



Gender differences in response to contingent rewards: Evidence from a natural experiment of junior tennis[☆]



Nejat Anbarci^a, K. Peren Arin^b, Jungmin Lee^{c,d,*}

^a Deakin University, Australia

^b Zayed University, United Arab Emirates

^c Sogang University, Republic of Korea

^d Institute for the Study of Labor (IZA), Germany

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ABSTRACT

We investigate gender differences in responding to contingent rewards by exploiting a natural experiment in junior tennis tournaments in Florida where the ranking point system was revised to induce more players to play doubles. The new point system increased the points earned from wins in singles matches significantly if the two thirds or more of players in their sex/age group chose to play doubles. We examine three types of potential responses to the new system: (1) a 'positive' response of playing doubles more by singles winners, (2) a 'subversive' response of playing doubles less by singles losers, and (3) a 'slack' response of playing loosely in their doubles matches by singles winners. We find strong evidence on the positive response among boys and top-ranked girls but no evidence for subversive and slack responses.

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1. Introduction

According to a growing body of evidence from empirical and experimental studies, individuals respond to incentives and especially to rewards that are contingent upon effective performance. On the other hand, some other studies have recently found that individuals do not necessarily respond to explicit incentives in a simple monotonic manner. For example, it has been found that people might behave even in the opposite direction of what explicit incentives intend to induce (Gneezy and Rustichini, 2000; James, 2005). It is therefore important to understand when such economic rewards work and when they do not.

In this paper, we aim to shed more light on the issue by examining gender differences in response to explicit incentives at young ages. We exploit a natural experiment in junior tennis tournaments

– a change in the ranking point system in 2005 instituted by the governing United States Tennis Association (USTA) Florida Section, which it applied to its 'Super Series' tournaments. The aim of the system change was to encourage junior players to play more doubles matches. Under the new point system, if at least 2/3 of players in their sex-age group play doubles, the points earned from wins in singles matches increase by roughly 75%; otherwise, players receive their base points as in the old point system.

We examine how young players respond to the change in the incentives to play doubles and, in particular, whether boys and girls do respond differently. Since the rule change is clearly set, the ranking points are high stakes for players,¹ and there are separate tournaments for boys and girls, our natural experimental setting provides us with a good opportunity to study gender differences in response to explicit incentives.

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* Corresponding author at: Sogang University, Republic of Korea.
Tel.: +82 27058504.

E-mail address: jungle@sogang.ac.kr (J. Lee).

¹ Points are important for junior players' careers toward college scholarships, if not toward professional play later. Points determine rankings, and points earned at the local or state level tournaments are needed to qualify for higher national-level tournaments at each age group. Doubles matches were not very popular before, because singles' rankings points were not affected by winning or losing those matches.

Different genders may exhibit different degrees of response to contingent rewards in a given activity. Then gender may be another critical factor besides standard variables that one may have to consider regarding workers' compensation scheme (e.g., performance pay), motivation of students at schools, and incentive mechanisms in various contexts.² There has been a growing body of literature involving laboratory and field experiments which examine the extent of innate or culturally and socially determined gender differences in certain personal traits, such as risk aversion, overconfidence, and competitiveness.³

Gneezy, Niederle, and Rustichini (2003) and Gneezy and Rustichini (2004) find that competition improves performance relative to a noncompetitive environment for males, but not for females. Niederle and Vesterlund (2007), using a laboratory experiment with university students, however find no gender differences in performance on an arithmetic task under either a non-competitive piece rate compensation scheme or a competitive tournament scheme. But they do find that men are significantly more likely than women to self-select into the competitive compensation scheme. Booth and Nolen (2012), using a laboratory experiment with students under 15 years old, find robust differences in competitiveness between girls from single-sex and those from coeducational schools. Specifically, they find that girls from single-sex schools behave more like boys. Thus, they contend that one cannot claim that the average female avoids competitive behavior more than the average male does; they instead suggest that observed gender differences might reflect social learning rather than inherent gender traits.

Gender differences in competitiveness constitute a major topic outside of economics as well. In psychology, Campbell (2002) cites numerous studies which suggest that men are more competitive than women by self-selection, as during their formative years boys spend most of their time at competitive games and girls select activities that are less competitive and more cooperative. In addition, evolutionary biology and sociobiology literatures teem with work that documents differences in competitiveness between males and females in many species (see, for instance, Knight, 2002). These literatures argue that the differences in competitiveness are actually due to differences in the cost of reproduction: since for males the cost of participating in the reproductive process is very low, they will attempt to mate with many partners and, to do so, they will be willing to compete with other males. On the other hand, since females endure a much higher cost in parental investment, they are inherently much more choosy, rather than competitive.

Here in order to focus on gender differences in response to contingent rewards in competitive environments, we examine how junior tennis players respond to the ranking point change intended to increase participation in doubles. Under the old point system, many players already had some incentive to play doubles regardless of the outcome of their singles matches – simply to hone their tennis skills because the tournament fee is a sunk cost once that tournament is entered and there is no additional fee for

the doubles part of that tournament.⁴ This honing motivation to improve one's tennis skills exists in the new point system as well. The new point system, however, added more explicit incentives regarding playing doubles for players who won their first singles match.

The reform of the ranking point system provides us a natural experiment to examine how people respond to a change in contingent rewards. Specifically, we examine three types of rational responses to a change in contingent rewards. First, those players who win their first singles match (simply "winners" hereafter) would be more likely to participate in doubles to increase their earned points for their first match wins as well as their option values in the rest of their singles matches in the tournament – a 'positive' response of winners to contingent rewards. Second, those players who lose their first singles match (simply "losers" hereafter) could refrain from playing doubles in order not to allow the winners to gain more grounds against themselves – a 'subversive' response to contingent rewards. Third, since the singles ranking was the only ranking that really mattered for their career at that time, there is a potential incentive issue in that winners could put out much more effort in the dimension where it is rewarded and perform perfunctorily (to minimize effort) in the doubles matches they would play to increase their singles points by focusing more than further singles matches in the tournament – thus, the positive response of the winners could involve a 'slack' response by them to contingent rewards as a negative by-product.

Using a novel data set on 3887 players and their 10,405 decisions to play or not in doubles matches in 77 junior tournaments during the years of 2004 and 2005 – before and after the point system change, we use the difference-in-differences method examining whether singles match winners are more likely to participate in doubles after the system change. The reform of the ranking point system changed the incentive to play doubles differentially by whether singles players have won their first match. Also having individual-level panel data, we control for players' unobservable characteristics such as their career concern or passion about tennis by individual-specific fixed effects. We find a positive response among boys regardless of their rankings. Although there is no positive response by girls overall, top-ranked girls respond to contingent rewards just like boys. Our result for top-ranked girls is consistent with general findings that gender differences are smaller among professionals (refer to section 2.4 of Croson and Gneezy, 2009). We find no evidence for either a boys respond to contingent rewards positively but not subversively. This is true regardless of their ranking.

The remainder of the paper is organized as follows: our novel dataset and our research methodology is explained in Section 2. Section 3 discusses the empirical results in detail. Finally, Section 4 concludes.

2. Natural experiment, data and empirical model

In 2005, the USTA Florida Section changed the ranking point system for the purpose of encourage junior players to play more doubles matches. Under the new point system, if at least 2/3 of players in their sex-age group play doubles, the points earned from wins in first-round singles matches increase by roughly 75%. An important detail is that, for practical logistical reasons such as court availability, in tennis tournaments doubles matches do not start

² The most relevant field should be education. For example, Cawley, Frisvold, and Meyerhoefer (2013) find that at elementary school, for girls, additional physical education (PE) time crowds out participation in individual sports and playground activities. For boys, on the other hand, additional PE time increases structured sports activities, free-time physical activity, and aerobic exercise. They conclude that "PE time and other types of physical activity may be complements for boys, but substitutes for girls." This example shows that a policy regarding PE time can have different consequences between genders. In the education literature, similar findings are used for supporting single-sex schooling and classes.

³ For a survey on gender differences in preferences, please refer to Croson and Gneezy (2009).

⁴ As is generally agreed, "It's more interesting to play a match of doubles than to practice" (<http://blogs.wsj.com/dailyfix/2009/09/05/doubles-tennis-more-fun-than-practice/>). In addition, a typical tennis lesson for an hour involves a coaching fee of at least \$70–75.

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