Information Transparency in Nonprofit Settings

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Dedication

This is dedicated to my sister Michelle Benaim who would have loved sharing the news of her brilliant older sister the “doctor”. Her energy and optimism were an inspiration to me.

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I would like to thank my husband Richard for his love and support, years of proofreading, and only rarely questioning that I would eventually finish this dissertation. All my love and thanks to my children Amanda, Jessi, Daniel, and Victoria who have inspired me to dream big through their words and deeds. Thanks to my cohort and the faculty of the GMU economics department who have become my mentors, teachers and friends. Lastly, thanks to my parents who have been patient for thirty-one years between my first graduation and my last.

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Abstract

INFORMATION TRANSPARENCY IN NONPROFIT SETTINGS

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In 1913, Justice Louis Brandeis writes in *Other People's Money and How the Bankers Use It*: "Publicity is justly commended as a remedy for social and industrial diseases. Sunlight is said to be the best of disinfectants; electric light the most efficient policeman." At that time the word "publicity" referred both to something like what we think of as "public relations" as well as to the practice of making information widely available to the public, what we call transparency. This dissertation investigates transparency as a method of regulation and sheds light on the effectiveness of such transparency on behavior.

This dissertation examines the behavior of figure skating judges. Figure skating marks are transparent to the public with marks identified by judge. We provide evidence from natural data to examine variations in affiliation bias. Using data from figure skating, we test whether judges are biased by affiliating with the same club as skaters, and under which conditions this bias may increase or decrease. We find that belonging to the same skating club correlates with higher marks. This finding is robust to a number of alternative

specifications. Further, judges assign both positive and negative strategic markings in program segments with more than one favored skater. We find that under higher visibility of skating performance and judging marks, the bias goes to zero. In addition, we find more bias when marking guidelines are flexible. Finally, we find that judges show greater favoritism when judging teams, which is consistent with the salience associated with a team sport.

Bias in Figure Skating

Section One: Introduction

Rules often mandate objectivity and impartiality from those who evaluate the performance of others in employment, legal, and other settings. However, factors outside the actual conduct or performance may influence assessments, including race, gender, religion, or other group identifications. While evidence suggests favoritism based on heritable characteristics such as race, ethnicity and gender, little is known regarding whether and how shared voluntary group membership affects evaluation. This is the case in particular when shared group affiliations do not reflect underlying shared preferences that are relevant to evaluating performance. Affiliations such as those shared by university alumni, fraternity and sorority members or civic associations such as Masons or Elks clubs are not always apparent to nongroup members yet may influence evaluators who share membership with performers. The lack of visibility of such affiliations may allow favoritism in many settings to go unnoticed and unstudied. While the affiliations may be scarcely visible, the outcomes of the evaluations may be visible and provide transparency to all regarding the specific evaluations.

There is an abundance of literature on favoritism due to race, gender and ethnicity. This literature includes work showing that individuals are more likely to favorably evaluate those who share the same race in sports settings. (Price and Wolfers 2010, Parsons et al.

2011). The 2011 work of Parsons et al concludes that a match of the ethnicity of umpire and batter decreases the probability of a pitch being called a strike. Interestingly, this effect can only be found in games where the decisions of umpires are not electronically monitored. The data suggests that referees adapt their behavior consciously when they are aware that there may be a spotlight on their "errors". Also in a sports setting, judging bias has been found in Olympic sports such as diving (Emerson, 2009; Emerson & Meredith, 2011; Whissell, Lyons, Wilkinson, & Whissell, 1993), winter sports including figure skating (Seltzer & Glass, 1991; Zitzewitz, 2006, 2014), and gymnastics (Leskošek, Čuk, Pajek, Forbes, & Bučar-Pajek, 2012; Popović, 2000; Ste-Marie, 1996). These are primarily focused on national bias. Findings on soccer referees indicated own-nationality bias.(B. R. Pope & Pope, 2015) Mixed Martial Arts referees make decisions that suggest implicit bias on multiple dimensions. (Gift, 2014)

While shared gender, race, or citizenship between the evaluator and performer might be easily observed, shared group membership is more difficult to recognize, and has been subject to less study. Well-known work in social psychology analyzes group membership in an experimental setting and shows that even seemingly meaningless distinctions among groups can lead individuals to favor those within their group relative to those outside of their group (Tajfel 1970). Economists have contributed to this area of study with theoretical and experimental analyses of the effect of identity and in-group membership (Akerlof and Kranton, 2000, Bertrand et al 2005, Goette et al 2012, Shayo and Suzzman 2011, Charness et al 2007, Chen, Y., & Li, S. X. 2009, Bar and Zussman

2012). If groups imposed in an experimental setting can influence behavior, how might self-chosen affiliation impact decisions?

Data from figure skating allows us to identify the club membership of both skater and skating judges along with the details of the performance and evaluation, where club membership does not provide information content regarding performance and evaluation standards. Compared to hiring and evaluation of employees in the labor market, the structure of the sport allows us to separate characteristics of performance from other personal characteristics. In the skating setting, group membership has no information content regarding shared preferences that are relevant to evaluation decisions. This setting allows us to analyze relatively innocuous joint group membership on judging behavior. Figure skating is "necessarily subjective and ideological; it is not, however, arbitrary as naïve observers sometimes conclude."(Kestnbaum, 2003, p. 13) Further, institutions in this sport allow for an analysis of strategic behavior, allow us to exploit a non-linearity in payoffs, and the effect of transparency, publicity, and rules, on biased evaluations.

In the United States, officials evaluate skating performances according the International Judging System (IJS), which is a set of objective criteria that was developed by the International Skating Union (ISU). The IJS requires judges to award two sets of marks. Judges award one set of marks based on the quality of each technical element performed and identified by a technical panel, such as a jump, spin, or step sequence. Judges give these marks during the performance. Judges award a second set of five marks relating to the skater's skill and the artistic and musical qualities of the entire performance. Judges award these latter marks immediately following the skater's performance.

Because judges are randomly assigned to competitions and events in the qualifying competitions up to and including the National Championships, we are not concerned with selection issues that might bias these results if judges could choose to be on the judging panels for skaters that they favor. Further, all judges must be members of the US Figure Skating Association, usually through membership in a local club.[1] Thus, any finding does not arise from some judges choosing to have a club affiliation while others do not. Additionally, unlike settings in which groups maintain certain characteristics, skaters from different skating clubs do not differ systematically with respect to their style of skating. The sport of figure skating has institutions that allow us to isolate any effects which are not due to shared preferences, but merely due to sharing the same "social construct," here being the skating club.

One benefit of our data is that a panel of judges, each of whom performs their evaluation independently, evaluates each skater performance. This characteristic of the data allows us to control for the quality of the skate, as judged by peers. A further interesting feature in using figure skating as the subject of analysis of favoritism is that there is a non-linearity in the payoff structure in the ranking of skaters. Only skaters ranked fourth or higher advance to the next level of competition. We predict that bias will be the largest at that discontinuity, since there is a discrete jump in the benefit-cost calculus of exercising bias. A further plus of our field data is that they allow us to test the hypothesis that favoritism decreases when the cost of exercising that preference rises. In our data,

1 Less than one percent of all judges in US Figure Skating do not have a club affiliation.

some events are on live TV. With this feature of our data, we can test the hypothesis that television coverage decreases bias. This is because live TV increases the cost of inaccurate judging because evidence of any bias is more easily detected when many individuals watch a competition.

We show that skaters receive higher marks from judges with whom they share a club affiliation. We find these results for singles skating and synchronized skating, senior and non-senior levels of skating ability, and national, sectional, and regional events. We show that the differential in performance evaluations disappears for nationally televised events. We examine multiple strategies that judges might employ in showing favoritism for club members. We also find support for the hypothesis that judges follow a strategy of showing favoritism in cases where the results matter the most, at the point of discontinuity, when skaters are on the verge of elimination from advancement to higher-level competitions. This result and the finding that bias vanishes when transparency is combined with a greater spotlight, i.e., with TV coverage, are consistent with the hypothesis that evaluation accuracy increase when the cost of error increases, and are not consistent with the hypothesis that judges have a fixed club-based skating style preference. Additionally we find evidence that salience of a group affiliation increases favoritism using evidence from synchronized team skating which is judged by the same pool of figure skating judges and consists of teams that compete over decades and inspire the same intense commitment and devotion we see from team fans in other sports. Lastly, we examine evaluation decisions when the guidelines for awarding marks are less strict. Here, we find a larger bias when judges have greater discretion in awarding marks.

Section Two: Institutions: Skating Clubs, Skating Disciplines, Qualifying Structure, and Judges

A. Skating Clubs

Skaters, officials and coaches must all be members of the U.S. Figure Skating Association to participate in skating competitions. Membership is achieved through joining a local skating club. Skating clubs are non-profit organizations, which exist to foster the sport through providing opportunities for testing, competitions, exhibitions, education, social activities and leadership for skaters, officials and their families. Figure skating clubs in the US originated around 1850, sponsoring figure skating even prior to the invention of the indoor ice rink. The current United States Figure Skating Association originated between 1914 and 1921, when the local clubs formed the Association.(Hines, 2006) This Association enabled clubs to organize championships from the regional to the national level and to standardize the rules and regulations of the sport. Members of clubs have voting rights to elect leaders and to make internal decisions.

Skating clubs do not generally own figure skating facilities with few exceptions. Skating rinks, that is, figure skating facilities, are often owned by for-profit organizations or local governments. To offer skaters the opportunity to participate in the U.S. Figure Skating program a skating club must work in partnership with a skating rink. Each skating club has an official principal skating headquarters. However, skating club members may skate and train at any rink. There is not a one-to-one relationship between clubs and rinks with some areas of the country having many skating rinks and few skating clubs and other

areas with many clubs but fewer rinks. Most professional coaches affiliate with a skating club in their area, although they tend to work at multiple skating rinks and with skaters from multiple clubs on a regular basis. With the exception of a handful of skating clubs that own their own rinks, professional coaches are not generally employed by skating clubs. Typically, rinks and skaters employ coaches as independent contractors.

Clubs may also provide skaters with time slots to train on the ice, and without membership in a skating club affiliated with the US Figure Skating Association, a skater cannot compete in US Figure Skating qualifying competitions. A skater may choose to be a member of a particular club because that club uses the rink where he or she skates. In areas with multiple clubs and rinks, clubs compete in attracting skaters by offering time slots at convenient days and times, having social offerings, availability of additional ice time for club members, or availability of special events such as ice dance.

There is some impermanence with respect to a skater's club affiliation, which we do not observe in this data, since this data is primarily cross-sectional. Top skaters may relocate to change coaches with the goal to improve performance. Further, many of skaters are of an age when they are finishing high school and start attending college. These skaters may relocate for educational purposes and thus change clubs and coaches.

Since skating style is skater specific, clubs do not compete by offering a specific brand with respect to the style of skating. Moreover, clubs are not known for skating styles, but for the amenities they offer to skaters and their families and for their geographic locations. The style of skating is based on individual strengths and weaknesses in combination with personal choices by the skater as to their music, choreographer, and

techniques. Coaches, parents and other members of a skater's individual "team" assist in decisions regarding the design of choreography, costumes, makeup and hairstyles etc,.

Coaches vary in their specialties, training, experience and, artistic execution. Coaches might train skaters in a particular style - either with more power, greater artistry, or jump techniques. However, styles are specific to a coach, not to a skating club. It is common for coaches to work as part of a team that includes multiple coaches, spending a short time working with a skater over the course of a season. Further, at any skating rink, both skaters and coaches are comprised of a mix of club affiliations.

When groups maintain specific characteristics, it is difficult to determine whether favoritism in evaluation is due to bias or due to placing a higher weight on same-group characteristics. Figure skating is a setting, in which where groups, here clubs do no maintain certain characteristics that are relevant for the evaluation of performance because skaters from different skating clubs do not differ systematically with respect to their style of skating. The described institutions in this section imply that there is no club specific skating style, but that skating styles are skater specific.

B. Disciplines, Competitions, Events, and Divisions

Competitive figure skating has five disciplines: ladies' singles, men's singles, synchronized team skating, pairs, and ice dancing. Of these five disciplines, we study ladies' singles, men's singles, and synchronized team competitions.

Singles skaters and teams have unique club affiliations, allowing us to study potential bias in evaluation. In contrast, pair skaters and members of ice-dance teams may represent different clubs, or are located in different parts of the country. Hence, for the

latter disciplines, skaters do not tend to share a group membership and this is why we exclude pairs and ice-dancing competitions from our analysis.

Singles skating has nine regional qualifying competitions, three sectional competitions, and one national competition, the National Championship. Synchronized skating has three sectional competitions and the National Championship. Figure A1 in the Appendix shows how the United States is divided into sections and regions by US Figure Skating, the governing body of competitive skating in the United States. The sections are Eastern, Midwestern, and Pacific, each of which contains three regions, as described in the notes to Figure A1.

For each figure skating discipline, that is, ladies' singles, men's singles, and synchronized teams, a competition has events for skaters of different skill levels. Singles competitors have one of five skill levels. These skill levels are, in order of technical proficiency: juvenile, intermediate, novice, junior, and senior. Higher skill levels require the performance of more difficult elements. Each skill level is subject to different rules and guidelines.[2] A so-called event in ice skating includes in three dimensions: a competition level, a skill level, and the skater's gender. Moreover, most events have both a short program and a long program.

Regional competitions are open to singles skaters with the appropriate skill levels. The top four skaters from each event in the regional competitions advance to one of the

2 Prior to entering competitions skaters take proficiency tests, which determine at which skill level they will compete. The tests are increasingly more difficult as skaters desire to compete in more technically difficult divisions. Skaters are also subject to age requirements; for example, juvenile skaters must be 12 or under, while junior skaters must be 18 or younger.

three sectional singles competitions.[3] And, within each event, the top four skaters or teams in each of the sectional competitions advance to the annual US National Championship.

It is possible for additional skaters to advance directly to sectional competitions either based on their previous performance, or because these skaters could not participate in the regional competitions due to conflicts with international competition assignments. US Figure Skating also permits skaters to participate in the National Championship due to merit reasons, such as high placement at the previous year's championship or at international events.

Overall, approximately 16,000 figure skaters compete in regional competitions each year and about 175 figure skaters participate in the US National Championships. However, for ladies' and men's singles, only novice, junior, and senior skaters compete in the US Championships. Therefore, for singles skaters, we consider only these three skill levels. To be consistent in our approach, for synchronized skating we also analyze events only for novice, junior, and senior skill levels.

C. Singles Skating

Novice, junior and senior singles events have two separate segments: a short program, skated first, and a long program, also referred to as the free skating program. The short program has required moves, referred to as elements, and are determined by US Figure Skating for the intermediate skill level or by the ISU for the novice through senior

3 For our sample period, juvenile and intermediate skaters do not compete in sectionals, but compete at a junior national event.

skill levels. For example, in the 2011–12 season, junior men were required to perform in the short program a double or triple axel, a double or triple lutz with connecting steps entry, a jump combination, a flying sit spin, a camel spin, a spin combination, and a step sequence. A random draw determines the skating order in the short program—that is, who skates first, second, and so on. For the long program, a seeded draw determines the skating order. Here, skaters are grouped in the inverse order of their rank after the short program. The highest-ranked skater in the short program, for example, performs in the last group in the long program.

No rule determines who advances from National Championships to international championships. A US Figure Skating committee decides who of the top skaters at the National Championship will represent the United States at the next year's international competitions. This includes the opportunity to compete at the World Championships, which awards cash prizes totaling over $700,000, with $45,000 being awarded to the men's and ladies' event winners. Moreover, the committee also selects skaters to compete in the Olympic Games. Their primary selection criterion is the skaters' performance at the National Championship and international events that precede the Olympic event. In addition, the committee decides which junior and senior skaters to send to international events in the International Skating Union's Grand Prix Series. At these events skaters compete for cash prizes up to $25,000.

D. Synchronized Skating

Synchronized teams consist of eight to twenty skaters and compete in fourteen different divisions. A combination of skill level and age defines a division. All

synchronized teams perform a long program, which has required program elements.[4] Elements in synchronized skating include blocks, circles, wheels, lines, intersections, and step sequences. Only synchronized teams at the junior and senior levels perform a short program in addition to the long program. The short program also consists of required program elements.

Whereas skaters in singles competitions tend to skate for a few years, but then disappear from the sport, synchronized teams compete for decades under the same name and club affiliation. This might explain why skating fans tend to have more loyalty to a team than to an individual skater. That is, teams have greater salience to fans than individuals. In synchronized skating, as with team sports like baseball or football, fans identify with their teams by wearing team colors and displaying team banners. Fans and alumni of synchronized skating teams often maintain a lifelong connection with their team.

E. Skating Officials and Scoring

Judges award marks at competitions. The judging panel consists of six judges at the regional and sectional competitions while the judging panel consists of nine judges at the US National Championships. Along with the judges, all competitions include a referee, who keeps time, makes sure other officials are at their pre-assigned seats, who stops a performance if equipment malfunctions, etc. All competitions also include a technical panel, which identifies and assigns a level of difficulty to elements. The technical panel

4 See http://www.usfsa.org/Programs.asp?id=44 - accessed March 21, 2012.

consists of a technical specialist, an assistant technical specialist, and a technical controller. Other officials at competitions include an accountant, who has the responsibility to compute the marks given by the judges, and officials for data input, video, music and other tasks.

At regional, sectional, and national competitions, judges evaluate the skaters in accordance with the guidelines of the International Judging System. Subsequent to the figure skating judging scandals in the 1998 and 2002 Olympics, the International Skating Union introduced this system in 2004. This system has been more fair, although there are criticisms that the programs are more homogenous with a diminishment of overall aesthetic beauty. (Katz, 2014)

Table A1 in the Appendix shows the computation of skaters' overall scores. The top panel of this table contains the technical element scores, and the bottom panel contains the program component scores. A trimmed mean for each type of mark is used to calculate the total score. Further details on how scores are calculated is provided in the notes to Table A1.

The technical elements are identified by a technical panel and communicated to the judges as they are performed. For the evaluation of the technical elements, judges have very specific guidelines for markings, with suggested reductions and increases based on performance quality, and mandatory caps on the highest mark when major errors occur. For example, three points must be deducted if a skater falls on a jump or misses a required element in a short program. Judges award the technical element marks, also referred to as

Grade of Execution (GOE) scores while skaters perform, and award program component marks directly after each skater or team's performance.

For the program component score, each judge assigns a mark to each of the five individual components, which are skating skills, transitions, performance/execution, choreography, and interpretation. Judges mark each program component on a scale from 0.25 to 10.0, in increments of 0.25. During the entire event, skating rules do not permit judges to discuss their evaluations among themselves.

After the conclusion of each event segment, that is, after the short and after the long program, all marks are posted publicly, usually prior to the next skater or team taking the ice. Marks for qualifying events are available online contemporaneously.

F. Judges

Three competency levels reflect the qualification of judges. For singles skating, the levels are regional, sectional, and national. For synchronized skating, the levels are junior sectional, senior sectional, and national. For both skating categories, a national appointment indicates a higher level of skill and experience. Judges of all of three competency levels serve in regional competitions. Regional judges cannot serve at sectional or national events and sectional judges cannot serve at national events.

To receive an appointment at any particular judging level, or to advance to the next level, an individual must trial judge. Trial judging is followed by a debriefing session with peers and higher-level judges, where the participants compare trial judges' marks to the actual judging panel's marks. Evaluators may ask trial judges to describe the programs of

skaters or teams for which they judged and to justify their marks. Further, evaluators may ask trial judges to compare and contrast the observed performances with the guidelines for judging skating. To be recommended for promotion, a trial judge's marks must be within the range of the official panel's marks, the judge must receive positive peer reviews and pass an exam, demonstrating competence.

Conditional on eligibility, judges are polled for availability and then, prior to the skating season, are assigned at least two months ahead of time to qualifying competitions. At that point, the identity of judges that are assigned to regional, sectional, and national competitions becomes public information. However, judges do not learn the specific event assignments at the time of assignment, that is, they do not know whether they will be on a panel for men or ladies, nor the skill level of the skaters that they will be judging. Judges learn about the events to which they are assigned a week or two prior to the date of the competition. Another restriction in the assignment process is that US Figure Skating rarely assigns judges more than once every few years to national competitions.

Just prior to each event segment, for example, the junior ladies' short program, the announcer makes public the identity and hometown of each member of the panel of judges. Skaters' club affiliations are announced at competitions just prior their performance. So, it is implausible that a judge would be unaware that they share a club affiliation with a skater. The composition of the judging panel can change between the short and the long programs. After each event segment concludes, the posted results includes the names of the judges along with their marks.

Since the beginning of the US Figure Skating Association, about ninety years ago, judges have been required to become members through a membership in a local club. Often judges are involved at the local-club level, serving as volunteers and officers, managing activities, and serving as judges at club test sessions. Judges receive no pay for their services. However, the clubs reimburse judges for judging-related expenses including the costs of travel.

To avoid a conflict of interest, rules do not allow judges to earn income by serving as a coach, choreographer, or consultant to skaters. The Judges' Creed Standard of Conduct, which includes the statement "I shall make my judgment to the best of my ability with all humility and then shall keep my own counsel unless questioned officially" (US Figure Skating Rulebook 2012, Section JR1.01, p. 67), is meant to guide the behavior of judges.[5]

Section Three: Model and Hypotheses

We assume that judges will show bias in their evaluation of a skater or team if the utility of having a member of their group place higher in a competition exceeds the cost of exercising such a preference.

$$U_w - C > 0$$

5See http://usfigureskating.org/content/2014-15%20Rulebook%2008-14-14.pdf- Accessed March 1, 2015.

U_w represents the utility to a judge of a skater representing his or her club placing well, and C represents the utility resulting from being suspected of or caught displaying bias. C=0 in the case of absolutely anonymous judging. C grows larger with the easier it is to determine which judge gave what mark, and with increasing visibility of the marks.

If $U_w > C$, the mark (M) is determined by four factors:

$$M = M_E * \alpha + M_A$$

M is the actual mark awarded. The first term (M_E) is the hypothetical mark earned by an objective evaluation. The variable α refers to the experience and expertise level of the judge, where $0<\alpha<2$, with the most experienced judges having a value closer to one and judges with less experience and skill a value further from one. The first term in the second product represents the judges' adjustment to raise the marks of the skater with the shared relationship (M_A).

We predict that the evaluation will be biased in favor of the skater when the difference between benefits and costs (U_w and C) is positive. When the loss in utility from getting caught exercising bias outweighs the utility gain the bias is bounded by zero. Thus, if $C>U_w$, then

$$M= M_E * \alpha.$$

Hence, each judge's mark is based on the skater's performance and his or her skill level in evaluating performance.

This model generates multiple hypotheses regarding the evaluation of skaters:

1. Judges will increase their marks when they and the skater belong to the same skating club.

Testing for biased evaluation based on a shared group membership is different from testing for bias based on race or gender. For race or gender, favoritism may be due to heritable shared genetics rather than a choice of affiliation. In contrast, clubs are social constructs and individuals choose to belong to a particular club. We test the hypothesis that this seemingly unimportant group affiliation gives rise to biased decision making.

Biased evaluation might also originate from geographical location.[6] That is, judges may evaluate skaters more favorably when the distance between their residence and that of the skater's club is smaller. Biased judging based on geography might also occur based on whether the judge's residence is located in the athlete's skating region, as defined by US Figure Skating. Another source of bias may stem from a shared gender between a judge and a skater. Female judges might evaluate female skaters more favorably. Similarly, male judges might evaluate male skaters more favorably. We address these alternative sources of bias in our analysis of the data.

My first hypothesis predicts that judges will award higher marks to skaters who share the same club affiliation as the judge. We refer to the higher marking by a judge as affiliation bias, when this judge has the same club affiliation as the skater. In terms of our model, M_A increases with shared club affiliation.

2. Affiliation bias in evaluation increases when a skater is on the cusp of elimination from further competitions.

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6 Previous studies on Olympic figure skating judging found biases in favor of the judges' countrymen (E. Zitzewitz 2006, Whissell et al. 1993).

The top placed four males and four females from each skill level (novice, junior, and senior) advance from the regional qualifying competition to the sectional and from the sectional to the national competition. Fifth placed skaters do not advance to the next level of competition. This non-linearity in the benefits of a skater's final placement alters the cost-benefit analysis for exhibiting bias. The short programs are skated a day or two before the long programs and the results are publicly available. The fourth-placed skater after the short program faces the danger of not advancing. A judge who shares affiliation with such a skater "on the bubble" has an increased incentive to show favoritism. We predict that skaters in third, fourth, and fifth place after the short program at regionals and sectionals competitions will receive higher marks from judges of their own club than skaters more securely at the top of the standings, or at the bottom of the standings after the short program.

Our model makes this prediction because exercising bias is costly. The return from exercising costly bias is larger, when biased markings help the skater advance to the next level. Rational exercise of bias predicts that little or no bias is exerted when after the short program skaters are ranked so low that even an excellent mark in the long program would not allow them to advance to the next level of competition.

3. *Evaluations exhibit greater objectivity when an event has TV coverage*.

Television increases the cost of exercising bias. When events are televised, viewers and members of the skating community can easily connect the marks to specific judges. At the US Nationals, the senior long programs are broadcasted live, while the short programs are not. This increased exposure of the senior long programs makes any bias visible to a larger audience, thus increases the rate of detection, and thus increases the cost of

exhibiting bias. Therefore, TV coverage provides judges with incentives to dampen their bias. We thus predict in our model, α decrease with TV coverage and that we will therefore observe less bias in televised senior long program than in the senior short program and other non-televised events.

4. Affiliation bias will impact evaluation of synchronized skating teams to a greater extent than individual skaters.

Synchronized skating is a team sport in which teams endure for decades. Team loyalty runs deep in skating, as in other sports such as baseball or football. There is an emotional connection between members and their teams, and many synchronized skating judges are alumni of teams. Teams differ from individual skaters in that individual skaters have relatively short competitive careers but teams are much longer-lived. This in part explains the fan loyalty to teams, a loyalty that can run through family generations. Salience of this group affiliation is greater and we would expect the impact of the shared group affiliation to be greater (Mullen, Brown, & Smith, 1992). When comparing synchronized skating competitions to singles competitions, we predict that the affiliation bias is larger for synchronized skating. Thus, M_A is larger in synchronized skating than in single skating.

5. Evaluation of technical elements will be more objective than the program component marks.

Judges have much more discretion in marking components of a performance, such as choreography, than in marking the grades of execution of the technical elements. While GOE marks must be reduced for a fall or major error, there is no corresponding requirement

for program component marks. Greater ambiguity in evaluation has been shown experimentally to result in greater implicit bias (Bertrand, Chugh, & Mullainathan, 2005).

Additionally, GOE marks have a smaller range and have larger and thus fewer increments than the component marks. This implies that a one-increment increase or decrease moves the GOE mark further from the GOE mark mean than a corresponding increment increase or decrease of the component mark from its corresponding mean. The fact that the increments are larger for GOE marks serves as a barrier to exercising bias in awarding GOE marks, because an increment increase in GOE more easily detected as being due to bias or error, than component marks that come in smaller increments. For these reasons, we predict less bias and more objective marks for the grade of execution of technical elements than for the marks associated with the five program components.

Section Four: Data Sources and Empirical Model

The institutions of figure skating allow us to examine the group biases based on a quasi-random assignment. US Figure Skating randomly assigns judges each year to each of regional and sectional competitions, as well as to the National Championships. The constraints to the random assignment are eligibility and availability of judges. There are multiple competitions with similar timeframes, implying that manipulating one's availability is no guarantee of an assignment to a particular competition. Additionally, a judge is assigned to qualifying competitions for the season (October through January) in the prior summer, but is not assigned to specific events until just prior to the beginning of the competition. Thus, no selection issues, as would be the case if judges could choose

events in which affiliated skaters are participating. In addition, all judges must be members of US Figure Skating, primarily through membership in a local club. Thus, no selection bias comes from some judges choosing to have a club affiliation while others do not. Further, there is no link between the quality of skaters from a given club and the tendency of judges to belong to that club, that is, judges rarely change affiliations for reasons other than relocation. In our data no judge changed his or her club affiliation.[7]

In some ways, our data mimics a randomized experiment, however, a study like ours that uses field data certainly has shortcomings when compared to one using experimental data. In a well-designed experiment, we can attribute observed differences in behavior solely to group assignment. This is also the goal of our empirical specification. In our design, judges who do not share club affiliation serve as a control group, allowing us to identify bias arising from shared club affiliation.

We collected data from the US Figure Skating website (http://www.usfsa.org) and its affiliate Icenetwork.com. We obtained data on the official competition results for all final rounds of qualifying competitions in singles and synchronized skating leading to the National Championships in 2012, and for the 2010, 2011, and 2012 National Championships.

7 It is possible that a skater and judge shared a club affiliation prior to the competitions we consider, but no longer do in our data set, because the judge now belongs to a different club. We do not observe such past affiliations. To the extent that such past affiliations exist for some of our observations, unidentified relationships tend to increase favoritism, so we can view our estimates as a lower bound.

Our data allow us to link each skater's marks to the judge who awarded those marks. We identified the club affiliation of the judges by searching skating club websites, searching the Internet for information regarding their biographies, and conducting personal interviews. We obtained the club affiliation of skaters and teams from official competition results. We measure distance between the judge's residence and the club's location by the distance between their respective ZIP codes. Information regarding judges' home ZIP codes comes from the Directory of US Figure Skating Officials 2011-12.

To test our hypotheses, our preferred specification is

$$mark_{ijkt} = \beta_1 SameClub_{ijkt} + \beta_2 Location_{ijt} + \beta_3 OtherMarksMean_{ijkt-i} + \gamma_i + \delta_j + \mu_t + \varepsilon_{ijkt} \quad (1)$$

where $mark_{ijkt}$ is the mark given for skater i by judge j for component k in the competition t. We employ a similar specification to test the grade of execution marks, wherein $mark_{ijkt}$ is the GOE mark given for skater i by judge j for element k in the competition t.

To test whether any potential favoritism arises based on club affiliation, geographical preferences, or both, we include the variable $SameClub_{ijkt}$, which equals one if the judge shares a club affiliation with the skater or skating team. Key in our identification strategy is that skating styles vary by skater, not by club. As we described, clubs are merely social entities that provide the right to train on a specific rink at ta specific time. No club-specific or geography-specific skating styles exist in figure skating. In this sport, the quality of skaters' performances depends on physical and personal attributes

rather than their club membership. Therefore, club membership does not reveal a sharing preferences between a skater and a judge from the same club. These institutional settings lead us to assume that judges do not favor same-club skaters because the club has a preferred style of skating.

The variable $Location_{ijkt}$ measures the geographic location of the skater (or team) and judge. We use two alternative indicators for geographic location. In one specification, we include an indicator for whether or not the judge resides in the same skating region in which the skater's club is located. In the other specification, we include the distance between the judge's residence and the skater's club location.

For observations belonging to judge *i*, we control for overall quality of the performance by including the mean component mark by all judges other than the mark of the *i*th judge, $OtherMarksMean_{ijkt\text{-}i}$. In some specifications we also control for a skater's overall ability and skill by including skater fixed effect γ_i. When the skater fixed effect is included in the specification, this variable also controls for any "home field" advantage to the skater. When we do not, we include indicators for whether the skater is a junior or senior with novice being the left-out category. In some specifications we also include an indicator as to whether the program is a long or short program. In some specifications we include judge fixed effects, δ_j, that captures heterogeneity among judges. The variable μ_t is an indicator for each of the competitions. For example, the regression includes an indicator for the New England Regional competition, for the Southwest Pacific Regional competition, and so on.

We estimate various specifications of model (1) for singles long programs, singles short programs, and synchronized programs. We analyze both the program component marks and the GOE marks. For singles events, we also study biased judging based on gender. Here we test whether male judges award higher marks to male skaters and whether female judges award higher marks to female skaters. For synchronized skating teams, we do not include gender variables, given that teams have both male and female skaters. In addition, we estimate separate regressions for events that air live on national television.

For the program component scores, each skater receives as many marks as there are judges for each of the five components. This generates multiple observations per skater. However, treating the multiple scores for each skater as independent is not appropriate. The marks awarded to a skater are correlated because all judges evaluate the same performance and share similar views regarding what counts as a high-quality or low-quality performance. Therefore, we cluster the standard errors in two dimensions, by competitor and by judge.

For our baseline regression results, we focus on the program component marks rather than on the GOE marks. Table 1A summarizes the number of program component marks that judges award for both long and short programs by competition type, and by skater and team skill levels for the 2011–12 season. In parentheses, Table 1A also presents the number of programs skated in each of these categories. Because judging panels have more judges in national competitions than in regional or sectional competitions, there are more marks per judging panel in the national competitions. Judges awarded 50,640

program component marks during the 2011-12 qualifying competitions, after removing 245 marks for skaters who are independent members of US Figure Skating**.**

Table 1B presents the cross tabulations for the number of program component marks awarded for the US National Championship competitions in 2010, 2011, and 2012 for novice, junior, and senior levels, broken down by short and long programs. Single skaters perform in both programs, unless they become injured. Therefore, almost exactly half of the observations for singles are short program marks while the other half consists of long program marks. Short programs are not performed by all team levels in synchronized skating. Thus, we included only the long programs to allow for a like comparison. Our data for the three years of National Championships include 29,025 observations.

Section Five: Program Components Results and Analysis

A. Affiliation and Evaluation

Starting with cross-tabulations, we first computed the number of observations with the highest mark for each component given to each skater for each program. For example, without considering ties, for the choreography component, on a panel with five judges, that would be the highest mark of the five choreography component marks, or twenty percent of the marks. We then separated the marks into two groups, those in which the judge and skater share a club affiliation and those in which they do not. Table 2 shows that high marks

constitute 22.05 percent of all marks.[8] The highest marks awarded by judges to skaters with whom they share a shared club affiliation constitute 29.11 percent of all high marks. Marks awarded by judges to skaters with whom they do not share the same club affiliation constitute 21.62 percent of the highest marks. We reject the hypothesis that this difference between two groups is due to chance at the one percent level (binomial *p*,one-tailed. = 0.00). These results provide initial evidence that judges tend to award the highest marks when they share the same club affiliation with the skater who they are evaluating.

Table 3A presents regression results for the 2011–12 season. The dependent variable in this table is the program component mark. The observations come from all qualifying events: the nine regional singles competitions, three sectional singles competitions, one national singles championship competition, three sectional synchronized competitions, and one national synchronized championship. Table 3B reports the descriptive statistics for the variables in Table 3A. Over all skating events, marks range from 0.75 to 10, where 10 is the highest possible mark.

In Table 3A, the regressions in columns 1 and 2 include indicators for each competition but do not include skater or judge fixed effects. These two columns differ with respect to our measure for the location variable. In the first column, we include a variable for regional affiliation, identifying whether a judge resides in the same region as the skater's club. In the second column, we include log distance, measured in miles, between the

8 Given that there are five component marks, without any ties, only twenty percent of the marks would be the highest mark. However, because of ties there can be two highest values, and thus the percentage of high marks is greater than twenty percent.

residence of the judge and the location of the skater's club. In Table 3A, columns 3 and 4 have the same explanatory variables as the first two columns, except for indicators for junior and senior levels, but add skater and judge fixed effects. Junior and senior levels are perfectly collinear with skater effects. In all columns we include an indicator for whether a mark is for a long program. In all four specifications in Table 3A, as well as in subsequent tables, we cluster the standard errors by skater and by judge.

In all four columns, the point estimates on skaters and judges sharing the same club affiliation are positive and statistically significant. The estimates show that when a judge and a skater share the same club affiliation, the skater's mark increases between 0.14 and 0.18 points. Thus, our estimates show that the shared club affiliation leads, on average, to a little less than a one-increment increase in the mark awarded. The point estimates further imply that an increase in a judge's mark by 0.25 on a panel with five judges leads to only as much as a 0.05 increase in the final score of the skater, as each judge's mark contributes to the average mark. However, as each judge awards five marks to each skater, the cumulative effect of a one-increment increase on all component scores is to increase a skater's final score by 0.25.

For the regressions in Table 3A, the mean component mark is 4.42 and the standard deviation is 1.23 (Table 3B).[9] The point estimates show that having the same club affiliation is associated with an increase that mark by approximately 15% of that mark's

9 The official International Skating Union's documentation explains that a component mark of 5 connotes average performance of the criteria, with a 4 being fair.. This means that the average program observed in the US qualifying stream is below average.

standard deviation. Table 3A further shows that when not including fixed effects for skater and judge, junior skaters on average have higher marks by about 0.036 points, and senior skaters have, on average, higher marks by about 0.067 points, than novice skaters. These results show that higher-skilled skaters tend to receive higher marks, as one would expect.

All specifications in Table 3A also include an indicator variable for the long programs. We find that when we include fixed effects for skater, judge and competition, the coefficient on long programs is negative, small, and statistically significant. In the first two specifications in Table 3A the estimates on the mean component score of other judges are close to one, suggesting that judges score fairly uniformly. The corresponding estimates are about 0.85 when we include skater and judge effects.

In light of the results in Table 2, one might wonder whether the results on the shared club affiliation variable are driven the fact that judges who share a club affiliation with a skater tend to award the highest marks to that skater. To study this issue, we discard for each skater the highest mark for each component. If most of the biased marks are driven by the highest marks then the impact of bias will be mitigated when we drop the high mark for each component for each program and use the remaining marks to estimate the same regression specifications as we do in Table 3A. Further, for this analysis, we recomputed the mean of other judges to take into account the dropped marks.

Table 3C shows that the point estimate on shared club affiliation remains positive and statistically significant. Here, a shared club affiliation leads to an increase in the judge's mark by between 0.11-0.14. Given we had dropped the highest marks, compared to the new mean of the dependent variable, these point estimates are of similar magnitudes

as those in Table 3A. The sum of these results shows that the findings in Table 3A are not driven by only those judges who share a club affiliation with the skater and award the highest mark.[10]

Table 4 presents regression results using the program component marks for the thirteen singles qualifying competitions in the 2011–12 season and excludes the synchronized skating events.[11] The first four specifications include no competitor or judge indicators, while the last four specifications include these indicators. The point estimates on whether the judge has the same club affiliation as the skater are between 0.13 and 0.17, similar in size to the combined singles and synchronized events in Table 3A. Thus, these estimates provide further support for our hypothesis that group membership impacts evaluation, as it is present even when only singles events are considered.

The point estimates on whether the judge resides in the same region as the skater's club is positive in all specifications in which it is included, and statistically significant. None of the point estimates on the distance between the judge's residence and the skater's club location are statistically significant. This implies that while being in the same geographic region has a small positive effect on marks awarded, the actual distance between skater and judge does not have an effect on marks.

10 Summary statistics for Table 3C are presented in the Appendix Table A2.

11 Summary statistics for Table 4 are presented in the Appendix Table A3.

As for the remaining variables, we find in none of the specifications that male judges favor male skaters or that female judges favor female skaters. Thus, there is no evidence of any discrimination based on the gender mix of the judge and the skater. In addition, we find that in the long program, marks tend to be slightly lower, when we include skater and judge fixed effects. As in Table 3A, the average component score of the other judges has a positive sign, and all corresponding point estimates are statistically significant. As before, the fact that the point estimate is close to one suggests that judges evaluate performances similarly to other judges on their panel. Also, as found in Table 3A, junior skaters have, on average, higher marks than the novices who comprise the reference group in our regressions, and senior skaters have higher marks than junior skaters, as we expect, due to the seniors' higher level of skill.

B. Component Mark Evaluation

In the Table 14, we show results from the estimation from the same specification corresponding to column 1 and column 3 in Table 3A, but where the dependent variable is the component type: skating skills, transitions, performance/execution, choreography, and interpretation. Rule 4923 from the 2014-2015 US Figure Skating Rulebook provides specific definitions and criteria for the evaluation of each mark. Figure X1 shows these definitions and criteria for each component. Marks are awarded on a scale of .25 to 10 in increments of .25.

The program component marks are to be awarded independently of each other. In practice, judges rarely spread the marks for an individual skater across the scale, with most marks awarded within no more than a 2-point range for each skater. There are two reasons

for the correlation between marks. One reason is due to the characteristics of a figure skating performance. If skaters have weak skating skills, then it is more difficult for them to have very good performance and execution. In addition, skaters who do not have strong choreography may also have difficulty interpreting the music or executing the elements. A second reason for the correlation and limited spread of marks for an individual judge and skater is that the program components are interconnected. Choreography and transitions are connected though the placement and design of elements and transitions leading to part of the choreography mark. Additionally, both choreography and interpretation refer to music and it is difficult for a judge to separate the two. In examining the criteria for each component, the first two component marks for skating skills and transitions have criteria that are most tangible and most easily evaluated. The last three components marks refer to the more artistic part of the skate, and are more linked to an individual judge's preferences. The results of Table 14 show that we find support for the affiliation bias hypothesis for each component type. Appendix Table A14 presents summary statistics for the five component marks that we use in Table 14

We hypothesize that due to the different criteria for each component that we will find more favoritism in the last three components than in the first component marks. To test this hypothesis, Table 14 presents the regression results for the entire 2011-12 season of singles and synchronized skating by component type with the program component mark as the dependent variable. Using fixed effects for skaters, competitions and judges, the point estimate in the skating skill regression for the impact of the judge and skater having a shared skating club affiliation is 0.148. The corresponding estimate in the transitions

regression is 0.174. The estimates in the performance/execution, choreography and interpretation regressions are 0.177, 0.184, and 0.202 respectively. The existence of statistically significant estimates for each component shows that the affiliation bias is not being driven just by one or two components but is present in all. All estimates are significant at the one percent level. Although the point estimates do exhibit the expected variation - it appears that there is a difference between .148 and .202, there is an overlap between the confidence intervals at the 95 percent level.

On the input screens, the first mark on the screen is skating skills with the other marks are in the order listed in the rulebook. However, judges may award the marks in any order they wish, so we do not expect a systematic difference in component marks due to the order of entry.

The judging panel have only a minute or two to award the five marks, each of which consist of multiple criteria. This forces judges to quickly assess performances, and this makes judges rely on their instinct rather than on a methodical evaluation of each criteria. This could explain why we find somewhat larger point estimates for affiliation bias for the marks that have less concrete criteria.

C. Evaluation at the Discontinuity in Payoffs

After the long program and short program scores are summed. The top four men and women, at each skill level advance from the regional competition to the sectional and from the sectional competition to the National Championships, while the season is over for those who finish 5th or lower.

After the short program, which is skated first, some skaters are more secure in advancing based on a strong performance while others, who are ranked very low, have a poor outlook. The skaters in 3rd, 4th, and 5th places after the short program are on the cusp of advancement but are not guaranteed to advance until performance of the long program and the computation of a final placement. For judges, the benefits of biased marking for these skaters on the bubble are higher in this case than the benefits of biased markings for low-ranked skaters. Therefore, we predict greater bias for skaters on the bubble.

To test whether the bubble status affects the marking of the skater I include an indicator to the long program observations for those skaters who were ranked third, fourth, or fifth after the short program. I also include an indicator for the interaction between relationship and bubble status. I do not include an indicator for bubble only because that indicator is perfectly collinear with skater fixed effects.

The first three columns of Table 5[12] show results for regional and sectional competitions. Table 5, columns 1, 2 and 3 show approximately a 0.095 point increase in marks for skaters on the bubble and who share the same club affiliation with one of the judges. The point estimates are statistically significant at the ten percent level. The positive point estimate implies that when a judge shares the same club membership as the skater, and the skater is on the bubble, then this judge increases the mark by 0.095. This effect is considerable, given that the point estimates on the biased marks that is due solely from having the same club affiliation is 0.12 points. We also find that the sum of the estimate

12 Table A4 presents the summary statistics for Table 5.

from both judge and skater sharing the same club affiliation and the estimate from being on the bubble interacted with same club affiliation is statistically significant. These findings are consistent with the hypothesis that the largest bias occurs in situation where the bias is most likely to be a determining factor regarding whether the skater will advance to the next level of competition.

Column 4 of Table 5 shows results for National competitions, where we do not predict an effect on the interaction variable, since no skater automatically advances to international competitions. Consistent with this prediction, for the National Championship, we do not find a statistically significant effect on the bubble times relationship interaction variable.

D. Effect of Level of Competition on Affiliation Bias

To examine whether any biased judging is occurring only at some types of competitions, in Table 6 we estimate separate regressions for each competition level for the 2011–12 singles event with the program component mark as the dependent variable. All specifications include skater and judge fixed effects that control for heterogeneity of judging and skating ability. Further, as in the previous regressions, we cluster standard errors in both of these dimensions.

The weaker skaters are eliminated through the qualifying process and the average skating quality increases as the season progresses from regional to sectional to national competition. Meanwhile, while national, sectional, and regional judges serve as officials and award marks at regional events, only national judges participate in the national event

and only sectional and national judges participate in the sectional event. National Judges, i.e. those with the highest appointment, have at a minimum of about ten years of experience in judging, prior to getting the appointment. Most of the active national judges have been judging for over twenty years.

We find a positive and statistically significant coefficient on same-club affiliation for all levels of competition, showing that marks increase when the skater and the judge share the same club affiliation. The point estimates for the regional, sectional and national competitions are between 0.10 and 0.244. The former table also shows the percentage of marks for which a judge shares a club affiliation with a skater. Judges share an affiliation for 6.6 percent of the marks in the regional competitions, 2.1 percent at sectional competitions, and 2.7 percent at the national competitions.

An interesting finding presented in Table 6 is that the point estimate on the mean component score of other judges changes with the competition level. The point estimates are about 0.6 for the regional events and 0.63 for the sectional events, and rise to 0.72 for the national competitions. As the finding for the same club affiliation variable, this finding could either be due to the fact that the judging pool is more heterogeneous in lower level competitions, or due to the fact that at higher level competitions, judges have a stronger incentive to mark accurately, due to the increased publicity associated with higher level competitions.

To distinguish between these two explanations, in Table 7 we re-estimate the specification of 6 for national-level judges.[13] Only national-level judges can serve at regional, sectional, and national competitions We drop any marks from in the regional and sectional competitions in which there were fewer than three national judges on the official panel. We find that national judges display bias from shared club affiliation in all levels of competition. For all competitions, the 95 percent confidence intervals of the estimates on same-club affiliation overlap.

With respect to the effect of the score of other national judges, we find that the national judges remain less in line with their peers in regional and sectional competitions than in the national events. The point estimates differ for the mean component score between nationals and the other two competitions, with no overlap among the 90 percent confidence intervals. This finding seems to indicate that national judges become more conscious of being in line with their peers at the nationals as opposed to lower level competitions.

E. The Impact of Scrutiny (Television)

Here we test the hypothesis that judging under greater scrutiny is less likely to be impacted by a shared group membership. National Championships differ from other competitions because portions of the senior singles long-program event segments are

13 We report the summary statistics for the variables of Table 6 in Appendix Table A5 while the variables of Table 7 can be found in Appendix Table A6.

televised live and other portions are replayed on tape on a major TV network. TV cameras record the entire long-program senior event segment and judges are well aware of the taping and televising of these showcase performances.

A little more than half of the senior long programs were shown live on TV over the three years of national singles competitions in our study. These programs included the skaters who received the highest marks in the short program. While only the higher-seeded skaters appear on live TV, the judges' marks for the other groups also appear on TV because broadcasters fill breaks in the program for ice resurfacing and warm-ups by showing some of the taped performances from the earlier rounds in the senior singles long program. In contrast, short programs, synchronized programs, and some of the low-seeded singles long programs are not televised live or at all but are only available later online.

Table 8 presents regression results for the US Nationals senior singles long program in 2010, 2011, and 2012. [14] Table 8 shows that the point estimates on club affiliation for the senior long programs at the National Championships are not statistically significant, regardless whether or not we include skater and judge indicators. These findings are consistent with the hypothesis that judges will exercise restraint in biased scoring when an event has greater visibility and provide support for the hypothesis that the presence of television cameras is that it raises the cost of biased behavior and thus causes the biased behavior to decrease or disappear altogether.

14 Summary statistics for Table 8 are presented in the Appendix Table A7

i. Robustness Check on TV Effect – Novice, Junior, and Short Programs and Lower-Ranked Skaters

Next, we study whether the lack of a statistically significant effect of club affiliation on judges' marks shown in Table 8 is just a feature of National competitions, as opposed to TV cameras broadcasting the event. We first examine the long program marks for the junior and novice levels at the US National Championships. In contrast to the senior events in Table 8 the novice and junior events in Table 9A all have statistically significant point estimates on the variable measuring whether the judge and skater share the same club affiliation. The point estimates range from 0.20 to 0.5. All but one point estimate for the novice and junior events are larger than 0.25, the smallest increment of judges' marks.[15]

Table 9B presents results for the subsample of seniors skating in the short program, which precedes the long program. [16] Different from the long program, the short program is not televised. Consistent with the hypothesis that bias will be larger when events are less visible, we find a positive and statistically significant effect of same club affiliation on judges' markings. The estimates show that sharing a club affiliation increases the mark by between 0.13 and 0.22 points. Measures for geographic proximity are not statistically significant. The fixed-effects specifications in Table 9B show that female judges mark

15 Variables for male/male and female/female judge and skater pairs were also included in additional specification and there were no changes to the estimates on the same club affiliation bias. However, we excluded because in some specification there was very little within variation for these variables. Summary statistics for Table 9A are included in the Appendix Table A8.

16 Summary statistics for Table 9B are included in the Appendix Table A9

female skaters higher than male skaters. However, since male and female skaters compete separately, this difference does influence the results of an individual skater.

If exercising bias is costly because of possible detection, judges have little incentive to award biased marks for skaters who rank very low and have no chance to be placed in a prominent position. Table 10[17] shows regression results for the subsample of senior skaters who placed between 11th to 22nd , the latter being the last place, in the long program at the National Championships. This group is similar but not identical to the group of skaters who are not televised live. The judges' experience with judging these skaters is identical to their experience with the top-placing skaters in the event. These performances take place immediately prior to the live television broadcast with cameras and commentators in place and with the identical set of officials. In this subsample, we also observe no statistically significant biased marking. None of the coefficients on same club affiliations are statistically significant. We can attribute this to the broadcast effect as well.

ii. Robustness of TV effect – Synchronized Skating

As a comparison to the singles skating at the National Championship we study the effect of club affiliation in synchronized skating at the National Championship. Both singles and synchronized skating have almost identical institutions and all synchronized skating judges are also qualified as singles judges. Further, judges who serve at the qualifying competitions are selected in the same way and from a similar pool as judges

17 Summary statistics for Table 10 are presented in the Appendix Table A10.

serving at the singles competitions. As for the single skating events, for synchronized skating we define the affiliation indicator to equal one if the judge has the same club membership as the team.

Table 11[18] shows that we find a positive and statistically significant effect of same-club affiliation on marking by judges at the US Nationals synchronized skating championships. Columns 1-4 present results for all long programs by novice, junior and senior teams while columns 5 and 6 present results for solely the senior long programs at the synchronized national championship. A key feature distinguishing this latter event from its singles counterpart is the lack of live television broadcast. Having the same club affiliation increases the mark by between 0.20 and 0.31 points.

F. Evaluation of Team Skating

Next, we test the hypothesis that there is more bias in the markings at synchronized skating events, as opposed to singles skating events. Skaters in singles events and teams come and go, but for a team, the team name, colors, logos and club affiliation are long-lasting. A judge can have a shared club membership with a team that spans decades.

In Table 12, we present regression results for the entire 2011–12 season for all levels of synchronized skating.[19] All regressions include a variable equaling one if the judge has some affiliation with the team's club, and zero otherwise. The point estimate for

18 Appendix A11 contains the summary statistics for the variables of Table 11

19 Summary statistics for the variables of Table 12 is contained in Appendix Table A12.

club affiliation ranges from 0.44 to 0.5, roughly twice as large as the estimate for singles skating. This is consistent with our prediction that the bias is stronger in synchronized skating because synchronized teams membership is more salient. The impact of the shared group membership with a team could be due to the individual shared affiliations with multiple skaters increasing the bias, or due to the enduring nature of synchronized teams.

As for the remaining variables, in Table 12 the point estimate on the mean component score of other judges is about one for all but one specification. The point estimates on log distance and whether the judge and the skating team come from the same region are again not statistically significant. Because synchronized skaters may be of mixed gender, we do not analyze gender differences in scoring.

Section Six: Grade of Execution marks Results and Analysis

The International Skating Union enacts rules regarding the number and type of elements that will be included in a program. In a singles event, these elements may include jumps, spins and step sequences. In synchronized team skating, elements include such blocks, wheels, intersections. The specific elements and vary based on the level, sex and program length (short or long) with a minimum of five elements and a maximum of thirteen. There are also rules regarding the repetition of elements and illegal elements. As a skater performs their program, a technical panel identifies each element and the panel of judges immediately award a GOE. Each judge awards a Grade of Execution (GOE) mark for each element, ranging from -3 to +3 in one unit increments.

We test the hypothesis that for the evaluation of program component marks is more biased than the evaluation of GOE marks. Two institutional features motivate this hypothesis. First, with GOE marks judges have less discretion, the guidelines for awarding GOE marks have very specific directions for a base GOE mark with deductions and reductions for errors and increases for positive aspects. Second, a one increment increase in GOE marks is more likely to be noticed, because it is larger, than a one increment increase in component marks. In Appendix Table A3, we show that the mean of component marks for singles competitions is 4.434 with a standard deviation of 1.258. The increment of the component marks is 0.25, implying that an increase of one increment is equivalent to a 0.206 standard deviation. We can compare this to the statistics for the GOE mark Appendix Table A18, in which the mean of the GOE marks in singles competitions is -0.285 with a standard deviation of 1.373. For GOE marks, an increase of one increment is equivalent to a 0.728 standard deviation, while if the component mark is increased by one increment, the result is a 0.2 standard deviation increase. Because a GOE one increment increase is larger in terms of standard deviation, an one increment increase in a GOE mark is more likely to be noticed than an increment increase in component marks.

The first four columns of Table 13 present the regression results for the GOE marks for singles competitions for the 2011–12 season. For the last four columns reproduce the analog specifications for component marks that we had presented in Table 4. In each of the first four columns, we find that the point estimate on same club affiliation is smaller for the GOE marks than for the component marks. The estimates for the GOE marks range

from 0.041 to 0.048 while the program component marks range from 0.164 to 0.167. Thus, judges are more objective in awarding marks when they have less discretion.

In our further analysis of GOE marks we use only observations from singles skaters to compare these auxiliary results to our main results on component marks. Appendix Tables A15 and A16 provide summary statistics for these data. There are many more observations per skater when examining GOE marks in comparison to the component marks due to the larger number of elements in a program. There are more GOE marks per skater at the junior level than the novice level, and even more marks at the senior level than at the junior level due to the number of elements. The number of marks per skater given in the national event is also greater due to the use of a nine member panel of judges rather than the standard six judges used at regional and sectional events. To examine in-group favoritism due to affiliation using the GOE marks, our preferred specification is:

$$mark_{ijkt} = \beta_1 SameClub_{ijkt} + \beta_2 Location_{ijt} + \beta_3 OtherMarksMean_{ijkt-i} + \gamma_i + \delta_j + \mu_t + \varepsilon_{ijkt} \quad (2)$$

where $mark_{ijkt}$ is the GOE mark given for skater *i* by judge *j* for element *k* in the competition *t.*

We include the variable $SameClub_{ijkt}$, which equals one if the judge shares a club affiliation with the skater. The variable $Location_{ijkt}$ measures the geographic location of the skater and judge. We use two alternative indicators for geographic location. In one specification, we use an indicator for whether or not the judge resides in the same skating

region in which the skater's club is located. Alternatively, we include the distance between the judge's residence and the skater's club location.

For observations belonging to judge *i*, we control for the overall quality of the performance by including the mean component mark of all judges other than the mark of the *i*th judge, $OtherMarksMean_{ijkt\text{-}i}$. In some specifications we also control for a skater's overall ability and skill by including skater fixed effect γ_i.When we do not, we include indicators for whether the skater is a junior or senior with novice being the omitted category. In some specifications we also include an indicator as to whether the program is a long or short program. In some specifications we include judge fixed effects, δ_j, that capture heterogeneity among judges. The variable μ_t is an indicator for each of the competitions.

Table 15 presents the regression results for four specification, two with fixed effects for only the competition and two with fixed effects for skater, judge and competition. In all specifications, we find a statistically significant positive effect of a judge and skater sharing a club affiliation. In some specification, we also find a smaller but statistically significant effect for a judge and skater representing the same region and a slight negative effect of distance, which is the predicted direction, that is, as the distance between judge and skater increases, bias decreases. The summary statistics for Table 15 are presented in Appendix Table A17.

To examine whether the level of competition makes a difference for affiliation bias, the same type of specification that we used to study the observations grouped by level of competition. These results are shown in Table 16 (summary statistics in Table A18). These

results show a statistically significant positive affiliation bias for the regional competitions, and positive, but not statistically significant estimates for the sectional competitions. In the national competition the estimate is slightly negative. This fits the prediction that judges exercise more bias in the GOE mark when they are less likely to be caught. There is more visibility and scrutiny of results from a sectional event than a regional event, with the highest level of scrutiny at the National Championships. This implies that judges at regional events show more favoritism than at higher level competitions and we find support for this implication in our data.

Section Seven: Conclusions

The impact of group membership on the evaluation of performance is important for the design of institutions to make decisions regarding the evaluation in the hiring and promotion process, political and legal systems and other non-sports setting. Our data allow for close study of the impact of shared group membership on the evaluation of others. Using data from figure skating competitions in the United States, we study bias and find that judges who share the same club affiliation as the skater show favoritism in awarding higher marks. The finding that shared group identity helps to shape the evaluation by judges in this context ties into the theoretical work on identity and individual decision making. This is of interest because group identity of a skating club is not as meaningful or salient as race, sex or nationality and yet still we find the evaluation to be rendered less than objectively.[20]

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20 From personal interviews, we learned that judges report that they do not favor members of their club. Indeed, they report that they tend to judge club members more harshly. Possibly judges consciously

Interestingly, although both judges and skaters generally choose club affiliation for geographic proximity, bias impacts the judges' performance directly though membership in the club, not primarily through physical proximity as measured by the distance between judges' homes and skaters' club. Thus, as a social construct, the club elicits greater affiliation bias than any bias due to physical proximity, whether regional or distance.

We find a larger bias when judges award marks to synchronized skating teams than to single skaters. This is consistent with the culture of skating, in which fans tend to feel intense, long-lived loyalty to a team, creating a more salient group identity with the skating club as opposed to an individual skater.

We also provide evidence that judges act strategically to the extent that bias in judges' evaluations is a function of the benefits and costs. We find no affiliation bias in the senior ladies' and men's long programs at the US National Championships, which are broadcast live on TV. This evidence on the impact of television is consistent with our utility maximizing framework in which an increase in visibility also increases the cost of bias. Greater transparency in this case leads to greater objectivity in evaluation. Other work as found that publicity and awareness of bias in evaluation can decrease bias.(D. G. Pope, Price, & Wolfers, 2013) We also find that judges enhance the placement of the skater from their club when their skater is on the bubble (i.e. in danger of not advancing). These findings imply intentional increases in markings, rather than any unintentional or implicit

increase their marks to compensate for an inclination to judge a club member too severely. Regardless of the reason, the group membership influences the less than objective evaluation.

beliefs impacting the objectivity of the evaluator. An additional finding is that decisions that allow for greater discretion by the judges are subject to larger bias than those with more strict guidelines. These results are relevant to many contexts when designing rule structures with the objective to limit the discretion of the evaluator as to decrease the impact of bias.

In the specific context of figure skating, our estimated average treatment effect may appear small, but in figure skating the final marks are often very close. It can make a difference even if one judge changed his or her mark by the minimum increment of 0.25. For example, at the end of the 2008 National Championships, the top two competitors in the senior men's event were tied at exactly 244.77 points, even after skating two programs and receiving 90 component marks(Borzi, 2008).

This study explores only United States judging although there are significant stakes in the international competitions. Prior to the implementation of the International Judging System in 2004 instances of national bias were often so transparent that "fans could accurately predict a judge's nationality according to which skaters the judge marked especially high or low."(Kestnbaum, 2003, p. 269) The initial IJS system did not allow for transparency of marks, with scoring published without attribution of marks to specific judges. This led to accusations of bias and collusion internationally. As of the 2018-19 season, anonymous judging has been eliminated by the ISU in an effort to be more transparent. A further analysis of the international marks would be a natural extension of this work.

One limitation of our data set is that we can only recognize and account for transparent relationships between skaters and judges. Many individual skaters change locations to train with different coaches, located at different clubs, and over a span of many years. Some skaters retain membership in their first club while others change membership frequently. Judges, also, relocate and change club affiliations for work and family reasons. Because we can only identify the most transparent relationships, our empirical analysis may only identify the lower bound of any bias. This mimics other settings in which potential shared group memberships may be largely invisible. Nonetheless, this the findings in this paper support the view that bias-reduction is possible through the selection of a pool of evaluators from varying backgrounds, implementation of stringent conflict of interest policies, transparency in the evaluation process, and limiting discretion through structure and guidelines.

References

"201112Rulebook.Pdf." n.d. Accessed March 12, 2012. http://usfsa.org/Content/201112Rulebook.pdf.

Akerlof, George A., and Rachel E. Kranton. 2005. "Identity and the Economics of Organizations." *The Journal of Economic Perspectives* 19 (1): 9–32.

Bar, Talia, and Asaf Zussman. 2012. "Partisan Grading." *American Economic Journal: Applied Economics* 4 (1): 30–48.

Bertrand, Marianne, Dolly Chugh, and Sendhil Mullainathan. 2005. "Implicit Discrimination." *The American Economic Review* 95 (2): 94–98. https://doi.org/10.2307/4132797.

Borzi, Pat. 2008. "Tie Breaker Allows Lysacek to Defend Title." *The New York Times*, January 28, 2008, sec. Sports / Other Sports. http://www.nytimes.com/2008/01/28/sports/othersports/28skate.html.

Charness, G., L. Rigotti, and Aldo Rustichini. 2007. "Individual Behavior and Group Membership." *American Economic Review* 97 (4): 1340–1352.

Chen, Y., and S. X. Li. 2009. "Group Identity and Social Preferences." *The American Economic Review*, 431–457.

Emerson, John W. 2009. "Assessing Judging Bias: An Example From the 2000 Olympic Games." *The American Statistician* 63 (2): 124–31. https://doi.org/10.1198/tast.2009.0026.

Emerson, John W., and Silas Meredith. 2011. "Nationalistic Judging Bias in the 2000 Olympic Diving Competition." *Math Horizons* 18 (3): 8–11. https://doi.org/10.4169/194762111x12954578043019.

Gift, Paul. 2014. "Performance Evaluation and Favoritism: Evidence from Mixed Martial Arts." *Browser Download This Paper*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2395994.

Goette, Lorenz, David Huffman, and Stephan Meier. 2012. "The Impact of Social Ties on Group Interactions: Evidence from Minimal Groups and Randomly Assigned Real Groups." *American Economic Journal: Microeconomics* 4 (1): 101–115.

Hines, James R. 2006. *Figure Skating: A HISTORY*. 1st edition. Urbana : Colorado Springs: University of Illinois Press.

Katz, Chloe. 2014. "Levelling the Rink." The Economist. February 16, 2014. http://www.economist.com/blogs/gametheory/2014/02/judging-figure-skating.

Kestnbaum, Ellyn. 2003. *Culture on Ice: Figure Skating & Cultural Meaning*. Wesleyan University Press.

Leskošek, Bojan, Ivan Čuk, Jernej Pajek, Warwick Forbes, and Maja Bučar-Pajek. 2012. "Bias of Judging in Men's Artistic Gymnastics at the European Championship 2011." *Biology of Sport* 29 (2).

Mullen, Brian, Rupert Brown, and Colleen Smith. 1992. "Ingroup Bias as a Function of Salience, Relevance, and Status: An Integration." *European Journal of Social Psychology* 22 (2): 103–122. https://doi.org/10.1002/ejsp.2420220202.

Parsons, Christopher A, Johan Sulaeman, Michael C Yates, and Daniel S Hamermesh. 2011. "Strike Three: Discrimination, Incentives, and Evaluation." *American Economic Review* 101 (4): 1410–35. https://doi.org/10.1257/aer.101.4.1410.

Pierce, Lamar, and Parasuram Balasubramanian. 2015. "Behavioral Field Evidence on Psychological and Social Factors in Dishonesty and Misconduct." *Current Opinion in Psychology*, Morality and ethics, 6 (December): 70–76. https://doi.org/10.1016/j.copsyc.2015.04.002.

Plessner, Henning, and Thomas Haar. 2006. "Sports Performance Judgments from a Social Cognitive Perspective." *Psychology of Sport and Exercise* 7 (6): 555–75. https://doi.org/10.1016/j.psychsport.2006.03.007.

Pope, Bryson R., and Nolan G. Pope. 2015. "Own-Nationality Bias: Evidence from Uefa Champions League Football Referees." *Economic Inquiry* 53 (2): 1292–1304. https://doi.org/10.1111/ecin.12180.

Pope, Devin G., Joseph Price, and Justin Wolfers. 2013. "Awareness Reduces Racial Bias." Working Paper 19765. National Bureau of Economic Research. http://www.nber.org/papers/w19765.

Popović, Ružena. 2000. "International Bias Detected in Judging Rhythmic Gymnastics Competition at Sydney-2000 Olympic Games." *Facta Universitatis-Series: Physical Education and Sport* 1 (7): 1–13.

Price, J., and J. Wolfers. 2010. "Racial Discrimination among NBA Referees." *Quarterly Journal of Economics* 125 (4): 1859–87. https://doi.org/10.1162/qjec.2010.125.4.1859.

Seltzer, R., and W. Glass. 1991. “International Politics and Judging in Olympic Skating Events: 1968-1988.” *Journal of Sport Behavior* 14 (3): 189–200.

Shayo, Moses, and Asaf Zussman. 2011. “Judicial Ingroup Bias in the Shadow of Terrorism.” *The Quarterly Journal of Economics* 126 (3): 1447–84. https://doi.org/10.1093/qje/qjr022.

Ste-Marie, Diane M. 1996. “International Bias in Gymnastic Judging - Conscious or Unconscious Influences.” *Perceptual and Motor Skills* 83 (3): 963–975.

Tajfel, H. 1970. “Experiments in Intergroup Discrimination.” *Scientific American* 223 (5): 96–102.

“Welcome to U.S. Figure Skating.” n.d. Accessed August 29, 2017. http://www.usfsa.org/story?id=84109.

Whissell, Robert, Scott Lyons, Derek Wilkinson, and Cynthia Whissell. 1993. “National Bias in Judgements of Olympic-Level Skating.” *Perceptual and Motor Skills* 77 (2): 355–58. https://doi.org/10.2466/pms.1993.77.2.355.

Zitzewitz, Eric. 2006. “Nationalism in Winter Sports Judging and Its Lessons for Organizational Decision Making.” *Journal of Economics & Management Strategy* 15 (1): 67–99.

———. 2014. “Does Transparency Reduce Favoritism and Corruption? Evidence From the Reform of Figure Skating Judging.” *Journal of Sports Economics* 15 (1): 3–30. https://doi.org/10.1177/1527002512441479.

Tables

Table 1A: Cross-Tabulation of Program Component Marks Awarded, 2011-2012 Qualifying Season

	Skill Levels			
Competition	Novice	Junior	Senior	Total
(1)	(2)	(3)	(4)	(5)
National Singles	2,160	2,160	3,510	7,830
	(48)	(48)	(78)	(174)
Sectional Singles	4,315	4,200	3,870	12,385
	(144)	(140)	(129)	(413)
Regional Singles	11,640	8,885	7,200	27,725
	(388)	(301)**	(240)	(929)
National	540	450	360	1,350
Synchronized	(12)	(10)	(8)	(30)
Sectional	510	480	360	1,350
Synchronized	(17)	(16)	(12)	(45)
Totals	19,165	16,175	15,300	50,640
	(609)	(515)	(467)	(1,591)

Notes: The unit of analysis is a judge's program component mark and data are for the 2011-2012 skating season. Each judge awards five marks per program per skater. Table 1A tabulates the total number of component marks awarded in each level of competition at each level of skating. In parentheses are the total numbers of long and short programs. Regional and sectional competitions generally use a panel of six judges, (**29 programs judges with a 5 judge panel) while national competitions use nine judges, resulting in more marks per skater.

Table 1B: Cross-Tabulation of Program Component Marks Awarded National Championships 2010, 2011, and 2012

Discipline	Program Length	TV	Skill Levels			Totals
			Novice	Junior	Senior	
Singles	Short	No	3,240	3,330	5,850	12,420
			(72)	(74)	(130)	(276)
Singles	Long	No	3,240	3,330		6570
			(72)	(74)		(146)
Singles	Long	Yes			5715	5715
					(127)	(127)
Synchronized	Long	No	1,755	1,395	1,170	4320
			(39)	(31)	(26)	(96)
Totals			8,235	8,055	12,735	29,025
			(185)	(179)	(283)	(645)

Notes: The unit of analysis is a judge's program component mark and data are for the 2010, 2011, and 2012 National Championships. Each judge awards five marks per program per skater. Table 1B tabulates the total number of component marks awarded in each level of competition at each level of skating. In parentheses are the total numbers of long and short programs.

Table 2: Tabulation of Highest Program Component Mark

	Number of Marks		
Shared Club Affiliation	All (1)	Highest (2)	% Highest Marks (3)
Yes	2,831	824	29.11
No	47,809	10,335	21.62
Totals	50,640	11,159	22.04

Notes: The table reports data from the 2011-2012 skating season. Column (1) shows the total number of observations and the number of observations where the judge shares the same club affiliation or not. Column (2) considers only the observations that constitute the highest mark per judge per component per program skated. Column (3) provides percentage of these marks that are given by judges with and without the same club affiliation as the skater

Table 3A: The Effect of Shared Club Affiliation on Program Component Marks, All Levels of Competition, Singles and Synchronized, 2011-12

	(1)	(2)	(3)	(4)
Judge and skater share club affiliation	0.154***	0.143***	0.178***	0.181***
	(0.032)	(0.033)	(0.027)	(0.030)
Mean component score of other judges	1.091***	1.091***	0.875***	0.875***
	(0.013)	(0.013)	(0.033)	(0.033)
Judge and skater reside in same region	0.037		0.030*	
	(0.030)		(0.018)	
Log distance between skater club and judge's residence		-0.011		-0.003
		(0.009)		(0.007)
Long Program	-0.003	-0.003	-0.031**	-0.031**
	(0.015)	(0.015)	(0.013)	(0.013)
Junior skater/team	0.036*	0.036*		
	(0.020)	(0.020)		
Senior skater/team	0.067**	0.068**		
	(0.027)	(0.027)		
Skater Fixed Effect?	No	No	Yes	Yes
Judge Fixed Effect?	No	No	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes
Observations	50,640	50,640	50,640	50,640
R-squared	0.802	0.802	0.838	0.838

Notes: Dependent variable is the mark a judge assigns for a program component in either a singles competition or a synchronized competition. The data comprises 17 competitions. The following events are included: CP Regional 2012, EGL Regional 2012, Eastern Sectional 2012, Midwestern Sectional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, Nationals 2012, Pacific Coast Sectional 2012, SA Regional 2012, SW Regional 2012, UGL Regional 2012, Synchronized Eastern Sectional 2012, Synchronized National Championships 2012, Synchronized Pacific Coast Sectional 2012, and Synchronized Midwestern Sectional 2012. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 3B: Summary Statistics for Table 3A

Variable	N	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	5 0,640	4. 416	1. 231	0. 75	1 0
Judge and skater share club affiliation	5 0,640	0. 056	0. 230	0	1
Mean component score of other judges on panel	5 0,640	3. 732	1. 032	1. 333	8. 667
Judge and skater reside in same region	5 0,640	0. 445	0. 497	0	1
Log distance between skater club and judge residence	5 0,640	5. 583	1. 526	.0 001	8. 121
Long Program	5 0,640	0. 517	0. 500	0	1
Junior level skater	5 0,640	0. 319	0. 466	0	1
Senior level skater	5 0,640	0. 302	0. 459	0	1

Notes: The data comprises 17 competitions that make up the 2011-12 qualifying stream in singles and synchronized skating. The following events are included: CP Regional 2012, EGL Regional 2012, Eastern Sectional 2012, Midwestern Sectional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, Nationals 2012, Pacific Coast Sectional 2012, SA Regional 2012, SW Regional 2012, UGL Regional 2012, Synchronized Eastern Sectional 2012, Synchronized National Championships 2012, Synchronized Pacific Coast Sectional 2012, and Synchronized Midwestern Sectional 2012.

Table 3C: The Effect of Shared Club Affiliation on Program Component Marks with Highest Mark Excluded, All Levels of Qualifying Competitions, Singles and Synchronized, 2011-12

	(1)	(2)	(3)	(4)
Judge and skater share club affiliation	0.109***	0.105***	0.139***	0.144***
	(0.029)	(0.029)	(0.022)	(0.023)
Mean score of other judges - Highest Mark excluded	0.942***	0.942***	0.772***	0.771***
	(0.009)	(0.009)	(0.024)	(0.024)
Judge and skater reside in same region	0.046*		0.036**	
	(0.024)		(0.015)	
Log distance between skater club and judge's home		-0.010		-0.003
		(0.007)		(0.005)
Long Program	-0.002	-0.002	-0.017*	-0.017*
	(0.011)	(0.011)	(0.010)	(0.010)
Junior skater/team	0.023*	0.024*		
	(0.014)	(0.014)		
Senior skater/team	0.056***	0.056***		
	(0.019)	(0.019)		
Skater Fixed Effect?	Yes	Yes	Yes	Yes
Judge Fixed Effect?	No	No	Yes	Yes
Competition Fixed Effect?	No	No	Yes	Yes
Observations	39,374	39,374	39,374	39,374
R-squared	0.867	0.867	0.888	0.888

Notes: Dependent variable is the mark a judge assigns for a program component in either a singles competition or a synchronized competition. The highest mark per skater per component was dropped. The data comprises 17 competitions. The following events are included: CP Regional 2012, EGL Regional 2012, Eastern Sectional 2012, Midwestern Sectional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, Nationals 2012, Pacific Coast Sectional 2012, SA Regional 2012, SW Regional 2012, UGL Regional 2012, Synchronized Eastern Sectional 2012, Synchronized National Championships 2012, Synchronized Pacific Coast Sectional 2012, and Synchronized Midwestern Sectional 2012. Standard errors

are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 4: The Effect of Shared Club Affiliation on Program Component Marks,
All Levels of Qualifying Competitions, Singles Only, 2011-12

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	0.141***	0.129***	0.140***	0.129***	0.165***	0.165***	0.164***	0.164***
	(0.031)	(0.033)	(0.031)	(0.033)	(0.027)	(0.029)	(0.027)	(0.029)
Mean component score of other judges	1.097***	1.097***	1.098***	1.098***	0.868***	0.868***	0.865***	0.865***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.036)	(0.036)	(0.035)	(0.035)
Judge and skater reside in same region	0.042		0.042		0.037**		0.037**	
	(0.031)		(0.031)		(0.017)		(0.017)	
Log distance between skater club and judge's residence		-0.012		-0.012		-0.004		-0.004
		(0.009)		(0.009)		(0.006)		(0.006)
Program Length	-0.000	-0.001	-0.001	-0.001	-0.029**	-0.029**	-0.029**	-0.029**
	(0.015)	(0.015)	(0.015)	(0.015)	(0.013)	(0.013)	(0.013)	(0.013)
Male judge and skater			-0.002	-0.001			0.080	0.080
			(0.039)	(0.039)			(0.075)	(0.075)
Female judge and skater			0.015	0.016			-0.032	-0.032
			(0.028)	(0.028)			(0.060)	(0.060)
Junior skater	0.029	0.030	0.028	0.029				
	(0.019)	(0.019)	(0.019)	(0.019)				
Senior skater	0.058**	0.060**	0.056**	0.057**				
	(0.027)	(0.027)	(0.027)	(0.027)				
Skater Fixed Effect?	No	No	No	No	Yes	Yes	Yes	Yes
Judge Fixed Effect?	No	No	No	No	Yes	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47,880	47,880	47,880	47,880	47,880	47,880	47,880	47,880
R-squared	0.795	0.795	0.795	0.795	0.829	0.829	0.829	0.829

otes: The dependent variable is the program component mark awarded by each judge to each skater for each component. The data comprises 13 competitions that make up the 2011-12 qualifying stream in singles. The following events are included: CP Regional 2012, EGL Regional 2012, Eastern Sectional 2012, Midwestern Sectional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, Nationals 2012, Pacific Coast Sectional 2012, SA Regional 2012, SW Regional 2012, UGL Regional 2012. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 5: Strategic Marking Behavior. Examination of Skaters on the Bubble (3rd – 5th Place after the Short Program)

	Regional and Sectional Competitions			National
	(1)	(2)	(3)	(4)
Judge and skater share club affiliation	0.121***	0.118***	0.117***	0.174**
	(0.038)	(0.039)	(0.039)	(0.085)
Bubble interaction with shared club affiliation	0.095*	0.096*	0.095*	0.063
	(0.051)	(0.051)	(0.052)	(0.185)
Mean component score of other judges	0.827***	0.827***	0.823***	0.419***
	(0.045)	(0.045)	(0.045)	(0.078)
Judge and skater reside in same region		0.021	0.021	0.047
		(0.026)	(0.025)	(0.065)
Male judge and male skater			0.115	2.289***
			(0.099)	(0.313)
Female judge and female skater			-0.092	-1.997***
			(0.087)	(0.276)
Skater Fixed Effect?	Yes	Yes	Yes	Yes
Judge Fixed Effect?	Yes	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes
Observations	20,006	20,006	20,006	3,915
R-squared	0.781	0.781	0.781	0.880

Notes: Bubble is defined as a 3rd to 5th place finish in the short program. Observations include long programs for the 9 regional and 3 sectional competitions in columns 1-3. Dependent variable is the mark a judge assigns for a program component. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 6: The Effect of Shared Club Affiliation on Program Component Marks, All Levels of Qualifying Competitions, Singles Only, 2011-12

	Regional			Sectional			National (same as table 7)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Judge and skater share club affiliation	0.185***	0.185***	0.185***	0.119**	0.105*	0.102*	0.244***	0.144***	0.138**
	(0.034)	(0.034)	(0.034)	(0.059)	(0.060)	(0.059)	(0.029)	(0.051)	(0.058)
Mean component score of other judges	0.604***	0.604***	0.602***	0.628***	0.628***	0.629***	0.717***	0.717***	0.722***
	(0.040)	(0.040)	(0.040)	(0.061)	(0.061)	(0.073)	(0.041)	(0.041)	(0.039)
Judge and skater reside in same region		0.216**	0.203**		0.017	0.018		0.124***	0.129***
		(0.092)	(0.090)		(0.020)	(0.020)		(0.041)	(0.040)
Long Program	-0.052**	-0.053**	-0.050**	-0.017	-0.017	-0.018	0.004	0.004	0.004
	(0.021)	(0.021)	(0.022)	(0.027)	(0.027)	(0.027)	(0.033)	(0.033)	(0.033)
Male Judge and Male Skater			0.006			-0.067			0.984***
			(0.115)			(0.146)			(0.211)
Female Judge and Female Skater			-0.087			0.043			-0.695***
			(0.077)			(0.143)			(0.148)
Skater Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Judge Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	N/A
Observations	27,665	27,665	27,665	12,385	12,385	12,385	7,830	7,830	7,830
R-squared	0.748	0.748	0.749	0.754	0.754	0.754	0.845	0.846	0.848

Notes: Dependent variable is the mark a judge assigns for a program component. The data comprises 13 competitions. The regional competitions included are the CP Regional 2012, EGL Regional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, SA Regional 2012, SW Regional 2012, SWP Regional 2012, and UGL Regional 2012. The sectional competitions are the Eastern Sectional 2012, Midwestern Sectional 2012, Pacific Coast Sectional 2012. The last three columns are based on the National Competition 2012. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 7: The Effect of Shared Club Affiliation on Program Component Marks, NATIONAL JUDGES ONLY - All Levels of Qualifying Competitions, Singles Only, 2011-12

	Regional			Sectional			National (same as Table 6)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Judge and skater share club affiliation	0.141***	0.141***	0.139***	0.124*	0.111*	0.109*	0.244***	0.144***	0.138**
	(0.052)	(0.052)	(0.053)	(0.065)	(0.065)	(0.064)	(0.029)	(0.051)	(0.058)
Mean component score of other NATIONAL judges	0.276***	0.277***	0.279***	0.524***	0.525***	0.526***	0.717***	0.717***	0.722***
	(0.044)	(0.044)	(0.044)	(0.071)	(0.071)	(0.071)	(0.041)	(0.041)	(0.039)
Judge and skater reside in same region		0.182***	0.174***		0.017	0.017		0.124***	0.129***
		(0.049)	(0.054)		(0.025)	(0.025)		(0.041)	(0.040)
Long Program	-0.059*	-0.062*	-0.055	-0.040	-0.040	-0.040	0.004	0.004	0.004
	(0.036)	(0.036)	(0.040)	(0.031)	(0.031)	(0.031)	(0.033)	(0.033)	(0.033)
Male Judge and Male Skater			-0.057			0.126			0.984***
			(0.211)			(0.205)			(0.236)
Female Judge and Female Skater			-0.003			-0.127			-0.695***
			(0.158)			(0.207)			(0.166)
Skater Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Judge Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	N/A
Observations	11,400	11,400	11,400	9,415	9,415	9,415	7,830	7,830	7,830
R-squared	0.759	0.759	0.760	0.745	0.745	0.745	0.845	0.846	0.848

Notes: Dependent variable is the mark a judge assigns for a program component. The data comprises 13 competitions.. The last three columns are based on the National Championships 2012 and are identical to columns 7-9 in Table 6. For columns 1-6, panels consisting of less than three national level judges at the regional and sectional competitions have been dropped. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 8: The Effect of Shared Club Affiliation on Program Component Marks, Men's and Ladies' Senior Long Program, 2010-12 National Championships

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	-0.013	-0.024	-0.010	-0.020	0.069	0.020	0.071	0.021
	(0.049)	(0.061)	(0.051)	(0.061)	(0.071)	(0.068)	(0.069)	(0.065)
Mean component score of other judges	0.976***	0.976***	0.978***	0.978***	0.833***	0.833***	0.834***	0.833***
	(0.014)	(0.014)	(0.015)	(0.015)	(0.036)	(0.036)	(0.036)	(0.035)
Judge and skater reside in same region	-0.013		-0.011		-0.012		-0.012	
	(0.042)		(0.043)		(0.049)		(0.048)	
Male judge and male skater			0.023	0.023			0.401***	0.153*
			(0.059)	(0.059)			(0.106)	(0.087)
Female judge and female skater			0.034	0.034			-0.144	0.104
			(0.070)	(0.070)			(0.115)	(0.125)
Skater Fixed Effect?	No	No	No	No	Yes	Yes	Yes	Yes
Judge Fixed Effect?	No	No	No	No	Yes	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,715	5,715	5,715	5,715	5,715	5,715	5,715	5,715
R-squared	0.826	0.826	0.827	0.827	0.855	0.854	0.855	0.855

Notes: The dependent variable is the mark a judge assigns for a program component. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 9A: The Effect of Shared Club Affiliation on Program Component Marks, Novice and Junior Long Programs, 2010-12 National Championships

	Novice				Junior			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	0.538***	0.394***	0.484***	0.357***	0.260***	0.200***	0.305***	0.257**
	(0.089)	(0.090)	(0.127)	(0.130)	(0.066)	(0.069)	(0.104)	(0.100)
Mean component score of other judges	0.924***	0.927***	0.530***	0.537***	0.954***	0.951***	0.843***	0.841***
	(0.019)	(0.018)	(0.049)	(0.050)	(0.024)	(0.023)	(0.038)	(0.037)
Judge and skater reside in the same region		0.162***		0.146***		0.071		0.055
		(0.041)		(0.039)		(0.052)		(0.045)
Skater Fixed Effect?	No	No	Yes	Yes	No	No	Yes	Yes
Judge Fixed Effect?	No	No	Yes	Yes	No	No	Yes	Yes
Competition Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,195	3,195	3,195	3,195	3,330	3,330	3,330	3,330
R-squared	0.564	0.569	0.678	0.681	0.672	0.673	0.744	0.744

Notes: The dependent variable is the mark a judge assigns for a program component. Columns 1-4 include the novice long programs at the National Championships while columns 5-8 contain marks from the junior long programs. Standard errors are clustered by competitor and judge. . *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 9B: The Effect of Shared Club Affiliation on Program Component Marks, Senior Short Program, 2010-12 National Championships

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	0.125*	0.162**	0.134*	0.170***	0.169**	0.222***	0.171**	0.224***
	(0.072)	(0.064)	(0.072)	(0.064)	(0.076)	(0.053)	(0.080)	(0.056)
Mean component score of other judges	1.078***	1.078***	1.081***	1.080***	0.757***	0.757***	0.760***	0.759***
	(0.009)	(0.008)	(0.009)	(0.008)	(0.053)	(0.053)	(0.053)	(0.053)
Judge and skater reside in same region	0.049		0.048		0.067		0.068	
	(0.053)		(0.053)		(0.059)		(0.059)	
Male judge and male skater			-0.095**	-0.095**			-0.006	0.005
			(0.037)	(0.037)			(0.041)	(0.035)
Female judge and female skater			-0.020	-0.021			0.746***	0.736***
			(0.030)	(0.029)			(0.056)	(0.058)
Skater Fixed Effect?	No	No	No	No	Yes	Yes	Yes	Yes
Judge Fixed Effect?	No	No	No	No	Yes	Yes	Yes	Yes
Competition Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,850	5,850	5,850	5,850	5,850	5,850	5,850	5,850
R-squared	0.727	0.727	0.728	0.728	0.783	0.783	0.786	0.786

Notes: The dependent variable is the mark a judge assign for a program component. Standard errors are clustered by competitor and judge. . *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 10: The Effect of Shared Club Affiliation on Program Component Marks, All Long Programs, 2010-12 National Championships Skaters Placing in 10th Place or Below

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	-0.038	-0.083	-0.034	-0.079	0.088	-0.017	0.091	-0.008
	(0.147)	(0.137)	(0.147)	(0.136)	(0.146)	(0.142)	(0.142)	(0.138)
Mean component score of other judges	1.070***	1.070***	1.069***	1.070***	0.790***	0.789***	0.791***	0.790***
	(0.009)	(0.009)	(0.012)	(0.012)	(0.054)	(0.054)	(0.054)	(0.054)
Judge and skater reside in same region	-0.057		-0.056		-0.120**		-0.115**	
	(0.066)		(0.066)		(0.054)		(0.053)	
Male judge and male skater			0.023	0.024			0.372***	0.570***
			(0.052)	(0.053)			(0.112)	(0.120)
Female judge and female skater			0.014	0.014			-0.082	-0.255
			(0.041)	(0.041)			(0.176)	(0.184)
Skater Fixed Effect?	No	No	No	No	Yes	Yes	Yes	Yes
Judge Fixed Effect?	No	No	No	No	Yes	Yes	Yes	Yes
Competition Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016
R-squared	0.698	0.697	0.698	0.697	0.775	0.774	0.775	0.774

Notes: The dependent variable is the mark a judge assigns for a program component. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 11: The Effect of Shared Club Affiliation on Program Component Marks, Synchronized Skating Long Programs, 2010-12 National Championships

	All levels – Novice, Junior and Senior				Senior Only	
	(1)	(2)	(3)	(4)	(5)	(6)
Judge and team share club affiliation	0.276***	0.267**	0.307***	0.299***	0.204***	0.237**
	(0.096)	(0.112)	(0.097)	(0.093)	(0.090)	(0.111)
Mean component score of other judges	1.087***	1.087***	1.027***	1.027***	0.705***	0.705***
	(0.020)	(0.019)	(0.046)	(0.046)	(0.143)	(0.142)
Judge and team reside in same region	0.063		0.058		0.036	
	(0.061)		(0.066)		(0.078)	
Log distance between team's club and judge's residence		-0.018		-0.017		0.004
		(0.018)		(0.013)		(0.026)
Junior team	0.043	0.042				
	(0.063)	(0.063)				
Senior team	0.101	0.104				
	(0.120)	(0.119)				
Team Fixed Effect?	No	No	Yes	Yes	Yes	Yes
Judge Fixed Effect?	No	No	Yes	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,320	4,320	4,320	4,320	1,170	1,170
R-squared	0.873	0.873	0.897	0.897	0.877	0.877

Notes: The dependent variable is the mark a judge assigns for a skating program component. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 12: The Effect of Shared Club Affiliation on Program Component Marks, All Levels of Qualifying Competitions, Synchronized Only, 2011-12

	(1)	(2)	(3)	(4)
Judge and team share club affiliation	0.499***	0.458***	0.460***	0.442***
	(0.097)	(0.108)	(0.133)	(0.134)
Mean component score of other judges	1.053***	1.054***	0.964***	0.964***
	(0.018)	(0.016)	(0.076)	(0.076)
Judge and team reside in same region	-0.063		-0.019	
	(0.111)		(0.074)	
Log distance between team's club		0.001		-0.002
and judge's residence		(0.039)		(0.028)
Long program	0.010	0.011	-0.010	-0.010
	(0.095)	(0.096)	(0.084)	(0.084)
Junior team	0.089	0.086		
	(0.116)	(0.117)		
Senior team	0.269***	0.262**		
	(0.103)	(0.102)		
Team Fixed Effect?	No	No	Yes	Yes
Judge Fixed Effect?	No	No	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes
Observations	2,700	2,700	2,700	2,700
R-squared	0.795	0.795	0.885	0.885

Notes: The dependent variable is the mark a judge assigns for a skate component. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 13: Comparison of Grade of Execution Marks vs Component Marks, All Levels of Qualifying Competitions, Singles Only, 2011-12

Dependent Variable	GOE				Program Component			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	0.041***	0.031*	0.041**	0.031	0.165***	0.167***	0.164***	0.166***
	(0.015)	(0.016)	(0.020)	(0.023)	(0.027)	(0.030)	(0.027)	(0.030)
Mean component score of other judges	0.959***	0.959***	0.959***	0.959***	0.866***	0.866***	0.863***	0.863***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.036)	(0.036)	(0.035)	(0.035)
Judge and skater reside in same region	0.031**		0.031**		0.037**		0.037**	
	(0.013)		(0.013)		(0.017)		(0.017)	
Log distance between skater club and judge's residence		-0.009**		-0.009**		-0.003		-0.003
		(0.004)		(0.004)		(0.007)		(0.007)
Long Program	-0.000	-0.000	-0.000	-0.000	-0.030**	-0.030**	-0.030**	-0.030**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.013)	(0.013)	(0.013)	(0.013)
Male judge and male skater			-0.002	-0.001			0.087	0.088
			(0.023)	(0.023)			(0.075)	(0.075)
Female judge and female skater			-0.008	-0.007			-0.043	-0.043
			(0.018)	(0.019)			(0.060)	(0.060)
Skater Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Judge Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	84,309	84,309	84,309	84,309	47,940	47,940	47,940	47,940
R-squared	0.815	0.815	0.815	0.815	0.829	0.837	0.836	0.837

Notes: Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 14: Effect of Component Type on Program Component Marks, Singles and Synchronized Skating 2011-2012 Season

	Skating Skills		Transitions		Performance and Execution		Choreography		Interpretation	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Judge and skater share club affiliation	0.163***	0.148***	0.122***	0.174***	0.168***	0.177***	0.156***	0.184***	0.167***	0.202***
	(0.031)	(0.038)	(0.038)	(0.031)	(0.035)	(0.032)	(0.036)	(0.031)	(0.036)	(0.035)
Mean Component Score of other Judges	0.940***	0.920***	0.920***	0.678***	0.933***	0.722***	0.922***	0.680***	0.927***	0.696***
	(0.011)	(0.015)	(0.015)	(0.043)	(0.012)	(0.034)	(0.014)	(0.043)	(0.012)	(0.037)
Judge and skater reside in the same region	0.047*	0.014	0.014	0.028	0.053	0.043*	0.062*	0.024	0.025	0.036*
	(0.027)	(0.040)	(0.040)	(0.019)	(0.035)	(0.022)	(0.035)	(0.018)	(0.033)	(0.022)
Long Program	0.004	-0.003	-0.003	-0.030**	-0.003	-0.034**	-0.002	-0.041***	-0.006	-0.048***
	(0.015)	(0.015)	(0.015)	(0.014)	(0.016)	(0.016)	(0.016)	(0.014)	(0.016)	(0.015)
Junior Skater	0.024		0.031		0.027		0.032		0.032	
	(0.021)		(0.022)		(0.022)		(0.019)		(0.020)	
Senior Skater	0.057**		0.075**		0.064**		0.076***		0.075***	
	(0.026)		(0.029)		(0.027)		(0.027)		(0.028)	
Skater Fixed Effect?	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Judge Fixed Effect?	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	10,116	10,116	10,116	10,116	10,116	10,116	10,116	10,116	10,116	10,116
	0.835	0.870	0.782	0.834	0.817	0.834	0.802	0.850	0.800	0.845

Notes: Dependent variable is the mark assigned for a component by a judge.
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 15: The Effect of Shared Club Affiliation on GOE Marks, 2011-12 Skating Season, All. Levels of qualifying competitions, Singles Skating

	(1)	(2)	(3)	(4)
Judge and skater share club affiliation	0.063***	0.049***	0.041***	0.031*
	(0.017)	(0.019)	(0.015)	(0.016)
Mean GOE score of other judges	0.963***	0.963***	0.959***	0.959***
	(0.005)	(0.005)	(0.005)	(0.005)
Judge and skater reside in the same region	0.025		0.031**	
	(0.015)		(0.013)	
Log distance between residence of judge and skater		-0.010**		-0.009**
		(0.005)		(0.004)
Long Program	0.002	0.002	-0.000	-0.000
	(0.009)	(0.009)	(0.009)	(0.009)
Junior skater/team	-0.004	-0.004		
	(0.008)	(0.008)		
Senior skater/team	0.000	0.001		
	(0.010)	(0.010)		
Skater Fixed Effect?	No	No	Yes	Yes
Judge Fixed Effect?	No	No	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes
Observations	84,309	84,309	84,309	84,309
R-squared	0.808	0.808	0.815	0.815

Notes: The dependent variable is the mark a judge assigns for a grade of execution (GOE) for an element performed by a skater or team. The data comprises 13 competitions. The following events are included: CP Regional 2012, EGL Regional 2012, Easter Sectional 2012, Midwestern Sectional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, Nationals Championships 2012, Pacific Coast Sectional 2012, SA Regional 2012, SW Regional 2012, UGL Regional 2012. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1 two-tailed test

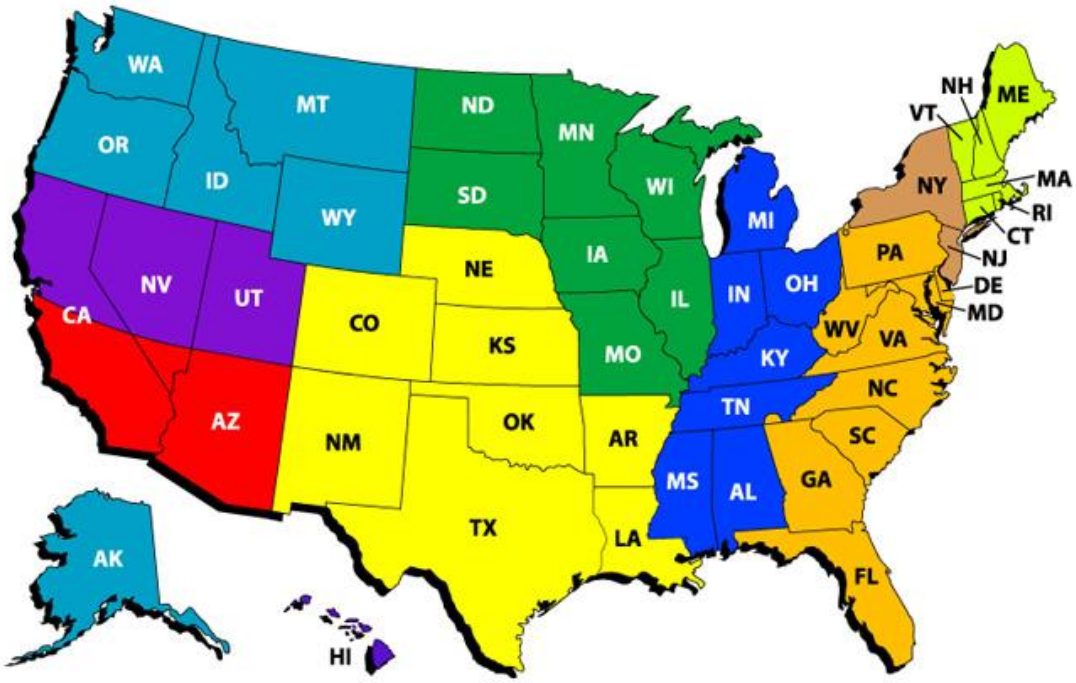
Table 16: The Effect of Shared Club Affiliation on Grade of Execution Marks, All Levels of Qualifying Competitions, Singles Only, 2011-12

	Regional			Sectional			National		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Judge and skater share club affiliation	0.065***	0.065***	0.064***	0.029	0.011	0.012	0.015	-0.040	-0.042
	(0.017)	(0.017)	(0.017)	(0.031)	(0.030)	(0.031)	(0.051)	(0.054)	(0.053)
Mean GOE score of other judges	0.956***	0.956***	0.956***	0.950***	0.950***	0.950***	0.972***	0.972***	0.972***
	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)
Judge and skater reside in same region		0.241***	0.243***		0.022	0.023		0.070***	0.071***
		(0.045)	(0.045)		(0.017)	(0.017)		(0.026)	(0.025)
Long Program	0.002	0.001	0.000	-0.000	-0.000	-0.001	-0.004	-0.004	-0.004
	(0.010)	(0.010)	(0.010)	(0.020)	(0.020)	(0.020)	(0.018)	(0.018)	(0.018)
Male Judge and Male Skater			0.038			-0.011			-0.026
			(0.032)			(0.045)			(0.042)
Female Judge and Female Skater			-0.005			-0.058*			0.077
			(0.023)			(0.035)			(0.065)
Skater Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Judge Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	N/A
Observations	47,789	47,789	47,789	22,147	22,147	22,147	14,373	14,373	14,373
R-squared	0.815	0.815	0.815	0.793	0.793	0.793	0.823	0.823	0.823

Notes: Dependent variable is the mark a judge assigns for a grade of execution mark. The data comprises 13 competitions. The regional competitions included are the CP Regional 2012, EGL Regional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, SA Regional 2012, SW Regional 2012, SWP Regional 2012, and UGL Regional 2012. The sectional competitions are the Eastern Sectional 2012, Midwestern Sectional 2012, Pacific Coast Sectional 2012. The last three columns are based on the National Competition 2012. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Appendix

Figure 1: Ice Skating Regions in the United States



Notes:

EASTERN SECTION**:** New England Region (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); North Atlantic Region (New Jersey, New York, Pennsylvania including Erie); South Atlantic Region (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, Pennsylvania excluding Erie, South Carolina, Virginia, West Virginia, Chattanooga, Tennessee).

MIDWESTERN SECTION: Eastern Great Lakes Region (Alabama, Indiana, Kentucky, Michigan-Lower Peninsula, Mississippi, Ohio, Tennessee excluding Chattanooga); Upper Great Lakes Region (Illinois, Iowa, Michigan -Upper Peninsula, Minnesota, Missouri excluding Kansas City and St. Joseph's, North Dakota, South Dakota, Wisconsin); Region Southwestern (Arkansas, Colorado [excluded for synchronized only], Kansas, Louisiana, Nebraska, New Mexico, Missouri (Kansas City and St. Joseph's),Oklahoma, Texas).

PACIFIC COAST SECTION: Northwest Pacific Region (Alaska, Idaho, Montana, Oregon, Washington, Wyoming); Central Pacific Region (California [all cities north of and including Visalia], Colorado [for synchronized only], Hawaii, Nevada, [excluding Las Vegas], Utah); Southwest Pacific Region (Arizona, California (all cities south of Visalia), Nevada [Las Vegas]

Table A1: Sample Score Sheet

Place	Name	Nation	Total Seg Score =	Total Elm Score +	Total Comp Score +	Deductions -
1	XXX		88.14	47.23	40.91	0.00

#	Executed Elements		Base Value		GOE	J1	J2	J3	J4	J5	J6	J7	J8	J9			Panel Scores
1	3S+2Lo		6.00		0.35	0	0	0	1	1	1						6.35
2	FSSp4		3.00		0.13	1	0	1	0	0	0						3.13
3	3Lz		6.00		0.00	1	0	0	0	0	0						6.00
4	FCCoSp3		3.00		0.00	0	0	0	0	0	0						3.00
5	3S<<	<	1.43	x	-0.55	-3	-2	-2	-3	-3	-3						0.88
6	3Lo+2Lo		7.59	x	0.35	1	0	1	0	0	1						7.94
7	2A		3.63	x	0.38	1	0	1	1	1	0						4.01
8	3Lo		5.61	x	0.00	0	0	0	0	0	1						5.61
9	2A		3.63	x	0.38	0	0	1	1	1	1						4.01
1	SlSt3		3.30		0.00	0	0	0	0	0	0						3.30
1	CCoSp3		3.00		0.00	0	0	0	0	0	1						3.00
	Total BV:		46.19									Total elm. score:					47.23
	Program Components				Factor												
	Skating Skills				1.00	5.50	5.25	5.00	5.25	5.00	5.50						5.25
	Transitions				1.00	5.25	5.25	3.75	4.75	5.00	5.25						5.06
	Performance/Execution				1.00	5.25	5.00	5.00	5.50	5.25	5.25						5.19
	Choreography				1.00	5.50	5.00	4.25	5.00	5.00	5.75						5.13
	Interpretation				1.00	5.25	4.75	4.50	4.50	5.25	5.75						4.94
	General Component Factor:				1.6							Total factored comp. score:					40.91

Notes:

This example shows that the technical score in this case, comprises eleven technical elements ,which the technical panel identify and for which the judges give grades of execution (GOE). Members of the technical panel identify a given technical element by observing the skater's performance. For example, they identify jumps by the type of jump and number of rotations. Judges give spins, many step sequences, and synchronized skating elements levels from one to four based on predetermined criteria. Each difficulty level for a particular element has a predetermined base value of points. Each judge then assigns a GOE, ranging from -3 to +3, to each of these elements. These GOEs are trimmed (high and low dropped), averaged, scaled, and added to the each element's base value. The sum of all the adjusted base values and GOEs comprises the technical elements score.

Judges assign the five program component scores in addition to assigning the GOEs. The lower portion of the sample score sheet provides the particulars of these scores. The last column of Table A1, entitled "Panel Scores," shows the trimmed mean. The trimmed mean discards the highest and lowest scores and then sums the five program components averages to a total component score. As determined by the ISU and the US Figure Skating Association, judges multiply the total component score by a general component factor, which varies by program length and skater level. The purpose of the general component factor is to appropriately weight the program component scores relative to the technical elements score, as the number and point value of the skater's technical elements vary according to competition level and gender.

For example, in the row containing the "Transitions" program component, the lowest score is 3.75 and the highest is 5.25. Judges discard those scores. The remaining four scores account for the mean Transitions score of 5.06. In this example, judges sum the trimmed means and multiply by the factor 1.6 to generate the total component score. When a skater or team skates in both the long and short programs, the scores of both programs are added together. The skater or team with the highest total score wins the competition.

Figure 2 – Description of Program Component Scores

Program Component Score – Singles – IJS

In addition to the technical score, the skater's whole performance is evaluated by five program components: (1) Skating Skills; (2) Transitions/Linking Footwork and Movement; (3) Performance/Execution; (4) Choreography/Composition; and (5) Interpretation of the Music/Timing.

A. Definitions and criteria for analyzing the program components

1. Skating Skills
   a. Definition: Overall skating quality, edge control and flow over the ice surface demonstrated by a command of the skating vocabulary (edges, steps, turns, etc.), the clarity of technique and the use of effortless power to accelerate and vary speed. Varied use of power/energy, speed and acceleration.
   b. Criteria: In evaluating the Skating Skills, the judge must consider the following:
      i. Balance, rhythmic knee action and precision of foot placement
      ii. Flow and effortless glide
      iii. Cleanness and sureness of deep edges, steps and turns
      iv. Power/energy and acceleration
      v. Mastery of multi-directional skating
      vi. Mastery of one-foot skating
2. Transitions/Linking Footwork and Movement
   a. Definition: The varied and/or intricate footwork, positions and movements that link all elements, including the entrances and exits of those elements.
   b. Criteria: In evaluating the Transitions/Linking Footwork and Movement, the judge must consider the following:
      i. Variety
      ii. Difficulty
      iii. Intricacy
      iv. Quality
3. Performance/Execution
   a. Definition: Performance is the involvement of the skater physically, emotionally and intellectually as they translate the intent of the music and choreography. Execution is the quality of movement and precision in delivery.
   b. Criteria: In evaluating the Performance/Execution, the judge must consider the following:
      i. Physical, emotional and intellectual involvement
      ii. Carriage
      iii. Style and individuality/personality
      iv. Clarity of movement
      v. Variety and contrast
      vi. Projection
4. Choreography/Composition
   a. Definition: An intentional, developed and/or original arrangement of all types of movements according to the principles of proportion, unity, space, pattern, structure and phrasing.
   b. Criteria: In evaluating the Choreography/Composition, the judge must consider the following:
      i. Purpose (idea, concept, vision, mood)
      ii. Proportion (equal weight of parts)
      iii. Unity (purposeful threading of all movements)
      iv. Utilization of personal and public space
      v. Pattern and ice coverage
      vi. Phrasing and form (movements and parts structured to match the phrasing of the music)
      vii. Originality of purpose, movement and design
5. Interpretation of the Music/Timing
   a. Definition: The personal and creative translation of the rhythm, character and content of the music to the movement on ice.
   b. Criteria: In evaluating the Interpretation of the Music, the judge must consider the following:
      i. Effortless movement in time to the music (timing)
      ii. Expression of the music's style, character and rhythm
      iii. Use of finesse to reflect the nuances of the music ("finesse" is the skater's refined, artful manipulation of nuances; "nuances" are the personal artistic ways of

Table A2: Summary Statistics for Table 3C

Variable	N	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	47,880	4.363	1.188	0.75	9.75
Judge and skater share club affiliation	47,880	0.057	0.231	0	1
Mean component score of other judges on panel	47,880	4.363	1.104	1.6	9.75
Judge and skater reside in same region	47,880	0.458	.498	0	1
Log distance between skater club and judge residence	47,880	5.551	1.526	.0001	8.121
Long Program	47,880	0.498	0.498	0	1
Junior level skater	47,880	0.318	0.460	0	1
Senior level skater	47,880	0.305	0.461	0	1
Male Judge and Skater	47,880	0.094	0.292	0	1
Female Judge and Skater	47,880	0.550	0.497	0	1

Notes: The highest mark for each skater for each component was dropped. The data comprises 17 competitions that make up the 2011-12 qualifying stream in singles and synchronized skating. The following events are included: CP Regional 2012, EGL Regional 2012, Eastern Sectional 2012, Midwestern Sectional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, Nationals 2012, Pacific Coast Sectional 2012, SA Regional 2012, SW Regional 2012, UGL Regional 2012, Synchronized Eastern Sectional 2012, Synchronized National Championships 2012, Synchronized Pacific Coast Sectional 2012, and Synchronized Midwestern Sectional 2012.

Table A3: Summary Statistics for Table 4

Variable	N	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	39,374	4.288	1.212	0.75	9.75
Judge and skater share club affiliation	39,374	0.051	0.219	0	1
Mean component score of other judges on panel	39,374	4.289	1.163	1.25	9.714
Judge and skater reside in same region	39,374	0.437	0.496	0	1
Log distance between skater club and judge residence	39,374	5.620	1.527	.0001	8.121
Long Program	39,374	0.520	0.500	0	1
Junior level skater	39,374	0.319	0.466	0	1
Senior level skater	39,374	0.306	0.461	0	1

Notes: The data comprises 13 competitions that make up the 2011-12 qualifying stream in singles.. The following events are included: CP Regional 2012, EGL Regional 2012, Eastern Sectional 2012, Midwestern Sectional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, Nationals 2012, Pacific Coast Sectional 2012, SA Regional 2012, SW Regional 2012 and UGL Regional 2012.

Table A4: Summary Statistics for Table 5

	N	Mean	Std. Dev.	Min	Max
Sectional and Regional Competitions					
Component mark assigned by judge	19,445	4.093	1.011	1	8.25
Judge and skater share club affiliation	19,445	0.611	0.239	0	1
Bubble Interaction with shared club affiliation	19,445	0.018	0.133	0	1
Mean component score of other judges on panel	19,445	4.093	.916	1.85	7.45
Judge and skater reside in same region	19,445	0.522	.499	0	1
Male Judge and Skater	19,445	0.066	0.248	0	1
Female Judge and Skater	19,445	0.621	0.485	0	1
National Competitions					
Component mark assigned by judge	3,915	5.660	1.335	2.25	10
Judge and skater share club affiliation	3,915	0.027	0.162	0	1
Bubble Interaction with shared club affiliation	3,915	.004	.062	0	1
Mean component score of other judges on panel	3,915	5.660	1.262	3.438	9.75
Judge and skater reside in same region	3,915	0.117	.322	0	1
Male Judge and Skater	3,915	0.250	0.433	0	1
Female Judge and Skater	3,915	0.290	0.454	0	1

Notes: Bubble is defined as a 3rd to 5th place finish in the short program. Observations include long programs for the 9 regional and 3 sectional competitions in columns 1-3.

Table A5: Summary Statistics for Table 6
All Levels of Qualifying Competitions, Singles Only, 2011-12

	N	Mean	Std. Dev.	Min	Max
Regional					
Component mark assigned by judge	27,665	3.913	0.893	0.75	8
Judge and skater share club affiliation	27,665	0.076	0.076	0	1
Mean component score of other judges on panel	27,665	3.913	0.786	1.6	7.45
Judge and skater reside in same region	27,665	0.610	0.488	0	1
Program length	27,665	0.498	0.500	0	1
Male judge and skater	27,665	0.029	0.168	0	1
Female judge and skater	27,665	0.690	0.462	0	1
Sectional					
Component mark assigned by judge	12,385	4.554	1.054	1.5	8.5
Judge and skater share club affiliation	12,385	0.032	0.177	0	1
Mean component score of other judges on panel	12,385	4.554	0.947	2.05	7.55
Judge and skater reside in same region	12,385	0.334	0.471	0	1
Program length	12,385	0.499	0.500	0	1
Male judge and skater	12,385	0.141	0.348	0	1
Female judge and skater	12,385	0.404	0.491	0	1
National					
Component mark assigned by judge	7,830	5.654	1.273	2.25	10
Judge and skater share club affiliation	7,830	0.027	0.162	0	1
Mean component score of other judges on panel	7,830	5.654	1.189	3.344	9.75
Judge and skater reside in same region	7,830	0.118	0.323	0	1
Program length	7,830	0.500	0.500	0	1
Male judge and skater	7,830	0.250	0.433	0	1
Female judge and skater	7,830	0.290	0.454	0	1

Table A6: Summary Statistics for Table 7
All Levels of Qualifying Competitions, Singles Only, 2011-12
Only National Judges

	N	Mean	Std. Dev.	Min	Max
Regional					
Component mark assigned by judge	11,400	3.871	0.890	0.75	7.75
Judge and skater share club affiliation	11,400	0.081	0.273	0	1
Mean component score of other judges on panel	11,400	3.885	0.778	1.75	7.45
Judge and skater reside in same region	11,400	0.559	0.496	0	1
Program length	11,400	0.477	0.500	0	1
Male judge and skater	11,400	0.040	0.195	0	1
Female judge and skater	11,400	0.671	0.470	0	1
Sectional					
Component mark assigned by judge	9,415	4.608	1.063	1.5	8.5
Judge and skater share club affiliation	9,415	0.038	0.191	0	1
Mean component score of other judges on panel	9,415	4.602	0.949	2.05	7.55
Judge and skater reside in same region	9,415	0.325	0.468	0	1
Program length	9,415	0.499	0.500	0	1
Male judge and skater	9,415	0.143	0.350	0	1
Female judge and skater	9,415	0.434	0.495	0	1
National					
Component mark assigned by judge	7,830	5.654	1.273	2.25	10
Judge and skater share club affiliation	7,830	0.027	0.162	0	1
Mean component score of other judges on panel	7,830	5.654	1.189	3.344	9.75
Judge and skater reside in same region	7,830	0.118	0.323	0	1
Program length	7,830	0.500	0.500	0	1
Male judge and skater	7,830	0.250	0.433	0	1
Female judge and skater	7,830	0.290	0.454	0	1

Table A7: Summary Statistics for Table 8
National Championships, Singles 2010-2012, Senior Long Programs

Variable	N	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	5,715	6.201	1.260	2.5	10
Judge and skater share club affiliation	5,715	0.024	0.152	0	1
Mean component score of other judges on panel	5,715	6.201	1.171	3.125	9.75
Judge and skater reside in same region	5,715	0.118	0.323	0	1
Male Judge and Skater	5,715	0.203	0.402	0	1
Female Judge and Skater	5,715	0.333	0.471	0	1

Table A8: Summary Statistics for Table 9a
National Championships, Singles 2010-2012, Novice and Junior Long Programs

Variable	N	Mean	Std. Dev.	Min	Max
Novice Level					
Component mark assigned by judge	3,195	4.563	0.720	2.25	7
Judge and skater share club affiliation	3,195	0.011	0.104	0	1
Mean component score of other judges on panel	3,195	4.563	0.582	3.156	6.219
Judge and skater reside in same region	3,195	0.122	0.327	0	1
Junior Level					
Component mark assigned by judge	3,330	5.151	0.866	2.25	7
Judge and skater share club affiliation	3,330	0.024	0.153	0	1
Mean component score of other judges on panel	3,330	5.151	0.746	3.156	6.219
Judge and skater reside in same region	3,330	0.135	0.342	0	1

Table A9: Summary Statistics for Table 9B
National Championships, Singles 2010-2012, Senior Short Programs

Variable	N	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	3,016	5.428	1.005	2.5	8.75
Judge and skater share club affiliation	3,016	0.015	0.121	0	1
Mean component score of other judges on panel	3,016	5.428	0.545	3.125	7.969
Judge and skater reside in same region	3,016	0.114	0.318	0	1
Male Judge and Skater	3,016	0.203	0.402	0	1
Female Judge and Skater	3,016	0.333	0.471	0	1

Table A10: Summary Statistics for Table 10
National Championships, Singles 2010-2012, Senior Long Programs in 10th place or lower

Variable	N	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	5,850	6.114	1.094	2	10
Judge and skater share club affiliation	5,850	0.028	0.164	0	1
Mean component score of other judges on panel	5,850	6.114	0.970	3.781	9.188
Judge and skater reside in same region	5,850	0.121	0.326	0	1
Male Judge and Skater	5,850	0.201	0.401	0	1
Female Judge and Skater	5,850	0.338	0.473	0	1

Table A11: Summary Statistics for Table 11
Synchronized Skating Championships, 2010-2012 Long Programs

	N	Mean	Std. Dev.	Min	Max
Novice, Junior and Senior Levels					
Component mark assigned by judge	4,320	5.468	1.649	1.75	9.75
Judge and team share club affiliation	4,320	0.037	0.188	0	1
Mean component score of other judges on panel	4,320	5.468	0.582	2.375	6.219
Judge and team reside in same region	4,320	0.133	0.340	0	1
Log distance between team's club and judge's residence	4,320	6.451	1.338	1.091	7.914
Junior Team	4,320	0.323	0.477	0	1
Senior Team	4,320	0.271	0.444	0	1
Senior Level Only					
Component mark assigned by judge	1,170	6.829	1.532	3.25	9.75
Judge and team share club affiliation	1,170	0.024	0.153	0	1
Mean component score of other judges on panel	1,170	6.829	1.392	4.1875	9.469
Judge and team reside in same region	1,170	0.154	0.361	0	1
Log distance between team's club and judge's residence	1,170	6.556	1.254	1.636	7.892

Table A12: Summary Statistics for Table 12
Synchronized Skating, 2011-2012 Season

	N	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	2,700	5.396	1.527	2	9.5
Judge and team share club affiliation	2,700	0.044	0.206	0	1
Mean component score of other judges on panel	2,700	5.395	1.409	2.813	9.286
Judge and team reside in same region	2,700	0.213	0.409	0	1
Log distance between team's club and judge's residence	2,700	6.149	1.411	1.091	7.892
Junior Team	2,700	0.344	0.475	0	1
Senior Team	2,700	0.267	0.442	0	1

Table A13: Summary Statistics for Table 13: Columns 1-4
Grade of Execution Marks
All Levels of Qualifying Competitions, Singles Only, 2011-12

Variable	N	Mean	Std. Dev.	Min	Max
GOE mark assigned by judge	84,309	-0.285	1.373	-3	3
Judge and skater share club affiliation	84,309	0.056	0.231	0	1
Mean component score of other judges on panel	84,309	-0.285	1.280	-3	3
Judge and skater reside in same region	84,309	0.452	0.498	0	1
Log distance between skater club and judge residence	84,309	5.560	1.524	0	8.121
Long Program	84,309	0.628	0.483	0	1
Male Judge and Skater	84,309	0.099	0.298	0	1
Female Judge and Skater	84,309	0.546	0.498	0	1

Table A14: Summary Statistics for Table 14
Program Component Marks by Type of Component

	N	Mean	St Dev	Min	Max
Skating Skills					
Component mark assigned by judge	10,116	4.565	1.166	1.5	9.75
Judge and skater share club affiliation	10,116	0.056	0.230	0	1
Mean component score of other judges on panel	10,116	4.565	1.097	1.9	9.47
Judge and skater reside in same region	10,116	0.445	0.497	0	1
Long Program	10,116	0.516	0.500	0	1
Junior Level	10,116	0.320	0.466	0	1
Senior Level	10,116	0.302	0.459	0	1
Transitions					
Component mark assigned by judge	10,116	4.234	1.193	1	9.75
Judge and skater share club affiliation	10,116	0.056	0.230	0	1
Mean component score of other judges on panel	10,116	4.234	1.099	1.85	9.31
Judge and skater reside in same region	10,116	0.445	0.497	0	1
Long Program	10,116	0.517	0.500	0	1
Junior Level	10,116	0.320	0.466	0	1
Senior Level	10,116	0.302	0.459	0	1
Performance and Execution					
Component mark assigned by judge	10,116	4.389	1.247	1	10
Judge and skater share club affiliation	10,116	0.056	0.230	0	1
Mean component score of other judges on panel	10,116	4.389	1.165	1.85	9.59
Judge and skater reside in same region	10,116	0.447	0.497	0	1
Long Program	10,116	0.517	0.500	0	1
Junior Level	10,116	0.320	0.466	0	1
Senior Level	10,116	0.302	0.459	0	1
Choreography					
Component mark assigned by judge	10,116	4.495	1.232	1	10
Judge and skater share club affiliation	10,116	0.056	0.230	0	1
Mean component score of other judges on panel	10,116	4.495	1.144	2.15	9.63
Judge and skater reside in same region	10,116	0.447	0.497	0	1
Long Program	10,116	0.517	0.500	0	1
Junior Level	10,116	0.320	0.466	0	1
Senior Level	10,116	0.302	0.459	0	1
Interpretation					
Component mark assigned by judge	10,116	4.411	1.287	.75	10
Judge and skater share club affiliation	10,116	0.056	0.230	0	1
Mean component score of other judges on panel	10,116	4.411	1.195	1.6	9.75
Judge and skater reside in same region	10,116	0.447	0.497	0	1
Long Program	10,116	0.517	0.500	0	1
Junior Level	10,116	0.320	0.466	0	1
Senior Level	10,116	0.302	0.459	0	1

Table A15: Cross-Tabulation of Number of Grade of Execution Marks Awarded:2011–2012 Skating Season, Singles Skaters

	Skill Level			
Competition	Novice	Junior	Senior	Totals
(1)	(2)	(3)	(4)	(5)
National Singles	3,546	3,987	6,840	14,373
	(48)	(48)	(78)	(174)
Sectional Singles	7,074	7,626	7,447	22,147
	(144)	(140)	(129)	(413)
Regional Singles	18,557	15,836	13,396	47,789
	(388)	(301)*	(240)	(929)
Total Observations	29,177	27,449	27,683	84,309
	(580)	(489)	(447)	(1,516)

Notes: The unit of analysis is a judge's grade of execution (GOE) mark. Each judge awards one mark per each technical element that a skater performs. In parentheses are the total numbers of long and short programs. Regional and sectional competitions generally use a panel of six judges, (**29 programs judged with a 5 judge panel) while national competitions use nine judges, resulting in more marks per skater.

Table A16: Cross Tabulation of Number of Grade of Execution Marks Awarded:National Championships in 2010, 2011 and 2012, Singles Skaters

	Skill Level			
Event Segment	Novice	Junior	Senior	Totals
(1)	(3)	(4)	(5)	(6)
Short Programs	3,834	4,815	8,532	17,181
	(72)	(74)	(130)	(276)
Long Programs	6,705	7,659	14,292	28,656
	(72)	(74)	(127)	(146)
Total Observations	10,539	12,474	22,824	45,837
	(144)	(148)	(257)	(549)

Notes: The unit of analysis is a judge's grade of execution mark (GOE). Each judge awards one mark per technical element per program per skater. In parentheses are the total numbers of long and short programs.

Table A17: Summary Statistics for Table 15,
2011-12 Skating Season, All Levels of Qualifying Competitions, Singles Skating

	N	Mean	Std. Dev.	Min	Max
Grade of Execution mark assigned by judge	84,309	-0.285	1.373	-3	3
Judge and skater share club affiliation	84,309	0.056	0.231	0	1
Mean GOE score of other judges on panel	84,309	-0.285	1.280	-3	3
Judge and skater reside in same region	84,309	0.452	0.498	0	1
Log distance between skater club and judge residence	84,309	5.560	1.524	0	8.121
Long Program	84,309	0.628	0.483	0	1
Junior level skater	84,309	0.325	0.469	0	1
Senior level skater	84,309	0.328	0.470	0	1

Notes: The data comprises 13 competitions that make up the 2011-12 qualifying stream in singles. The following events are included: CP Regional 2012, EGL Regional 2012, Eastern Sectional 2012, Midwestern Sectional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, Nationals 2012, Pacific Coast Sectional 2012, SA Regional 2012, SW Regional 2012, UGL Regional 2012.

Table A18: Summary Statistics for Table 16
All Levels of Qualifying Competitions, Singles Only, 2011-12

	N	Mean	St Dev	Min	Max
Regional					
Grade of Execution mark assigned by judge	47,789	-0.440	1.331	-3	3
Judge and skater share club affiliation	47,789	0.076	0.076	0	1
Mean GOE score of other judges on panel	47,789	-0.440	1.243	-3	3
Judge and skater reside in same region	47,789	0.606	0.489	0	1
Program length	47,789	0.625	0.484	0	1
Male judge and skater	47,789	0.031	0.173	0	1
Female judge and skater	47,789	0.398	0.459	0	1
Sectional					
Grade of Execution mark assigned by judge	22,147	-0.210	1.354	-3	3
Judge and skater share club affiliation	22,147	0.033	0.178	0	1
Mean GOE score of other judges on panel	22,147	-0.210	1.253	-3	3
Judge and skater reside in same region	22,147	0.335	0.472	0	1
Program length	22,147	0.631	0.482	0	1
Male judge and skater	22,147	0.143	0.350	0	1
Female judge and skater	22,147	0.393	0.488	0	1
National					
Grade of Execution mark assigned by judge	14,373	0.112	1.450	-3	3
Judge and skater share club affiliation	14,373	0.029	0.168	0	1
Mean GOE score of other judges on panel	14,373	0.112	0.134	-3	3
Judge and skater reside in same region	14,373	0.118	0.323	0	1
Program length	14,373	0.634	0.482	0	1
Male judge and skater	14,373	0.256	0.437	0	1
Female judge and skater	14,373	0.281	0.449	0	1

Biography

Cheryl Litman received a Bachelor of Science in Nuclear Engineering from the University of Maryland in 1988. She graduated with a Bachelor of Science from George Mason University in 2010. She received her Master of Arts in Economics from George Mason University in 2012. She has lived in Fairfax Station, Virginia for the last thirty years with her husband Richard and is the parent of four grown children.