

Relationship Between Economic Status and Money Spent on Private Education Leading to Economic Inequality in South Korea

Jiho Lee

Senior Honor Thesis

Economics - Fall 2021

Abstract

In this paper, I examine the role of private education in South Korea's education system and how much weight it has on students' lives. Then, I analyze the relationship between people's economic status and the amount of money spent on private education. After coming out with the result of a positive correlation between more wealth leading to more money spent on private education, I then investigate the correlation between the money spent on private education and students' academic performance in major subjects. These analyses conclude that in three out of five subjects, students who spent more money on private tutoring got better scores. However, the small effect size leads to the conclusion that there may be other factors like the environment and attention toward students that influence their academic performance, and money spent on private education is either just the reflection of a parent's passion or a small factor.

*I would like to express my sincere gratitude to Professor Jesse Rothstein for his support and advice that allowed me to successfully finish this long adventure.

I. Introduction

South Korea's education system is highly competitive, and many parents spend large sums on private tutoring as a supplement to public schools. In fact, this intensity became a competition, and the majority of parents started to spend more money and start early on private education. In this paper, I will define private education as spending extra money after school to achieve better testing scores. It includes but is not limited to private tutoring, cram school, paid internet lectures, paid worksheets, after-school classes, and EBS lectures. Statistics Korea reported that average students (counting Elementary, Middle, and High School students) spent 291,000 Korean Won (the equivalent of approximately 244.01 U.S. dollars) per month on private education in 2018. Consuming private education is becoming a competition as the money spent keeps on increasing as the year goes by as 272,000 Korean Won per month was spent back in 2017 and 321,000 Korean Won per month in 2019. The survey states that approximately 75.7% of parents provide private education to their children (Kim et al., 2016).

The central question to answer in this paper is “Do people with more wealth spend more money on private education in South Korea? If so, does the amount of money spent on education affect students' test scores and their careers that could potentially lead to the cycle of wealth inequality?” In order to answer these questions, this paper will first go over other literature that talks about the relation between private education and wealth both in Korea and foreign countries. Section 3 will examine the data. Section 4 presents the analysis in three steps. The first step is finding a correlation between quantiles based on total wealth and spending on education. The second is to look for a correlation between monthly income and spending on education. Lastly, it is to find a correlation between a students' grades and their monthly spending on

education. Then, Section 5 will end the paper with the conclusion of this investigation with possible further research topics.

One of the major reasons why private education has become an essential part of the Korean education system is because of the weight each test has on the student's grade. Unlike the United States, where there are lots of weekly quizzes, homework, essays, and projects that take up a good portion of grades, Korean schools tend to focus only on the midterm and final exams. There are zero or few quizzes or homework. Thus, the two exams determine a student's grade for the semester, making both students and parents more concerned about performance on those tests.

This phenomenon of having high-stake tests is not limited to schools but also to college admission tests called Suneung -- Korean SAT. Because Suneung is key to getting into a good college, students and parents invest heavily in preparing for it, typically through private after-school tutoring programs. Unlike the United States, where both the Scholastic Assessment Test (SAT) and American College Test (ACT) occur seven times a year, Suneung is the only college admission test in Korea and happens only once a year. Thus, if students are not satisfied with their scores and wish to re-take it to aim for a higher-ranked college, they must wait another year to take the exam and re-apply to the universities they wish to attend. Additionally, unlike United States universities where the admission office looks into personal essays, extracurricular activities, letters of recommendation, and more, Korean colleges only look at students' Suneung scores and GPA unless there are special circumstances like athletes. In fact, in 2015, the Ministry of Education enforced a regulation that students writing about extracurricular activities like winning an outside tournament will be eliminated in the document screening phase.

The reason why Koreans are eager to do well in exams and attend high-ranked universities is that it directly leads to their job and income. It is hard for a student to attend a low-rank university and to catch up with the salary of students who graduated from high-rank colleges. Hultberg's team calculated a hypothetical salary based on 2019 Korean Statistical Information Service data and assumed that students who graduated from colleges that are not top 15 will expect to earn a monthly salary of 3,103,000 Korean Won starting at age 24 and 6,086,000 Korean Won by age 40. On the other hand, students graduating from the top 15 universities are expected to start with 6,987,000 Korean Won per month and 13,704,000 Korean Won per month at age 40. Thus, one's college ranking represents their career path and income for at least 16 years. It is very hard to get into top schools, as the Korea Educational Development Institute reported in 2018, that only 12.5% of students got accepted to the top 15 universities and only 3.3% went to Seoul National University, Yonsei University, or Korea University. These three universities, known as SKY, are the rough equivalent of the Ivy League in the United States. Because getting into SKY and other quality colleges is a challenging task and life-changing event, competition is intense.

At the same time, based on the data provided by the Korea Research Institute for Vocational Education and Training, the school environment is not fit for learning. They asked questions if many students were sleeping, doing outside work, and chatting during class. Because the question asked “if there are lots of students” doing given actions during class, answering “Some” does also imply that there are a handful of students that are either sleeping, doing outside work, or chatting during class. Approximately 76.8% answered “Some,” “Yes,” or “Absolutely” on the question that asked if there were many students that slept during class. Similar trends are also shown on both doing outside work and chatting during class as 62.4% and

54.96% of students answered “Some,” “Yes,” or “Absolutely.” This shows that most students are not focusing during class. The school environment is causing more weight on private education for students to be educated and be successful in exams.

Figure 1: Students Sleeping in School

Source: Korean Education & Employment Panel

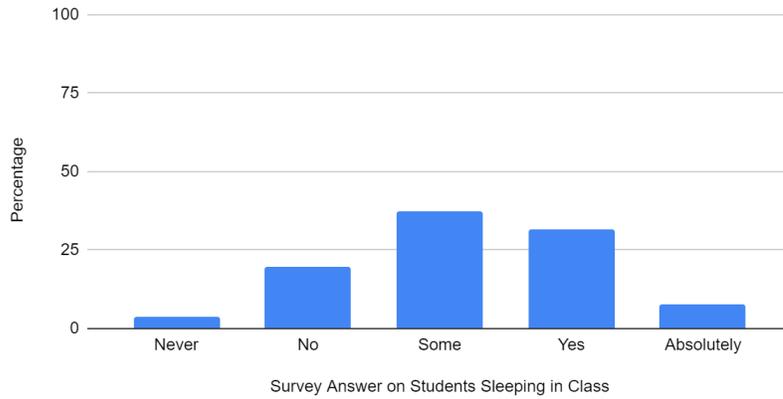


Figure 2: Students Doing Outside Work in School

Source: Korean Education & Employment Panel

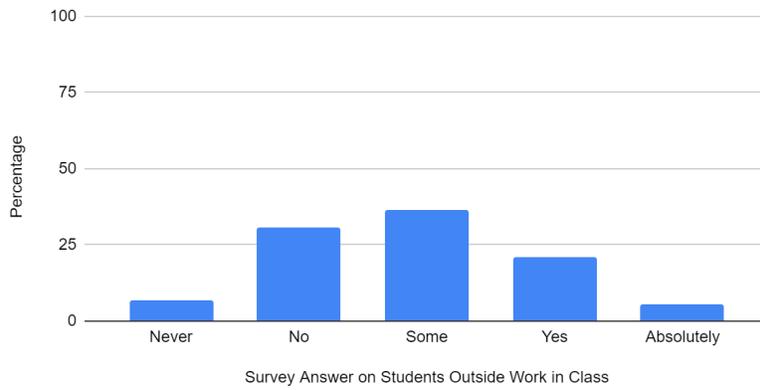
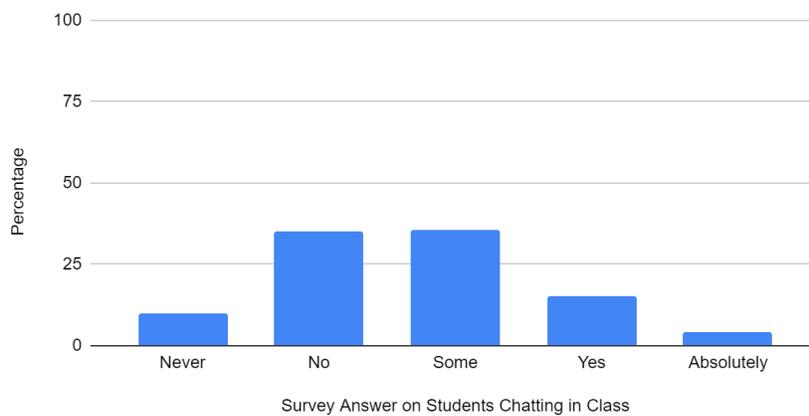


Figure 3: Students Chatting During Class

Source: Korean Education & Employment Panel



II. Literature Review

Even though the demand for better quality education is rapidly increasing in South Korea, the government spends less on public education than do its peer countries. The OECD reported that both Korea and the average OECD nations spent 3.1 percent of their GDP on public education back in 2018. On the other hand, Norway spent 4.6 percent of its GDP on public education. Accordingly, South Koreans spent 0.40 percent of their GDP on private education -- this is counting private schools and outside studies like cram school, tutoring, and more -- whereas Norway only spent 0.02 percent of their GDP on private education -- which is mostly on private schools. This suggests that if Korea wants to decrease spending on private education, the government should invest more in public education.

As previously mentioned, Korean colleges only accept Suneung scores -- happening once a year -- and GPA to evaluate students' admission. On the other hand, many other countries tend to be more flexible with college admissions. The United Kingdom does not have a specific standardized test for college admissions but rather GPA and interviews in most cases. Brazil does have the High School National Exam, but it is not mandatory to take. Last but not least, India is similar to the United States as many institutions offer tests.

Firstly, Patrik T. Hultberg, David Santandreu Calonge, and Ty Choi tried to come up with the prediction of the optimal amount of money that families of each wealth level should spend on private education (Haltberg et al., 2021). Their paper first investigated the private education system in Korea -- average participation rate and spending. Then, it made a hypothetical amount of monthly income a person will earn based on his or her college ranking. Last but not least, the authors divided families into four groups based on monthly income to determine the optimal amount of money each family should spend on private education. This measurement was done

based on the concept that spending money on private education is a means of investment and the potential monthly income students will earn based on their universities' ranks. They found that households earning less than 3 million Korean Won per month should spend zero Korean Won on private education, whereas if they earn between 3 and 5 million Korean Won, they should invest up to 46,000 Korean Won. Families that earn between 5 and 7 million Korean Won per month should ideally spend up to 69,000 Korean Won and if they earn more than 7 million Korean Won, they should spend up to 718,000 Korean Won per month on private education. Thus, this process can only work after getting into college since this measurement is based on the university he or she got accepted to.

Secondly, Sunwoong Kim and Ju-ho Kim investigated the relationship between private tutoring and the entire education system in Korea. First, the paper looks into the reasons why private education in Korea has grown, even more rapidly than the speed of Korea's economic growth. The authors concluded that the increase in market demand for better quality education cannot be fulfilled by public education. Then, they went into making a theoretical scenario to examine why Koreans were eager to provide their children with better education using the following equation.

$$y_i^* = X_i\beta + \varepsilon_i$$

Authors have defined y_i as the observed private tutoring expenditure for household i , X_i is set as an independent variable of the household that affects the level of private education, and ε_i is the error term. Independent variables account for both student and household characteristics, and environmental variables. Based on the regression, they have found that wealthier families and parents with higher years of completed education spend more money on private education.

Additionally, students in higher grade levels and students living in large cities have a higher demand for private tutoring.

Comparing the results of regression and social events that happened in Korea, the authors concluded that there is not just a single reason why there is such a high demand for private education, but several reasons combined. One of the reasons shown was an increase in economic growth in Korea, leading to demand for a better quality of education that cannot be satisfied with public education. Second, the High School Equalization Policy (HSEP) -- implemented in Korea back in the mid-1970s that abolished entrance exams in public high schools and randomly assigned students to a high school nearby their residence -- was enforced in Korea and made students with diverse levels of academic skills in a class. Thus, high-achieving students felt that school was slow in pace as well as lacked quality, making them rely more on private tutoring to perform better on college entrance exams. Lastly, the lack of effectiveness in Korean public schools is the cause of the increase in demand for private tutoring. Public schools are completely insulated from competition, which leads them to lack the will to improve their quality.

Thirdly, Hai-Anh Dang and F. Halsey Rogers investigated to find out the impact of private education on society. The paper examines whether the private tutoring system helps students to improve their academic performance or create social inequalities. They first looked into factors that led to an increase in the demand for private tutoring around the globe. They specifically examined Egypt, Japan, South Korea, Turkey, and Vietnam and concluded that they all showed that household income, parental education, and urban location influenced the demand for private education. The authors concluded that the high demand for private education does create corruption and potentially widen the inequalities. However, they believe that there are

higher benefits -- creating effectiveness in the education system -- from having private tutoring that diminishes all the negative effects.

I will be investigating the current private education system in Korea as well as the relationship between wealth and money spent on private education. In fact, this paper will use wealth and money spent on private education to see if people with more wealth spend more money on tutoring, whereas Haltberg's paper is to determine the optimal amount of money spent on private education for each family. Sunwoong's paper differs as their purpose was to find the cause of such high demand for private education in Korea, not find the influence of private tutoring on academic achievement. Dang's paper had a wider range, as they did not just investigate Korea. In fact, data from India and Vietnam was used more to support the authors' arguments. To add on, my paper differs from the rest as I will further investigate the relationship between money spent on private education and students' performance (their actual grade), since a better score means a better chance of attending higher-ranked universities, to find a potential connection to the cycle of wealth inequality.

III. Data

In this section, I will describe the data I am going to use for this paper for each of the three sections that I will analyze. The first dataset is going through Statistics Korea and gathering data on how much money people in each group of wealth level tend to spend on private education. Next, I will again look into Statistics Korea to determine how much money people spend on private education based on their monthly income. Last but not least, I will go over the survey done by the Korea Research Institute for Vocational Education and Training to find data on money spent on private education and their grades from school. All of this data will be in

Korean Won and is based on 2018 as the COVID-19 pandemic began in 2019, leading to possible inadequate data. Also, I will be using cross-sectional data.

III.i. Statistics Korea for Wealth Level and Money Spent on Private Education

Datasets are aggregated data from Statistics Korea, and I set the time as 2018 with the unit of currency being the Korean Won. Then, I will categorize households into five different groups based on their overall wealth -- the sum of income, house, building, and more -- and look for the amount of money each group on average spent on private education. Both the quantiles and money spent on private education are per household. After gathering all the data from 2018, I will make a regression analysis to determine the possible relationship between the two factors. This data is reliable as it is one of the largest samples -- 12,000 households -- that has been gathered by the Korean government. In fact, previous years' data was based on 8,700 households but increased the number of households to 12,000 households starting from 2018.

III.ii. Data for Monthly Income and Money Spent on Private Education

Another aspect of measuring economic status is looking at a household's monthly income. Just because one has lots of total wealth does not always mean that they have a high monthly income. Thus, I will divide monthly income into five categories based on the amount of money a household earns. The first group is people that earn between 2,000,000 and 3,000,000 Korean Won per month. The fifth group is people that earn 6,000,000 to 7,000,000 Korean Won per month. Units are in Korean Won and are based on 2018 data from Statistics Korea.

This is an aggregated data set and was gathered from elementary, middle, and high school students and parents in Korea. This was done among 1,486 schools and 1,491 classes, which are approximately 40,000 students in Korea. Even though it failed to investigate every single student in Korea, this is reasonable data to trust because data sampling has been done by the Korean government organization, and it has gathered the data from a massive student pool.

III.iii. Data for Student's Academic Performance and Money Spent on Private Education

Lastly, the data used to investigate the relationship between the money spent on private education and students' academic performance is from the Korea Research Institute for Vocational Education and Training. I will investigate five major courses in Korea, which are English, Math, Korean, Science, and Social Science because they are the subjects that students or universities look for the most and attend private education the most. The following data are subject-specific measurements.

In this data, academic performance will be divided into three different groups. Group 3 will be students that are ranked in the top 23 percent, group 2 are students between 23 percent and 77 percent, and group 1 are students 77 percent and below.

This was an individual survey given to both recent high school students and graduates in Korea. Survey participants were 9,157 people, and there is a question about the reliability of this data. First, many of the respondents did not answer properly to the survey as some of the answers were negative when only positive answers were possible -- like the amount of money spent on private education. However, this survey has been done by the Korea Research Institute for

Vocational Education and Training, which is a reliable organization that works together with the Korean government. Thus, I am going to use the data from the survey.

Some of the data provided by the Korea Research Institute for Vocational Education and Training was insufficient to use. First, some of the values for scores, amount of money spent, and amount of time studied were negative. For students that gave negative values for score, I will delete that student from the data. Also, if all four -- monthly tutor and cram school cost, monthly worksheet cost, monthly after school cost, and monthly EBS cost -- values were answered in negative values, I will also delete the student data. However, if there was at least one answer that was not a negative value, I will change negative values to zero and keep the non-negative answer. It is the same for the amount of time studying as I am only going to keep the data that had at least one non-negative value answer. Additionally, the data for the amount of money spent on private education was given in monthly value, whereas studying time was weekly value. Thus, I will multiply the studying time by four as I am assuming one month is four weeks.

Table 1: Korean Data Summary

Variable	Observation	Mean	Standard Deviation	Min.	Max.
Score	3,709	2.437853869	0.566725039	1	3
Monthly Tutor and Cram School Cost	3,709	417533.0056	417533.0056	0	7000000
Monthly Worksheet Cost	3,709	107865.3203	188368.9293	0	3000000
Monthly After School Cost	3,709	35337.66111	49233.69665	0	500000
Monthly EBS Cost	3,709	9681.901529	33227.97297	0	500000
Monthly Total Cost	3,709	188877.9202	353527.9257	0	7000000
Monthly Tutor and Cram School Time	3,490	7.760528444	15.2824451	0	203.32
Monthly Worksheet Time	3,490	3.771561068	12.00487532	0	168
Monthly After School Time	3,490	7.739574009	11.84097427	0	203.32
Monthly EBS Time	3,490	9.331744406	14.64237994	0	203.32

Monthly Total Time	3,490	28.60340793	28.18907999	0	336
--------------------	-------	-------------	-------------	---	-----

Table 2: Math Data Summary

Variable	Observation	Mean	Standard Deviation	Min.	Max.
Score	3,588	2.402731327	0.605948865	1	3
Monthly Tutor and Cram School Cost	3,588	356758.92	300541.3489	0	5000000
Monthly Worksheet Cost	3,588	89393.35863	124425.6871	0	1000000
Monthly After School Cost	3,588	28567.80627	38462.03411	0	500000
Monthly EBS Cost	3,588	8457.620042	27755.43874	0	300000
Monthly Total Cost	3,588	280361.0831	312619.6897	0	5000000
Monthly Tutor and Cram School Time	3,535	15.70506365	16.47895809	0	160
Monthly Worksheet Time	3,535	3.573770863	11.75144887	0	120
Monthly After School Time	3,535	6.347190948	9.708921271	0	176
Monthly EBS Time	3,535	6.525442716	11.99368114	0	120
Monthly Total Time	3,535	32.15146818	26.63241644	0.68	240

Table 3: English Data Summary

Variable	Observation	Mean	Standard Deviation	Min.	Max.
Score	3,672	2.447440087	0.582093634	1	3
Monthly Tutor and Cram School Cost	3,672	320448.4902	282770.6662	0	4500000
Monthly Worksheet Cost	3,672	96824.27386	196755.7701	0	3000000
Monthly After School Cost	3,672	30006.31175	45162.87674	0	500000
Monthly EBS Cost	3,672	7978.349285	25825.51551	0	444440
Monthly Total Cost	3,672	210098.8698	292023.7609	0	6000000
Monthly Tutor and Cram School Time	3,596	11.14302558	15.19138543	0	200
Monthly Worksheet Time	3,596	2.47214683	8.691999586	0	120
Monthly After School	3,596	6.262080089	9.151015199	0	120.68

Time					
Monthly EBS Time	3,596	8.008375973	13.6230293	0	200
Monthly Total Time	3,596	27.88562848	25.09802159	0.68	495.32

Table 4: Science Data Summary

Variable	Observation	Mean	Standard Deviation	Min.	Max.
Score	1,399	2.441744103	0.577970739	1	3
Monthly Tutor and Cram School Cost	1,399	345384.4905	291561.2905	0	2500000
Monthly Worksheet Cost	1,399	87343.97759	106689.8806	0	600000
Monthly After School Cost	1,399	27342.44792	33435.23846	0	300000
Monthly EBS Cost	1,399	7290.773067	22154.18932	0	300000
Monthly Total Cost	1,399	119492.1365	218668.2665	0	2560000
Monthly Tutor and Cram School Time	1,378	4.082699565	9.504606213	0	120
Monthly Worksheet Time	1,378	5.599448476	12.93375552	0	120
Monthly After School Time	1,378	6.857532656	9.668676119	0	120
Monthly EBS Time	1,378	9.468417997	13.37576471	0	84
Monthly Total Time	1,378	26.00809869	22.09218088	0.68	216

Table 5: Social Science Data Summary

Variable	Observation	Mean	Standard Deviation	Min.	Max.
Score	1,420	2.547887324	0.555416447	1	3
Monthly Tutor and Cram School Cost	1,420	334629.627	298446.3408	0	2000000
Monthly Worksheet Cost	1,420	99284.5953	153639.5624	0	2000000
Monthly After School Cost	1,420	25769.23077	35445.62683	0	400000
Monthly EBS Cost	1,420	6653.125	21131.70164	0	300000
Monthly Total Cost	1,420	73558.75563	168685.8933	0	2500000
Monthly Tutor and Cram School Time	1,384	1.750375723	6.884235935	0	76.68

Monthly Worksheet Time	1,384	6.204710983	14.12285579	0	120
Monthly After School Time	1,384	5.814450867	8.498441139	0	80
Monthly EBS Time	1,384	10.79679191	14.44876887	0	112
Monthly Total Time	1,384	24.56632948	22.18746716	0.68	200

IV. Results

There are three major results in this paper. I will first review the correlation between the total wealth of people and their money spent on private education. Then, I will examine the correlation between a household's monthly income and their spending on private education. Last but not least, I will investigate the correlation between students' grades in five major subjects -- English, Math, Korean, Science, and Social Science -- and their monthly spending on each subject. This is to determine if the high demand for private education is responsible for the larger gap between rich and poor.

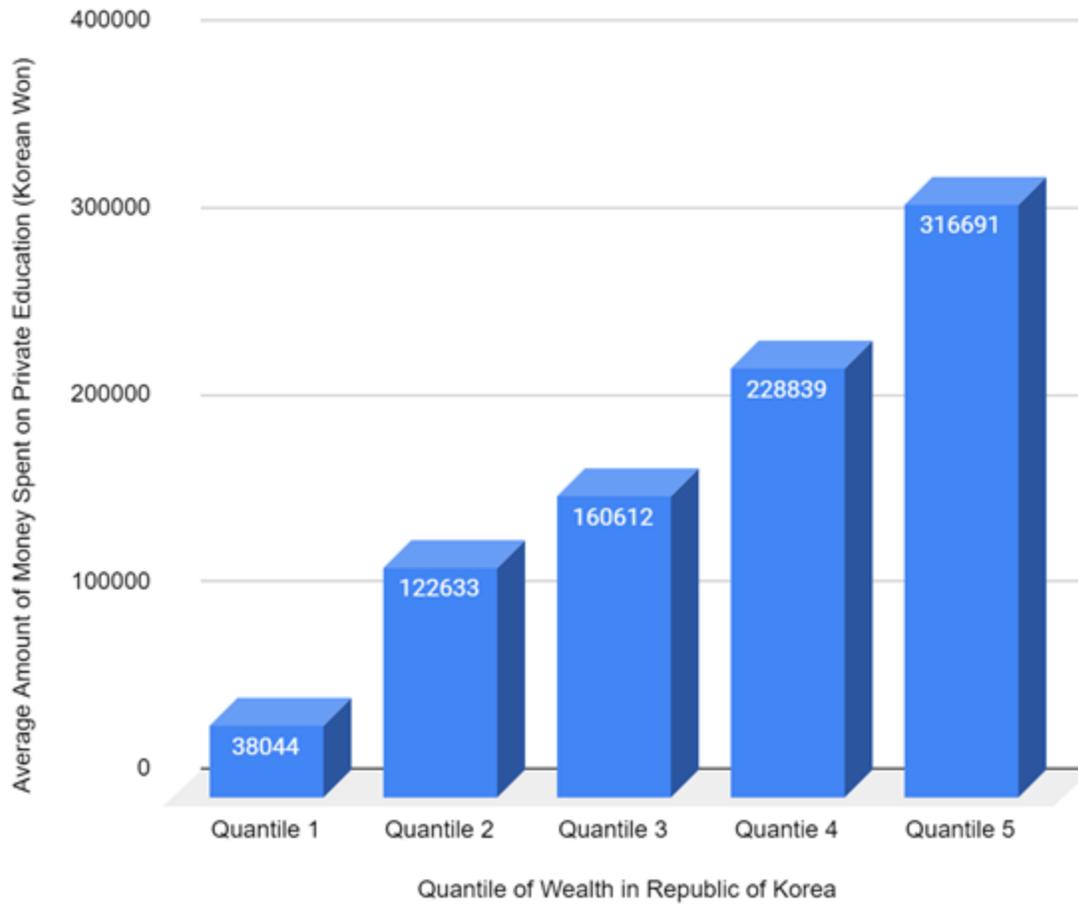
IV.i. Quantiles Based on Wealth and Money Spent on Private Education

In this section, I will evaluate whether people with more overall wealth are going to spend more money on private education. As previously mentioned, one of the major purposes of this paper is to determine the relationship between the economic status of the family and money spent on private education. In order to do so, I will gather data that divided Korea into five categories based on their total wealth -- Quintile 1 being the bottom 20 percent and Quintile 5 being the top 20 percent -- and look into how much each group on average spent their money on private education. As stated above, this paper defines total wealth as the entire wealth that one possesses -- including houses, money, buildings, and more.

The result shows that there is a positive correlation between overall wealth and money spent on private education. Thus, households with greater overall wealth tend to invest more money on private education compared to those who have less overall wealth. It also means that people with greater overall wealth are more likely to either get better quality private tutoring or learn more subjects than families that are not as rich. This result is similar to the conclusion that Haltberg, Sunwoong, and Dang's papers came up with as they have also stated that one of the major causes of the increase in the private education market is due to economic growth and that people with more wealth tend to spend more on tutoring.

2018 Average Amount of Money Spent on Private Education by Quantile (Unit: Korean Won)

Source: Statistics Korea



IV.ii. Monthly Earning and Money Spent on Private Education

After seeing the relationship between the overall wealth and money spent on private education in South Korea, I will then analyze the possible connection between monthly earnings and money spent on private education. The purpose of this test is to investigate if either the entire wealth or monthly earning affects more on the consumption of private education or if both factors show a similar trend. If they do show similar results, then I can reasonably conclude that

economic status, whether overall wealth or monthly income, has a direct influence on the consumption of private education in South Korea.

The independent variable is the range of monthly income, which is divided into five categories. The first group is households that are earning between 2,000,000 Korean Won and 3,000,000 Korean Won per month. The fifth group is families that have a monthly income of between 6,000,000 and 7,000,000 Korean Won. The OLS Regression also shows a great fit as R^2 for this graph is 0.994, showing a decent positive trend.

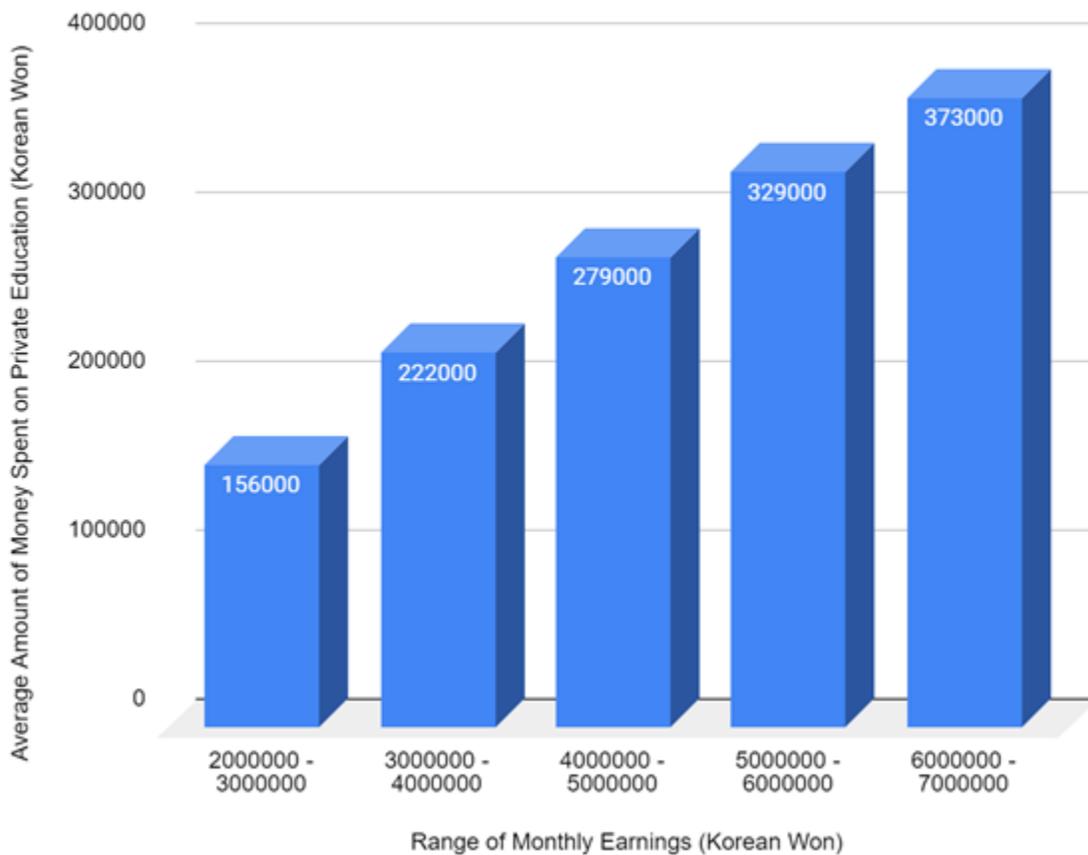
Households categorized in the first group spent an average of 156,000 Korean Won per month on their private education. They have spent approximately 6.24 percent of their monthly earnings on private education. The second group spent approximately 222,000 Korean Won per month on private education, and that was about 6.34 percent of their monthly income. The middle group spent 279,000 Korean Won, which was around 6.2 percent of their income. The fourth group paid 329,000 Korean Won for private education, which took 5.98 percent of their paycheck. Last but not least, the last group spent approximately 5.74 percent of their earnings on private education, which was 373,000 Korean Won. It seems that all the groups spent approximately 6 percent of their monthly income on private education. This implies that families from different income groups spend a similar portion of their income on private education. However, because 6 percent from groups that have higher monthly income is larger than the lower-income group, I can conclude that higher income groups spend more money on private education -- either to get a better quality of private education or just increase the number of subjects being taught.

Comparing the strength of the income and wealth relationships to the money spent on private education, I can imply that they both have a strong positive relationship toward money

spent on private education. Both show high R^2 values, and the value of money invested toward private education constantly increases as it gets to richer or better-earning groups. Thus, it is reasonable to conclude that households with higher economic status are more likely to get better quality private education or more subjects taught through private education.

2018 Monthly Earnings and Money Spent on Private Education (Unit: Korean Won)

Source: Statistics Korea



IV.iii. Money Spent on Private Education and Academic Performance

In order to determine if the amount of money spent on private education causes economic inequality, I am going to investigate the relationship between money spent on private education

and students' academic performance. The reason for comparing academic performance with the money spent on private education is because students' academic performance will directly affect which university they will be attending after graduating high school. As previously mentioned, students graduating from the top 15 universities in Korea tended to earn twice as much throughout their careers as those who failed to graduate from the top 15 schools (Haltberg et al., 2021). Thus, I am going to investigate if students who spend more money on private education score better to get accepted for higher-ranked universities, and if that turns out to be true, then inequality of money spent on private tutoring may even be one of the causes of economic inequality in Korea.

In order to measure the performance level, I will look into five major subjects in Korea -- English, Mathematics, Korean, Science, and Social Science. The money value will be in thousand Korean Won, which will provide a clearer understanding of the effect of money spent on private education on the outcome since one Korean Won is too small to create a viewable change. Last but not least, all of the data is done as robust regression analysis.

$$Y_m = \beta_0 + \beta_1 M_m + \varepsilon_m$$

In this regression, Y_m is the dependent variable and represents the score a student received in school. M_m is the independent variable that stands for the amount of money spent on private education per month, in thousands. Lastly, ε_m means the error term.

$$Y_m = \beta_0 + \beta_1 M_m + \beta_2 T_m + \varepsilon_m$$

Similar to the first regression, in this regression, Y_m is the dependent variable that represents the score a student received in school. M_m is the independent variable and stands for the amount of money spent on private education per month. T_m is the control variable, and it is

the monthly studying time. The below tables will abbreviate monthly studying time to MST.

Lastly, ε_m means the error term.

Table 6: English Relationship between Money Spent and Studying Time on Private Education with Performance

VARIABLES	(1) Score Robust	(2) Score Robust
Money Spent	9.96e-05*** (3.81e-05)	8.89e-05** (3.94e-05)
MST		0.0003274 (0.0004065)
Constant	2.426504*** (0.0126095)	2.421927*** (0.0155122)
Observations	3,672	3,596
t-value (Money)	2.62	2.26
t-value (MST)		0.81
t-value (Constant)	192.43	156.13

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

The first column in Table 6 shows the relationship between the money spent on private education and students' English scores. The coefficient for the Money Spent is 9.96e-05, which is a positive value. Thus, it shows that there is a positive correlation between the amount of money spent on private study and students' academic performance in school. It also means that when students spend a thousand Korean Won on private education, their test scores will go up by 9.96e-05. These values are statistically significant as its p-value is smaller than 0.01 and T-value is larger than 1.96. Referring back to Table 3, it shows that the average total spending is 210,099 Korean Won, and the standard deviation is 292,024. That means that a one standard deviation increase in spending raises scores by 0.029. As stated before, scores are on a 3-point scale, and the standard deviation is 0.58. Thus, the effect size is 0.05, which means the effect is small. Even though the result is statistically significant, the relation is not powerful enough to give an effect.

The second column in Table 6 shows the result with the control variable added. Even though the coefficient for Money Spent has gotten lower to 8.89e-05, it is still a positive value. It also means that a thousand Korean Won for private education increases the score by 8.89e-05. Also, the P-value has increased a little and now is less than 0.05. However, this is still statistically significant data as there is only 5 percent that the null hypothesis will be correct. Additionally, the T-value of 2.26 supports this hypothesis. To add on, the effect size is approximately 0.05, which is too small to create an effect for experiments. Similar to the first column, even though the result is statistically significant, they are not giving viewable impacts.

Table 7: Math Relationship between Money Spent and Studying Time on Private Education with Performance

VARIABLES	(1) Score Robust	(2) Score Robust
Money Spent	1.94e-04*** (3.63e-05)	1.97e-04** (3.84e-05)
MST		0.0006945* (0.0003905)
Constant	2.348244*** (0.0145162)	2.327709*** (0.0177409)
Observations	3,588	3,535
t-value (Money)	5.35	5.12
t-value (MST)		1.78
t-value (Constant)	161.77	131.21

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 7 looks at Mathematics, and how money spent and time studied on Math influenced students' performance at school. The first column solely looked into the relationship between money spent on math and its score. The coefficient for Money Spent is 1.94e-04, which shows that there is a positive correlation between the amount of money spent and the outcome. This

also means that the expenditure of a thousand Korean Won leads to a $1.94e-04$ increase in score. To add on, the P-value is lower than 0.01 and the T-value is 5.35 to show that this value is statistically significant. Additionally, Table 2 shows that the average total spending is 280,361 Korean Won, and the standard deviation is 312,620. This shows that a one standard deviation increase in spending raises scores by 0.061. The standard deviation for the score is 0.61. Thus, one standard deviation increase in spending raises scores by 0.1 standard deviations, which is considered small but does have statistical power to detect effects.

Moving on to the second column, which added the control variable, I can see that the coefficient for Money Spent is also a positive value. Similar to Table 6, the P-value has increased to be larger than 0.01 but smaller than 0.05. However, this does not change the fact that this is statistically significant as the P-value is still smaller than 0.05, and the T-value is 5.12. Additionally, the effect size is approximately 0.1, which does create a small effect for the experiment.

Table 8: Korean Relationship between Money Spent and Studying Time on Private Education with Performance

VARIABLES	(1) Score Robust	(2) Score Robust
Money Spent	3.66e-05 (2.84e-05)	3.13e-05 (3.36e-05)
MST		-7.28e-06 (0.0003241)
Constant	2.43106*** (0.0106198)	2.433987*** (0.0133848)
Observations	3,709	3,490
t-value (Money)	1.27	0.93
t-value (MST)		-0.02
t-value (Constant)	228.92	181.85

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 looks into Korean, and how this subject's score is influenced by the amount of money spent on private education and time spent on studying. In the first column, the coefficient for Money Spent is a positive value (3.66e-05). However, unlike Mathematics and English, this data is not statistically significant as the P-value is larger than 0.1, and the T-value is 1.27. Thus, even though the data itself shows positive relations, it fails to reject the null hypothesis.

Similarly, even after the control variable is added to the regression, the Money Spent is not statistically significant as P-value is larger than 0.1, and T-value is 0.93. In this case, the coefficient for Money Spent is still a positive value. However, I cannot conclude that scores in Korean have a relationship with the amount of money spent on private education due to a lack of statistical support.

Table 9: Science Relationship between Money Spent and Studying Time on Private Education with Performance

VARIABLES	(1) Score Robust	(2) Score Robust
Money Spent	1.19e-04** (7.24e-05)	1.30e-04* (7.72e-05)
MST		-0.0001952 (0.0007525)
Constant	2.427279*** (0.0175896)	2.43154*** (0.0240721)
Observations	1,399	1,378
t-value (Money)	1.65	1.68
t-value (MST)		-0.26
t-value (Constant)	138.01	101.01

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9 looks into Science, and how its test scores are related to the amount of money spent on private education. The first column shows that the coefficient of Money Spent without the control variable is 1.19e-04. This is a positive value that shows that more money spent on private education leads to better academic performance in the Science class. It also means that a thousand Korean Won investment for private education makes 1.19e-04 better in performance. Even though it is hard to say it has strong statistical support as the T-value is slightly lower than 1.96 and the P-value is larger than 0.01, it can still be seen as statistically significant enough to reject the null hypothesis as the P-value is still smaller than 0.05. Additionally, referring to the data from Table 4, the effect size is 0.02, which is not enough to create an effect for the study.

After adding the control variable in the second column, the coefficient of Money Spent is 1.30e-04. Like the data from the first column, the coefficient is a positive value, which represents that there is a positive correlation between money spent on private education and Science scores. However, the statistical significance has become weaker as the P-value is now larger than 0.05

but smaller than 0.1 with the T-value still being smaller than 1.96. Thus, I cannot reject the null hypothesis after adding the control variable.

Table 10: Social Science Relationship between Money Spent and Studying Time on Private Education with Performance

VARIABLES	(1) Score	(2) Score Robust
Money Spent	1.23e-05 (8.20e-05)	-9.90e-05 (8.83e-05)
MST		0.0021613*** (0.0007398)
Constant	2.546985*** (0.0161335)	2.50251*** (0.0231794)
Observations	1,420	1,384
t-value (Money)	0.15	-1.12
t-value (MST)		2.92
t-value (Constant)	157.87	107.96

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Last but not least, Table 10 analyses the relationship between money spent on private education and studying time with the performance level in Social Science class. Looking at the first column, the coefficient for Money Spent is 1.23e-05. As this is a positive value, I can say that there is a positive relationship between money spent on private education and achievement in Social Science class. However, the P-value is larger than 0.1, and the T-value is 0.15. Thus, this data is not statistically significant, and I have to reject the hypothesis that more money spent on private education leads to better performance for Social Science.

The second column shows data with the control variable. Unlike any other data shown throughout this paper, the coefficient of Money Spent shows a negative value (-9.90e-05). This means that more money spent on private education will lead to worse performance in Social

Science classes. However, this data also lacks statistical significance as the P-value is larger than 0.1 and the T-value is smaller than the absolute value of 1.96.

Overall, most of the coefficient for Money Spent except for Social Science with control variables added shows positive value. This represents that as more money is spent toward private education, students will perform better in that subject. However, among those results, only five of those data -- English with and without control, Mathematics with and without control, and Science without control -- are statistically significant. Also, only two out of five statistically significant results have a large enough effect size.

Because some of the results, even though they have a positive correlation, are not statistically significant, it is hard to firmly state that spending more money on private education leads to better scores on every subject. However, the hypothesis still stands for English, Math, and Science. As performance for three out of five most important subjects when applying to university in Korea is influenced by the amount of money spent on private education, it is reasonable to state that students will be more likely to attend higher-ranked college when they spend more money on the private study -- even though the effect is not huge.

V. Conclusion

The private education market is indeed growing around the world, and South Korea is one of the most rapidly growing countries. This cannot be helped as the Korean education system is based on high-stakes testing, and these scores may impact both one's university and the amount of money he or she can earn in the future. Through this paper, I am able to conclude that wealthier households tend to spend more money on private education, both overall wealth and monthly income. Not only that, I am able to say that there is a higher chance to perform better in

English, Mathematics, and Science when more money is invested on private education. It is also reasonable to argue that better outcomes in three out of five major courses can increase students' chances of getting accepted to higher-ranked universities. For English, a thousand Korean Won led to an increase of $9.96e-05$ without the control and $8.89e-05$ with the control. Additionally, without the control, math scores increase by $1.94e-04$ for a thousand Korean Won and $1.97e-04$ for the control variable. The last data that show significance is science score without control, and it is an increase of $1.19e-04$. Among those five statistically significant results, only two -- math with and without control -- have substantial effect sizes. Thus, even though there is a positive influence, its impact tends to be small. Combining all three results, I can say that there is a higher chance for students from wealthier families to score better, but the effect will be minimal.

As previously mentioned in Haltberg's paper, one's university ranking can influence the entire career and wealth he or she can earn. Thus, if student A grew up in a poor household and spent little money on private education, student A has a lower chance of getting accepted to a selective college. On the other hand, if student B was raised in a wealthy family with lots of money invested in him or her, then student B will be more likely to get accepted to a quality college. Then, student A will be more likely to earn less money compared to student B. As student A gets a child, the child will be more likely to repeat the cycle student A followed, whereas the child of student B will follow student B's path. If this cycle repeats for generations, this will lead to creating a larger gap between rich and poor. However, the question is whether academic performance is solely dependent on money invested toward private education?

There are arguments regarding whether the money one can earn, despite the ranking of a student's university, may be influenced by one's ability. One study showed that students that had similar abilities back in high school -- measured based on their high school academic

performance like SAT -- earned similar amounts of money after graduating college, even when one went to a selective university and one did not (Dale and Krueger, 2002). If this is true in Korea, then a student's ability becomes the major factor in deciding one's future income and the university does not matter. In fact, there are other potential threats to the interpretation of extra money spent on private education leading to better academic performance and starting a successful career. One of the critical threats is the family's passion for education. The amount of money the family spends on private education may in fact be one of the reflections of the family's eagerness to educate their children. If the money spent on tutoring is a reflection of how serious a family is about education, then the correlation between money spent on private education and academic achievement found in this paper may have overstated the causal effect of spending on achievement.

In 2003, the Korea Research Institute for Vocational Education and Training surveyed and analyzed that about 25% of Middle School students that are showing outstanding academic performance have considered studying abroad. Thinking of sending their child to study abroad at a young age represents that a family is prioritizing education. Not only that, it is fair to assume that families who care about education and have thought about sending their children to foreign countries to study will spend more money on private education.

Also, this idea can be further developed and say that the money spent on private education, academic performance, and seriousness toward education may even be a reflection of how much parents care about their children. Results from The Korea Research Institute for Vocational Education and Training in 2003 showed that 53% of top-tier students answered that their parents knew their personal concerns, whereas 45.8% of parents from the middle group and only 41.6% from the bottom group knew their child's concern. Even though knowing the

student's concern may not be the direct reason why children perform better in school, it may show that parents' attention toward their children may cause better performance as they invest more money in their children.

Thus, both family's passion for education and parents' attention toward children can potentially be the causal effect of spending money on private education, which leads to better academic performance. Then, the result of this paper is overstating the importance of money spent on private education and how it can be the major factor influencing one's wealth in the future, when actually, a passion for education and attention towards children may be the most important factor.

It is hard to say that one factor is causing both students to perform better and wealth inequality. Even though there is a positive relationship between both wealth level and monthly income with the expenditure on private education as well as students tend to perform better when they spend more money on private education, there are other factors like attention and environment that students grew up with that can also influence academic performance.

As such, there is more room for further research to be done as some of the values from section IV.iii were not statistically significant and have weak effects. Thus, the next investigation would be to find other factors that may have created this cycle of economic inequalities. One of the ways to approach this could be looking for other control variables that are not in the Korea Research Institute for Vocational Education and Training's report.

References

Dang, Hai-Anh, and F. Halsey Rogers. "The Growing Phenomenon of Private Tutoring: Does It Deepen Human Capital, Widen Inequalities, or Waste Resources?" *The World Bank*

Research Observer, vol. 23, no. 2, Oxford University Press, 2008, pp. 161–200,
<http://www.jstor.org/stable/40282371>.

Eo, Hyojin. “I asked him why he took private education and how to reduce it...” *Korea Policy Briefing*, Ministry of Culture, Sports and Tourism, 22 Feb. 2008,
<https://www.korea.kr/special/policyFocusView.do?newsId=148649134&pkgId=4950004>
[9](#).

Hultberg, Patrik T., et al. “Optimal Levels of Private Tutoring Investment in South Korea.”
International Journal of Education Economics and Development, vol. 12, no. 2, Jan.
2021, pp. 97–115., <https://doi.org/10.1504/IJEED.2021.10035303>.

Kim, Sunwoong, and Ju-Ho Lee. “Private Tutoring and Demand for Education in South Korea.”
Economic Development and Cultural Change, vol. 58, no. 2, The University of Chicago
Press, 2010, pp. 259–96, <https://doi.org/10.1086/648186>.

Kim, Eun-young, et al. “Current Status of Private Education for Infants and Toddlers and
Improvement Plan II.” *Korea Institute of Child Care and Education*, 2016.

Korea Educational Development Institute. “KEDI Annual Report.” Korea Educational
Development Institute, 2019.

Korea Research Institute for Vocational Education and Training. “Korean Education &
Employment Panel 2.” Korea Research Institute for Vocational Education and Training,
2018.

Korea Research Institute for Vocational Education and Training. “Korean Education & Employment Panel.” Korea Research Institute for Vocational Education and Training, 2003.

Ministry of Education. “0 Points for Document Screening When Writing External Specifications in the College Admissions Self-Introduction Letter.” *Korea Policy Briefing*, Ministry of Culture, Sports and Tourism, 13 Feb. 2014, <https://www.korea.kr/special/policyFocusView.do?newsId=148773957&pkgId=49500590>.

OECD. “Private spending on education.” 2021, <https://data.oecd.org/eduresource/private-spending-on-education.htm>

OECD. “Public spending on education.” 2021, <https://data.oecd.org/eduresource/public-spending-on-education.htm>

Stacy Berg Dale, and Alan B. Krueger. “Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables.” *The Quarterly Journal of Economics*, vol. 117, no. 4, Oxford University Press, 2002, pp. 1491–527, <http://www.jstor.org/stable/4132484>.

Statistics Korea. “Current Status of Private Education for Elementary, Middle and High School Students in Korea.” *e-Country Indicators*, 17 Mar. 2021, https://www.index.go.kr/potal/main/EachDtlPageDetail.do?idx_cd=2697.

Statistics Korea. “2018 Elementary, Middle, and High School Results of Private Education Cost Survey.” 12 Mar. 2019,

<http://kostat.go.kr/assist/synap/preview/skin/miri.html?fn=e17f456067485330202009&rs=/assist/synap/preview>

Statistics Korea. “2018 Results of the Household Trend Survey (Spending Sector).” 25 Apr.

2019,

<http://kostat.go.kr/assist/synap/preview/skin/miri.html?fn=d7ee01797860306330204218&rs=/assist/synap/preview>