Judging on Thin Ice: Affiliation Bias in Judging Figure Skating

Cheryl Litman
George Mason University

Thomas Stratmann
George Mason University

September2013

Abstract

Ice skating judging lends itselfto study affiliation bias. We test whether there is bias due to the judge and skater being affiliated with the same skating club, andbias due to geographic proximity and regional affiliation between the judge and skater. We analyze scores from recent U.S. Figure Skating events to detect biased judging. We find little evidence for marks givenwhen judges and skaters live in close geographic proximity or share regional affiliations. However, belonging to the same skating club is correlated with higher marks. This findingis robust to a number of alternative specifications and supports the in-group favoritism hypothesis. The estimate of the in-group favoritism effect is large enough tochange the final placement of some skaters at competitive skating events. In addition, we find that underhigher visibility of skating performance and judging marks, the bias goes to zero.

I. Introduction

Objectivity and impartiality are expected from those who are put in the position to judge the conduct or performance of others. We expect these criteria to be followed in legal contexts and other environments, such as sports. However, there are many situations that require judges to evaluate performance subjectively, at least in part. Assessments may be influenced by factors outside the actual conduct or performance, including the social identity of both the judge and the person who is being judged, where social identity is determined by individual membership in a group. In-group favoritism has long been an area of study in social psychology.

Recently, economists have contributed to this area of study by analyzing the effect of identity on outcomes (Akerlof and Kranton 2000). Experimental evidence from social psychology shows that even meaningless distinctions between groups, such as the color of their shirts, can trigger a preferential favoring of those within the group relative to those outside the group (Tajfel 1970). However, studies documenting in-group biases using field data are relatively scarce. This is, in part, because it is difficult to convincingly document affiliation bias using field data. To identify in-group favoritism the empirical design must be suitable to distinguish outcomes due to merit and other factors,from those due to favoritism benefitting in-group members.

In this study we use field data from the sport of figure skating to investigate how in-group favoritism, also referred to as in-group bias or affiliation bias, affects outcomes. We study how individuals' self-chosen affiliations influence their decisions when they assess the performance of those within their group versus those outside of their group.

Our analysis differs from previous work that studies the importance of race, gender, and nationality when evaluating others. That literature, for example, shows that individuals of a

particular race are more likely to favorably evaluate those who share the same race (Price and Wolfers 2010, Parsons et.al 2011). That literature also shows nationalistic bias in Olympic sports such as diving (Emerson 2009), winter sports (Zitzewitz 2006), and gymnastics (Lesko\vsek et al. 2012). These findings are consistent with research on social cognition which identifies common systemic errors in performance evaluation.Those errors or biases might be due to phenomena such as the halo effect, confirmation biases and other mechanisms including in group favoritism and international bias(Plessner and Haar 2006).

In this paper we analyze whether membership to a group biases an individual's decision with respect to the performance evaluations of others, when that group membership was chosen by that individual rather than inherited through genes. We apply this analysis to behavior of skating judges who are members of the same club as those who they evaluate. These skating judges are member of clubs based on their choosing, and not based on assignment. We study in-group bias by analyzing the marks given by those figure skating judges who have an affiliation with the skater though common club membership. The analysis of the presence of an affiliation bias is of particular interest, because judges face strong incentives to accurately assess performance of all skaters.

In the sport of figure skating judges are given rules which they are required to follow while evaluating figure skaters performing at competitions. Figures skating judges are evaluated by the U.S. Figure Skating judges committee and judges move up the ranks by accurate judging assessments, attending training, passing exams, and peer reviews. By following rules accurately and by making evaluations that are consistent with the views of their peers, figure skating judges increase their chances to advance to judging at more important skating events including international assignments. Moreover, the marks awarded by each judge at U.S. Figure Skating

sanctioned events are public information and subject to scrutiny by the skating community and the general public. Thus, skating judges have incentives to accurately evaluate skating performances.

Figure skating judges are randomly assigned to ice skating competitions in the qualifying events up to and including the National Championships. Thus, we are not concerned with selection issues that might bias our results, as might be the case if judges could choose to be a judge at events they would like to judge, for example, because they have a an interest in advancing the career of one or several of the skaters participating in that event. Also, all figure skating judges are required to be members of the U. S. Figure Skating Association through membership in a local club.[1] Thus selection bias does not come from some judges choosing to have a club affiliation while others do not.

Thesport of figure skating is well suited to study in-group favoritism. It allows us to test whether judges who are affiliated with the same club of the skater, assign more favorable scores to the skater who represents that club. Skaters'club affiliations are announced at competitions just prior their performance. Judges aremade aware of the skater's club affiliation through the announcement.

Television coverage increases the cost of inaccurate judging because evidence of any bias is more easily detected when many individuals watch a competition and when the consequences of the outcomes are greater. In this respect, our design using field data allows us to test whether the affiliation bias decreases when the cost of exercising that preference rises as was demonstrated in laboratory experiments by Chen and Li (2009).

[1] Less than one percent of all judges are "individual" members of the U.S. Figure Skating organization, and do not have a club affiliation.

We study U.S. Figure Skating competitions in qualifying events during the 2011-2012 season, and for three national championships in 2010, 2011, and 2012. We show that skaters receive higher marks from judges with whom they share club affiliation than from those with whom they do not share a club affiliation. This implies that judges are either giving lower marks to skaters who do not have the same club affiliation as the judge, or, that judges give higher marks to skaters have the same club affiliation as the judge. We find these results for singles skating and synchronized skating, senior and non-senior levels of skating ability, and for national, sectional and regional events.

Interestingly, we find that the differential in performance evaluations disappears for televised events. This is consistent with the hypothesis that the affiliation bias decreases when the cost of exercising this preference increases. The finding suggests that judges either intentionally assign higher marks for skaters from one's own club when there is no TV coverage, or, that under the glare of TV cameras try to compensate for any unconscious bias in order to score fairly.

II. Institutions: Skating Disciplines, Qualifying Structure and Judges

A. 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 figure skating club affiliations, allowing us to study potential affiliation biases. In contrast, pair skaters and ice dance teams may represent different clubs, and are sometimes located in different parts of the country, making any potential

judging bias more difficult to detect. This is why we exclude pairs and ice dancing competitions from our analysis.

For singles skating, there are nine regional qualifying competitions, three sectional competitions, and the U.S. Championship, which is the national competition. For synchronized skating there are three sectional competitions and one national competition. Figure A1 in the Appendix shows how the United States is divided into ice skating regions and sections by the U.S. Figure Skating organization, the governing body of competitive skating in the U.S. The sections are Eastern, Midwestern and Pacific, each of which is divided in to three regions respectively.

In the U.S, fourteen annual regional ice skating competitions are open to singles skaters with the appropriate skill levels. These regional competitions are qualifying competitions for the three annual sectional competitions. Within each figure skating category, that is, discipline, gender, age, andskill level, the top four skaters in the regional competitions advance to one of thesesectional competitions. And, within each category, the top four skaters or teams in each of the sectional competitions advance to the annual U.S. Championship.

It is possible for additional skaters to advance directly to sectional competitionseither based on their previous performance or because these skaters could not participate in the regional competitions dueto conflicts with international competition assignments. The U.S. Championship also permits participation of skaters due to merit reasons, such as high placement at the previous year's championships, or at international events. Approximately 16,000 figure skaters compete in regional competitions each year and about 175 figure skaters participate in the U.S. Championships.

The participation of skaters of the same skill level and same gender defines and skating event.Thus, for each figure skating discipline, i.e., ladies singles, men's singles, etc., a competition hosts multiple events. Skaters in the qualifying competitions enter in one of five skill levels. These skill levels are, in order of technical proficiency, juvenile, intermediate, novice, junior, and senior levels. These levels are referred to as divisions. Higher skill levels require the performance of more difficult elements. Each skill level is subject to different rules and guidelines.[2]

Only novice, junior, and senior skaters compete in the U.S. Championships for ladies and men's singles. Therefore, for single skaters, we consider these three levels of skating in our empirical analysis. To be consistent in our approach with respect to which skill levels we analyze, for synchronized skating, we also analyze events at the novice, junior, and senior skill levels.

B. Singles Skating

Events have two separate segments: a short program, which is skated first, and a long program, also referred to as the free skate program.

The short program has required moves, also referred to as elements, which aredetermined by the U.S. Skating Association.For example for the 2011-12 season, a junior men were required to perform 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. Skaters

[2]Prior to the entering competitions skaters take proficiency tests that determine at which skill level they will compete and take successively more difficult tests as they aspire to compete in more technically difficult divisions. Skaters are subject to age requirements, for example, juvenile skaters must be 12 or under, while junior skaters must be 18 or younger.

have two minutes and fifty seconds to complete the required moves in any order in the short program.

In the free skate program the allowable time is four minutes and thirty seconds for senior men. The allowable time is shorter for men with lower skill levels and for ladies.[3]

For the short program, the skating order, i.e., which skater skates first, second, etc., is determined by a random draw. For the long program, a seeded draw determines the skating order. For the seeded draw, the strongest skaters are generally in the last few skating groups. For national events, the latter performances typically receive live TV coverage.

The U.S. Figure Skating Association selects the top scorers at the National Championships to represent the United States at international competitions during the next year. This includes the opportunity to compete at the World Championships which awards cash prizes totaling over $700,000 with $45,000 going to the men's and ladies event winner. Moreover, the Association selection skaters to compete in the Olympic Games. Their selection is based primarily on the skaters' performance at the national championship that precedes the year of the Olympic event. In addition, the U.S. Skating Association may assign junior and senior skaters to international events in the International Skating Union's Grand Prix Series. At these events skaters compete for cash prizes reaching $25,000.

C. Synchronized Skating

Synchronized teams, consisting of eight to twenty skaters, compete in fourteen different divisions that are based on both skills and ages of the skaters. All synchronized teams perform a

[3]Single skaters select their own music and theme, and choreograph their jumps, spins, footwork and interpretive moves. The ice skating rules encourage change of pace, creativity, and innovative moves.

long program, and this program 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 level perform a short program consisting of required program elements.

Synchronized skating teams are known by their name and while skaters for the team change over the seasons, the team name stays the same. Teams tend to have a long history of skating, akin to dynasties, and have an emotional following. Skating fans tend to have a more emotional connection with a team, as opposed to an individual skater. Skaters in singles competitions tend to skate for a few years, but then disappear from thatsport. In contrast, synchronized teams compete for decades and they do so under the same name and club affiliation. In synchronized skating, similar to team sports like baseball or football, fans identify with their teamsby wearing team colors and displaying team banners, making their team loyalty recognizable in public. Fans and alumni of synchronized skating teams often maintain a lifelong emotional connection with their teams.

D. Scoring System

Judges award marks at figure skating events. At the U.S. Championships, the judging panel consists of nine judges. The judging panel consists of six members at the regional and sectional competitions.

Other skating officials include a referee, who keeps time, makes sure other officials are at their pre-assigned seats, stops a performance if equipment malfunctions, etc., a technical panel, consisting of a technical specialist, assistant technical specialist and a technical controller, and an accountant who has the responsibility to computes the marks given by the judges.

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

At regional, sectional, and national competitions, ice skating judges evaluate the skaters in accordance with the guidelines of the International Judging System. This system was introduced in 2004 by the International Skating Union, subsequent to the figure skating judging scandals in the 1998 and 2002 Olympics.

Table A1 in the Appendix shows how a skater's overall score is computed based on his or her technical and component scores. The top panel of this table contains the technical element scores, and the bottom panel contains the program component scores. The Table A1 example shows that the technical score is comprised of eleven technical elements,which are identified by the technical panel and the judges give the grades of execution (GOE). Judges also assign the five component scores.[5]

Members of the technical panel call which element the skater performed. Elements have a base value, measured in points. Each judge then assigns a GOE, ranging from -3 to +3, to each of these elements. These GOEs are averaged, scaled, andadded to the each element's base value. The sum of all the adjusted base values and GOEs comprises the technical elements score.

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 component on a scale from 0.25 to 10.0, in increments of 0.25.

During the entire event, judges are not permitted to discuss their evaluations among themselves. For the evaluation of the technical elements, judges have very specific guidelines for reductions and deductions marking the GOE scores. For example, -3 for the GOE is mandatory if

[5]Members of the technical panel identify a given technical element by observing the skater's performance. For example, jumps are simply identified by the type of jump and number of rotations. Spins, many step sequences, and synchronized skating elements are given levels from one to four based on predetermined criteria. Each difficulty level for a particular element has a pre-determined base value.

a skater falls on a jump or misses a required element in a short program. However, for the evaluation of the program components, judges have much more discretion in their marking. We therefore focus our empirical analysis on marks for the five program components.

Judges award the program componentsmarks directly after each skater's or team's performance. All marks are posted publically shortly following the conclusion of each skating event. Sometimes marks are publically announced right after the performance, before the next skater or team takes the ice.

E. Judges

Figure skating judges are required to be members of the U. S. Figure Skating Association through membership in a local club. Often judges are involved at the local club level, serving as volunteers, officers and managing activities as well as serving as a judge at club test sessions and regional, sectional, and national competitions. These volunteers are not paid for their services, but may be reimbursed for expenses including the costs of travel.

To avoid a conflict of interest, judges are not allowed to earn income related to figure skating by serving as a coach, choreographer, or consultant to skaters.The behavior of ice skating judges is guided by 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).[6]

For singles skating, three levels indicatethe qualification of judges. These levels are regional, sectional,and national judges. For synchronized skating, there are the levels of junior

[6]See http://www.usfsa.org/Content/201112Rulebook.pdf - Accessed March 19, 2012.

sectional, senior sectional, and national judges. For both skating categories, national appointments reflect the higher level of skill and experience. National and sectional judges are members of judging panels in regional competitions. Regional judges cannot serve at sectional or national events and sectional judges are not assignedto national events.

For an individual to receive an appointment at any particular level, or to advance to the next level of judging, the individual is required to judge on trial. The trial judging is followed by a debriefing session with peers and higher level judges, where the trial judges' marks are compared to the actual judging panel. Trial judges are asked to justify their marks and are expected to describe the programs of every skater or team for which they were trial judges. Further, they are asked 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.

Judges are assigned to qualifying competitions prior to the season, based on availability and eligibility. At that point, the identity of judges assigned to regional, sectional and national competitions becomes public information However, the specific event assignments, i.e., whether a judge will be on a panel for an event for men or women, and for a specific skill level, is not known to the judges at the time of assignment. Judges themselves know about the events to which they are assigned only a week or two prior to the date of the competition. Another restriction regarding assignment is that judges are not assigned to nationals more than once every three years.

The panel of judges and officials are announced to the skaters and audience just prior to the skaters getting on the ice. After the skate,the names of the judges are posted with their marks.

Neither the identities of judges nor their marks are anonymous in U.S. competitions unlike at international skating events.

III. Hypotheses

There is extensive academic literature studying biased decision making based on the natural identity of gender, race or ethnicity, in-group favoritism and out-group discrimination. This works dates back to the work of Tajfel on Social Identity Theory in the 1960's. In an experimental setting, individuals with minimal group affiliation show in-group favoritism in allocations in a laboratory setting (Tajfel 1970). More recently, experimental work by Chen and Li measures the impact of induced, group identity on behavior and finds favoritism towards in-group members and also finds that the likelihood to reward good behavior from in-group members or punish bad behavior depends negatively on the cost of that activity.

We focus on whether biasoriginates from a judge having the same club affiliation as the skater. Since a judge is a member of a local skating club, judges may view themselves as belonging to the group of individuals that constitutes their clubs. The in-group favoritism hypothesis predicts that judges will display favoritism by awarding higher marks to skaters who share the same club affiliation as the judge.

In our case, the group is not based on an inherited characteristic, but instead on a self-selected club affiliation. Testing for the importance of clubs is of interest because clubs are social constructs and individuals choose to belong to a particular club. Different from current studies, group is not assigned either by genes or by the experimenter, but self-chosen. Testing for this in-group bias is different than testing for bias based on race or gender, because for race and gender, favoritism may be due to heritable shared genetics rather than a choice of affiliation.

In our context, in group bias might also originate from other sources. Such a source might be geographical location.[7]That is, judges may evaluate skaters more favorably when in-group bias is based on the distance between their residence and that of the skating club of the skater. Biased judging based on geography might also occur based on whether the location of the skater's skating club is in the same region as the judge's residence.

Bias may also stem from a shared gender between a judge and a skater. Female judges may evaluate female skaters more favorable than male judges. Or, male judges may evaluate female skaters more favorable than female judges.

The U.S. Nationals competitions differ from the regional and sectional competitions in several aspects. First, judges at this championship are the most skilled and experienced judges in U.S. Figure skating. Second, at the U.S. Nationals, judges have the use of instant replay on their screens while this is not the case for most other competitions. Third, for U.S. Nationals some of the long programs for skaters in the seniors category is televised live, while the short programs are not usually shown live.

Bias in synchronized skating arising from club affiliation may be heightened by the relationship between judges and teams. As do fans, judges might identify more strongly with a team and root for it, as oppose to a skater. Further, many of the judges who judge synchronized events skated in synchronized teams. Based on this background, one might observe a more tilted judging in team skating as opposed to singles skating

In general, judges know that judging errors they might makemight be noticed, because each competition in the United States qualifying stream and identified in this study has both results and videos available on icenetwork.com. Television coverage further increases the cost to

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

judges of making errors because with television coverage, the audience expands further. Television increases the cost of exercising any bias becausetelevision viewers and members of the skating community can observe errors in judging and connect those errors to specific judges. Discovery of errors might damage those judges' reputation.[8]

Cleary, there are some shortcomings of a study like ours that uses field data, as opposed to experimental data. With a well-designed experiment, we can attribute observed differences in behavior solely to group assignment. However, identifying bias based on natural groups, such as skating club membership, can be confounded by characteristics and experiences that are shared by group members that are not exclusive to the group membership. In this case, the judges that do not share club affiliation with the skaters are the control group that allows us to identify bias arising from shared club affiliation.

Related to our study is the work by Price and Wolfers's (2010) on racial bias among NBA referees, and the work by Parsons et al showing that Major League Baseball umpires display racial preference when calling strikes. This exercise in racial preference in turn indirectly alters the behavior of pitchers who correctly anticipate bias.

IV. Data Sources, and Empirical Model

The institutions of figure skating allow us to examine the results of a natural experiment. Figure skating judges are randomly assigned each year based on their availability to ice skating competitions in the qualifying events up to and including the National Championships. There are multiple competitions with similar timeframes so manipulating one's availability is no guarantee of assignment to a particular competition. Additionally, a judge is assigned to qualifying

[8]Parsons et.al. (2011) find that racial discrimination by baseball umpires decreased as the cost of exercising this preference rises.

competitions for the season (October through January) in the summer prior to that season, but is not assigned to specific events until just prior to the beginning of the competition. Thus, there are no selection issues that might bias our results, as might be the case if judges could choose to be a judge at events that they would like to judge. For example, because they have an interest in advancing the career of one or several of the skaters participating in that event. Also, all figure skating judges are required to be members of U. S. Figure Skating, primarily through membership in a local club. Thus selection bias does not come 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 a figure skating club, that is, judges rarely change affiliations for reasons other than relocation and in our data no judge changes his or her club affiliation over time.

The scoring mechanism and transparency offigure skating in the United States is well suited to study in-group favoritism. It allows us to test whether judges who are affiliated with the skater's club, assign more favorable scores to the skater who represents that club. Our control group are judges on the same panel, observing identical performances, and who do not share club affiliation with the skater. Moreover, skaters who differ with respect to their club affiliations receive marks from the identical judging panel. Thus, in many ways our data mimics a randomized experiment.

In our data analysis we focus on the program component marks because they are the most subjective portion of the scoring system. Judges have most discretion in marking components of a performance, and much less in marking the grades of execution of the technical elements. For example, for component marks there are no mandatory deductions for a fall or major error as

there are for the grades of execution marks. Mandatory reductions tend to reduce judge discretion.

We obtained data from the U.S. Figure Skating website (http://www.usfsa.org) and their affiliate Icenetwork.com. We obtaineddata on the official competition results for all qualifying competitions in singles and synchronized skating leading to the National Championships in 2012 and for the 2010, 2011, and 2012 National Championship competitions.

Our data allows us to link the marksassigned to each skater to the judge who awarded those marks. Information regarding judges' home addresses comes from the Directory of U.S. Figure Skating Officials. We identified the club affiliation of the judges by searching skating club websites, searching the internet about information regarding judges bibliographies, and conducting personal interviews. We obtained the club affiliation of skaters and teamsfrom the official competition results. We measure distance between the judge's residence and the club's location by the distance between their respective zip codes.

Table 1A summarizes the number of component marksthat judges awarded for both long and short programsby competition type, and by skater and team skill levels for the 2011-12 season. Table 1A also presents the number ofprograms skated in each of these categories in parentheses. Judging panels have more judges in national competitions than in regional or sectional competitions. This is explains why in Table 1A there are more marks per judging panel in the national competitions, compared to the other competitions.

Table 1B presents the cross tabulations for the number of marks awarded for the U.S. National Championship competitions in 2010, 2011, and 2012 for novice, junior, and senior levels, broken down by short and long program, and by whether the event is televised or not. For the three years of national competitions, the long programs for the last two senior warm-up

groups were shown live on television. These last two groups are senior skaters that had received the highest marks in the short program.

Because single skaters participate in both the short and long competition, unless they become injured, half of the singles observations are from the short program and the other half from the long program. A little more than half of the seniors' long programs are shown live on TV (Table 1B). Short programs, synchronized programs, and some of the low seeded singles long programs are not televised live.

To test our hypotheses, we estimate

$$mark_{ijkt} = \beta_1 SameClub_{ijt} + \beta_2 SameRegion_{ijt} + \beta_3 MaleSkater_{ijt} + \beta_4 MaleJudge_{ijt+}$$
$$\beta_5 MaleSkater*MaleJudge_{ijt} + \beta_6 Markmeanotherjudges_{ijkt-i} + \gamma_i + \delta_j + \mu_t + \varepsilon_{ijkt} \qquad (1)$$

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

To test whether favoritism is based on club affiliation, geographical preferences, or both, we include the variable *SameClub*, which equals one if the judge and the skater, or skating team, both are affiliated with the same club. The variable *SameRegion* measureswhether both come from the same skating region. We use two alternative measures for this latter variable. In one specification we include an indicator for whether or not the judge resides in the 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.

We estimate various specifications of model (1) for singles long programs, singles short programs, and for synchronized events. For singles events, we include an indicator variable for whether the judge is male, the skater is male, and the interaction of the two. For synchronized

skating we do not include gender variables. In this type of skating most skating teams are of female but sometimes include mixed gender teams.

We control for overall quality of the performance by including the mean component mark by all judges, excluding the component mark of the*i*'th judge, $Markmeanotherjudges_{ijkt\text{-}i}$. In addition to controlling for the performance specific quality, in some specifications we also control for a skater's overall ability and skill by including skater fixed effect γ_i. In some specifications we include an indicator δ_j, which captures heterogeneity among judges. Further, we include indicators μ_t for each of the competitions.

Each skater receives as many marks as there are judges for each of the five components. This generatesmultiple observations per skater, and this feature of the data allows us to identify any biased judging that stems from belonging to the same club. If there were only one mark per performance, then it would be difficult to disentangle whether a judge gives a certain mark due to the quality of the skate, or because he or she has the same club affiliation as the skater. However, treating the multiple scores for each skater as independent is not appropriate. The marks given to a skater are correlated because all judges evaluate the same performance and share similar views regarding what establishes a high or a low quality performance. Therefore we cluster the standard errors in two dimensions, by competitor and by judge.

V. Results

A. U.S. Figure Skating Qualifying Events for the 2011-12 Season

Table 2 reports regression results from all single and synchronized skating observations from the 2011-12 qualifying competitions. The observations include nineregional singles competitions, three sectional singles competitions, one national singles championship

competition, three sectional synchronized competitions, and one national synchronized championship. In the appendix, Table A2reports the descriptive statistics for the observations used in the regressions in Table 2. Over all skating events, marks range from 0.75 to 10, where the latter is the highest mark that can be awarded.

In Table 2the regressions corresponding to columns 1 and 2 include indicators for each competition, and do not include skater fixed effects. These two columns differ with respect to the measurement of the regional affiliation variable. In the first column we include an indicator variable for regional affiliation, measuring whether a judge residesin the same region as the skater's skating club. In the second column we include log distance, measured in miles, between the residence of the judge and the location of the skater's skating club. Table 2, columns 3 and 4 have the same explanatory variables as the first two columns, but add skater and judge fixed effects. In all four specifications in Table 2, as well as in subsequent tables, we cluster the standard errorsby 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, a skater's mark increases between 0.21 and 0.24 points. The magnitude of these point estimates is not statistically different from 0.25, which is the minimum increment for component scores. Thus, our estimates show that the shared club affiliation leads to a one increment increase in the mark awarded.

Ultimately, an increase in a judge's mark by 0.25 leads to as much as a .05 increase in the final score of the skater, as each judge's mark contributes to an average mark. However, as each judge awards five marks to each skater, the cumulative effect of a one increment increase in marks is to increase a skater's final score by 0.25 for a program.

For the regressions in Table 2, the mean component mark is 4.43 and the standard deviation is 1.3 (Table A2).[9] The magnitude of the point estimates in Table 2show that the having the same club affiliation of the skater is associated with an increase in the markthat amounts to twenty percent of the mark standard deviation.

Table 2 also shows that junior skaters, on average, have higher marks by 0.03 points, and that seniorskaters have , on average, higher marks by 0.6 points, relative to novice skaters. Because this finding shows that higher level skaters receive higher marks, this results shows that, on average, that higher skilled skaters receive higher marks.

In the first two specifications in Table 2 the estimates on the mean component score of other judges is close to one, suggesting that judges score fairly uniformly. The corresponding estimates are about 0.8 when we include skater and judge effects.

One of the reasons why we focus in the following regression specifications on singles events is that for these events we can determine the gender of the skater, and study biased judging based on gender. This is difficult for team skating, because some skating teams include both males and females. In addition, some of the singles events each year are aired live on national television which adds an interesting variation to singles events, which is not available for synchronized skating.

Table 3 presents regression results for the thirteen singles qualifying competitions in the 2011-12 season. The first four specifications include no competitor or judge indicators, while the last four specifications in the table do. The point estimates in this table on whether the judge has the same club affiliation as the skater are between 0.21 and 0.24, which are similar to the

[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 U.S. qualifying stream is below average.

point estimates in the combined singles and synchronized events in Table 2. In Table 3, the mean component score of other judges are close to one,but statistically different from one.

Table 3 shows that the point estimates on whether the judge resides in the same region as the region of the skater's club ispositive in all specifications and statistically significant in three of sixspecifications. Sharing the same regional affiliation increases the mark by between 0.3 and 0.6 points. None of the point estimates on the distance between the judge's residence and the skater's club location are statistically significant.

In none ofspecifications do we find thateither male judges favor male skatersor that female judges favor femaleskates, although all point estimates on both variables are positive. Thus, there is no evidence that there is any discrimination of based on the gender mix of the judge and the skater.

As in Table 2, the average component scores of the other judges has a positive sign and all corresponding point estimates are statistically significant. As before, that the point estimate is close to one suggests that a given judge evaluates ice skating performances similar to other judges on their panel. Also, as found in the Table 2, junior skaters have, on average, higher marks than novices who comprise the reference group in our regressions, and senior skaters have higher marks than junior skaters.However the estimates are only statistically significant for senior skaters in the regressions that include skater and judge fixed effects.

With each increasing level of competition the stakesbecome higher for the skaters with respect to their reputational impact and possible financial gains.For example, the outcome at the national events determines the competitors for the World Championships and the Olympics, and also impacts thefuture earning potential of individual skaters. Increasing levels of competitions receive more publicity and because of greater public scrutiny, the cost of biased judging

increases at higher level events. Thus, there is a greater incentive for judges to award marks accurately at higher levels of competition.

To examine the impact of the level of competition on favoritism, in Table 4Awe estimate separate regression for each competition level for the 2011-12 singles event. All specifications include skater and judge fixed effects and we cluster standard errors in both of these dimensions.We include skater and judge fixed effects in all competitions that control for heterogeneity with respect to judging and skating ability, it is noteworthy that these competitions differ in that the composition of the skaters and judges varies across competition levels. The weaker performing skaters have been eliminated out through the qualifying process and the average qualify of skater increases as the season progresses from regional to section to the national competition. Further, while national, sectional and regional judges award marks at regional events, only national judges participate in the national event and only sectional and national judges participate in the sectional event.

We find a positive and statistically coefficient on same club affiliation for all levels of competitions, showing that markings increase when the skater and the judge share the same club affiliation. While the point estimates for the regional and sectional competitionsare between 0.28 and 0.21, the highest of these estimates is for the regional competition, and the lowest is for the more prestigious sectional competition. All other point estimates range between 0.25 and 0.27. When studying the marking at national eventsthe point estimates on same club affiliation fall to between 0.14 and 0.15. This is consistent with the hypothesis that increased scrutiny raises the cost of favoritism, and thus leads to a reduction in biased judging.

In the appendix Table A4 shows that the mean marks and standard deviations increase as the level of competition increases. Thus, relative to these means and standard deviation, Table

4A shows that we estimate the largest point estimate on same club affiliationin the regional competitions, followed by the section competitions, and followed by a sharper drop in the national competitions. In addition, Table A4 provides the percentage of marks awards for which a judge shares a club affiliation with a skater that they are judging. In the case of the regional competitions, there a shared affiliation 6.8% of the time. This occurs for 3.2% of the marks at sectional competitions and 2.6% of the national competitions marks. Another interesting finding is how the point estimate on the mean component score of other judges changes with different competition levels. The point estimates on that score are about 0.56 for the regional event, between 0.67 and 0.68 for the sectional event, and rise to 0.8 for the national competition (Table 4A). This shows that national event judges give marks that are closer to each other as the competition level increases. This finding is consistent with the fact that national judgesare more skilled and thus have a more homogeneous marking of performances. However, it could also reflect more careful judging because of the increased publicity and more monitoring by others at the national event.

To distinguish between these latter two explanations, we estimate the specifications in Table 4A, using only national judges. Table 4B shows these results and shows that national judges have a larger bias in regional and sectional competitions than in national competitions. While most of the estimates for the regionals and sectionals are around 0.21, the estimates for the nationals are 0.15. However, also the bias appears to be smaller in national competitions, the 95 percent confidence intervals of the estimates on same club affiliation for all three competitions overlap.

Another interesting findingin Table 4B is the point estimates on the score of other judges. While National judges are less in line with their peers in regional competitions, the point

estimates on the score of other judges is close to one in the national events. Given that we control for judge fixed effects to control for the difference in heterogeneity of judges across competition levels, this finding seems to indicate that judges become more conscious of being in line with their peers at the Nationals as opposed to lower competition levels.

B. Singles National Championships 2010, 2011, and 2012

Some of the previous resultsshow that judging in the national championships for singles skating differs from judging in lower level competitions.In the national competitions we expect to find higher component marks for the more highly skilled skaters, but we would not expect to find other differences in scoring. To examine more closely judging at national competition, we study three years of results for the national championships in 2010, 2011 and2012.

National championships differ from other competitions because portions of the senior singles long program events are televised live and other portions are replayed on tape on a major TV network. TV cameras are recording the entire long program senior event and judges are well aware of the taping and televising of this showcase event. And while the last two warm-up groups of skaters, who are the higher seeded skaters, are shown on life TV, the judges marks for the earlier warm-up groups are also shown on live TV and the TV fills 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.

We present tests of the hypothesis that events under larger scrutiny are less likely to be subject to marking that is influence by in-group bias. Table 5 presents regression results for the U.S. Nationals seniorsingles long program. To allow for the fact that live TV coverage might

have a different effect than taped coverage, we include an indicator for live TV coverage and interact that variable with our same club affiliation variable.

Table 5 shows that the point estimates on club affiliation statistically significant. Nor are the interaction effects are notstatistically significant when fixed effects are included. These findingsare consistent with the hypothesis that judges will exercise restraint in biased scoring, because of the larger visibility, due to TV coverage. The bias that is exhibited throughout a skating season disappears for the senior long program at the U.S. National Championships. Shared club affiliation does not impact the scoring. It is not possible to determine whether the change in awarding marks is due to conscious or unconscious behavior on the part of the judges but it is reasonable to assume that the presence of live television cameras raises the cost of the behavior and therefore the behavior decreases or disappears altogether.

C. Robustness – Novice, Junior and Short Programs and Lower Ranked Skaters

In order study whether the lack of a statistically significant effect of club affiliation on judges' marks is due to the nature of the senior level events we first examine the long program marks for the junior and novice levels at the U.S. National Championships over three years. In contrast to the senior events in Table 5, the novice and junior events in Table 6A all have statistically significant point estimates for an increase in the mark awarded in the case of a shared club affiliation between judge and skater. The size of the point estimate ranges from .257 to .358 for the specifications which include fixed effects for judge and skater. All point estimates for the novice and junior events are larger than .25, the smallest increment of judges' marks which could make a shared affiliation between skater and judge meaningful in determining the outcome of a skating competition.

To further study whether the lack of finding a zero effect of club affiliation on scores when there is TV coverage is due to the fact of larger visibility, or because judges do not exercise affiliation bias for senior skaters, Table 6B presents results for the subsample of seniors skating in the short program, which precedes the long program. The skaters themselves are the same in both the short program and the long program. Here we find a positive and statistically significant effect of same club affiliation on the markings. The estimates show that sharing a club affiliation increases the mark by between 0.13 and 0.18 points. Measures for geographic proximity are not statistically significant in this subsample. The fixed effects specifications in Table 6bshow that female judges mark female skaters higher than male skaters.

Table 6C shows regression results for the subsample of skaters competing in the senior long program at the National Championships and who placed lower than 10^{th} in the final results. This group is similar but not identical to the group of skaters who are not televised live. In this subsample we also see no statistically significant biased marking from shared affiliation. This supports our hypothesis that the greater exposure of the entire senior events at the National Championships minimizes biased behavior.

D. Robustness – Synchronized Skating

As a comparison to the singles skating we study at the effect of club affiliation on the competitions in synchronized skating. Both singles and synchronized skating have almost identical institutions and all synchronized skating judges also are qualified to judge some level of singles and pairs skating. We code the affiliation indicator to equal one if either the judge has the same club membership as the team, or the judge has skated for the team earlier in this life, or if a child of the judge has skated for the team in the past.

Table 7 presents regression results for the 2011-12 season for all levels of synchronized competitions. 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 club affiliation ranges from 0.36 to 0.5 which is larger than the corresponding point estimates in the previous tables for singles skating. Above, we predicted that the affiliation bias is stronger in synchronized skating because synchronized teams exist for many years or even decades and though the skaters come and go, the team name and club affiliation carry on.For example, coaches remain with teams for decades. A judge who belongs to a club with synchronized teams may have a very longstanding relationship and familiarity with the club, team or coach.

In Table 7 the point estimate on the mean component score of other judges remains around one for all but one specification. The point estimates on log distance and on whether the judge and the skating team comefrom the same region are not statistically significant. Because synchronized skaters may be of mixed gender, we do not analyze gender differences in scoring.

Table 8 shows that in contrast to the U.S. Nationals singles skating championship results,we find a positive and statistically significant effect of same club affiliation on marking by judges at the U.S. Nationals Synchronized Skating championships. A distinguishing feature of this competition from its singles counterpart is the lack of live television broadcast. Table 8shows the results from three years of national synchronized skating competitions. Because synchronized skaters can also be of mixed gender, we do not analyze gender differences in scoring. Relative to the previous finding, having the same club affiliation as the skater increases the mark given by between 0.26 and 0.28. As in our previous findings, marks awarded to junior and senior teams are higher than those given to novice teams.

VI. Conclusions

We use data from figure skating competitions in the United States as a natural experiment to study affiliation biases and find that judges who have the same club affiliation as the skater award marks to skaters of their club. This finding is consistent with the affiliation bias hypothesis.We also find that affiliation bias is responsive to the cost of exercising it. Our results show no evidence of affiliation biasfor the singles ladies and mens long programs at the US National Championships, which are broadcast live on TV. These broadcastsappear to increase the cost of exercising bias. We also find a larger bias when judges award marks to synchronized skating teams than when they award marks to single skaters. Here, the stronger affiliation bias is consistent with the culture of the skating sport, where fans tend to feel a stronger affiliation with the team than for individual skaters.

Another interesting finding regards the mechanism of affiliation bias. The affiliation with a figure skating club, as required to either compete or serve as a US Figure Skating official, is generally chosen by both judge and skater for geographic proximity. However, we show bias impacts the judges' performance though membership in a group, not primarily through physical proximity. Thus a social construct, as a club, is more inductive to elicit affiliation bias than more physical proximity.

Our estimated average treatment effect of a judge's club affiliation on marks may appear to be small, but in figure skating the final marks are often very close. Even the changing of one mark by the minimum increment of 0.25 can make a difference in the outcome of an event. For example, at the 2008 National Championships, in the senior men's event, the top two competitors were tied at exactly 244.77 points,even after skating two programs and receiving 90 different component marks.

One limitation of our data set is that we can only recognize and account for transparent relationships between skaters and judges. Many individual skaters move to training locations to work with more experienced coaches or different coaches over a period of years. Some skaters retain membership in their first club while others change membership from year to year. Judges also relocate for work and family reasons and while some join their local club, others maintain memberships in the club they skated for as a child, or where they served as a judge initially, or maintain dual memberships. Because we can only identify the most transparent relationships, our empirical analysis may only identify the lower bound of any bias.

References

2011-12Rulebook.pdf. (n.d.). Retrieved from http://usfsa.org/Content/201112Rulebook.pdf

Akerlof, G. A., & Kranton, R. E. (2000). Economics and Identity. *The Quarterly Journal of Economics*, *115*(3), 715–753..

Bar, T., & Zussman, A. (2012). Partisan grading. *American Economic Journal: Applied Economics*, *4*(1), 30–48.

Bertrand, M., Chugh, D., & Mullainathan, S. (2005). Implicit Discrimination. *The American Economic Review*, *95*(2), 94–98..

Borzi, P. (2008, January 28). Tie Breaker Allows Lysacek to Defend Title. *The New York Times*. Retrieved from http://www.nytimes.com/2008/01/28/sports/othersports/28skate.html.

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

Chen, Y., & Li, S. X. (2009). Group identity and social preferences. *The American Economic Review*, 431–457.

Emerson, J. W. (2009). Assessing Judging Bias: An Example From the 2000 Olympic Games. *The American Statistician*, *63*(2), 124–131

Emerson, J. W. (2011). Statistical Sleuthing by Leveraging Human Nature: A Study of Olympic Figure Skating. *The American Statistician*, *65*(3), 143–148.

Goette, L., Huffman, D., & Meier, S. (2006). The Impact of Group Membership on Cooperation and Norm Enforcement: Evidence Using Random Assignment to Real Social Groups. *The American Economic Review*, *96*(2), 212–216..

King, R. R. (2002). An Experimental Investigation of Self-Serving Biases in an Auditing Trust Game: The Effect of Group Affiliation. *The Accounting Review*, *77*(2), 265–284.

Lesko\vsek, B., \vCuk, I., Pajek, J., Forbes, W., & Bu\vcar-Pajek, M. (2012). BIAS OF JUDGING IN MEN'S ARTISTIC GYMNASTICS AT THE EUROPEAN CHAMPIONSHIP 2011. *Biology of Sport*, *29*. Retrieved from http://biolsport.com/fulltxt.php?ICID=988967.

List, J. A. (2004). The nature and extent of discrimination in the marketplace: Evidence from the field. *The Quarterly Journal of Economics*, *119*(1), 49–89.

Mohr, P. B., & Larsen, K. (1998). Ingroup Favoritism in Umpiring Decisions in Australian Football. *The Journal of Social Psychology*, *138*(4), 495–504. doi:10.1080/00224549809600403.

Morgan, H., & Rotthoff, K. (2012). The Harder the Task, the Higher the Score: Findings of a Difficulty Bias. *Available at SSRN 1555094*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2137977.

Mullen, B., Brown, R., & Smith, C. (1992). Ingroup bias as a function of salience, relevance, and status: An integration. *European Journal of Social Psychology*, *22*(2), 103–122.

Parsons, C. A., Sulaeman, J., Yates, M. C., & Hamermesh, D. S. (2011). Strike Three: Discrimination, Incentives, and Evaluation. *American Economic Review*, *101*(4), 1410–1435.

Plessner, H., & Haar, T. (2006). Sports performance judgments from a social cognitive perspective. *Psychology of Sport and Exercise*, *7*(6), 555–575.

Price, J., & Wolfers, J. (2010). Racial discrimination among NBA referees. *Quarterly Journal of Economics*, *125*(4), 1859–1887.

Seltzer, R., & Glass, W. (1991). International politics and judging in Olympic skating events: 1968-1988. *Journal of Sport Behavior*, *14*(3), 189–200.

Shayo, M., & Zussman, A. (2011). Judicial Ingroup Bias in the Shadow of Terrorism. *The Quarterly Journal of Economics*, *126*(3), 1447–1484.

Ste-Marie, D. 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.

Whissell, R., Lyons, S., Wilkinson, D., & Whissell, C. (1993). NATIONAL BIAS IN JUDGMENTS OF OLYMPIC-LEVEL SKATING. *Perceptual and Motor Skills*, *77*(2), 355–358.

Zitzewitz, E. (2006). Nationalism in winter sports judging and its lessons for organizational decision making. *Journal of Economics & Management Strategy*, *15*(1), 67–99.

Zitzewitz, Eric. (2012). Does Transparency Reduce Favoritism and Corruption? Evidence from the Reform of Figure Skating Judging. *National Bureau of Economic Research Working Paper Series*, *No. 17732*. Retrieved from http://www.nber.org/papers/w17732

Table 1A: Cross-Tabulation of Number of Marks Awarded: 2011-2012 Skating Season

	Novice	Junior	Senior	Totals
Singles Nationals	2,160 (48)	2,160 (48)	3,510 (78)	7,830 (174)
Singles Sectionals	2,160 (72)	1,590 (53)	1,740 (58)	5,490 (183)
Singles Regionals	9,615 (325)	7,085 (239)	6,120 (204)	23,005 (768)
Synchronized Nationals	540 (12)	450 (10)	360 (8)	1,350 (30)
Synchronized Sectionals	510 (17)	480 (16)	360 (12)	1,350 (45)
N	14,985	11,765	12,090	39,025

Notes: The unit of analysis is the component mark assigned by a judge. Each judge awards five marks per program performed by a skater. The tabulation is the total number of component marks awarded in each level of competition at each level of skating. The numbers in parentheses \are the total number of long and short programs performed.

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

	TV	Novice	Junior	Senior	Totals
Singles Short Programs	No	3,240 (72)	3,330 (74)	5,850 (130)	12,420 (276)
Singles Long Programs	No	3,240 (72)	3,330 (74)	2,610 (58)	9,180 (204)
Singles - Long Programs	Yes			3,105 (69)	3,105 (69)
Synchronized - Long Programs	No	1,755 (39)	1,395 (31)	1,170 (26)	4320 (96)
N		8,235 (185)	8,055 (179)	12,735 (283)	29,025 (645)

Notes: The unit of analysis is the component mark assigned by a judge. Each judge awards five marks per program performed by a skater. The tabulation is the total number of component marks awarded in each level of competition at each level of skating. The numbers in parentheses \are the total number of long and short programs performed.

Table 2: The Effect of Shared Club Affiliation on Marks
2011-12 Season, All Levels of Qualifying Competitions, Singles and Synchronized Skating

	(1)	(2)	(3)	(4)
Judge and skater share club or team affiliation	0.234***	0.225***	0.243***	0.253***
	(0.040)	(0.045)	(0.027)	(0.031)
Mean component mark of other judges	1.087***	1.087***	0.805***	0.806***
	(0.015)	(0.015)	(0.030)	(0.030)
Judge and skater reside in same region	0.027		0.019	
	(0.038)		(0.024)	
Junior skater	0.036	0.028	0.212**	0.209**
	(0.024)	(0.024)	(0.086)	(0.086)
Senior skater	0.066**	0.063*	0.456***	0.449***
	(0.033)	(0.034)	(0.091)	(0.090)
Log distance between skater/team club and judge's residence		-0.011		0.001
		(0.011)		(0.007)
Skater Fixed Effect?	No	No	Yes	Yes
Judge Fixed Effect?	No	No	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes
N	39,380	38,585	39,380	38,585
R-squared	0.813	0.814	0.852	0.853

Notes: Dependent variable is the mark assigned for a skate component by a judge in either a singles competition or a synchronized competition. The data is comprised of 17 different 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 2012, SA Regionals 2012, SW Regional 2012, UGL Regional 2012, Synchro Easterns 2012, Synchro Nationals 2012, Synchro Pacific Coast Sectional 2012, and Synchro Midwestern Sectionals 2012.. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two-tailed test.

Table 3: The Effect of Shared Club Affiliation on Marks
2011-12 Season, All Levels of Qualifying Competitions, Singles Skating Only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	0.218***	0.211***	0.216***	0.210***	0.230***	0.238***	0.229***	0.239***
	(0.042)	(0.047)	(0.042)	(0.047)	(0.027)	(0.031)	(0.027)	(0.031)
Mean component score of other judges	1.086***	1.085***	1.087***	1.086***	0.812***	0.813***	0.811***	0.812***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.031)	(0.031)	(0.030)	(0.030)
Judge and skater reside in same region	0.032		0.032	0.031	0.047*		0.047*	0.059**
	(0.040)		(0.040)	(0.043)	(0.025)		(0.025)	(0.028)
Male Judge and Male Skater			0.042	0.045			0.098	0.090
			(0.034)	(0.035)			(0.081)	(0.079)
Female Judge and Female Skater			0.025	0.029			0.003	0.007
			(0.035)	(0.036)			(0.069)	(0.069)
Junior skater	0.033	0.025	0.034	0.025	0.121	0.115	0.122	0.115
	(0.024)	(0.024)	(0.024)	(0.023)	(0.080)	(0.080)	(0.081)	(0.080)
Senior skater	0.056	0.054	0.053	0.051	0.353***	0.350***	0.353***	0.348***
	(0.034)	(0.035)	(0.034)	(0.035)	(0.097)	(0.097)	(0.099)	(0.098)
Log distance between skater		-0.010		-0.005		-0.002		0.006
club and judge's residence		(0.011)		(0.011)		(0.007)		(0.008)
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	36,140	35,415	36,140	35,415	36,140	35,415	36,140	35,415
R-squared	0.809	0.811	0.810	0.811	0.845	0.847	0.846	0.847

Notes: Dependent variable is the mark assigned for a skate component by a judge. The data is comprised of13 different 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, SWP Regional 2012 and UGL Regional 2012. Standard errors are clustered by competitor and judge.
*** p<0.01, ** p<0.05, * p<0.1, two tailed test.

Table 4A: The Effect of Shared Club Affiliation on Marks by Competition Type
2011-12 Season, Singles Skate Only

	Regional Competitions			Sectional Competitions			National Competition		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Judge and skater share club affiliation	0.288***	0.254***	0.270***	0.272***	0.210***	0.272***	0.113**	0.136**	0.095*
	(0.034)	(0.031)	(0.034)	(0.091)	(0.074)	(0.088)	(0.055)	(0.058)	(0.057)
Mean component score of other judges	0.560***	0.557***	0.559***	0.680***	0.670***	0.671***	0.803***	0.808***	0.808***
	(0.059)	(0.058)	(0.059)	(0.055)	(0.052)	(0.054)	(0.050)	(0.048)	(0.049)
Judge and skater reside in same region		-0.057	-0.053		0.026	0.052		0.129***	0.080
		(0.093)	(0.095)		(0.034)	(0.045)		(0.041)	(0.063)
Male Judge and Male Skater		-0.085	-0.081		0.394	0.405		0.280	0.293
		(0.130)	(0.129)		(0.297)	(0.298)		(.)	(.)
Female Judge and Female Skater		-0.021	-0.027		-0.389	-0.416		0.010	-0.000
		(0.099)	(0.098)		(0.329)	(0.326)		(.)	(.)
Junior skater/team	-0.046	-0.045	-0.054	0.069	-0.150	-0.185*	0.982***	0.827***	0.835***
	(0.145)	(0.145)	(0.146)	(0.118)	(0.101)	(0.095)	0.862***	(0.204)	(0.200)
Senior skater/team	0.481**	0.476**	0.473**	0.758***	0.859***	0.843***	(0.200)	0.717	0.715
	(0.195)	(0.196)	(0.195)	(0.248)	(0.234)	(0.246)	-0.032***	(.)	(.)
Log distance between skater	0.014		0.014	0.001		0.017	(0.011)		-0.020
club and judge's residence	(0.010)		(0.010)	(0.017)		(0.021)	(0.010)		(0.017)
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	22,215	22,820	22,215	5,370	5,490	5,370	7,830	7,830	7,830
R-squared	0.730	0.731	0.730	0.787	0.785	0.788	0.837	0.838	0.838

Notes: Dependent variable is the mark assigned for a skate component by a judge. The data is comprised of 13 different competitions. The regional competitions included are the CP Regional 2012, EGL Regional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, SA Regionals 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 4B: National Judges Only 2011-12 Season

	Regional			Sectional			Nationals		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Judge and skater share club affiliation	0.212***	0.174***	0.209***	0.287**	0.211***	0.287**	0.152***	0.150***	0.135***
	(0.060)	(0.058)	(0.060)	(0.114)	(0.078)	(0.111)	(0.039)	(0.035)	(0.041)
Mean component score of other judges	0.629***	0.632***	0.632***	0.726***	0.707***	0.709***	1.078***	1.077***	1.077***
	(0.067)	(0.066)	(0.067)	(0.058)	(0.055)	(0.059)	(0.023)	(0.024)	(0.024)
Judge and skater reside in same region		-0.059	0.006		0.034	0.065		0.108***	0.093*
		(0.298)	(0.216)		(0.042)	(0.054)		(0.035)	(0.056)
Male Judge and Male Skater		-0.140	-0.131		0.591*	0.618*		0.085*	0.086*
		(0.128)	(0.123)		(0.327)	(0.318)		(0.046)	(0.047)
Female Judge and Female Skater		-0.069	-0.072		-0.628	-0.671*		0.089	0.089
		(0.106)	(0.102)		(0.395)	(0.374)		(0.061)	(0.061)
Junior skater/team	-0.060	-0.079	-0.078	0.284**	-0.063	-0.120	0.027	0.043	0.043
	(0.209)	(0.207)	(0.208)	(0.132)	(0.130)	(0.115)	(0.064)	(0.063)	(0.063)
Senior skater/team	0.247	0.213	0.216	0.793***	0.932***	0.915***	0.074	0.080	0.080
	(0.236)	(0.225)	(0.223)	(0.225)	(0.200)	(0.212)	(0.078)	(0.077)	(0.077)
Log distance between skater	0.027		0.026	0.002		0.021	-0.022**		-0.007
club and judge's residence	(0.021)		(0.020)	(0.026)		(0.032)	(0.010)		(0.017)
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	9,490	9,675	9,490	3,865	3,975	3,865	7,830	7,830	7,830
R-squared	0.755	0.757	0.756	0.786	0.784	0.787	0.837	0.838	0.838

Notes: The dependent variable is the mark assigned for a skate component by a judge. The data included the results of 13 different competitions. The regional competitions included are the CP Regional 2012, EGL Regional 2012, NA Regional 2012, NE Regional 2012, NWP Regional 2012, SA Regionals 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 5: Factors affecting judges' marks
2010-12 National Championships Senior Long Programs: The Effect of TV Coverage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Judge and skater share club affiliation	0.074	0.060	0.067	0.113	0.059	0.062	0.062
	(0.070)	(0.083)	(0.083)	(0.084)	(0.093)	(0.096)	(0.096)
Mean component score of other judges	1.077***	1.078***	1.078***	0.936***	0.937***	0.937***	0.937***
	(0.021)	(0.021)	(0.020)	(0.039)	(0.039)	(0.040)	(0.040)
Live TV coverage	0.064***	0.063***	0.062***	0.007	0.004	0.008	0.008
	(0.018)	(0.019)	(0.016)	(0.055)	(0.053)	(0.052)	(0.052)
Club Affiliation*Live TV	0.046	0.048	0.043	0.112	0.119	0.118	0.118
	(0.145)	(0.145)	(0.147)	(0.138)	(0.141)	(0.140)	(0.140)
Judge and skater reside in same region	-0.015		-0.026	-0.012		-0.079	-0.079
	(0.043)		(0.074)	(0.050)		(0.075)	(0.075)
Log distance between skater		-0.000	-0.005		-0.010	-0.025	-0.025
club and judge's residence		(0.009)	(0.018)		(0.010)	(0.016)	(0.016)
Male Judge and Male Skater			0.028				
			(0.059)				
Female Judge and Female Skater			0.026				
			(0.071)				
Skater Fixed Effect?	No	No	No	Yes	Yes	Yes	Yes
Judge Fixed Effect?	No	No	No	Yes	Yes	Yes	Yes
Competition Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,715	5,715	5,715	5,715	5,715	5,715	5,715
R-squared	0.827	0.827	0.827	0.855	0.855	0.855	0.855

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

Table 6A: Factors affecting judges' marks
2010-12 National Championships, Junior and Novice Long Programs

	Novice			Junior			Novice			Junior		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Judge and skater share club affiliation	0.394***	0.332***	0.317***	0.200***	0.237***	0.252***	0.358***	0.289**	0.289**	0.257**	0.263**	0.267**
	(0.090)	(0.096)	(0.101)	(0.069)	(0.081)	(0.086)	(0.129)	(0.132)	(0.132)	(0.100)	(0.108)	(0.106)
Mean component score of other judges	1.042***	1.043***	1.045***	1.070***	1.069***	1.073***	0.604***	0.605***	0.605***	0.946***	0.949***	0.945***
	(0.019)	(0.016)	(0.017)	(0.026)	(0.027)	(0.026)	(0.057)	(0.056)	(0.056)	(0.042)	(0.043)	(0.046)
Judge and skater reside in same region	0.162***	0.080**		0.071	0.112**		0.145***			0.055		
	(0.040)	(0.037)		(0.052)	(0.055)		(0.041)			(0.045)		
Male Judge and Male Skater			0.053			-0.011			0.838***			0.370
			(0.111)			(0.115)			(0.148)			(0.228)
Female Judge and Female Skater			0.112*			-0.006						-0.052
			(0.057)			(0.065)						(0.093)
Log distance between skater club and judge's residence		-0.037**	0.052***		0.019	-0.001		0.051***	0.051***		-0.011	-0.011
		(0.019)	(0.018)		(0.017)	(0.015)		(0.014)	(0.014)		(0.014)	(0.014)
Skater Fixed Effect?	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Judge Fixed Effect?	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Competition Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,195	3,195	3,195	3,330	3,330	3,330	3,195	3,195	3,195	3,330	3,330	3,330
R-squared	0.569	0.571	0.575	0.673	0.673	0.672	0.681	0.683	0.683	0.744	0.744	0.746

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

Table 6B: Factors affecting judges' marks
2010-12 National Championships, Senior Short Program

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	0.125*	0.175***	0.134*	0.184***	0.169**	0.159**	0.171**	0.160**
	(0.073)	(0.066)	(0.075)	(0.068)	(0.076)	(0.072)	(0.080)	(0.072)
Mean component score of other judges	1.078***	1.078***	1.081***	1.080***	0.757***	0.758***	0.760***	0.761***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.053)	(0.053)	(0.053)	(0.053)
Judge and skater reside in same region	0.049		0.048		0.067		0.068	
	(0.066)		(0.066)		(0.059)		(0.059)	
Male Judge and Male Skater			-0.095	-0.095			-0.006	0.005
			(0.096)	(0.095)			(0.041)	(0.043)
Female Judge and Female Skater			-0.020	-0.021			0.746***	0.737***
			(0.075)	(0.075)			(0.056)	(0.057)
Log distance between skater		0.004		0.004		-0.016		-0.017
club and judge's residence		(0.014)		(0.014)		(0.014)		(0.014)
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 assigned for a skate component by a judge. Standard errors are clustered by competitor and judge. *** p<0.01, ** p<0.05, * p<0.1, two tailed test.

Table 6C:Factors affecting judges' marks
2010-12, Long program Singles. Nationals, skaters placing lower than 10th in the free skate

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Judge and skater share club affiliation	0.051	0.047	0.055	0.051	0.176	0.124	0.180	0.126
	(0.121)	(0.118)	(0.126)	(0.121)	(0.138)	(0.138)	(0.134)	(0.134)
Mean component score of other judges	1.070***	1.070***	1.070***	1.070***	0.790***	0.790***	0.791***	0.790***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.054)	(0.054)	(0.054)	(0.054)
Judge and skater reside in same region	-0.057		-0.057		-0.119**		-0.115**	
	(0.063)		(0.063)		(0.054)		(0.053)	
Male Judge and Male Skater			0.023	0.024			0.372***	0.204***
			(0.082)	(0.082)			(0.112)	(0.057)
Female Judge and Female Skater			0.014	0.016			-0.086	0.099
			(0.094)	(0.093)			(0.178)	(0.186)
Log distance between skater		0.009		0.010		0.011		0.010
club and judge's residence		(0.009)		(0.008)		(0.008)		(0.008)
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	0.698	0.698	0.698	0.776	0.775	0.776	0.775

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

Table 7: Factors affecting judges' marks
2011-12 Season. Synchronized. All Levels of Competition

	(1)	(2)	(3)	(4)	(5)	(6)
Judge and skater share club affiliation	0.505***	0.430***	0.444***	0.390***	0.373***	0.361***
	(0.083)	(0.117)	(0.116)	(0.092)	(0.113)	(0.113)
Mean component score of other judges	1.049***	1.061***	1.060***	0.563***	1.033***	1.022***
	(0.019)	(0.016)	(0.017)	(0.112)	(0.028)	(0.027)
Judge and skater reside in same region	-0.062		-0.106	0.018		
	(0.111)		(0.131)	(0.069)		
Junior skater/team	0.096	0.078	0.079	0.909***	0.137	0.147
	(0.114)	(0.116)	(0.114)	(0.243)	(0.120)	(0.121)
Senior skater/team	0.282***	0.225**	0.234**	1.114***	0.317**	0.323**
	(0.107)	(0.112)	(0.112)	(0.264)	(0.134)	(0.134)
Log distance between skater		-0.012	-0.031		-0.039	-0.041
club and judge's residence		(0.038)	(0.043)		(0.035)	(0.035)
Skater Fixed Effect?	No	No	No	Yes	Yes	Yes
Judge Fixed Effect?	No	No	No	Yes	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,240	3,170	3,170	3,240	3,170	3,170
R-squared	0.798	0.799	0.799	0.882	0.793	0.794

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

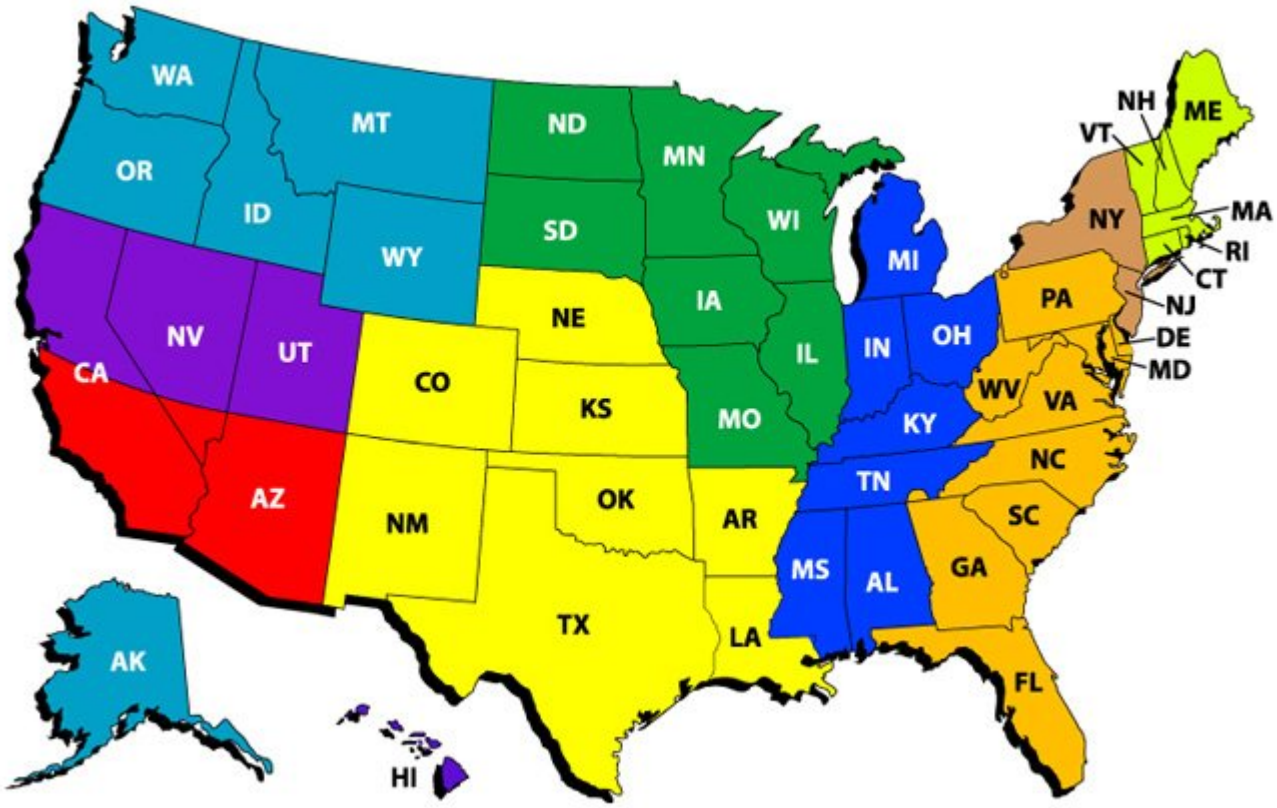
Table 8: Factors affecting judges' marks
2010-12 Synchronized Skating Nationals. Long Programs No TV

	(1)	(2)	(3)	(4)
Judge and skater share club affiliation	0.276***	0.267**	0.299***	0.290***
	(0.096)	(0.112)	(0.096)	(0.093)
Mean component score of other judges	1.087***	1.087***	0.873***	0.873***
	(0.020)	(0.019)	(0.053)	(0.053)
Judge and skater reside in same region	0.063		0.056	
	(0.061)		(0.066)	
Junior skater/team	0.043	0.042	0.298**	0.299**
	(0.063)	(0.063)	(0.124)	(0.125)
Senior skater/team	0.101	0.104	0.572***	0.573***
	(0.120)	(0.119)	(0.207)	(0.207)
Log distance between skater club and judge's residence		-0.018		-0.016
		(0.018)		(0.014)
Skater Fixed Effect?	No	No	Yes	Yes
Judge Fixed Effect?	No	No	Yes	Yes
Competition Fixed Effect?	Yes	Yes	Yes	Yes
Observations	4,320	4,320	4,320	4,320
R-squared	0.873	0.873	0.899	0.899

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

Appendix:

Figure A1: Ice Skating Regions in the United States



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
10	SlSt3		3.30		0.00	0	0	0	0	0	0				3.30
11	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

Deductions											**-0.00**	

Majority deductions	**J1**	**J2**	**J3**	**J4**	**J5**	**J6**	**J7**	**J8**	**J9**		**REF**	

Notes: The upper half of the sample score sheet provides a listing of the elements performed and the grades of execution marks awarded for each element by each judges. The points for each element after adjustment for the quality of execution are totaled and comprise the total element score. The lower portion of the sample score sheet provides the particulars of the program component scores. The last column of Table A1, entitled "Panel Scores," shows the trimmed mean, which discards the highest and lowest score, then these five program components averages are summed to a total component score. As determined by the ISU and the U.S. Figure Skating

Association, the total component score is multiplied 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 to the technical elements score as the number and point value of the technical elements attempted vary according to skater 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. Those scores are discarded and the remaining four scores account for the mean Transitions score of 5.06. In this example, the trimmed means are summed up and multiplied with 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.

Table A2: Summary Statistics for Table 2
2011-12 Season, All Levels of Qualifying Competitions, Singles and Synchronized Skating
N = 39,380

	Variable	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	mark	4.431	1.295	0.75	10
Judge and skater share club affiliation	relationship	0.053	0.227	0	1
Mean component score of other judges on panel	newmymean	3.762	1.102	1.333	8.667
Judge and skater reside in same region	sameregion	0.397	0.489	0	1
Log distance between skater club and judge residence	Log distance	5.769	1.477	0	8.121
Junior level skater	Junior	0.299	0.458	0	1
Senior level skater	Senior	0.307	0.461	0	1

Table A3: Summary Statistics for Table 3
2011-12 Season. Singles. All Levels of Competition
N=36,140

	Variable	Mean	Std. Dev.	Min	Max
Component mark assigned by judge	Mark	4.365	1.251	0.75	10
Judge and skater share club affiliation	Relationship	0.054	0.228	0	1
Mean component score of other judges on panel	Newmymean	3.670	1.068	1.333	8.667
Judge and skater reside in same region	Sameregion	0.415	0.492	0	1
Log distance between skater club and judge residence	Log distance	5.730	1.477	0	8.121
Junior level skater	Junior	0.299	0.458	0	1
Senior level skater	Senior	0.315	0.464	0	1

Table A4: Summary Statistics for Table 4A and 4B
2011-12 Season, Singles Competitions

	Regional Events					
	Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Component mark assigned by judge	mark	22820	3.887	0.902	0.75	8
Judge and skater share club affiliation	relationship	22820	0.068	0.256	0	2
Mean component score of other judges on panel	newmymean	22820	3.230	0.653	1.333	6.208
Judge and skater reside in same region	sameregion	22820	0.533	0.499	0	1
Log distance between skater club and judge residence	log distance	22215	5.415	1.444	0	7.786
Junior level skater	junior	22820	0.310	0.463	0	1
Senior level skater	senior	22820	0.268	0.443		1
	Sectional Events					
	Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Component mark assigned by judge	mark	5490	4.513	1.122	1.5	8.25
Judge and skater share club affiliation	relationship	5490	0.032	0.175	0	1
Mean component score of other judges on panel	newmymean	5490	3.764	0.849	1.708	6.208
Judge and skater reside in same region	sameregion	5490	0.346	0.476	0	1
Log distance between skater club and judge residence	log distance	5370	5.663	1.373	0.869	7.988
Junior level skater	Junior	5490	0.289	0.453	0	1
Senior level skater	Senior	5490	0.314	0.465	0	1
	National Championships					
	Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Component mark assigned by judge	Mark	7830	5.653	1.273	2.25	10
Judge and skater share club affiliation	Relationship	7830	0.026	0.161	0	1
Mean component score of other judges on panel	Newmymean	7830	5.025	1.056	2.972	8.666
Judge and skater reside in same region	Sameregion	7830	0.118	0.322	0	1
Log distance between skater club and judge residence	Log distance	7830	6.669	1.204	0.869	8.121
Junior level skater	Junior	7830	0.275	0.446	0	1
Senior level skater	Senior	7830	0.448	0.497	0	1