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The effect of the Free High School Tuition law on upper-secondary school choice in Japan

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ABSTRACT

The aim of this study was to analyse the determining factors behind parents' and students' decisions when choosing upper-secondary schools in Japan and how these factors were affected by the implementation of the new "Free High School Tuition" law introduced in 2010. Public and private upper-secondary schools can be either vocational or academic. This school choice was analysed using the characteristics of families and schools included in the PISA 2009 and 2012 questionnaires in a multinomial logit model. The most influential family characteristics in the upper secondary school choice in Japan are related to the family budget, parental education, class, and status. Moreover, the results show that the implementation of the new law affected families' school choice. Nevertheless, the law did not have the same equalising effect on families with more than one child and low-budget families in areas with a limited offer of private schools.

1. Introduction

Japan is one of the most homogeneous countries in the world. Japanese is the uniform, universally used language in the country, and the education system is based on high-quality public and private schools. The private education sector has some curiosities. It is generally used by higher classes looking for prestige, as is usual in other countries, even though quality and selectivity indices typically indicate that high-quality education is also offered in public schools (James, Benjamin, & Mendras, 1988). Prestigious private upper-secondary schools are generally located in urban areas. In prefectures in urban areas, the highest-ranked public and private upper-secondary schools are competitive, whereas, in prefectures in suburban areas, there are generally many public upper-secondary schools that are ranked higher than the highest-ranked private upper-secondary schools.

The upper-secondary school choice in Japan seems to be a decisive point affecting students' future job opportunities and social status. The quality of the chosen upper-secondary school to a large extent determines students' prospective opportunities, and that is why this decision can be seen as the start of a long-term competition for a professional career. According to rational choice theory, individuals are conscious decision makers, and their choices are influenced by a cost–benefit analysis. This analysis of the upper-secondary school choice decision in Japan was based on students' socio-economic background, educational aspirations, and previous academic achievement. These aspects can cause class-specific decisions that may contribute to educational as well as social inequalities.

The aim of this study is to conduct a detailed analysis of the first of these three aspects of the upper-secondary school choice decision, that is, of students' socio-economic background. The first specific goal of this study is to analyse the factors that lead families to choose a specific upper-secondary school in Japan. The second specific goal is to determine the impact of the new law called "Free High School Tuition", which was introduced in 2010. We use data on the school and family characteristics included in the PISA (OECD, 2009, 2012) questionnaires and apply a discrete choice model to analyse school choices before and after the implementation of this law and the way in which these choices vary depending on students' socio-economic background and an urban or a non-urban location. These PISA data categorise Japanese schools according to two dimensions: their orientation (academic/vocational) and their funding (public/private). We analyse the relationship between those two school dimensions and the socio-economic characteristics of the students' family.

PISA data have been widely used in recent years to study similar and

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related topics. For example, school choice and school efficiency were investigated by Montes and Rubalcaba (2014), who assessed the extent to which choice and choice equity mechanisms influenced school efficiency. Another recent analysis based on PISA data was performed by Givord (2019), who showed that the share of students whose schools admitted students based on their home address reduced by approximately 20 % in Japan between 2000 and 2015. A typical study based on students' achievement was that of Sakellariou (2017), who analysed the private versus public school performance in mathematics for 40 countries and showed, in the case of Japan, a public school advantage.

The paper is organised as follows. Section 2 describes the education system in Japan, Section 3 presents the data and methods, and Section 4 discusses the empirical results. Finally, Section 5 presents the main conclusions.

2. The education system in Japan

Japan has a single-track comprehensive school system that is similar to the US model (Entrich, 2015). The highly competitive and relatively rigid education system in Japan is compulsory at the first two stages, which are elementary school (*shōgakkō*, for 6- to 12-year-olds) and lower-secondary school (*chūgakkō*, for 12- to 15-year-olds). After this stage, students can continue in upper-secondary school (*kōtōgakkō*, for 15- to 18-year-olds) or attend a college of technology (*kōtō-senmon-gakkō*). The upper-secondary school can be either vocational (*senmongakka*) or academic (*futsūka*). Afterwards, upper-secondary school graduates advance to universities or specialised training colleges, undertake vocational training, or enter the labour market directly. The percentage of those who enrol in universities differs significantly between academic and vocational upper-secondary school students. Colleges of technology were established in 1962, and, unlike universities or junior colleges, they accept those who have completed lower-secondary schooling. Students of these institutions are granted the title of associate (*jun-gakushi*) and may apply for admission to the upper division of university. Generally, these institutions focus on teaching specialised subjects, with the aim of helping students to develop the abilities that are required for vocational life (Ministry of Education, Culture, Sports, Science and Technology (MEXT) (2021a)).

Secondary schools in Japan do not usually include both stages of secondary education (lower secondary and upper secondary), so the vast majority of students have to change schools between these two stages. According to the Ministry of Education, Culture, Sports, Science and Technology (MEXT, 2012), only 3% of students in 2012 did not change schools between these stages. Nearly 1.2 million students in that year started their education at the upper-secondary level, but fewer than 5,000 students continued to study at a secondary school that had both lower- and upper-secondary divisions, and fewer than 30,000 students enrolled in an upper-secondary school that was operated by the same educational body as their lower-secondary school or that had a close relationship with their lower-secondary school.

Admission to the upper-secondary school system plays an important role. After having finished their compulsory education, students are admitted to high- or low-prestige upper-secondary schools depending on their scores in compulsory entrance examinations. Schools at the upper-secondary level are valued by their reputation, that is, according to the percentage of their students who pass the difficult entrance examinations to the most prestigious universities in the country (Stevenson & Baker, 1992). Reputable upper-secondary schools receive many applications; therefore, students applying to these schools need higher exam scores. Thus, schools are ranked by the minimum exam scores to be admitted, and students apply for schools that fit their academic achievements. The system therefore represents a type of hierarchical academic ranking system (Kariya & Rosenbaum, 1999). However, in recent years there have been certain changes to the admission process for upper secondary schools. For example, Entrich (2019, p 275) recently wrote: "From 1997 onwards, students' individual motivation and aptitudes were given more weight for high school admission through the evaluation of practical or technical examinations, essays, and interviews, and by stronger considering extra-curricular activities and recommendation letters. Additionally, the catchment areas for high school admission were expanded, wherefore students can choose from a larger range of high schools now and take more than one entrance examination in the same year."

We investigate how the upper-secondary school choice is related to the socio-economic characteristics of the family and how this relationship changed in 2010 with the implementation of the new "Free High School Tuition" law. This direct approach would not be valid for the elementary school choice because elementary schools and lower-secondary schools are compulsory and most students are allocated to public schools within their school district. Therefore, some parents are willing to pay more for housing in specific school districts. Kuroda (2018), for example, showed that parents exhibited higher willingness to pay housing rent in a better public elementary school district. However, this has been shown only for married couples who have children attending or expecting to attend elementary schools. Similarly, Ushijima and Yoshida (2009) and Yoshida, Zhang, and Ushijima (2008) analysed the effect of school quality on land prices. They concluded that the quality of elementary schools influences land prices in the school district but that this effect varies depending on the time period analysed and the type of district. A possible relationship between the type of upper-secondary school and students' socio-economic characteristics has been studied indirectly in the following two streams of research.

The first stream is based on students' test scores. In this literature, the variances of scores are decomposed into between-school and in-school variances. If students were allocated to schools based on their achievement level, then a high between-school variance in scores would be expected. This was shown, for example, by Knipprath (2010), in an analysis of the mathematics and science scores of PISA 2000, 2003, and 2006, and by Taki (2011), in a study focusing on the mathematics scores of PISA 2003. Although these studies showed that the students in the same upper-secondary schools have similar scores, they did not directly model school choice. Nevertheless, Knipprath (2010) found correlations between students' performance in mathematics and science and their socio-economic status at the high school level and concluded that "The PISA studies also showed that Japanese students are allocated to high schools according to their achievement level and their economic, social, and cultural background" (Knipprath, 2010, p. 403).

The second stream of research focuses on the quality of schools. Defining the quality of a school is not a straightforward task, which is why the definitions differ among studies. Yamamoto and Brinton (2010) analysed the 1995 Social Stratification and Mobility Survey and defined the quality of upper-secondary schools using respondents' reports on the proportion of classmates who proceeded to junior college or university. They concluded that the top-ranked secondary schools were chosen by families with a higher socio-economic status. Nakanishi (2011) applied a different approach and defined the quality of an upper-secondary school using students' self-reported achievement at lower-secondary schools, concluding that the achievement, and therefore the quality of the school, is highly related to the father's socio-economic characteristics. Recently, Entrich (2019), using the Hyōgo High School Students (HHSS) survey (Ojima & Aramaki, 2018), not only related the school ranking to classical school choice drivers, like parents' socio-economic status, students' academic performance, and institutional constraints, but also showed that a significant share in the school choice decision is made by individual students themselves. This was achieved by showing that students' concrete future plans significantly affected their decision making at the transition to high school.

There is also a vast literature focusing on the importance of tracking, that is, the early determination of whether students will follow an academic track or a vocational track, in the Japanese system. Taki (2010, p. 247) concluded that "Japan is a country having the distinct characteristic wherein almost all the relevance between SES [socio-economic

status] and the academic performance is being converted into inter-school disparity by the high school entrance exam". Similarly, Hallinan (1994) and Oakes (1994) observed an impact of tracking on achievement, attitudes, and educational attainment. They also concluded that tracking is related to students' economic, social, and cultural background; the school environment; and the classroom climate, among other variables. This is an important fact because, subsequently, students from low-ranked schools are unlikely to enter competitive universities (Ono, 2001).

Moreover, students with a higher socio-economic status usually have easier access to shadow education lessons that help them to improve their academic performance, which in turn leads to admission to competitive universities. Matsuoka (2015), for example, indicated that, in 2007, the percentage of students attending cram schools (*juku*) to learn academic subjects increased heavily in the period when students took high school entrance examinations, reaching 50.9 % for eighth-graders and 65.4 % for ninth-graders. Furthermore, more recent information has shown that the importance of shadow education is not decreasing. According to e-Stat (2018), 79.8 % of ninth-graders in public schools attend cram schools that teach academic subjects, and their estimated average annual expenditure is JPY 393,000. One of the most important and comprehensive studies on this topic is Entrich (2018), who conducted an analysis of the impact of shadow education on social inequality formation in Japan based on several detailed empirical analyses. This work examined the reasons for the high Japanese enrolment rates in cram schools and private tutoring, together with their causes and their implications for social inequality.

There is also an extensive literature focusing specifically on the choice of high school. Fujihara (2012), for example, developed two hypotheses related to this topic. The first is the relative risk aversion hypothesis (Breen & Goldthorpe, 1997), and the second is the downward educational mobility aversion hypothesis (Kikkawa, 2006). These hypotheses were tested with data on second-year students at Japanese senior high schools. As expected, the results showed that fathers' occupation and parental education had direct effects on the rank of high school attended.

An important conclusion with respect to the aim of our work was drawn by Kariya (2016), who investigated the operation of mechanisms that have produced social inequality in education over recent decades. Specifically, his work analysed three data sets collected in three different decades focusing on the relationship between the hierarchy of Japanese senior high schools and inequality. The results provided empirical evidence of an increasing impact of students' family background on their academic grades and the rank positions of the high schools in which the students are enrolled. Moreover, the results showed a decreasing and indirect effect of the family background on the students' allocation to high schools over recent decades. This indirect effect has occurred primarily through its influences on students' academic achievement. Specifically, the "selection of students into different future SES strata takes place visibly through educational differentiation at the upper secondary educational level" (Kariya, 2016, p. 151).

Finally, Sakai (2010) analysed the career consciousness of students at an urban commercial high school and their possible motivations to attend high- or middle-level universities. His results helped to provide an understanding of how the economic recession of the 1990s influenced schools' policy on career guidance. Specifically, he concluded that the students' consciousness lacked a concrete future perspective and that helping them to overcome this issue was consistent with the management strategy of the school.

Upper-secondary school is not compulsory, but the vast majority of all lower-secondary school graduates continue their studies at either public or private upper-secondary schools. According to MEXT (2021b), the percentage of private upper secondary students in 2010 was 29.8 %. Neither public nor private schools are free, but the cost of public upper-secondary schools is lower than that of private upper-secondary schools. In April 2010, the Japanese Government made public upper-secondary schools tuition free. At the same time, students at private upper-secondary schools started to receive an amount equivalent to the tuition fee at public upper-secondary schools as a subsidy. However, the household expenditure on education per student (including private school tuition after the subsidy and other expenses for school education and extracurricular school activities) for private school students is two to three times the expenditure for public school students. Since April 2014, a household income limit has been applied to determine eligibility to receive the subsidy. Modifications are continuously being made to this system.

The goal of the tuition-free high school programme was stated as follows: "Minimizing the financial burden on households to ensure that all motivated high school students can feel secure about receiving education, irrespective of the financial situations of their families, is an issue that needed to be tackled urgently" (Ministry of Education, Culture, Sports, Science and Technology (MEXT), 2009). The justification for the policy was based on an expectation of raised motivation of students given that the education that they receive is supported by society in addition to the argument of the prevalence of a tuition-free policy for high schools in other countries.

Hori and Shimizutani (2018) analysed this issue in detail, concluding that this law contributed to an improvement in the high school enrolment rate for poorer households; it also stimulated poorer households' spending relative to richer households and altered the composition of household expenditure for richer households, with an increase in spending in non-tuition education apart from other goods.

One specific direct impact of this policy can easily be observed from the percentage of students dropping out of schools for financial reasons. The percentage of upper-secondary public school students dropping out and claiming financial reasons as the most important was around 2.0–2.7 % during the school years 2002–2009; it dropped to 1.4 % in 2010, when the law was implemented, and, in the next years, remained stable at around 0.5–1.2 %. The figures in private schools present a sharp decrease only in the year of implementation as the percentage was around 4.8–6.4 % during the school years 2002–2009, dropped to 3.1 % in 2010, and since then has ranged between 3.0 % and 6.3 % (Ministry of Education, Culture, Sports, Science and Technology (MEXT), 2020).

Our analysis aims to provide the literature with new insights into other possible impacts of this equalization policy implemented by the law. This kind of policy has not always had the expected impact, as shown for example by Dawson (2010), who examined the relationship between private tutoring and formal education systems in Japan, the Republic of Korea, and Cambodia. Two consecutive policies, the High School and Middle School Equalization Policies, implemented in the Republic of Korea in 1974 and 1969, respectively, eliminated the corresponding school entrance exams. These policies did not reduce private tutoring, and they received strong criticism of the grouping together of students at different learning levels, increasing the demand for private tutoring (Dang & Halsey Rogers, 2008).

3. Data and methods

We used data from the PISA 2009 and 2012 student and school questionnaires (OECD, 2009, 2012). The Programme for International Student Assessment (PISA) is an ongoing triennial survey that assesses the extent to which 15-year-old students near the end of compulsory education have acquired the key knowledge and skills that are essential for full participation in modern societies.

In the Japanese case, the PISA data contain four categories of upper-secondary schools, distinguishing among private, public, academic, and vocational (called "practical" in the database) schools. The schools in the analysed database are sampled systematically from a comprehensive national list of all PISA-eligible schools, known as the school sampling frame, with probabilities that are proportional to a measure of school size. The schools in the sampling frame are assigned to mutually exclusive groups based on funding and orientation. The orientation is

based on the proportion of students taking university/college entrance exams. Therefore, the vocational (practical) orientation includes vocational upper-secondary schools and colleges of technology.

The use of this classification for school choice analysis is new in the literature. The present study directly estimates school choice through the use of an objective definition of types of schools provided by PISA and aims to contribute to the literature on the relationships between upper-secondary schools and students' socio-economic characteristics from a different angle.

Our analysis is based on the random utility maximization model proposed by McFadden (1974). It assumes that decision maker (in our case family) n chooses outcome i (in our case a specific type of school) that maximises the utility U_{ni} gained from that school choice, that is, $U_{ni} > U_{nj},\ j = 1, 2, \ldots J,\ j \neq i$ (in our case $J = 4$). Assuming linearity of the utility function, the utility derived from the j -th alternative for family n equals

$$U_{nj} = x_n^{'} \beta_j + \varepsilon_{nj},\ j = 1, 2, \ldots, J$$

where x_n is a vector of the characteristics of family n and the β_j s are vectors of unknown coefficients corresponding to each school type j. The error terms ε_{nj} in the multinomial logit model are assumed to be independently and type I extreme-value distributed. Under these assumptions,

$$\Pr(school\ type = i) = \Pr\left(U_{ni} > U_{nj},\ \forall j \neq i\right) = \frac{\exp(x_n^{'} \beta_i)}{\sum_{j=1}^{J} \exp(x_n^{'} \beta_j)}. \quad (1)$$

For the sake of identification of the model, one of the school types is set as a benchmark and, subsequently, one of the vector β_j s is set to zero (Long & Freese, 2005). Eq. (1) is the basis for the maximum likelihood estimator.

Our model focuses on the effects of a family's socio-economic characteristics on the upper-secondary school choice, paying special attention to the variables related to class segregation. The two effects causing class differentials in educational attainment have usually been classified into primary and secondary in the literature (Breen & Goldthorpe, 1997). Primary effects are all those related to the association between students' socio-economic class origins and their average levels of academic ability. Secondary effects are the other effects expressed in the actual choices that students make in the course of their career within the educational system. Unfortunately, this distinction cannot be analysed given the data availability in the PISA database. However, this classification has not always been applied in the literature. For example, Altrichter, Bacher, Beham, Nagy, and Wetzelhütter (2011) analysed the effects of the implementation of a free choice policy in the primary school sector of the city of Linz, Austria. Their results indicated that ethnic and social segregation in primary schools increased after the implementation of the free-choice policy but that the social composition of schools with a disadvantaged student population had not changed significantly. Moreover, they showed that the choice motives were associated with language and social family characteristics, which is why they concluded that these variables have an indirect effect via motives on choice behaviour.

It is also important to recognise that, given the system of admission to upper-secondary schools, prior individual achievement is likely to influence school choice. However, due to the lack of information in the database, the model does not include achievement before upper-secondary school transition. Therefore, the applied model analyses only the actual socio-economic factors of the families in the upper-secondary school choice. From this perspective, the model collapses the indirect effect of social class via previous achievement with the direct effect of social class on school choice.

The choice of some explanatory variables in our model, however, can be related to the classification adopted by Bukodi and Goldthorpe (2013), who decomposed students' social origins into parental class, parental status, and parental education and showed that these three components have independent and distinctive effects on educational attainment. These three elements have a representation among our explanatory variables, and their effect can therefore be stated explicitly.

Entrich (2014) used the same data set as this study to examine the link between school performance and shadow education in Japan and Germany, showing that out-of-school education may indeed be a factor that can improve academic achievements. Moreover, his results indicated great variation in the effects of out-of-school lessons on academic performance according to the types of out-of-school lessons and the living area.

The difference between urban and rural areas was also highlighted by Tsuneyoshi (2013), who discussed how access to reputable high schools in Japan has been gained historically through high-stakes testing and how this trend has affected the middle school entrance requirements. A higher number of schools in urban areas can lead to a higher level of competition, and differences in the effects of the socio-economic characteristics of the family on the upper-secondary school choice are therefore expected. Due to this evidence, we performed our analysis in two differentiated areas based on the codification used in the PISA 2009 and 2012 data sets, called city and large city (100,000–1,000,000 and more than 1,000,000 inhabitants, respectively) and small town and town (3,000–15,000 and 15,000–100,000 inhabitants, respectively).

The sample size and the selection of sampled schools were chosen according to the sampling rules set by the National Institute for Educational Policy Research and the PISA organisation. The strata were defined by the interaction between the school orientation (academic/vocational) and the funding (public/private). The dependent variable considered for our analysis was the school type, a categorical variable with four different outcomes: public academic, public vocational, private academic, and private vocational.

Table 1 shows the distributions of students surveyed in the PISA 2009 and 2012 questionnaires with valid entries for all the variables that we used in our analysis according to school ownership and orientation. The total numbers of students included in our samples for 2009 and 2012 were 4,889 and 4,976, respectively. As can be seen in Table 1, public schools with an academic orientation accounted for approximately 56 % and 64 % of the surveyed students in the town area and 49 % and 45 % in the city area in the two years of study.

Table 2 shows the basic summary statistics of the variables used for our analysis of school choice. As can be seen in Table 2, the descriptive statistics for the variables for 2009 and 2012 are similar, showing the high quality of the PISA data sets. In our sample, approximately 92 %–93 % of fathers and 34 %–41 % of mothers were working in the two analysed areas in 2009 and 2012. Moreover, about 91 %–92 % of the families were two-parent families, and about 87 %–91 % of the students had siblings. Finally, grandparents lived with the nuclear family in

Table 1
Number of Surveyed Students.

Type of school	City and large city		Town and small town	
	Number of students	*%*	*Number of students*	*%*
2009				
Public and academic	1,673	49.29	836	55.92
Public and vocational	548	16.15	363	24.28
Private and academic	991	29.20	241	16.12
Private and vocational	182	5.36	55	3.68
2012				
Public and academic	1,608	44.57	876	64.04
Public and vocational	626	17.35	377	27.56
Private and academic	1,199	33.23	77	5.63
Private and vocational	175	4.85	38	2.78

Table 2
Summary Statistics of the Explanatory Variables.

Variable	2009		2012	
	City and large city	*Town and small town*	*City and large city*	*Town and small town*
Number of students	3,394	1,495	3,608	1,368
Dummy variables				
	Proportion		Proportion	
Father not working	0.07	0.08	0.07	0.07
Mother not working	0.66	0.59	0.65	0.60
Two-parent family	0.91	0.91	0.92	0.91
Siblings	0.88	0.91	0.87	0.89
Grandparents living with the family	0.27	0.40	0.25	0.34

	Values					
Discrete variables	1	2	3	4	5	6
2009						
Educ. level mother						
City and large city	0%	2%	12 %	33 %	25 %	28 %
Town and small town	0%	4%	16 %	38 %	22 %	19 %
Educ. level father						
City and large city	0%	4%	13 %	26 %	7%	50 %
Town and small town	0%	7%	18 %	36 %	7%	32 %
2012						
Educ. level mother						
City and large city	0%	2%	10 %	33 %	26 %	29 %
Town and small town	0%	4%	16 %	40 %	22 %	18 %
Educ. level father						
City and large city	0%	5%	12 %	27 %	8%	48 %
Town and small town	0%	7%	19 %	35 %	8%	31 %

	City and large city				Town and small town			
Continuous variables	*Mean*	*S.D.*	*Min.*	*Max.*	*Mean*	*S.D.*	*Min.*	*Max.*
2009								
Cultural possessions	−0.25	0.93	−1.39	1.24	−0.30	0.90	−1.39	1.23
Family wealth	−0.43	0.70	−2.88	2.81	−0.43	0.71	−2.56	2.06
Home educ. resources	−0.32	1.02	−4.53	1.60	−0.51	1.07	−4.53	1.60
Highest parental occupational status	52.78	14.27	23.00	80.00	50.2	15.20	23.00	80.00
2012								
Cultural possessions	−0.38	0.96	−1.51	1.27	−0.57	0.94	−1.51	1.27
Family wealth	−0.24	0.63	−3.30	2.92	−0.16	0.62	−2.50	1.80
Home educ. resources	−0.44	0.81	−3.93	1.12	−0.60	0.81	−3.93	1.12
Highest parental occupational status	52.30	20.07	11.56	88.70	46.32	19.95	11.56	88.70

approximately 25 %–40 % of the cases, presenting higher values for the town and small town area.

The education levels of both parents were defined according to the International Standard Classification of Education (ISCED) of 1997, which is a scale index ranging from zero to six, with zero meaning no education and six denoting second-stage tertiary education (master's and/or PhD degrees). The variable *Cultural possessions* is an index variable that reflects the cultural level of the family and is based on the number of books of classical literature, books of poetry, and works of art that the family owns. In this study, the index values ranged between -1.39, 1.24 and -1.51, 1.27 in 2009 and 2012, respectively.

The measure of family wealth is an index based on the existence of certain household items as no direct income measure is available in the PISA data. The variable *Family wealth* in PISA 2012 represents students' reported availability of some general household items at home (their own room, a link to the Internet, a DVD player, and the number of cellular phones, televisions, computers, cars, and rooms with a bath or shower) in addition to three Japan-specific household items (a digital camera, a plasma TV/LCD, and a clothes dryer). According to Table 2, in our study in the two analysed years, this index took values between -2.88, 2.81 and -3.30, 2.92 in the city area and -2.56, 2.06 and -2.50, 1.80 in the town area.

Another index variable coded by PISA 2012 is *Home educational resources*, which is constructed using answers to questions concerning, for instance, whether students have a desk and a quiet place to study, a computer for schoolwork, educational software, books to help with their schoolwork, technical reference books, and dictionaries. As can be seen in Table 2, for our study, this index ranged between −4.53, 1.60 and −3.93, 1.12 for 2009 and 2012, respectively. Finally, the highest parental occupational status shows the higher International Socio-Economic Index of occupational status score of either parent or, in the case of single-parent households, of the only available parent. As stated above, Bukodi and Goldthorpe (2013) decomposed the social origins into parental class, parental status, and parental education. In our case, the parental class can be represented by *Family wealth*, the parental status by *Highest parental occupational status*, and the parental education by *Educ. level mother* and *Educ. level father*.

The estimation of a multinomial logit model for a school choice using PISA data could seem to be a non-standard approach, as PISA studies usually take into account the complex sample structure through the use of multilevel models and related techniques. Nevertheless, these studies are usually focused on the collected students' achievements, which may depend on the schools' and students' characteristics, and the complex sample structure must be taken into account. In our case, the explained variable (school choice) was determined prior to the data collection; therefore, the methodology does not need this multilevel approach.

4. Empirical results

We estimate multinomial logit models by maximum likelihood using the 2009 and 2012 samples for the two city/town areas to analyse the reasons that drive Japanese parents' and students' decision to choose a

Table 3
Likelihood Ratio Tests of the Explanatory Variables.

	2009				2012			
	City and large city		Town and small town		City and large city		Town and small town	
	χ^2 *statistic*	*p-value*	χ^2 *statistic*	*p-value*	χ^2 *statistic*	*p-value*	χ^2 *statistic*	*p-value*
Father not working	10.43	0.02	2.34	0.51	0.19	0.98	10.04	0.02
Mother not working	12.91	0.01	0.56	0.91	10.20	0.02	3.25	0.35
Two-parent family	2.42	0.49	8.06	0.05	1.47	0.69	6.74	0.08
Siblings	15.30	0.00	1.74	0.63	13.01	0.01	6.63	0.09
Grandparents living with the family	7.12	0.07	5.39	0.15	3.04	0.39	4.85	0.18
Cultural possessions	24.00	<0.01	6.42	0.09	24.52	0.00	18.98	0.00
Educ. level mother	58.51	<0.01	20.67	<0.01	46.51	0.00	12.09	0.01
Educ. level father	119.12	<0.01	34.51	<0.01	78.29	0.00	19.64	0.00
Family wealth	11.72	0.01	11.57	0.01	3.26	0.35	1.57	0.67
Home educ. resources	0.46	0.93	7.40	0.06	3.26	0.35	5.67	0.13
Highest parental occupational status	11.45	0.01	4.30	0.23	24.82	0.00	3.51	0.32

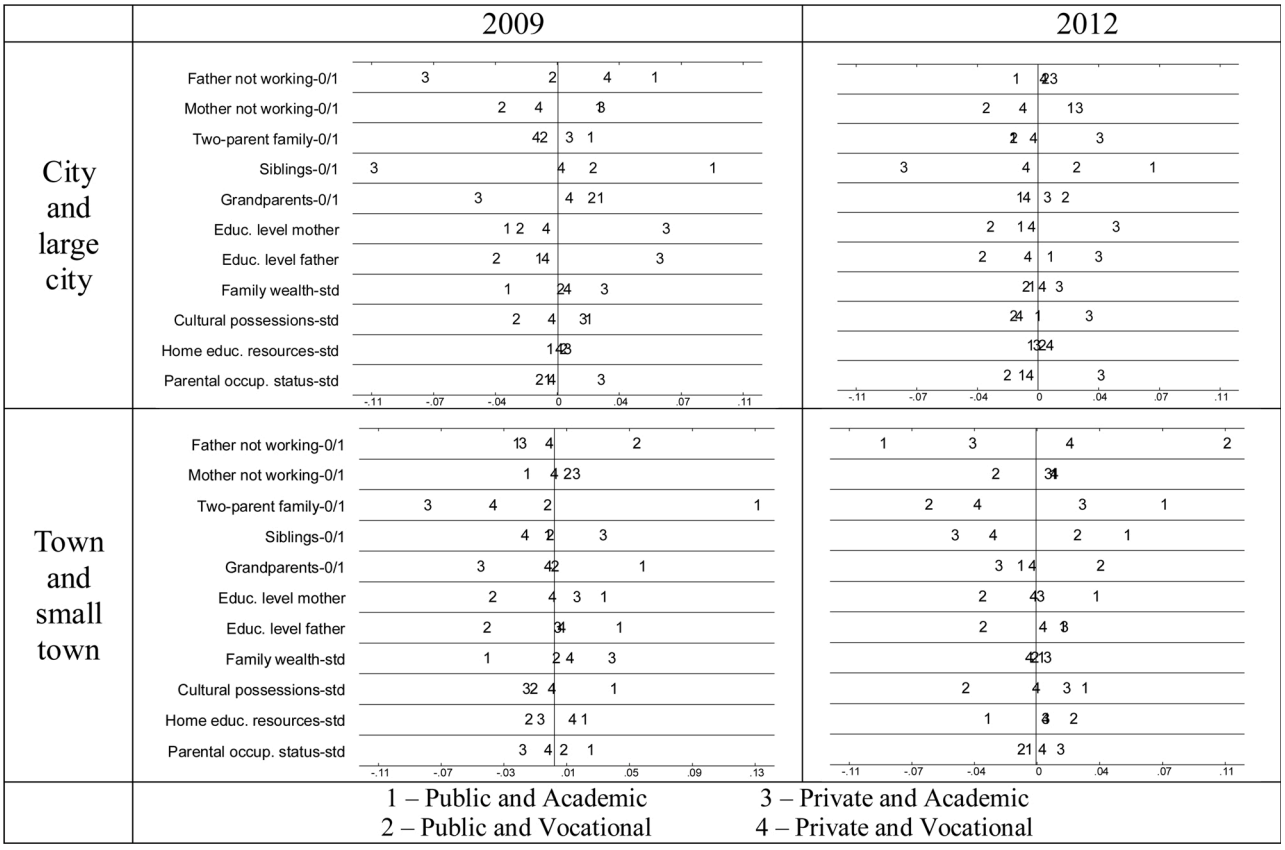

Fig. 1. Change in Probability with Respect to the Benchmark Family.

certain type of upper-secondary school. The dependent variable in our model is a categorical variable, *Type of school*, with four different values, as defined in Table 1. The explanatory variables are those included in Table 2. We checked for possible multicollinearity among these variables but found very low interdependency. Tables A1 and A2 in the Appendix A present the estimation outcome of the model with 36 parameters obtained for the two areas and two years. To summarise this outcome, we present the likelihood ratio tests for all the explanatory variables in Table 3. With four dependent categories in our dependent variable, there are three sets of parameters associated with each explanatory variable. The joint hypothesis that an explanatory variable does not affect the dependent variable (school type) therefore involves the set of three coefficients corresponding to each specific variable being equal to zero.

The specific effects of each variable on the school choice are discussed below, but probably the most important result in Table 3, related directly to our goal to analyse the impact of the new law, can be observed for *Family wealth*. Although its effect is significant at the 5% level in both city/town areas in 2009, prior to the passing of the law, it is no longer significant in 2012. This is in line with the conclusion reached by Hori and Shimizutani (2018) that the tuition-free programme enhanced the high school enrolment rate for lower-income households; that is, it gave them incentives to send their children to high school thanks to the exemption from the tuition payment.

Another important part of the interpretation of our results is based on changes in the probability defined in Eq. (1) of choosing a specific type of school depending on different values of our explanatory variables (x_n). Fig. 1 shows the change in the probability of choosing a certain type of school in the two analysed years and areas if one of the explanatory variables changes its value. In this comparison, the remaining explanatory variables are set to a representative value, taking into account the descriptive statistics presented in Table 2, by setting them to a "benchmark family". Representative values for the dummy variables are

determined based on the majority rule, that is, the father is working, the mother is not working, it is a two-parent family with one or more siblings, and there are no grandparents living with the family. Moreover, the discrete variable for fathers' and mothers' education level is set to a median value (5), while the values for the continuous explanatory variables (*Family wealth*, *Cultural possessions*, *Home educ. resources*, and *Highest parental occupational status*) are set to their corresponding mean value. All the changes presented in Fig. 1 are calculated as discrete changes (i.e. 0/1) for the dummy variables, as the unit change for the median value of fathers' and mothers' educational level (i.e. from 5 to 6), and as a standard deviation change for the continuous variables (i.e. from (mean - st. dev./2) to (mean + st. dev./2)). More details can be found in the study by Long and Freese (2005).

Fig. 1 allows for several comparisons. Given our goal to analyse the impact of the new law, the most relevant results for us are the differences between 2009 and 2012. We can observe that, for example, a change from zero to one in the *Father not working* variable in the city area in 2009, that is, a change from a family with a working father to a family with a non-working father, decreases the probability of families choosing the private and academic (outcome 3) type of school by about 0.08, but in 2012 the effect of this variable is close to zero. On the other hand, this variable increases the probability of choosing a public and academic (outcome 1) type of school in the city area in 2009 by about 0.06, but this change in 2012 is negative and close to zero.

To interpret the most relevant results in Fig. 1, we will focus first on the city area. Comparing all of the changes and taking into account that there are zero/one changes, unit changes, and standard deviation changes in the mix, we can see that the biggest changes in probability come from the variable *Siblings*, for both 2009 and 2012. That is, having more than one child increases the probability of choosing the public and academic type of school (outcome 1) by about 0.08 but decreases the probability of choosing the private and academic (outcome 3) type of school by about 0.10 in both years.

Moreover, the part of Fig. 1 devoted to the city area indicates that, approximately, the group of variables with the second most important effect in 2009 (behind the largest *Siblings* effect) can be considered to be *Father not working* and, as expected from the literature review, *Educ. level mother* and *Educ. level father*.

It is also important to note that the effects of the variables *Father not working* and *Mother not working* are different. According to Table 2, in the city area, the mother is not working in 66 % and 65 % of the families in 2009 and 2012, respectively, and the effect of this variable in the city area in Fig. 1 remains relatively stable between 2009 and 2012. On the other hand, the father is working in 93 % of the families in the two analysed years (Table 2), and, as mentioned earlier, its effect in Fig. 1 changes drastically between 2009 and 2012. This shows close dependence of the school choice on the family budget, which, according to this result, seems to be linked to fathers' but not mothers' employment status in the city area. Therefore, *Father not working* seems to be an indicator of a low-income household. On the other hand, *Mother not working* seems to represent a broader family characteristic than the work status per se – for example, a sufficiently high family income that allows this mother's employment status. A non-working mother, therefore, is likely to indicate a specific family class. It also highlights the fact that the change in *Mother not working* is similar to a standard deviation increase in *Cultural possessions*, both implying a higher probability of choosing an academic but a lower probability of choosing a vocational type of school.

As expected from the literature, the education level of the father and mother also have an important effect on the type of school chosen. A unit change in these variables (from 5 to 6) increases the probability of choosing the private and academic (outcome 3) type of school in the city area and in the two years by approximately 0.04–0.07, but it decreases the probability of choosing the public and vocational (outcome 2) type of school by about 0.03–0.04.

A typically observed effect in the literature is that higher wealth leads to a higher probability of choosing a private and academic school. This result, represented by the effect of the variable *Family wealth*, is observed only in 2009. A standard deviation increase raises the probability of choosing the private and academic (outcome 3) type of school by approximately 0.03 in the city area, but it decreases the probability of choosing the public and academic (outcome 1) type of school by approximately the same amount.

The comparison of the changes in probabilities between 2009 and 2012 is expected to shed light on the effect of the "Free High School Tuition" law implemented in 2010. The differences in the effects of the explanatory variables between 2009 and 2012 stay the same for some variables and vary for others. Continuing to focus on this in the city area, the largest *Siblings* effect stays very similar in 2009 and in 2012. This is a very important conclusion because the corresponding part of the family budget devoted to tuition costs obviously increases with the number of children and the fact that this effect remains constant in the two years seems to suggest that the new law has a more mitigated effect on families with more than one child. However, this stable effect of *Siblings* is not observed for other variables related to family budget.

The negative effect on the probability of choosing the private and academic type of school (outcome 3) in the city area of *Father not working* (a low-income household indicator) observed in 2009 diminishes in 2012. This is confirmed by the fact that its effect is significant at the 5% level in 2009 but not significant at the 5% level in 2012 (Table 3). Interestingly enough, the same result is obtained in Table 3 for *Family wealth*, a fact that is also reflected graphically in Fig. 1 as its effect diminishes in 2012 in the city area. Therefore, according to Table 3 and Fig. 1, the effect of the two variables directly or indirectly related to the family budget (*Father not working* and *Family wealth*) decreased significantly in 2012. This seems to be a direct effect of the new law's implementation in 2010.

The results are slightly different for the town area. The difference in the school offer as well as in the social class composition with respect to the city area becomes apparent in the descriptive statistics in Tables 1 and 2. Regarding the school offer, the largest differences are represented by a greater proportion of public and vocational and a lower proportion of private and academic types of schools in the town area. When it comes to the socio-economic characteristics, the largest differences are represented by a greater share of grandparents living with the family and a lower education level of both parents in the town area.

Focusing on Fig. 1, the biggest changes in probability in the town area come from the variables *Father not working* and *Two-parent family*. The effect of *Father not working* in the town area, with a lower offer of private schools, seems to be different from that in the city area, with a much larger share of private schools (Table 1). In this case, its effect increases the probability of choosing the vocational type and decreases the probability of choosing the academic type of school in 2012. This effect is not significant at the 5% level in 2009 (Table 3). This kind of family does not seem to be affected by the new law as the decision seems to be more between academic and vocational schools than between public and private schools. This is probably because of a lower offer of private schools locally; considering private schools in cities nearby would be linked to higher time and travel costs. Moreover, the situation of a non-working father in this more rural area could be associated with a desire for faster incorporation of the offspring into the labour market.

In spite of the large effect in Fig. 1, the effect of the *Two-parent family* is only marginally significant in 2009 and not significant at the 5% level in 2012 (Table 3). However, similar to the city area, the effects of *Educ. level mother* and *Educ. level father* are both significant at the 5% level (Table 3). Again, it appears that, given the lower offer of private schools, the preference of parents with higher education is more for the academic than for the vocational type of schools, unlike the preference for private over public schools observed in the city area.

On the other hand, an important result is represented by the same effect of *Family wealth* as obtained in the city area. Its effect on the probability of choosing a private and academic school in 2009 is positive, whereas it is negative for the public academic type of school. This

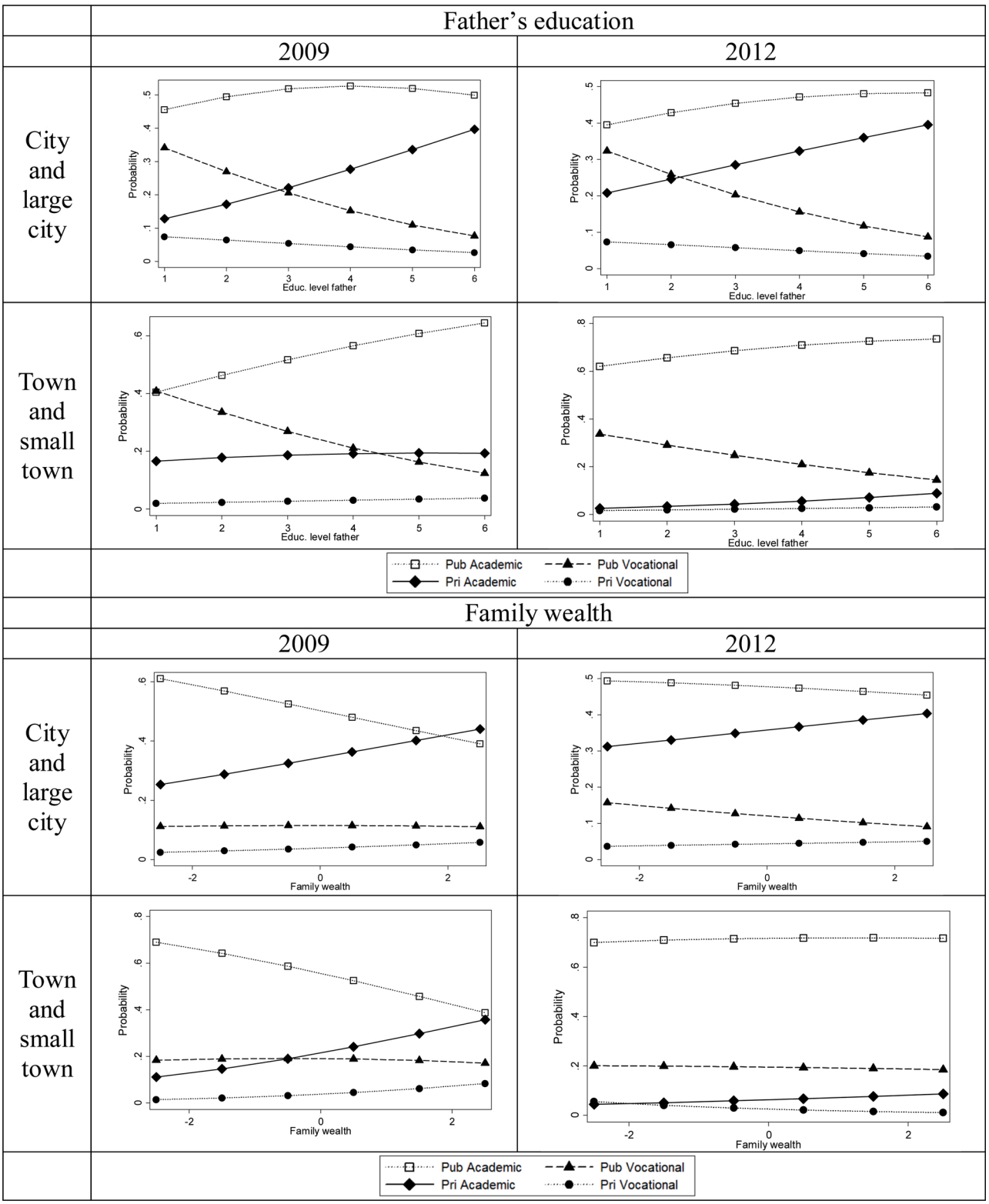

Fig. 2. Effect of the Father's Education and the Family Wealth on the Probability of School Choice.

effect practically disappears (Fig. 1) and becomes not significant at the 5% level in 2012 (Table 3). These are the same results that were obtained for the city area. Therefore, the direct effect of the new law can be observed both in the city and in the town area.

Fig. 2 shows the probability of choosing a specific type of school for specific values of the variables *Educ. level father* (as an example of a variable with similar effects in the two years considered) and *Family wealth* (as an example of a variable with different effects in the two years). The remaining variables in Fig. 2 are set at the benchmark family's values, as previously specified in Fig. 1.

Focusing on the graphs showing the effect of the father's education, the biggest changes in the probability of choosing a specific type of school belong, in the city area, to the private–academic and public–vocational types of schools. For the lowest levels of the father's

education, the probability of choosing the public and vocational type of school is higher than the probability of choosing the private and academic type of school. This situation is reversed for the higher levels of education. These effects are almost the same in 2009 and 2012. The same results for the town area are represented by the downward trend of the probability of choosing the public and vocational type of school. The expected upward trend for the private and academic types of school is not observed due to their limited offer in the town area. The most important result is that the trends of all four probabilities are very similar in the two areas and in the two analysed years.

The effect of family wealth, however, changes in 2012 compared with 2009 in the two areas (lower part of Fig. 2). In 2009, having greater family wealth increases the probability of choosing private schools but decreases the probability of choosing public schools both in the urban and in the town area. However, these trends soften in 2012. This is more evident for the town area, in which the probability of choosing any type of school in 2012 is practically unaffected by the family wealth. As previously mentioned, this could be related to the implementation of the "Free High School Tuition" and subsidy introduced in 2010.

Taking these results into account, we now focus on the differing impacts in 2009 and 2012 of the variables that represent social origins according to Bukodi and Goldthorpe (2013). The effect of parental education (*Educ. level mother* and *Educ. level father*) stays the same between 2009 and 2012 and does not seem to be affected by the implementation of the new law both in the city and in the town area. The effect of parental status (*Parental occupational status*) remains the same between 2009 and 2012 in the city area but is not relevant in the town area. The most evident effect is, however, observed for the parental class (*Family wealth*), which disappears in 2012 due to the implementation of the new law both in the city and in the town area.

5. Conclusions

The present work analyses upper-secondary school choice in Japan before and after the implementation of the "Free High School Tuition" law in 2010 using data from the PISA 2009 and 2012 student and school questionnaires. The applied methodology was a multinomial logit model, and the main conclusions were drawn based on an analysis of changes in the probability of choosing a specific type of upper-secondary school as a result of differentials in family characteristics.

One of the most influential family characteristics is the number of children in the family. Having only one child notably increases the probability of choosing the private academic type of upper-secondary school. This is an expected result since paying more than one private academic school fee obviously has a considerable impact on the family budget. Nevertheless, this conclusion can only be drawn in the city area due to the different socio-economic structures and the lower offer of private schools in the town area. As expected from the literature, the parental education level is a significant variable both in the city and in the town area in the two analysed years. Highly educated parents are more likely to choose the private and academic type of school in the city area and the academic type of school in the town area.

There are numerous examples of socio-economic, ethnic, or academic school choice segregation across many different countries and continents (e.g. Alegre & Ferrer, 2010; Bifulco & Ladd, 2007; Brunner, Imazeki, & Ross, 2010). In a highly homogeneous country such as Japan, ethnic segregation is a much smaller issue than in other industrialised countries, but, as described above, academic segregation is present due to the fact that schools are ranked by the minimum exam scores for students' admission. Our findings are therefore in line with Ishida, Nakamuro, and Takenaka (2016), who compared the academic achievement between native students and first- and second-generation immigrant pupils in Japan. One of their main conclusions was that parental socio-economic status has a positive effect on academic achievement, but the effect is not robust enough to mediate the impact of immigrant generation.

The main result of the current work is probably represented by the differences in the effect of the family characteristics considered on the upper-secondary school choice before and after the implementation of the new "Free High School Tuition" law. Our analysis shows that the effects related to parental status and parental education remained stable before and after the implementation of the law. Nevertheless, the variables that are closely related to the family budget present the largest changes. This seems to indicate that the law did have an impact on the upper-secondary school choice. The basic idea of the law was that a society as a whole should support students independently of whether they are from rich or poor families since it is youths who will build the future Japan. According to our results, the law's implementation to some extent led to a decrease in income segregation, but differences in the school choice between families with different parental education and parental status remained unchanged.

Our analysis shows that the new law has had the expected equalization impact in both town and city areas since the effect of family wealth on the probability of choosing a private school diminished after its implementation. However, the school choice in towns seems to be somewhat limited by the school offer, and that could be why there are some differences in the impact of the new law. The new law subsidy probably cannot cover the additional travel costs related to private schools existing in cities that are more distant. That is why, in families in specific situations, such as having a non-working father, that indirectly indicate a lower family budget, the subsidy seems to have a limited effect as these families did not prefer private schools even before the new law's implementation. Moreover, the law had a smaller impact on families with more than one child as the negative effect of siblings on the probability of choosing a private school did not disappear after its implementation. It appears that the law helps to mitigate costs but not enough to offset them completely for families that have more than one child.

In sum, the law seems to have had the desired effect in cities with a wide offer of private, public, academic, and vocational schools on families with one child. In the town area, the law does not seem to have had the desired effect not only on families with more than one child but also on families with a low budget.

Empirical research usually has its limitations, and this study is no exception. The most important limitation is related to the measure of *Family wealth* used in our analysis. This measure is a proxy variable based on the existence of particular household items, like a student's own room, a link to the Internet, a DVD player, cellular phones, televisions, computers, or cars, as no direct income measure is available in the PISA data. According to the OECD (2012, p. 16), Japan ranks second lowest among all the countries included in this database in terms of the reliability of the *Family wealth* proxy variable. This can be explained by the variation in accessibility to certain household items used to define this proxy variable for high proportions of the population across different countries, even countries with a similarly high level of development. In Japan, the income level is higher in urban areas, where the land and housing prices are high. Therefore, owning some of the items included in the family wealth measure, for example rooms and cars, is difficult even for high-income households. Nevertheless, this variable was measured in the PISA database in the same way in 2009 and in 2012. That means that this limitation does not invalidate the main conclusion based on the different results obtained for these two years and related to the family income.

Our empirical analysis seems to offer an interesting direction for further research, which should be based on a different database and which may include different measures of socio-economic differentiation that could help to analyse the effect of the new "Free High School Tuition" law from a different angle.

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Appendix A

Table A1
Multinomial Logit Model Estimation: 2009.

	City and large city			Town and small town		
	Coef.	Std error		Coef.	Std error	
Category: 1 – Public and academic						
Father not working	−0.491	0.247	**	0.094	0.555	
Mother not working	0.359	0.166	**	0.005	0.288	
Two-parent family	0.375	0.246		1.018	0.436	**
Siblings	0.174	0.250		0.454	0.412	
Grandparents living with the family	−0.104	0.181		0.257	0.304	
Cultural possessions	0.181	0.098	*	0.160	0.170	
Educ. level mother	0.176	0.083	**	0.117	0.145	
Educ. level father	0.222	0.067	***	−0.036	0.124	
Family wealth	−0.262	0.125	**	−0.462	0.220	**
Home educ. resources	0.001	0.088		−0.249	0.148	*
Highest parental occupational status	0.009	0.006		0.012	0.010	
Constant	−0.710	0.559		0.145	0.930	
Category: 2 – Public and vocational						
Father not working	−0.631	0.279	**	0.405	0.569	
Mother not working	0.044	0.180		0.080	0.302	
Two-parent family	0.256	0.266		0.754	0.454	*
Siblings	0.178	0.275		0.438	0.437	
Grandparents living with the family	0.010	0.196		0.166	0.317	
Cultural possessions	−0.104	0.108		−0.003	0.179	
Educ. level mother	0.024	0.091		−0.178	0.152	
Educ. level father	−0.095	0.073		−0.367	0.130	***
Family wealth	−0.174	0.136		−0.361	0.231	
Home educ. resources	0.030	0.096		−0.375	0.155	**
Highest parental occupational status	0.002	0.007		0.012	0.011	
Constant	0.836	0.606		2.095	0.969	**
Category: 3 – Private and academic						
Father not working	−0.876	0.280	***	0.024	0.593	
Mother not working	0.393	0.175	**	0.099	0.309	
Two-parent family	0.357	0.269		0.444	0.468	
Siblings	−0.308	0.258		0.623	0.460	
Grandparents living with the family	−0.312	0.191		−0.104	0.326	
Cultural possessions	0.192	0.103	*	−0.012	0.183	
Educ. level mother	0.431	0.088	***	0.134	0.156	
Educ. level father	0.429	0.072	***	−0.099	0.133	
Family wealth	−0.062	0.130		−0.114	0.236	
Home educ. resources	0.026	0.092		−0.324	0.158	**
Highest parental occupational status	0.015	0.007	**	0.003	0.011	
Constant	−3.289	0.599	***	0.067	1.005	
Category: 4 – Private and vocational	**Base category**			**Base category**		
Log-likelihood	−3670.0			−1542.7		
Number of parameters	36			36		
Observations	3394			1495		

***, **, and *: significance at the 1%, 5%, and 10 % levels.

Table A2
Multinomial Logit Model Estimation: 2012.

	City and large city			Town and small town		
	Coef.	Std error		Coef.	Std error	
Category: 1 – Public and academic						
Father not working	−0.089	0.311		−0.673	0.520	
Mother not working	0.260	0.171		−0.453	0.369	
Two-parent family	0.058	0.305		0.966	0.489	**
Siblings	0.335	0.228		0.771	0.418	*
Grandparents living with the family	0.193	0.203		0.130	0.400	
Cultural possessions	0.318	0.100	***	0.092	0.203	
Educ. level mother	0.092	0.087		0.150	0.171	
Educ. level father	0.192	0.071	***	−0.092	0.146	
Family wealth	−0.079	0.146		0.326	0.307	
Home educ. resources	−0.199	0.111	*	−0.249	0.230	
Highest parental occupational status	0.006	0.004		−0.005	0.009	
Constant	0.105	0.555		1.938	1.088	*
Category: 2 – Public and vocational						
Father not working	−0.032	0.328		−0.053	0.528	
Mother not working	−0.017	0.182		−0.597	0.378	
Two-parent family	−0.035	0.319		0.550	0.502	
Siblings	0.389	0.247		0.835	0.440	*
Grandparents living with the family	0.338	0.214		0.333	0.408	
Cultural possessions	0.181	0.108	*	−0.205	0.210	
Educ. level mother	−0.131	0.093		−0.082	0.176	
Educ. level father	−0.110	0.076		−0.295	0.150	**
Family wealth	−0.172	0.156		0.305	0.316	
Home educ. resources	−0.171	0.119		−0.054	0.236	
Highest parental occupational status	−0.001	0.005		−0.007	0.010	
Constant	1.949	0.587	***	3.250	1.118	***
Category: 3 – Private and academic						
Father not working	−0.036	0.320		−1.411	0.879	
Mother not working	0.292	0.175	*	−0.373	0.435	
Two-parent family	0.200	0.317		1.351	0.773	*
Siblings	−0.027	0.231		0.144	0.506	
Grandparents living with the family	0.230	0.208		−0.284	0.484	
Cultural possessions	0.409	0.102	***	0.322	0.239	
Educ. level mother	0.248	0.089	***	0.126	0.207	
Educ. level father	0.281	0.073	***	0.121	0.180	
Family wealth	−0.011	0.149		0.457	0.372	
Home educ. resources	−0.192	0.114	*	−0.114	0.277	
Highest parental occupational status	0.013	0.005	***	0.005	0.011	
Constant	−1.546	0.576	***	−1.484	1.403	
Category: 4 – Private and vocational	**Base category**			**Base category**		
Log-likelihood	−4022.1			−1159.7		
Number of parameters	36			36		
Observations	3608			1368		

***, **, and *: significance at the 1%, 5%, and 10 % levels.

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