six percentage points more decisive and white (black) players were four (three) percentage points more likely to win; on average white's points did not differ, however (Panel A). Games played under the Bilbao rule were five moves longer; they were about 15 percentage points more likely to go beyond 30 or 40 moves (Panel B). Players played under the

[14] In the data, the players used 278 openings. For consistency, we convert two openings in the list: We change "A05 Various" to "Reti Opening" and "A13 Reti" to "English opening". We downloaded the data on 17 June 2015.

Bilbao rule were less likely to play drawish openings: five percentage points less likely to play openings whose percentage of drawn games are more than 40% or 45% (Panel C). Players were two percentage points more likely to use openings whose percentage of drawn games is more than 50%, however.

[Insert Table 2 here]

The ratings of players in tournaments that used the standard and Bilbao rule were similar, but the two types of tournaments had some differences. Tournaments that used Bilbao rule on average had one fewer round; they also had about five fewer players on average (Panel D). Tournaments were more competitive under the Bilbao rule in the sense that more players had at most 0.5 or 1-win difference from the leader's (Panel E).

Results

First, we examine whether the Bilbao rule makes games more decisive. Secondly, we analyze two mechanisms why games may become more decisive: whether the rule lengthens the games and whether it induces players to avoid drawish openings. Then, we explore whether the rule matters more in more important games (games played in the last few rounds by players who have realistic chances to win tournaments).

Do Games Become More Decisive?

Table 3 shows that the Bilbao rule seems to make games more likely to be decisive (or less likely to end in a draw): All estimates are both large in magnitude and statistically significant. Compared to games under the standard rule, games under the Bilbao rule are six percentage points more likely to be decisive (column 1). When we include round characteristics (a set of dummy variables for each round relative to the last round of each tournament) as control variables (column 2), we find the Bilbao rule increases the likelihood that games are decisive by eleven percentage points, an estimate that we also get when we add player characteristics (a quadratic function of white's rating and that of black's, the number of wins each player had before the start of the round, and the difference between the number of wins each player had and the highest ranked player's before the round started—each of the last two is a set of dummy variables) and some fixed effects (white and black's fixed effects and year fixed effects) as controls (columns 3-5). Using the most complete specification (column 5), we find the Bilbao rule increases the likelihood that games are more decisive by 13 percentage points—a 33 percent increase.

[Insert Table 3 here]

The Bilbao rule makes games more decisive but to whose advantage? White players, Table 4 suggests: White have more wins and get more points (in these specifications, we calculate the points under the standard rule). The Bilbao rule increases the probability of white wins by 8% and 13% when we

control for only round- and both round and player characteristics, respectively (columns 1-2). It does not seem to make black players more likely to win or lose, however: The estimates (columns 3-4) are small and statistically insignificant; it is virtually zero when we control for both round and player characteristics (column 4). Because white players win more games and have fewer draws, white players get slightly more points on average (column 6).

The results in Tables 3 and 4 indicate the Bilbao rule induces white players to play more aggressively and exploit their first mover advantage, pressurizes black players to work harder to secure a draw, and overall makes games more exciting. Under the Bilbao rule, white players have more wins (columns 1-2 of Table 4), which indicates the Bilbao rule induces white players to play harder to win. It does not seem to affect black players' likelihood to win or lose, however (columns 3-4 of Table 4), which means, given white players' first-mover advantage and more aggressive plays, black players have to work harder to secure a draw. The Bilbao rule, therefore, induces both white and black players to play fighting chess (Table 4) and makes games more likely to be decisive (Table 3).

[Insert Table 4 here]

Does the Bilbao Rule Lengthen Games and Discourage Drawish Openings?

One mechanism why games become more decisive is players play longer to press for a win, which Table 5 seems to suggest. On average, the Bilbao rule increases the number of moves by four or five (i.e., eight to ten plies)

depending on whether we include player characteristics as controls (columns 1-2), which is about ten percent increase. Games are therefore more likely to go beyond 30 moves (by eleven percentage points, or 14 percent, if we use the most complete specification (column 4)); they are also more likely to go 40 moves or more though the estimate is statistically significant when we include only round characteristics as control (columns 5-6). Players seem to prefer to battle it out rather than to settle for a quick draw when they play in tournaments that use the Bilbao rule.

[Insert Table 5 here]

As Table 6 shows, another mechanism is players are more likely to avoid drawish openings. The Bilbao rule decreases the likelihood that players play drawish openings by about 11 percentage points, or 23 percent, when we define drawish openings as openings that have more than 40 or 45 percent draws in the past (columns 2 and 4). There is no evidence that they are less likely to use openings whose drawn games are more than 50 percent (columns 5-6), though it may be caused by the lack of statistical power to reject the null hypothesis as there are very few games that use these very drawish openings.

[Insert Table 6 here]

Does the Bilbao Rule Matter More in Crucial Games?

We explore whether the Bilbao rule matters more in games played in later rounds by players who have chances to win tournaments, but, as Table 7

shows, we do not find evidence of these. We consider two ways to define the later rounds—the last two rounds and the last three rounds—and two ways to define contesting players—0.5 win difference and 1-win difference from the tournament leader's number of wins. (Regressions in Panel A use the last two rounds and 0.5-win difference criteria; those in Panel B the last three rounds and 1-win difference.) Regardless of which definition we use, we find statistically insignificant estimates. (The table presents the estimates of interaction terms with the *Bilbao rule* for three measures of outcomes only for the sake of brevity.) These results seem to suggest that the Bilbao rule does not differently affect games in later rounds (it affects games in all rounds similarly), but given that the estimates are imprecise (the standard errors are large, as large as the estimates if not larger) it is also possible that we lack sufficient statistical power to differentiate the effects of the Bilbao rule on games in earlier and later rounds.

[Insert Table 7 here]

Concluding Remarks

The Bilbao rule induces players to play fighting chess and makes chess games more exciting, which would delight fans and tournament organizers. The rule, because it rewards more points for a win, reduces the likelihood of drawn games and makes games 33 percent more decisive—results that we argue are

causal estimates of the effects because we observe the same pairs of players played under the standard rule and the Bilbao rule, which allows us to control for many factors that may confound identification. We do not find evidence the rule matters more in games played in later rounds by players who have some chances to be tournament champions (which means either the rule matters equally in all rounds or we lack sufficient statistical power to reject the null hypothesis).

The Bilbao rule makes white players play harder to win; it also seems to make black players work harder to secure a draw. White players have the first mover advantage and usually could, to some extent, dictate whether the games are open or closed, positional or tactical; what structures the pawns take; whether the games have the same- or opposite colored bishops, and so on—features of games that may determine how the middle- and end games play out. Black players, on the other hand, usually play catch-up and try to equalize first. The Bilbao rule induces white players to exploit their first mover advantage—and they are rewarded with more wins; because white players play more aggresively to win, black players would also have to play harder to neutralize white players' advantage.

We identify two possible mechanisms: Players play longer and they are less likely to choose drawish openings. By playing longer, players think harder and take more risks of making blunders but, in return, they give themselves more opportunities to eke out wins when their positions allow them to. By avoiding drawish openings, games are more likely to become double-edged,

which makes players more likely to make inaccurate moves and leads to imbalanced positions and, later, decisive outcomes.

These findings show that incentive schemes like the three-point rule do work in some sports: In contrast to mixed evidence in the literature on its effects in soccer (Aylott and Aylott, 2007; Guedes and Machado, 2002; Palacious-Huerta, 2004; Dilger and Geyer, 2009; Moschini, 2010; Lee and Parinduri, 2016), the three-point rule works in chess. Perhaps, the rule provides stronger incentives in individual games in which efforts and financial rewards are directly linked and game dynamics and strategic interactions among teammates and with opponents are less complex. Chess tournaments that use three-point rule may attract more fans because boring draws become less likely; tournament organizers would like it too because sponsorships may become more available in the future. Leagues of individual sports may consider using the three-point rule to make their sports more exciting; however, leagues of team sports like soccer might need to continue tinkering with their scoring systems. Our results suggest that leagues of team sports have hopes to make their sports more exciting, without changing game rules too much, by adding sufficiently strong incentives for a win.

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Table 1. Tournaments We Include in the Sample

Tournament	Time period	Scoring format	Number of games
Bilbao Masters	2008-2014	Bilbao	138
London Chess Classic	2009-2014	Bilbao	139
Tal Memorial	2006-2014	Standard	360
Dortmund	2006-2014	Standard	292
Corus/Tata Steel	2006-2014	Standard	794

Notes: The number of all games is 1,723; the number of games under the Bilbao rule is 277.

Table 2. Summary Statistics

	Standard rule	Bilbao rule
	(1)	(2)
A. Game outcomes		
Decisive games	0.39	0.45
	(0.49)	(0.50)
White players win	0.25	0.29
	(0.43)	(0.45)
Black players win	0.14	0.17
	(0.34)	(0.37)
White's points	0.56	0.56
	(0.31)	(0.33)
B. Length of games		
Number of moves	43.15	48.78
	(17.79)	(19.21)
30 moves or more	0.78	0.94
	(0.42)	(0.25)
40 moves or more	0.53	0.67
	(0.50)	(0.47)
C. Drawish openings		
Percentage of drawn games more than 40%	0.48	0.43
	(0.50)	(0.50)
Percentage of drawn games more than 45%	0.48	0.43
	(0.50)	(0.50)
Percentage of drawn games more than 50%	0.01	0.03
	(0.11)	(0.17)
D. Players' ratings, number of rounds, number of players		
White's ratings	2735.05	2753.96
	(50.07)	(57.27)
Black's ratings	2735.45	2754.80
	(49.08)	(56.68)
Number of rounds	6.01	4.53
	(3.40)	(2.51)
Number of players	11.70	6.79
	(2.58)	(1.76)

Table 2. Summary Statistics (Continued)

	Standard rule	Bilbao rule
	(1)	(2)
E. Groups of games		
Games are played in last two rounds	0.19	0.26
	(0.39)	(0.44)
Games are played in the last three rounds	0.28	0.39
	(0.45)	(0.49)
A player has at most 0.5-win difference from the leader's	0.64	0.79
	(0.48)	(0.41)
A player has at most 1-win difference from the leader's	0.83	0.92
	(0.37)	(0.28)

Notes: The number in each cell is the proportion or mean. All variables except *white's points*, *number of moves*, *ratings*, *number of rounds*, and *number of players* are dummy variables. The figures in parentheses are standard deviations.

Table 3. The Bilbao Rule Makes Games More Decisive

Dependent variable: *Decisive games*					
	(1)	(2)	(3)	(4)	(5)
Bilbao rule	0.064*	0.112**	0.115**	0.117*	0.131**
	(0.033)	(0.037)	(0.038)	(0.049)	(0.050)
Control variables					
Round characteristics		✓	✓	✓	✓
Quadratic function of white- and black players' ratings			✓	✓	✓
White- and black players fixed effects				✓	✓
Year fixed effects					✓
Number of observations	1,723	1,708	1,708	1,708	1,708
Adjusted R^2	0.002	0.021	0.046	0.157	0.163

Notes: The number in each cell is the estimate of the effects of the Bilbao rule on whether games are decisive with or without sets of control variables listed in the bottom rows. *Bilbao rule* equals one if a game is played under the Bilbao rule and zero otherwise; *decisive games* equals one if a game is decisive. Round characteristics include a set of dummy variables for rounds (the last round, second-last round, etc.), that of players' number of wins before the start of the round, and that of the difference between the number of wins each player had and the highest ranked player's before the round started. The figures in parentheses are robust standard errors. One and two stars indicate statistical significance at a level of five and one percent, respectively.

Table 4. The Bilbao Rule Increases the Likelihood that White Players Win

Dependent variable	White win		Black win		White's points	
	(1)	(2)	(3)	(4)	(5)	(6)
Bilbao rule	0.081*	0.128**	0.032	0.002	0.025	0.063*
	(0.032)	(0.041)	(0.025)	(0.034)	(0.022)	(0.028)
Control variables						
Round characteristics	✓	✓	✓	✓	✓	✓
Player characteristics		✓		✓		✓
Adjusted R^2	0.146	0.304	0.125	0.155	0.215	0.345

Notes: The number in each cell is the estimate of the effects of the Bilbao rule on whether white players win, black players win, and points obtained by white under the standard rule with and without a set of control variables. *Bilbao rule* equals one if a game is played under the Bilbao rule and zero otherwise; *white win* and *black win* are dummy variables; *white's points* equals one if white players win, zero a loss, and 0.5 a draw. Round characteristics include a set of dummy variables for rounds (the last round, second-last round, etc.), that of players' number of wins before the start of the round, and that of the difference between the number of wins each player had and the highest ranked player's before the round started. Player characteristics include quadratic function of white- and black players' ratings and players fixed effects. All specifications include year fixed effects. The figures in parentheses are robust standard errors. Numbers of observations are 1,708. One and two stars indicate statistical significance at a level of five and one percent, respectively.

Table 5. The Bilbao Rules Makes Games Longer

Dependent variable	Number of moves		30 moves or more		40 moves or more	
	(1)	(2)	(3)	(4)	(5)	(6)
Bilbao rule	5.019**	3.554*	0.142**	0.107**	0.127**	0.046
	(1.357)	(1.777)	(0.024)	(0.035)	(0.037)	(0.050)
Control variables						
Round characteristics	✓	✓	✓	✓	✓	✓
Player characteristics		✓		✓		✓
Adjusted R^2	0.026	0.149	0.032	0.164	0.027	0.155

Notes: The number in each cell is the estimate of the effects of the Bilbao rule on the number of moves or the probability that a game goes beyond 30 or 40 moves with or without a set of control variables. *Bilbao rule* equals one if a game is played under the Bilbao rule and zero otherwise; *30 moves or more* and *40 moves or more* are dummy variables. Round characteristics include a set of dummy variables for rounds (the last round, second-last round, etc.), that of players' number of wins before the start of the round, and that of the difference between the number of wins each player had and the highest ranked player's before the round started. Player characteristics include quadratic function of white- and black players' ratings and players fixed effects. All specifications include year fixed effects. The figures in parentheses are robust standard errors. Numbers of observations are 1,708. One and two stars indicate statistical significance at a level of five and one percent, respectively.

Table 6. The Bilbao Rule Discourages the Use of Drawish Opening

Dependent variable: *Drawish openings*	> 40% draws		> 45% draws		> 50% draws	
	(1)	(2)	(3)	(4)	(5)	(6)
Bilbao rule	-0.131**	-0.105*	-0.131**	-0.105*	0.020	0.026
	(0.038)	(0.051)	(0.038)	(0.051)	(0.013)	(0.019)
Control variables						
Round characteristics	✓	✓	✓	✓	✓	✓
Player characteristics		✓		✓		✓
Adjusted R^2	0.022	0.221	0.022	0.221	0.007	0.070

Notes: The number in each cell is the estimate of the effects of the Bilbao rule on whether players use drawish openings with or without a set of control variables. *Bilbao rule* equals one if a game is played under the Bilbao rule and zero otherwise; the dependent variables are dummies, for example *> 40% draws* equals one if the percentage of draws among games that use the opening is more than 40%. Round characteristics include a set of dummy variables for rounds (the last round, second-last round, etc.), that of players' number of wins before the start of the round, and that of the difference between the number of wins each player had and the highest ranked player's before the round started. Player characteristics include quadratic function of white- and black players' ratings and players fixed effects. All specifications include year fixed effects. The figures in parentheses are robust standard errors. Numbers of observations are 1,708. One and two stars indicate statistical significance at a level of five and one percent, respectively.

Table 7. The Bilbao Rule does not Seem to Differently Affect Crucial Games

Dependent variable:	Decisive games			Number of moves			Drawish openings (> 40%)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. Last two rounds and a player has at most 0.5-win difference from the leader's									
*Bilbao rule * last two rounds*	-0.08		-0.15	0.89		-4.15	0.07		0.06
	(0.07)		(0.15)	(2.82)		(6.43)	(0.08)		(0.15)
*Bilbao rule * 0.5-win difference from the leader's*		-0.09	-0.13		-3.58	-5.47		-0.03	-0.02
		(0.09)	(0.11)		(3.32)	(4.14)		(0.09)	(0.11)
*Bilbao rule * last two rounds * 0.5-win difference from the leader's*			0.05			6.31			0.02
			(0.18)			(7.22)			(0.18)
B. Last three rounds and a player has at most 1-win difference from the leader's									
*Bilbao rule * last three rounds*	-0.07		-0.09	-1.22		-13.15	0.07		-0.04
	(0.07)		(0.23)	(2.65)		(12.54)	(0.07)		(0.24)
*Bilbao rule * 1-win difference from the leader's*		0.07	0.04		0.81	-6.05		-0.04	-0.09
		(0.13)	(0.20)		(6.42)	(10.04)		(0.13)	(0.18)
*Bilbao rule * last three rounds * 1-win difference from the leader's*			0.01			12.09			0.12
			(0.25)			(12.80)			(0.25)

Notes: The numbers in each column of each panel are the estimates of the interaction terms between the *Bilbao rule* and dummies of groups of games such as whether a game is played in the last two rounds, whether one of the two players has at most 0.5-win difference with the leader's wins, etc. in a regression of a measure of outcome on *Bilbao rule*, a full set of interaction terms, and a set of control variables. For the sake of brevity, we present the estimates of only the interactions with *Bilbao rule*. *Bilbao rule* equals one if a game is played under the Bilbao rule and zero otherwise; the dependent variable is whether a game is decisive, the number of moves, or whether the percentage of draws among games that use the opening is more than 40%. Round characteristics include a set of dummy variables for rounds (the last round, second-last round, etc.), players' number of wins at the start of the round, and that of the difference from the highest number of wins at the start of the round. Player characteristics include quadratic function of white- and black players' ratings and players fixed effects. All specifications include year fixed effects. Numbers of observations are 1,708. The figures in parentheses are robust standard errors. None of the estimates is statistically significant at five percent level.