An Evaluation of an Age Eligibility Policy Intervention in Tennis

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A well-recognized developmental problem resulting from categorizing children into chronological age groups that adhere to an arbitrary cutoff date is relative age effects (RAE), which refer to the physical and/or cognitive differences between children within the same annual age-grouped cohort. Although this method of categorization is meant to minimize disparities in children’s maturity and create more uniform youth competition and evaluation, there has been ample documentation reporting selection bias in favor of children born shortly after the cutoff date (Cobley, Baker, Wattie, & McKenna, 2009). Given this result, a persistence of RAEs could have impacts on labor market outcomes later in life, highlighting the importance of policy intervention to combat their rather arbitrary influence on early exit of certain groups of students or athletes. Unlike in school however, physical maturity discrepancies and the voluntary aspect of participation in sport are likely to amplify the presence of RAEs. Indeed, RAEs have been shown to affect the athletic development of children in many sports, including tennis (Ulbricht, Fernandez-Fernandez, Mendez-Villanueva, & Ferrauti, 2015), which is the focus of the presentation proposed here.

Previous studies observing RAEs in tennis have consistently demonstrated skewed birth date distributions with more tennis players (amateur and professional) being born in the first half of the year due to the commonly used January 1st cutoff date (Edgar & O’Donoghue, 2005; Giacomini, 1999; Ulbricht et al., 2015). In response to this issue, the United States Tennis Association (USTA) removed the January 1st cutoff date, and adopted a “month-of-birth” age eligibility rule in 1999, allowing children to compete in their age group until the last day of the prior month of their birthday. The intent of this policy change was to address competitive disadvantages, especially for those born towards the end of the year, to encourage participation by leveling out maturity discrepancies and enhance the overall junior performances.

Purpose of the Study
Given that 15 years have elapsed since the inception of this policy, this study comes at an appropriate time to assess the effects of this RAE-targeted youth level policy on professional players’ performance. Although such effects should depreciate as athletes reach puberty, past research has shown that RAEs tend to not only prevail at the junior level but also persist at the professional level in tennis (Edgar & O’Donoghue, 2005). Using the “month-of-birth” age eligibility policy change as the center of a natural experiment, the aim of this study is to estimate, using a triple difference estimation, the long-term effects of this age grouping policy on the performance of American professional tennis players ranked top 250 in the Women’s Tennis Association (WTA) and Association of Tennis Professionals (ATP) from 1990 to 2015. Since international junior competitions are based on the January 1st cutoff date, top 250 international professional tennis players during that same period will enable us to control for group specific trends.

Most analyses of RAEs in sport remain largely observational, and limited inquiries into the effects of a policy change on RAEs make it challenging for practitioners searching for strategies to alleviate them. Therefore, this study will add to the body of literature on RAEs by implementing a quasi-experimental econometric model to establish causal effects of policy change aimed at lessening RAEs.

Data and Method
For the empirical analysis of the policy change, two panel datasets of players ranked in the top 250’s year-end single rankings from 1990 to 2015 were constructed using publicly-available sources (ATP, 2016; WTA, 2016). Players born before 1981 were assumed to not have been subject to the policy. A brief overview of U.S. women’s birth dates distribution exhibits a reverse of the expected long-run effect of the policy, with a statistically significant drop of relatively younger players from 56% pre-policy to 42% post-policy. Opposite results were found for the birth dates distribution of U.S. men’s players, with a statistically significant increase of relatively younger players from 54% pre-policy to 63% post-policy. Thus, the policy may have enhanced the skewness of birth dates distribution towards the
end of the year for male athletes.

We examine outcomes more closely at the professional level by assuming that the difference in rankings trends for players born in the first half and second half of the year would have been the same in the U.S.A. and non-U.S.A. countries in the absence of the policy change. Therefore, the causal effect of the policy change is estimated using the following difference-in-differences-in-differences equation:

\[
\text{Ranking}_{ict} = B_0 + B_1\text{USA}_c + B_2\text{post}_t + B_3\text{secondhalf}_i + B_4\text{USA}_c\text{post}_t + B_5\text{USA}_c\text{secondhalf}_i + B_6\text{post}_t\text{secondhalf}_i + B_7\text{USA}_c\text{secondhalf}_i\text{post}_t + e_{ict}
\]

where the outcome variable is denoted by \( \text{Ranking}_{ict} \), which represents the ranking of an individual \( i \) at time \( t \) in country \( c \). \( \text{USA}_c \) is a dummy variable for U.S. players and zero otherwise. \( \text{post}_t \) indicates the time period and equals 1 for the post-policy. \( \text{secondhalf}_i \) is a dummy variable that takes the value 1 if an individual is born in the second half of the year. The triple interaction term \( \text{USA}_c\text{secondhalf}_i\text{post}_t \) is equal to 1 if an individual is from the USA, born in the second half of the year and played youth level tournaments in the post-policy period (post 1999). In this model, the Average Treatment Effect on the Treated (ATT) or the causal effect of the policy on rankings is given by the triple interaction \( B_7 \).

Discussion and Implications

Preliminary results indicated that the policy change did not appear to have an impact on birth dates distribution or long-term effects on rankings of professional women's tennis players. However, we find a statistically significant change from the policy for the U.S. male sample, with U.S. players born in the second half of the year having an average ranking that is 39 ranks higher than their international counterpart. Yet, such a long-term impact may be attributed to lower performances of those born in the first half of the year rather than to higher performances of those born in the second half of the year. Indeed, U.S. players born in the first half of the year had on average a ranking that is 31 ranks lower from pre- to post-policy periods. Using a triple difference estimate by adding the international sample of players to serve as a control group improves the robustness of the identified long-term impact of the policy by controlling potential confounding trends in average rankings of players born later in the year across countries and in average rankings of all players within the U.S. Our international sample showed that players born towards the end of the year had on average a ranking that is 10 ranks lower than those born towards the beginning of the year.

Given the USTA policy change intended to balance out birth dates distributions by enabling players born in the latter part of the year to play longer in their age category than a traditional January 1st cutoff date, such results may provide important practical implications for national and international youth sport governing bodies, athlete development specialists, coaches, and policy makers who are seeking for ways to improve current participation and selection policies in tennis as well as other individual sports. On the one hand, the ultimate goal of any RAPEs related policies should be to encourage a fair participation for all athletes regardless of their birthdates. This USTA policy, however, may have overcompensated competitive disadvantages of relatively younger children, or have been poorly targeted, at least for affecting professional tennis outcomes. We plan to discuss extension of our work to the amateur level, where we expect to see more prominent effects of the policy.