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# Effect of female elementary-school homeroom teachers on time preferences in adulthood

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## **Abstract**

Using teacher–student random gender matching and hand-collected individual-level data, we examine how female teachers in elementary schools influence students’ time preferences in adulthood. Our major finding is that female teachers lead pupils to have lower time discount rates. Furthermore, this effect on male pupils is larger than on female pupils.

*JEL classification: J16, A22.*

*Keywords: Time preference, Gender difference, Teacher–Student gender matches*

## **1. Introduction**

Time preferences are considered to be correlated with a range of life outcomes. Therefore, the formation of time preferences during one’s school days has recently attracted significant interest in economics and related fields (Andreoni et al., 2019; Perez-Arce, 2017; Sutter, 2018). It is also widely acknowledged that opposite-gender adults influence

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children's preferences, with the effects persisting even later in life. For instance, men with working mothers are likely to prefer working women as their partners (Kawaguchi and Miyazaki, 2009). In elementary school, opposite-gender teachers are thought to influence pupils' preferences. Men are inclined to support corporate social responsibility if they belonged to a female-teacher class in elementary school (Yamamura et al., 2019). However, little is known about the influence of female teachers on their pupils' time preferences.

We conducted web surveys to elicit the time preferences of over 2000 adults. In addition, we asked about the gender of their class teacher in the first grade of elementary school. In Japan, pupils aged 6 are randomly assigned to a homeroom class when they enter elementary school. Using the data from this quasi-natural experiment, we examined how the teacher's gender influenced the formation of children's time discounting, which persists in adulthood. After controlling for various variables, we find that female teachers contribute to reducing children's time discounting in their later years and that this effect is more significant and larger for male pupils than for female ones.

## **2. Data and Model**

We hand collected individual-level data through a web-based survey in March 2019. The Nikkei Research Company was commissioned to conduct the survey. Since we aimed to collect over 2,000 observations, the survey was active until the required numbers were met. A total of 2,333 respondents completed the questionnaire. However, since some questionnaires were incomplete, they were excluded from the sample. The final number of valid responses was 1,958, featuring 1,034 male and 924 female respondents. The respondents were Japanese adults aged 20–65 years. The sample's demographic composition is similar to that of the 2015 Japan Census.

The survey consisted of several questions: (i) gender of teacher in the first grade of elementary school, (ii) time and risk preferences, and (iii) respondents' economic, demographic, and social attributes, such as income, asset holdings, gender, educational background, and age. There could be bias because younger respondents could recall their teacher's gender more easily. However, in the sample, the response rate for the question about their homeroom teacher's gender in primary school is almost 80%, which is almost

the same in each cohort group<sup>1</sup>. Therefore, any recall bias may not be severe.

Under the Japanese education system, pupils enter elementary school in April at age 6 and are automatically assigned to a homeroom class. Pupils and their parents cannot choose the class in a public school. Public schools account for nearly 100 % of the elementary schools in Japan. Naturally, the data used in the estimation include pupils from public elementary schools only. According to the 2016 School Basic Survey, female teachers represent 65% of full-time teachers in elementary schools.<sup>2</sup> As shown in Figure 1, about 70 % of the survey respondents had been assigned to a homeroom class with a female teacher. Thus, the sample in this study can be considered as representative of Japanese society.

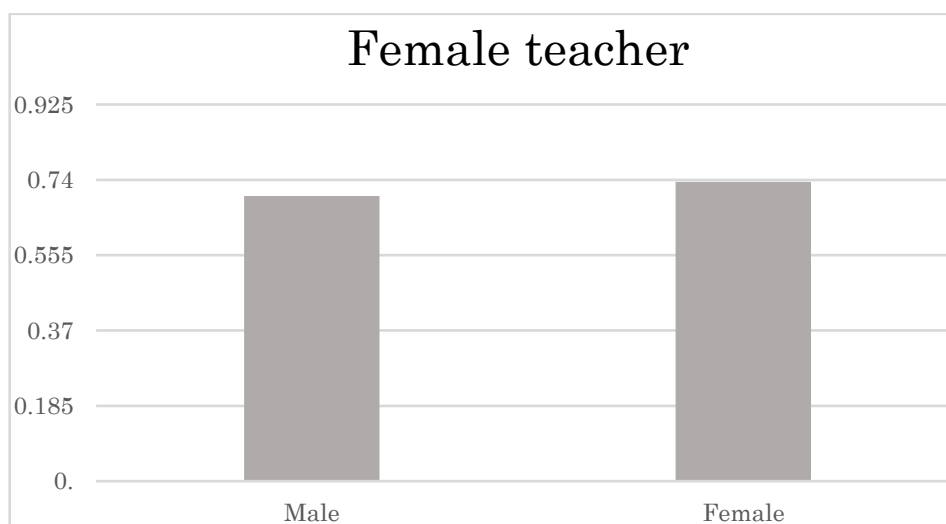


Figure 1. Ratio of respondents assigned to a female-teacher class.

Detailed and personal information about the pupils cannot be gathered by the elementary school until they enter school. The school has information about pupils' genders only when pupils are assigned to a class in the first grade. Hence, the assignment to a female teacher class can be considered to be a randomized event (Yamamura et al. 2019). We used our data to check whether the assignment is actually randomized. Figure 1 shows

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<sup>1</sup> The data are available upon request from the corresponding author.

<sup>2</sup> Data are available from the official website of the Statistics Bureau, Ministry of Internal Affairs and Communications

<https://www.e-stat.go.jp/stat-search/files?page=1&layout=datalist&tstat=000001011528&cycle=0&tclass1=000001110643&tclass2=000001110644&tclass3=000001110645&tclass4=000001110649&second2=1> (access on April 5, 2018)

the ratio of those who belonged to a female-teacher class in the first grade of elementary school. Figure 1 also shows that assignment to a female-teacher class is unlikely to depend on the pupils' genders.

Following Ikeda and Kang (2015) and Kang and Ikeda (2016), our survey asks two questions to elicit respondents' discount rates, which offer four binary intertemporal choices based on immediate future and distant future trade-offs<sup>3</sup>: respondents are asked to choose between (A) receiving JPY 10,000 today and (B) receiving JPY 10,000 plus a certain amount one month later; in Q2, respondents are asked to choose between (A) receiving JPY 10,000 one year later and (B) receiving JPY 10,000 plus a certain amount one year and one month later.

From each question, we obtain two 16-scaled variables on the short-term and long-term delayed monetary amounts, which are taken as being subjectively equivalent to JPY 10,000 in both cases of option (A). Let  $X_{Q1}$  and  $X_{Q2}$  be the delayed monetary amounts in Q1 and Q2, respectively. Then, the short-term discount rates,  $\rho_1$ , and long-term discount rates,  $\rho_2$ , are calculated by  $(X_{Q1}-10,000)/10,000$  and  $(X_{Q2}-10,000)/10,000$ , respectively.

To elicit the degree of risk aversion, our survey asks respondents to make eight binary choices in the payoff table, as shown in Appendix, on whether they would choose lottery "A," which pays out JPY10,000 with a probability of 0.25, or lottery "B," which pays out JPY14,000 at given probabilities ranging from 0.17 to 0.24. From the series of options chosen by respondents, which are expected to change from "A" to "B," the degree of risk aversion can be estimated as the median relative risk aversion (RRA) of the indifference categories in which the options they select are changed from "A" to "B."

We use standardized time discount rates for interpersonal comparison of short-term and long-term time discounting, where the rates range from negative to positive values. In Figure 2 (a) and (b), the mean values of the time discount rates are demonstrated for men in the left part, and for women in the right part. In each part, the left and right bars indicate values for those who belonged to male and female teacher classes, respectively. Figure 2 shows that the mean time discount rate of men is higher than that of women. More importantly, the time discount rate of female-teacher classes is, on average, clearly lower

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<sup>3</sup> Figure illustrating the procedure is available upon request from the corresponding author.

than that of male-teacher ones, regardless of the respondent's gender.

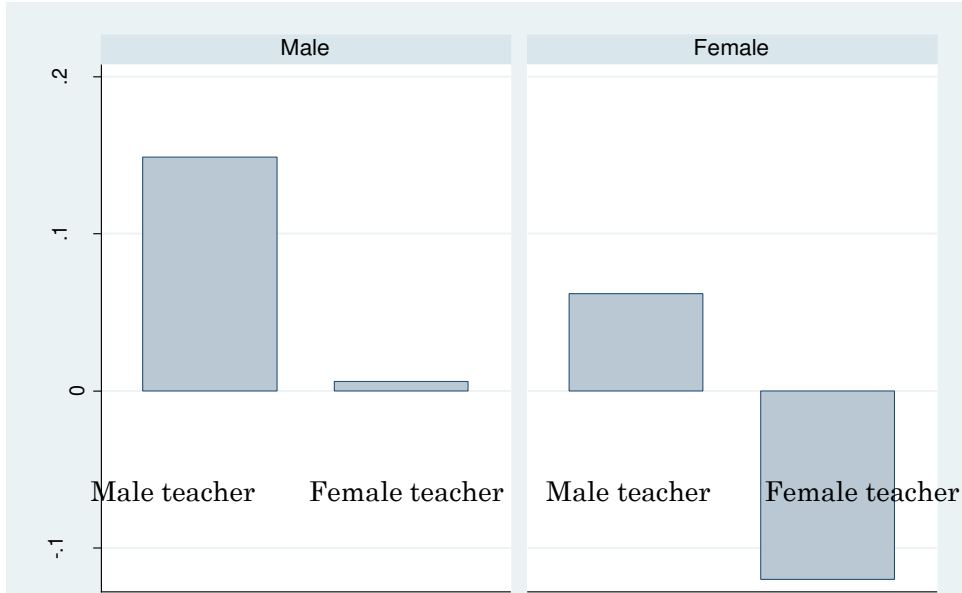


Figure 2 (a). Short-term time discount

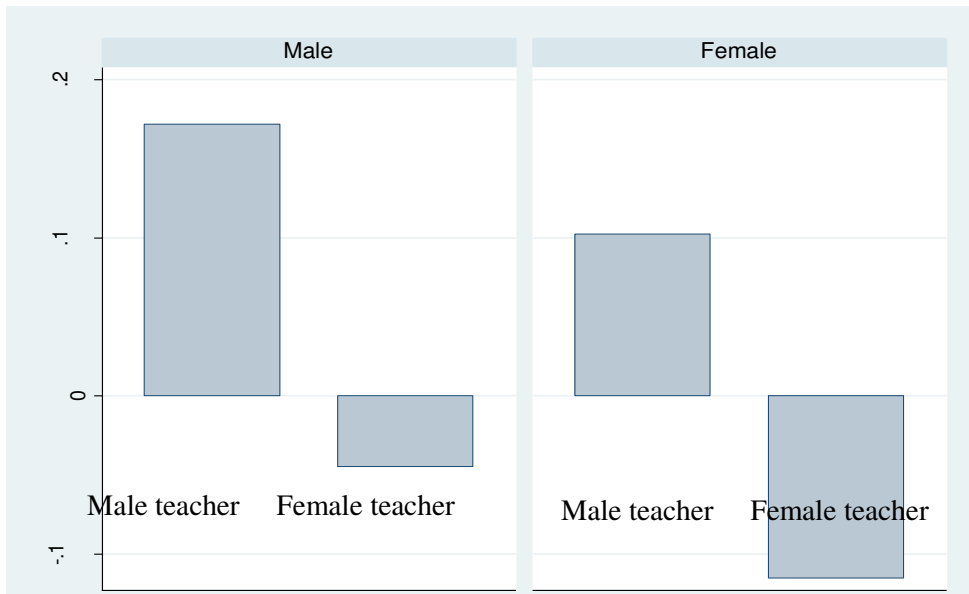


Figure 2 (b). Long-term time discount

Note: In all cases, differences in time discount between male and female teachers are statistically significant.

### 3. Results

Our model assesses how a female homeroom (class) teacher in elementary school affects her pupils' time discounting later in life. The estimated function takes the following form:

$$Time\ discounting_i = \alpha_0 + \alpha_1 Female\ teacher_i + \alpha_2 Risk\ Averse_i + X'_i B + u_i.$$

Apart from the above specification, where *time discounting* is the dependent variable, there are two other specifications where *short discounting* (short-term time discount rate) and *long discounting* (long term time discount) are adopted as dependent variables. The key independent variable is *Female teacher* (a dummy that takes the value of 1 if the respondent is assigned to a female homeroom teacher in the first grade, otherwise 0). Its coefficient has a negative sign if female teachers lead pupils to be more patient. Additionally, a proxy variable for risk aversion is included. In addition to the full-sample estimation in Panel A, we use sub-samples divided by the respondents' gender to examine the teacher-pupil gender-matching effects. *Female teacher* would show a significant positive sign only for the male sample if a different-gender matching effect exists (Yamamura et al., 2019). The control variables expressed as vector  $X'$  were also included.<sup>4</sup>

Table 1 Panel A shows the negative sign of *Female teacher* and its statistical significance at the 1 % level in all columns. The absolute value of its coefficients is 0.15 for the long-term discount rate, which is larger than for the short-term discount rate. In Panel B, we observed a significant negative sign of *Female teacher* in the male sample in all columns. By contrast, *Female teacher* indicates the statistical significance for the results of the long-term discount rate, but not for the short-term one. Furthermore, as a whole, the absolute values of the coefficient of *Female teacher* for the male sample is larger than for the female sample. These results indicate that a different-gender matching effect exists.

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<sup>4</sup> Control variables are respondents' ages and its square term, household income, marital status, job status dummies, educational background dummies, number of household members, number of children, and residential prefecture dummies at 6 years old.

Table 1. Regression estimation (OLS model): Dependent variable: Standardized time discount.

Panel A. Full sample

	(1) Short discount	(2) Long discount	(3) Short discount	(4) Long discount
<i>Female teacher</i>	-0.15*** (0.04)	-0.20*** (0.04)	-0.15*** (0.04)	-0.20*** (0.04)
<i>Risk Averse</i>			0.32*** (0.06)	0.44*** (0.04)
R-square	0.07	0.07	0.09	0.11
Observations	1,958	1,958	1,958	1,958

Panel B: Sub-sample

	Male sample				Female sample			
	(1) Short dis- count	(2) Long dis- count	(3) Short dis- count	(4) Long dis- count	(6) Short dis- count	(7) Long dis- count	(8) Short dis- count	(9) Long dis- count
<i>Female teacher</i>	-0.17** (0.07)	-0.24*** (0.06)	-0.16** (0.06)	-0.22*** (0.06)	-0.08 (0.07)	-0.13* (0.07)	-0.09 (0.07)	-0.15** (0.07)
<i>Risk Averse</i>			0.33*** (0.09)	0.53*** (0.07)			0.26*** (0.07)	0.30*** (0.07)
R-square	0.10	0.10	0.10	0.10	0.14	0.14	0.16	0.15
Observations	1,034	1,034	1,034	1,034	924	924	924	924

Note: Numbers within parentheses are robust-standard errors clustered on residential prefectures at 6 years old. \*\*\*, \*\*, \* indicates the statistical significance at 1 %, 5 %, and 10 % levels, respectively. Various control variables are included: respondents' ages and their square terms, household income, marital status, job status dummies, educational background dummies, number of household members, number of children, residential prefecture dummies at 6 .years old.



#### **4. Conclusion**

The empirical results of this study show that pupils aged 6 assigned to a female homeroom teacher in the first grade of elementary school tend to have lower time discount rates later in life than those who were assigned to a male teacher class. This tendency is observed more strongly for male pupils. This implies that female teachers lead male pupils to be more patient, which is regarded as different-gender matching effects. By contrast, women show lower discount rates on average. Women are likely to be more patient than men by nature. Furthermore, female pupils seem to be more mature than male pupils in the early stages of life. Thus, women are less likely to be influenced.

#### **Acknowledgment**

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### Appendix: The question to elicit the degree of risk aversion

Suppose you can choose between two options: “A” to receive JPY 10,000 with a probability 0.25 and “B” to receive JPY 14,000 with a lower probability than that of “A”. In either option, you cannot receive the money if you lose the lottery. Which option will you choose?

(Option A )		(Option B)
JPY 10,000 with Prob. 0.25	<input type="checkbox"/>	<input type="checkbox"/> JPY 10,000 with Prob. 0.17
JPY 10,000 with Prob. 0.25	<input type="checkbox"/>	<input type="checkbox"/> JPY 10,000 with Prob. 0.18
JPY 10,000 with Prob. 0.25	<input type="checkbox"/>	<input type="checkbox"/> JPY 10,000 with Prob. 0.19
JPY 10,000 with Prob. 0.25	<input type="checkbox"/>	<input type="checkbox"/> JPY 10,000 with Prob. 0.20
JPY 10,000 with Prob. 0.25	<input type="checkbox"/>	<input type="checkbox"/> JPY 10,000 with Prob. 0.21
JPY 10,000 with Prob. 0.25	<input type="checkbox"/>	<input type="checkbox"/> JPY 10,000 with Prob. 0.22
JPY 10,000 with Prob. 0.25	<input type="checkbox"/>	<input type="checkbox"/> JPY 10,000 with Prob. 0.23
JPY 10,000 with Prob. 0.25	<input type="checkbox"/>	<input type="checkbox"/> JPY 10,000 with Prob. 0.24