Difference of women's performance according to circumstances: The case speedboat racing in Japan.

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Abstract:

In the speedboat racing in Japan, women racers can participate and compete in the race in the same condition as the men racer do. This paper used the individual level panel data of records of the racing during the period April 2014-October 2015 to examine how the men's dominated circumstance influence women's performance in the race. The data allows us to control for various factors such as unobservable individual fixed effect, one's lean in the race, popularity, her conditions in the race, and weather condition. After controlling these factors, based on the women's race sample, we observe that the women's time of mixed race loses by approximately 0.3% in compared with that of the women's race.

Keywords: Peer effect; Gender and competition; Women's labor participation
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1. Introduction

Many societies have been seemingly characterized by the division of labor between genders. Men are inclined to work and earn money while women are likely to be household wife. In modern society, it is critical policy issues how to realize women's labor participation and gender equality in the work place. For this purpose, mutual understanding about opposite gender is thought to be called for. An increasing number of works deals with the difference of genders concerning performance in competitive environment (Booth 2009; Gneezy et al., 2003) and preference to competition (Gneezy et al, 2009; Booth and Nolen 2012)[2], value in winning (Zhuoqiong et al. 2015), and attitude towards risk (Booth et al., 2014a).

As is observed by the laboratory experiment of Gneezy et al. (2003), women's performance differ whether women compete against men or women in competitive environments. As for educational performance, single-sex education causes women to have better academic outcomes than coeducation (Booth et al., 2014b)[3]. However, studies using competitive environment in the real labor market have been scarce mainly because work conditions for women and men are different. In the labor market of Japan speedboat race where rate of women racers is approximately 13 % among all racers, women racers are equally treated as men racers and can compete with men in a race. Women racers are assigned to compete in the single-gender race and the mixed-gender race. Using novel and large sample data of women racer's time record, this paper aims to examine how women's performance changed according to the type of races.

2. Setting and data

Basic information about Japan boat race in this section is sourced from Matsumura (2015). In speedboat racing in Japan, there about 1600 racers, which are composed of 1400 men and 200 women racers[4]. Their ages raged between 18 and 70 years old[5]. Hence, wide variety of ages and genders in racers. In Japan, 24 speedboat racing stadiums throughout Japan and boat races are randomly held about four days per week in each stadium. Racers go to many different stadium to participate in the race. In each racing fixture, there are 12 races and 6 racers compete in a race.

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[2] Performance is also influenced by peer pressure (Yamane and Hayashi 2015).
[3] Girls who prefer single-sex schools have better exam performance due to attending single-sex schools (Jackson 2012).
[4] In order to be the professional speedboat racer, it is obliged to learn for one year and pass the examination in Yamato Kyotei Gakko (Yamato boat school) which is only a school to train professional boat racers.
[5] Youngest age of racer is 16 years old because those aged between 15 and 29 years can enter the Yamato Kyotei Gakko. However, there is not compulsory retirement age.

The circuit is 600 m in length and racers drive around it three times, leading to 1800 m in a race. There are three categories depending on composition of racers genders; the men race where all 6 racers are men, the women race where only women participate, and the mixed-gender race where both men and women racers participated[6]. There is no difference of condition between men and women racers when they compete in the race. Reflecting the gender ratio, there are only one or two women racers among 6 racers in most case of the gender-mixed race. However, among different types of races, rule and condition are equivalent[7]. Therefore, even in the gender-mixed races, women racers are treated as men racers on an equal basis[8].

Labor market of the Japan speedboat racing is characterized by the openness to ages and genders. Hence, women can compete with men and win the race if her time record is the fastest among racers in the gender-mixed race. For women racers, the difference between the women race and the gender-mixed race is only as follows; all 5 competitors are the same sex (women) in the women race, whereas 5 competitors are almost opposite sex (men). This setting allows me to examine how the gender of competitors influenced the women's performance.

In this paper, I compiled the women's individual's records of the racing during the period April 2014-October 2015. Accordingly, the panel data can be constructed for number of women racers and races where they participated. In a racing fixture, racers participate in two or three races. During the studied period, there are 202 women racers and her participated races are averagely 250, resulting in totally 50,000 observations. Among 24 boat race stadium, only 7 stadium provides the all racers records[9]. In this study, sample is restricted to races with all racers' record and so number of records used for this analysis reduced to about 16,000.

Table 1 reports the mean difference test of women racer's time record between the women's race and the mixed race. Numbers of women's races are 11,902, which is about two time larger than that of the mixed races. I see from it that women racer's time is about 1.3 seconds faster in the women's race than in the mixed race. It is statistically significant at the 1 % level. In the next section, for more closely examining it, the fixed effects regression model is used.

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[6] In terms of status of races, races are also classified into four grades; the super grade, grade I, grade II, and grade III..

[7] With the exception of limits of bottom weight, men (women) racers are obliged to be over 50 kg (47.5 kg).

[8] A maker and its model of boat and motors used are the same for all races. The boat and motors are not used in the race if they are registered for over one year. However, its individual performance varied among boats and motors due to differences of deterioration and maintenance. Hence, racer who ride on the boat and motor with higher performance have a greater advantage. In order to avoid unfairness among racers, allocation of machine is decided by drawing lots.

[9] Location of the 7 stadiums providing all racers' time records are Suminoe, Marugame, Kiryu, Miyajima, Biwako, Karatsu, Amagasaki.

Table 1. Mean difference test of women racers' time record between women's and mixed race (unit is second).

Women's race	Mixed race	t-value
112.8	114.1	23.4***
(11,092)	(4,981)	

*Note: *** indicates the statistical significance at the 1 % level. Numbers in parentheses are number of observations.*

3. Results

Results of the Fixed Effects model are presented in the Table 2. In this model, women racer's unobservable fixed characteristics such as racer's talent are controlled. Dependent variable is log of time record in a race and key independent variable is the dummy of women's race (reference group is the gender mixed race). For convenience of interpretation, dependent and independent variables are converted into log-form it they are continuous variables.

In addition, variables which is thought to influence the record are included as control variables; Number of lanes[10], log of racers' weight[11], log of exhibition time[12], log of start time[13], racer's popularity[14]. Weather condition and the boat allocated to racers are captured by inclusion of days-location dummies although results are not reported.

I see from column (1), Women's race dummy has the negative sign. On the other hand, log of weight and dummies for popularity (reference group is the first lane) are positive sign. They are statistically significant at the 1% level. As in column (2), even when other control variables are added, results of Women's race dummy does not change and control variables have the expected sign while being statistically significant. For instance, the positive sign of exhibition time is thought to reflect that the racer's bad condition in the race and her low ability leads to slower time in the race. In addition, dummies for popularity shows the significant positives sign implies that unpopular racer's time is behind popular racer's one.

[10] The first lance is the inner and increase in number indicates outer lane. Inner lane is generally known as advantageous for racers.
[11] Time of race is longer if racer's weight is heavier.
[12] When racer's name is announced before the race, every racers drive a boat alone for short distance (150m) in the part of straight line in the track, and its time is immediately exhibited. This provides the racer's condition in the race. The short exhibition time is thought to suggest racer's good condition which depends on physical and mental condition, and the condition of boat allocated to racers in the day.
[13] Time lag between the sound of the starter's sign and actual racers start is provided. When the time lag is short, racer can take its advantage for the race.
[14] Popularity of racers by betting, which is ranked from the first to 6th, is indicated in each race. This can be considered as the ability of the racers.

The results of women's race dummy implies that women racer's time record is 0.3 % faster in the women race than in the gender mixed race. This can be almost equivalent to 5 m difference at the point of goal. I have already controlled for various factors such as talent and ability of the racer (unobservable time-invariant racer's characteristics including talent), weather condition, conditions in a race (number of lane), racer's condition and ability (exhibition time), and her relative status in a race (popularity). The difference of time can be caused by the gender of competitors. If men behave more competitively than women, the finding of this study supports the results of laboratory experiment indicating that women may be less effective than men in competitive environments, even if they are able to perform similarly in non-competitive environments (Gneezy et al., 2003). Here, it is unknown whether women racer reduces her incentive in the race with opposite gender competitors or whether she is oppressed by men racers. It is remaining issue to address this issue to clarify the mechanism from the viewpoint of behavioral economics in the further works. To this end, for instance, effect of women's race dummy on the exhibition time and on start time should be considered.

Table 2. Dependent variable: log of time record in races (Fixed Effects Estimations):

	(1)	t-value	(3)	t-value
Women's race dummy	-0.003***	-3.18	-0.003***	-3.32
Ln (weight)	0.078***	3.87	0.074***	3.91
Ln (Start time)			0.007***	16.6
Ln (Exhibition time)			0.186***	7.29
Lane_1	<reference>		<reference>	
Lane_2			0.001	0.80
Lane_3			0.003***	3.37
Lane_4			0.003***	3.60
Lane_5			0.004***	4.13
Lane_6			0.007***	7.66
Popular_1	<reference>		<reference>	
Popular_2	0.009***	11.3	0.009***	11.3
Popular_3	0.013***	17.0	0.013***	17.0
Popular_4	0.017***	21.2	0.017***	21.2
Popular_5	0.021***	27.9	0.021***	27.9
Popular_6	0.024***	30.4	0.024***	30.4
Within R-Sq	0.28		0.31	
Groups	202		202	
Observations	16,703		16,508	

*Note: *** indicates the statistical significance at the 1 % level. T-value is calculated based on robust standard errors. Dummies for race grade, location dummies, interaction dummy between location and day are included but not reported.*

References.

Booth, A. L., 2009. Gender and competition. Labour Economics 16 (6), 599-606.

Booth, A.L. and Nolen, P. 2012.Choosing to compete: How different are girls and boys? Journal of Economic Behavior & Organization 81(2), 542-555.

Booth, A.L. Cardona Sosa, L., and Nolen, P. 2014 a. Gender differences in risk aversion: Do single-sex environments affect their development? Journal of Economic Behavior & Organization, 99(C), 126-154.

Booth, A.L. Cardona Sosa, L., and Nolen, P. 2014 b. Do single-sex classes affect achievement? an experiment in a coeducational university. CEPR Discussion Papers 10221, C.E.P.R. Discussion Papers.

Gneezy, U, Niederle, M., and Rustichini, A. 2003. Performance in competitive environments: Gender differences. Quarterly Journal of Economics 118, 1049-1074.

Gneezy, U., Leonard, K., and List, J. 2009. Gender differences in competition: evidence from a matrilineal and a patriarchal society. Econometrica 77, 1637-1664.

Jackson, C. K. 2012. Single-sex schools, student achievement, and course selection: Evi-dence from rule-based student assignments in Trinidad and Tobago. Journal of Public Economics 96, 173-187.

Matsumura, K. 2015. Yokuwakaru Boat Race no Subete (in Japanese) (Basic Kowledge about Boat Race). Tokyo: Sankei Books.

Yamane, S and Hayashi, R 2015. Peer effects among swimmers. Scandinavian Journal of Economics 117(4), 1230-1255.

Zhuoqiong, C. D., Ong, and Sheremeta,R.M. 2015. The gender difference in the value of winning. Economics Letters 137, 226–229