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Student Academic Performance, Dropout Decisions and Loan Defaults: Evidence from the Government College Loan Program

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This paper examines the effect of the government college loan program in Korea on student academic performance, dropout decisions and loan defaults. While fairness in educational opportunities has been guaranteed to some degree through this program, which started in 2009, there has been a great deal of controversy over its effectiveness. Empirical findings suggest that recipients of general student loan (GSL) lower academic performance than those who received income contingent loan (ICL). Moreover, for students attending private universities, a higher number of loans received increased the probability of a dropout decision, and students from middle-income households had a higher probability of being overdue than students from low-income households. These findings indicate that expanding the ICL program within the allowance of the government budget is necessary. Furthermore, providing opportunities for students to find various jobs and introducing a rating system for defaulters are two necessary tasks.

Key Word: Government College Loan Program, Student Academic Performance, Dropout Decision, Loan Default
JEL Code: H52, I22, I23

I. Introduction

Most high school graduates intend to obtain a tertiary education, as the social environment of Korea does not make it easy for them to have stable lives without a university degree. They have trouble in finding a quality job without a university degree, indeed finding it difficult to land any job. Moreover, promotions are rare without a degree for those who already have a job. In short, a university degree has become an essential condition for living in Korea.

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It has become common for any high school student in Korea to consider going to university, and the progression rate of high school graduates going to university has reached a fairly high level compared to other countries. The average progression rate[1] to university in Korea was 71% in 2008, which was at that time 15% point higher than the average for all OECD countries. This high university progression rate of Korea is due to the social environment and changes in the education policy made by the Korean government.

First, high school graduates go on to university due to social pressure, considering a university degree to be essential. If students enter universities to develop themselves or to satisfy their academic curiosity, it would have a positive impact on both personal and national development.[2] However, we should not overlook the current situation, in which they decide to go to university not out of any initial desire but mostly due to the social environment and pressure. It was also thought that the non-pecuniary cost[3] is the critical factor determining the entry of students into the higher education market, considering also that the opportunity cost of not going to university will be high.

Other main causes of the higher university progression rate were changes in the education policy of the government. The government introduced the Government-Guaranteed Student Loan program in 2005, the General Student Loan program in 2009, the Income-Contingent Loan program in 2010, and government scholarships (offering tuition assistance depending on students' income levels) in 2012 to address the issue of students from low-income families not continuing on to higher education for financial reasons. If students from low-income households do not go to universities out of economic reasons, there would be no choice for them but to advance to the job market after graduating from high school. A student without sufficient expertise will have a difficult time finding a job and, even if he or she finds a job, will be more likely to have a low-quality job. This will create a vicious circle, trapping the person in poverty. For this reason, the government introduced a tuition aid program, a mixture of scholarships and student loans, in order to mitigate these students' problems so as to help those not otherwise able to receive a higher education. The program definitely helped students with financial need to undertake higher education, and it improved the fairness of opportunities in education. On the other hand, it also increased the university progression rate. Furthermore, we have observed side effects of the program; threats to government finances due to excessive government support and increases in payments overdue owing to financial difficulties in the repayment of the student loans.

This is reasonable considering the effort to solve a market failure of the type that can occur in a credit market, in which a program supports students with financial need to ensure the fairness of educational opportunities. However, considerable government funding is needed to run such a program. Therefore, rigorous discussions are necessary to determine if the student loan program started in 2005

[1]This is calculated according to the ratio of the number of high school graduates per year entering university that year to the number of high school graduates of the same year.

[2]The theory of economic development argues that educated people have higher productivity and that a country can achieve sustainable economic development through them. Other benefits of education are a decrease in both crime rates and unemployment rates, as well as an improvement in public health overall.

[3]The major portion of the non-pecuniary cost is the stigma effect, meaning that members of a society consider a person without a university diploma as an inferior human being.

has been efficiently operated. Moreover, it should be determined if the objectives of the program have been fully met. Fairness in educational opportunities not only refers to the possibility for students to receive a higher education but ensuring an environment that allows students to focus fully on their studies continually. The validity of the program is only ensured when it helps students while they are in school while also allowing them to enter university.

Numerous studies have evaluated the effectiveness of student loan programs. Most focused on the effects of student loan programs on the enrollment rate, academic performance, dropout rate, and graduation rate, particularly considering income levels. They found that the effects of student loans varied according to the income class of the students, and they emphasized the need for active support of students from the low-income classes. Specifically, they suggested that students from the low-income classes need scholarships or other types of financial aid (Kim *et al*. 2008a; Kim *et al.* 2009b).

There has been growing interest in the effects of loan programs on the enrollment rate. Students' ability is positively correlated with the university enrollment rate, which increases with income (Lochner *et al*. 2011). Kim *et al*. (2008b) also argue that students from the low-income class have a higher potential for longer enrollment durations due to economic reasons, and a higher percentage of them took out student loans. They claim that a financial aid program in accordance with income should be implemented. A strong correlation between household income and university enrollment was shown after analyzing the data in the late 1990s and early 2000s (Belley and Lochner 2007). Moreover, it was reported that a student loan program operating at private Mexican universities raises university enrollment by approximately 24% and that loan beneficiaries show higher academic performance by 3% than non-beneficiaries (Canton and Blom 2004; Rau *et al*. 2013). In contrast, Cameron and Heckman (1998) report after analyzing data in the 1980s in the United States that household income scarcely influences university enrollment when the effects of the students' home environments, AFQT scores, and degrees of unobservable heterogeneity are excluded.

Kim *et al*. (2009a) analyze the effects of scholarships and student loans on students' grades by income level using KEEP data (2005-2007). They report that scholarships are an effective means of improving students' grades for those in the medium-income classes. In addition, the effects of student loans on students' grades for students from the low-income class were significantly weaker than those from the upper-income classes.

In addition, much of the work on the impact of student loan programs has focused on dropout decisions. Stress from school life affects the dropout decisions of students from the low-income class more than credit constraints does. However, stress from school life is closely related to economic issues and, consequently, financial problems are associated with the dropout rate (Stinebrickner *et al*. 2007). Rau *et al*. (2013) analyze the State Guaranteed Loan (SGL) program of Chile using a sequential schooling decision model and report that the SGL program decreases the dropout rate. Furthermore, they show that it is especially effective in reducing the dropout rate of unskilled students from low-income families.

Graduation rates can vary according to students' income levels, and students

from top income quartile have a higher graduation rate by 40% than those from the bottom income quartile (Haveman and Wilson 2007). Students receiving financial aid finish their degrees more rapidly than students without support, but the study duration is not shortened with more financial support. However, there is a higher probability of successfully finishing a degree with more financial aid (Glocker 2011).

Studies of student labor market outcomes show that students with higher student loan amounts tend to find employment quicker with a greater potential of holding a low-wage job than students with lower student loan amounts (Kim *et al*. 2012). They report that these results indicate the possibility of worsening income inequality after they enter the labor market, considering that students with higher student loan amounts would financially be in a harsher condition. A beneficiary of the State Guaranteed Loan (SGL) program has a higher probability of holding a low-wage job in the labor market, which raises a question about the quality of education (Rau *et al*. 2013).

Previous domestic studies analyze how the student loan system affects the enrollment rate, student performance, continuity of academic study, and employment. However, there is a limitation when evaluating the effectiveness of widely employed government student loan programs, as analyses are not conducted according to the loan type. Moreover, research has not examined the factor of overdue payments; therefore, there is no evidence pertaining to the sustainability of the program. Although many in-depth analyses have evaluated various effects of student loan programs in other countries, it is challenging directly to apply these results to Korean loan programs due to the many differences among these student loan programs.

There are two channels through which a student loan program affects student academic performance. The majority of the student loan is to pay for tuition. In the absence of a student loan program, students likely will have to hold a part-time job. However, if students have access to a loan program, it allows them to spend more time studying instead of working. This can reduce the probability of them taking a leave of absence or dropping out of school. Furthermore, it may improve their GPA and let them graduate on time.

On the other hand, if a student has received a student loan and has decided to take a part-time job to pay for the loan (principal and/or interest), the student will have less time to study. However, if the student works as a teaching assistant or research assistant, it would be difficult to conclude that working always has negative effects on academic performance. A problematic situation is when a student is forced to work in a job unrelated to school because he or she needs money for living expenses. Working to pay an urgent debt can cause students to underperform in classrooms or to drop out of school owing to a lack of studying hours and due to the psychological and economic burden.[4] Therefore, it is important to analyze if student loans influence academic performance and dropout decisions as part of the effort to improve the program.

[4]Another negative effect of student loans occurs when recipients hold low-quality jobs and must pay the loan quickly, starting the job with existing debt (Kim et al. 2012). However, the ICL will lower the potential that students must take low-quality jobs as compared to the GSL given its use of a grace period until they are hired.

In addition, this study takes into account reductions of overdue payments by considering the characteristics of delinquent students, which is a factor threatening the sustainability of the program. The amount of student loans overdue increased from 304.6 billion won in 2010 to 504.4 billion won in 2012. Once the ICL type enters into repayment, the government financial burden will be worsened due to the increased unemployment under the currently harsh global economic conditions. This can directly affect the sustainability of the program. For this reason, an analysis of this issue will be important.

In conclusion, this study aims to evaluate the impacts of government college loan programs on students' academic performance levels and dropout decisions. Academic performance and dropout decisions are chosen as the elements to analyze because they are closely related to the learning environment.

The remainder of this study is organized as follows. Chapter II introduces the history of the government college loan programs, and a theoretical analysis based on the human capital model is presented in Chapter III. Chapter IV discusses the data and empirical strategy. Chapter V presents the empirical findings regarding the impact of the college loan programs. Chapter VI finally concludes this study and presents policy implications.

II. Background of the Government College Loan Programs in Korea

The Korean government instigated the GSL during the second semester of 2009 and the ICL during the first semester of 2010 to provide equal higher education opportunities regardless of income and to ensure that students could fully concentrate on studying. The main difference between these two programs is the repayment time. The ICL does not require repayment until students enter the labor market and have an adequate level of earnings to pay back the loan. However, GSL recipients are supposed to pay the loan back from the time they receive it. The GSL program supports tuition and living expenses up to 2 million won per year at an fixed interest rate of 2.9% per year to university students from households in the top 20% by income and who are younger than 56, took more than 12 credits in the previous semester, and have a GPA higher than a C (70/100). Students freely set the grace period and payment term and pay the monthly interest (principal and interest) from the time they receive the loan. Meanwhile, the ICL program provides tuition and living expenses up to 3 million won per year at a variable interest rate starting at 2.9% per year to university students from the bottom 80% of households in terms of income who are also younger than 35, took more than 12 credits during the previous semester, and have a GPA higher than a C (70/100).

The government also introduced a government scholarship program in 2012 in addition to these two loan programs. It provides various amounts of financial aid to students depending on their income level. It only supports students below the 80% mark in terms of income. From 2014, it provided full tuition (4.5 million won) to students from households in the lower 20% group in terms of income and a portion of tuition (approximately 675 thousand won) to students from households in the 70 to 80% income level bracket. That is, the GSL, the ICL and government scholarship program support students differently depending on their GPA and income level.

TABLE 1— CURRENT STATUS OF THE GENERAL STUDENT LOAN AND INCOME-CONTINGENT LOAN PROGRAMS BY YEAR

(UNIT: 100 MILLION WON, PERSON)

		Amount of Loan	Number of Recipients
2009	General Student Loan	12,014	331,470
	Income-Contingent Loan	8,456	232,448
2010	General Student Loan	19,205	528,943
	Subtotal	27,661	761,391
2011	Income-Contingent Loan	10,873	303,792
	General Student Loan	15,980	429,742
	Subtotal	26,853	733,534
2012	Income-Contingent Loan	15,150	510,052
	General Student Loan	8,115	217,615
	Subtotal	23,265	727,667
2013	Income-Contingent Loan	17,811	590,746
	General Student Loan	7,709	194,054
	Subtotal	25,520	784,800

Note: A student from a household with three children or more can receive an ICL regardless of income level.

Although students from almost all income levels except the top income classes can receive scholarships, the amounts vary among them. This program allows students to receive loans as well as scholarships simultaneously. However, it is not enough for some students to cover their full tuition, and they are forced to take out a loan to cover the difference.

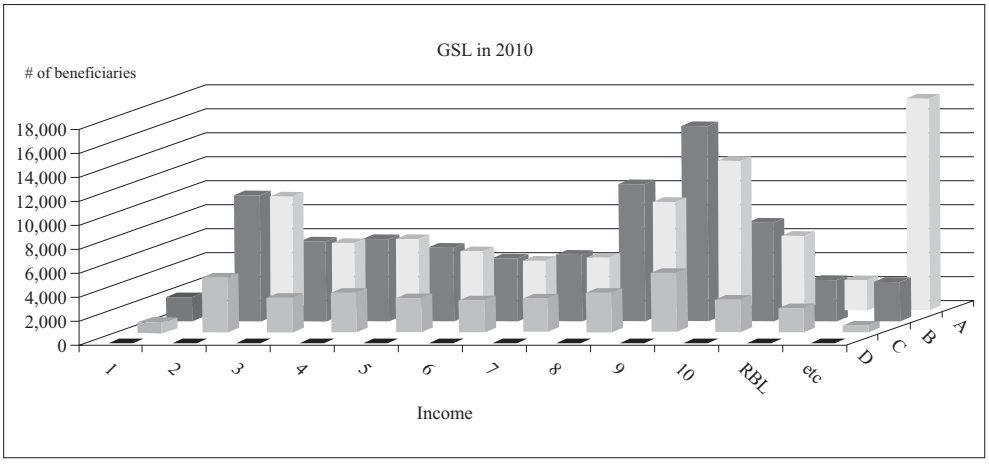
The student loan amounts and the number of recipients by year are shown in Table 1. The ICL started by lending 850 billion won in 2010 and had continuously more borrowers – nearly 600 thousand people borrowed about 1.78 trillion won in 2013. In contrast, the amounts and number of recipients for the GSL continuously decreased from 330 thousand and 1.2 trillion won in 2009 to 190 thousand and 770 billion in 2013. Considering the slight changes in the total number of beneficiaries during these years, it can be concluded that students who used the GSL program converted to the ICL program.

Figure 1 shows the number of beneficiaries of the GSL and ICL programs by income and academic performance for the first semester of 2010 and the second semester of 2012. Although the ICL was launched in 2010, it was not fully advertised to the public. Therefore, many students utilized the GSL program and most borrowers had GPAs higher than a B. The majority of ICL beneficiaries were students from households in the lower 70% in terms of income level, and most of them had GPAs higher than a B. Students with a GPA of C mainly used the GSL program at the early stage of the ICL, although the GPA cutline for the ICL was a C. This suggests that students did not have a good understanding of the loan programs.[5]

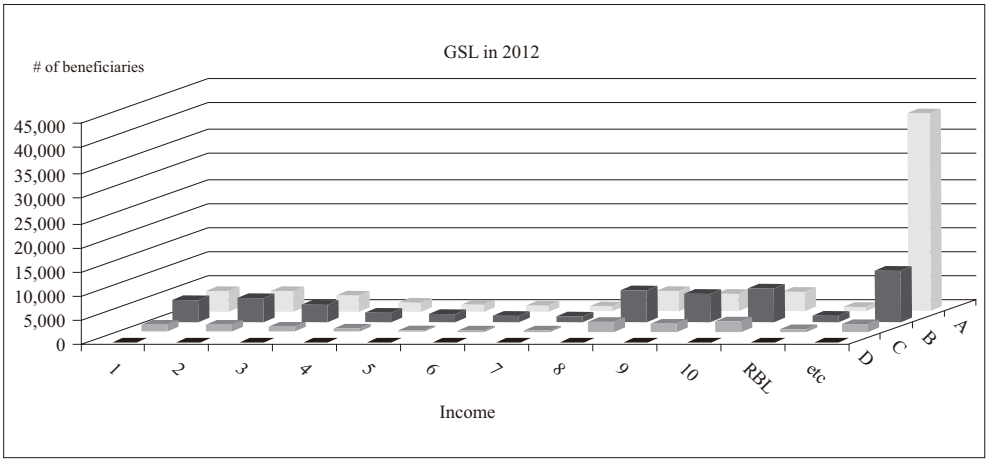
The number of ICL beneficiaries greatly exceeded that of GSL beneficiaries in

[5]Nam (2012) reports a positive correlation between the level of understanding of the ICL and use of the program.

2012. Particularly, students with a GPA at the C level increasingly used the ICL program instead of the GSL program. Students from low-income families (households with income levels in the bottom 30%) mainly used the ICL program. However, the number of GSL beneficiaries during the second semester of 2012 shows that students from lower 70% of households in terms of income often received this type. This may have occurred because a student from a household with three or more children can utilize the ICL program regardless of income.



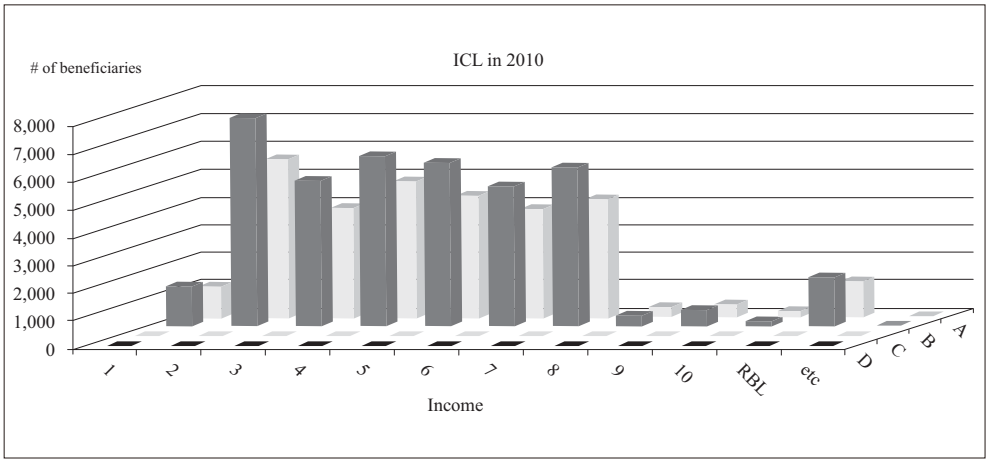
Note: RBL represents recipients of basic living costs. A, B, C and D indicate students' grades during each semester, and income level is divided into deciles.



Note: RBL represents recipients of basic living costs. A, B, C and D indicate students' grades during each semester, and income level is divided into deciles.

FIGURE 1. THE NUMBER OF BENEFICIARIES FOR THE GSL AND ICL PROGRAMS BY INCOME AND ACADEMIC PERFORMANCE

(CONTINUED)



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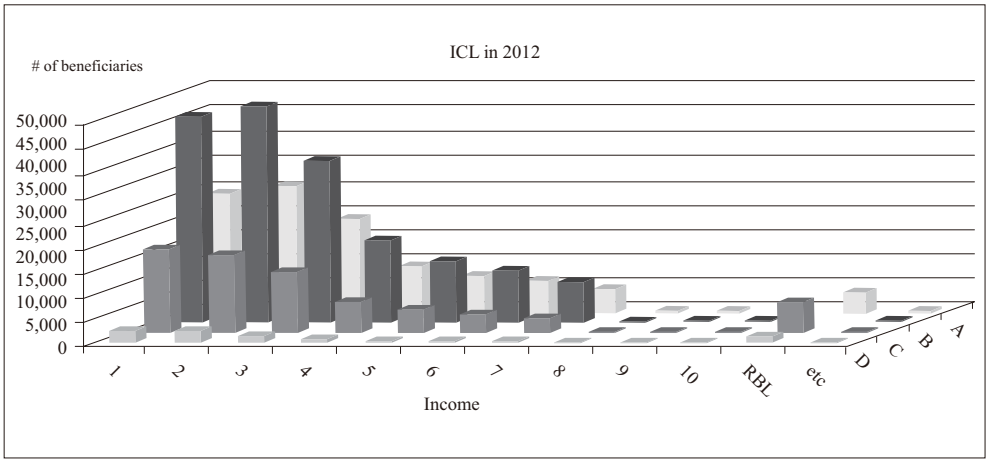

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FIGURE 1. THE NUMBER OF BENEFICIARIES FOR THE GSL AND ICL PROGRAMS BY INCOME AND ACADEMIC PERFORMANCE *(CONTINUED)*

III. Theoretical Framework

According to human capital investment theory, borrowing constraints may alter an individual's investment decision. Essentially, without borrowing constraints, individuals invest human capital regardless of their wealth. Meanwhile, they invest human capital less in the presence of borrowing constraints. Thus, it is critical to determine whether the level of human capital investment differs according to the existence of borrowing constraints. There exists a limit to the amount of loans

available, up to tuition and living expenses in the ICL and GSL programs. Therefore, this section investigates whether the level of human capital investment differs in these cases.[6] To assess this, the general human capital investment model proposed by Lochner *et al*. (2011) is used, and a simple two-period-lived individual model is applied, as described below.

Individuals invest in schooling and work during the first and second periods, respectively. Their utilities are then expressed as

$$\mathcal{U} = u(c_0) + \beta u(c_1) \tag{1}$$

where c_t denotes consumption during period t ($t = 0$ or 1); $\beta > 0$ is a discount factor; and $u(\cdot)$ is a positive, strictly increasing, strictly concave, and twice continuously differentiable function. Each individual is endowed with financial wealth w ($w > 0$) and ability a ($a > 0$). He invests in human capital to increase his future labor earnings, and labor earnings (y) at $t = 1$ are equal to $af(h)$. Here, h is human capital investment and $f(\cdot)$ is a positive, strictly increasing, strictly concave, and twice continuously differentiable function that satisfies Inada conditions. He can borrow money d ($d < 0$) to pay his tuition during school with a gross interest rate of, R(>1). If an individual is not restricted by borrowing constraints, he maximizes his utility (1) under the consumption levels in each period.

$$\begin{aligned} C_0 &= w + d - h \\ C_1 &= af(h) - Rd \end{aligned} \tag{2}$$

Then, the condition to determine the optimal level of human capital investment in order to maximize the present value of net lifetime income is as follows,

$$\frac{u'(c_0)}{\beta u'(c_1)} = af'(h^u) = R, \tag{3}$$

Where h^u indicates the optimal level of human capital investment without borrowing constraints.

For the ICL program, there exists only one borrowing constraint. There is a limit to the loan amount that a student can receive (up to tuition and living expenses). At this point, we consider a fixed upper limit on the amount of debt. The constraints for the ICL program are then as follows:

[6]Suppose that a student cannot borrow money in a financial market due to credit constraints. In such a case, it is clear that if the student receives funds from the ICL or GSL program, he or she can invest human capital more compared to when credit constraints exist. Nonetheless, because this study places emphasis on comparing the level of human capital investment depending on the difference between the upper limit of the loan amount and the repayment method, the case without credit constraints is compared.

$$C_O = w + d - h$$
$$C_1 = af(h) - Rd$$
(4) $$d \le d_{max}$$

The condition to determine the optimal level of human capital investment is expressed as shown below.

(5) $$af'(h^i) = R + \lambda^* \left(\lambda^* = \frac{\lambda}{\beta u'(c_1)}\right)$$

In this equation, λ is the LaGrange multiplier; it is strictly positive when the constraint binds and is $\lambda = 0$ otherwise. Here, h^i indicates the optimal level of human capital investment in the ICL program.

For the GSL program, there are two borrowing constraints. Once students borrow money during period 0, they should repay the money during period 0, with the rest of the money to be reimbursed during period 1. As above, another restriction is that there exists a fixed upper limit to the loan amount. Therefore, the constraints can be expressed as

$$C_0 = w + d - h - rd$$
$$C_1 = af(h) - (1-r)Rd$$
(6) $$d \le d_{max}$$

where $r\,(0 < r < 1)$ is the ratio of the repayment to the total amount students must pay back. Under these constraints, the optimization problem is as follows,

(7) $$af'(h^g) = R + \lambda^{**} \left(\lambda^{**} = \frac{\lambda}{(1-r)\beta u'(c_1)}\right),$$

where h^g indicates the optimal level of human capital investment in the case of the GSL program.

Based on the optimal level of human capital investment in each case, this study considers how borrowing constraints affect human capital investment. In a comparison of (3) and (5), (5) is found to be greater because λ is positive and $f(\cdot)$ is strictly concave and increasing. Therefore, h^u is greater than h^i.

$$af'(h^i) - af'(h^u) = \lambda^* > 0$$
(8) $$h^u > h^i$$

Next, when comparing (5) and (7), (7) is found to be greater because r is less than 1 and $f(\cdot)$ is strictly concave and increasing. Therefore, h^i is greater than h^g.

$$af'(h^g) - af'(h^i) = \lambda^{(**)} - \lambda^* > 0$$

(9) $$h^i > h^g$$

Finally, the optimal levels of human capital investment are ordered as follows:

(10) $$h^u > h^i > h^g$$

In short, once borrowing constraints concerning the upper limit of the loan amount and the repayment method are lifted, the optimal level of human capital investment may be reduced. Comparing the two different loan programs, the optimal level of human capital investment in the GSL program is lower than that in the ICL program. This can be explained according to the difference in the repayment time. While a GSL should be partly repaid during period 0, an ICL is repaid during period 1. For the GSL program, students need to pay the principal or interest while they are in school. However, if they cannot afford this, they may choose to work. If this is the case, the time to study can be reduced, which can negatively affect their academic performance. Under the assumption that students allocate time for study and work, their repayment burden may be reduced when accumulating human capital investment.

IV. Data and Estimation Strategy

A. *Administrative Data*

This study uses two different datasets to observe the effects of government student loan programs on academic performance, dropout decisions and to analyze the characteristics of those who default in relation to the programs. First, unique data supported by the Ministry of Education is used to determine the relative effects of the programs on academic achievement and to assess the characteristics of those in default in the programs. While it is impossible to compare students receiving loans with those not receiving them because the administrative data only contains information about recipients, it is possible to analyze the relative effects of different loan programs by comparing GSL recipients to ICL recipients. Nonetheless, because these two programs have different repayment methods, an analysis of the relative effect of academic performance is useful to measure which system is more effective at improving academic performance. This dataset contains information on students who received a GSL or ICL from the second semester of 2009 to the second semester of 2012. There were 917,509 students who received a loan, and the total number of observations is 1,563,554. Table 2 describes the descriptive statistics of this dataset.

In Table 2, female students received a loan slightly more often, and the average age of a recipient is 22 years. The recipients' scores were found to be between 80 and 90. Once they are converted to the 4.5 point scale, the result is approximately 3.69 points. Students attending private universities received loans more often than

TABLE 2— DESCRIPTIVE STATISTICS OF ADMINISTRATIVE DATA

(UNIT: MONTH, WON)

Variables		No. of obs	Mean	Std. dev	Min	Max
Sex		1,563,554	0.552	0.497	0	1
Age		1,563,554	22.274	3.620	14	57
Grade		1,563,554	2.199	0.694	0	3
Private University		1,563,554	0.873	0.333	0	1
Income Deciles		1,563,554	4.658	2.966	0	10
The loan amount received		1,563,554	3,261,175	1,160,740	100,000	24,200,000
The repayment amount		1,563,554	495,795	1,041,388	0	23,200,000
Overdue period		58,165	15	22.8	2	59
Overdue amount		58,133	3,015,649	1,209,098	1,694	9,976,500
GSL	Tuition	599,785	3,227,698	976,518	100,000	24,200,000
	Living expenses	20,678	1,118,846	848,461	500,000	15,000,000
	Tuition and living expenses	189,028	3,878,549	1,045,651	508,000	11,000,000
ICL	Tuition	295,050	3,029,577	1,014,538	100,000	24,200,000
	Living expenses	65,316	1,573,564	1,349,743	500,000	23,700,000
	Tuition and living expenses	393,697	3,578,123	1,112,757	600,000	15,900,000

Note: Grade is provided with an interval. The intervals of less than 70, 70~80, 80~90 and over 90 are defined as 0, 1, 2 and 3. The 0 income decile represents beneficiaries of basic living costs.

those attending public universities. This reflects the fact that the tuition at private universities is much higher than that at public universities. The main advantage of using this data is that it provides information about the income deciles for students who received a loan as well as those who default on their payments. The income decile of students who received a loan is 4.7, and the loan amount is around 3 million won, on average. In addition, the overdue period of those in default is 15 months, and the amount due is approximately 3 million won.

Using the administrative data, the following equation is used to determine the relative effect of the programs on academic performance. The regression equation is expressed below,

$$GPA_{it}=\alpha Loan_{it}+\beta X_{it}+c_i+y_t+\varepsilon_{it}\,, \tag{11}$$

where i indicates the student, t is the year, and GPA represents the grade point average achieved. Loan equals 1 if a student receives a GSL and is 0 otherwise, and X is a control variable which influences a student's academic performance. These can include sex, age, type of school (public university or private university), income, school region, total loan amount, payment, overdue period, and overdue amount. c_i represents a student's unobservable characteristics, y_t denotes the year effects, and e_{it} is an error term. In this data set, the GPA is provided with a range. Thus, it is represented as follows: below 70 is 0, above 70 and below 80 is 1, above 80 and below 90 is 2, and over 90 is 3. Year effects of variables influencing academic performance were considered for a longitudinal analysis, and a fixed-effect model analysis was conducted to control for unobservable characteristics.

In addition, continuous efforts should be made to lower the overdue rate, as large

amounts which are overdue can threaten the sustainability of the loan system. This study considers a means of lowering the overdue rate and helping delinquent borrowers by analyzing the characteristics of delinquency and determining the income classes most likely to be delinquent. To achieve this goal, the following equation is devised,

$$Default_{it}=\alpha IncDec_{it}+\beta X_{it}+c_i+y_t+\varepsilon_{it}, \quad (12)$$

where i indicates the student, t is the year, and Default is a dummy variable indicating whether a payment is overdue. $IncDec$ is the income decile of the student. X is a control variable which affects the probability of default. It can represent gender, age, the loan balance, the type of school (public university or private university), the school region and the total loan amount.

B. *Korean Education and Employment Panel (KEEP) Data*

The Korean Education and Employment Panel (KEEP) was launched in 2004 to provide basic data for establishing national human resources development policy, education policy and labor market policy. KEEP data traces 2,000 middle school seniors, 2,000 high school seniors and 2,000 occupational high school seniors yearly since 2004. In 2014, the ninth follow-up survey was carried out, containing a wealth of information regarding the educational experiences, grades and jobs of the participants. This data is used to determine how loans interact with dropout decisions. For this purpose, data were collected from 2011 to 2012 and were formulated into panel data after merging with each student's identification code. Descriptive statistics from the KEEP data are shown in Table 3.

3,468 students were used in the analysis of dropout decisions, and there were 6,935 observations for the two years. 58% of the data is from female students, and the school entrance year is 2006 on average. The proportion of those experiencing

TABLE 3— DESCRIPTIVE STATISTICS OF KEEP DATA

(UNIT: %)

Variables	Number of observations	Mean	Std. dev	Min	Max
Sex	6,935	0.579	0	0	1
Entrance year	6,935	2006.7	1.422	2005	2012
Dropout decision	6,935	0.245	0.430	0	1
Number of loans received	6,895	2.026	0.537	1	3
Job	6,929	0.484	0.500	0	1
Monthly income(ten thousand won)	6,255	130.017	313.894	0	4000
Existence of debt	6,780	0.204	0.403	0	1
Major	6,931	3.773	1.788	1	9
School region	6,935	7.007	4.579	1	17
Public school	6,882	0.781	0.414	0	1
Scholarship received at a previous year	6,935	0.117	0.322	0	1

a dropout among the sample is approximately 24.5%, and students received loans two times on average during the period. 20% and 11.7% of students among the sample are in debt and scholarship recipients, respectively. Contrary to the administrative data, 78% of students attend a public school. The tuition for private university is in general two times higher than that for public university. Thus, it would be interesting to determine if the type of school affects dropout decisions.

Regarding the dropout decision analysis, students who experienced a dropout are compared with students who did not. A logit model regression analysis is applied with using dropout experience as a dependent variable and variables influencing dropout decisions as independent variables. The type of school (public university or private university), the major, the location of the school, the presence of an on-campus job, monthly income, the existence of debt, and number of loans are considered as control variables affecting a leave of absence. Year effects of variables influencing a dropout decision are considered for a longitudinal analysis, and a fixed-effects model analysis is conducted to control unobservable characteristics. The regression equation is given below.

$$Dropout_{it} = \alpha NoL_{it} + \beta X_{it} + c_i + y_t + \varepsilon_{it} \quad (13)$$

Here, i indicates a student, t is the year and NoL is the number of loans received. X are control variables which affect the probability of default, such as the type of school (public university or private university), the major, the location of the school, the presence of an on-campus job, monthly income, wealth, and the existence of debt.

V. Results

A. *Impact of College Loan Programs on Academic Performance*

The administrative data with the information for the GSL and ICL is used to determine the relative effect between these two loan programs. Table 4 shows the relative effects of the student loan programs on academic performance.

Pooled regression for column 1 is conducted without controls, region or year effects. The findings indicate that the grades of GSL recipients are lower than those of ICL recipients. The more the loan amount increases, the more the grade decreases. The loan balance, overdue period and overdue amount all have negative effects on academic performance. Though control and region variables are added, the results in column 2 are similar to those in column 1. Lastly, the fixed-effects model is used to control unobservable characteristics in column 3.

The results in column 3 do not differ greatly from those in columns 1 and 2, but the magnitudes of the coefficients are different. GSL recipients show lower academic performance than ICL recipients, and the average grade of the GSL recipients is 3.63 points (out of a total of 100 points) lower than that of the ICL recipients. As the loan amount increases by 1 million won, this value decreases by 1.22 points. In addition, as the overdue amount increases by 1 million won, the

TABLE 4—RESULTS FOR THE EFFECT OF DIFFERENT COLLEGE LOAN PROGRAMS ON ACADEMIC PERFORMANCE ACCORDING TO ADMINISTRATIVE DATA

(UNIT: MIL WON, MONTH)

Variables	(1)	(2)	(3)
GSL	-0.193***	-0.239***	-0.363***
	(0.001)	(0.003)	(0.003)
Loan amount	-0.64***	-1.12***	-1.22***
	(0.01)	(0.01)	(0.01)
Loan balance	-0.49***	-0.51***	-0.20***
	(0.01)	(0.01)	(0.01)
Overdue period	-0.002***	-0.002***	-0.003
	(0.000)	(0.000)	(0.000)
Overdue amount	-0.58***	-0.61***	-0.15***
	(0.01)	(0.01)	(0.01)
Controls	no	yes	yes
Region	no	yes	yes
Year effect	no	no	yes
N	1,563,554	1,563,554	1,563,554

Note: 1) Sex, age, school, region, total loan amount, payment, overdue period, and overdue amounts are included as controls. 2) Robust standard errors are in parentheses. 3) *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

grade decreases by 0.15.

From the evidence derived by the analysis of the administrative data, it is concluded that the GSL program has a negative effect on academic performance, which is consistent with the evidence presented in Section III.

B. *Impact of the College Loan Programs on Dropout Decision*

Table 5 presents the results pertaining to the determinants of dropout decisions according to the type of school. While Panel A indicates the results for the pooled sample of students attending private and public universities, Panel B and Panel C consider the type of school. Only the results for the variables of interest, the number of loans received and scholarships received during the previous year, are shown in Table 5.

Column 1 begins with a simple logit regression without controls or fixed effects. First, as the number of loans received increases, the probability of a dropout decision increases by 20% in all three panels. Meanwhile, students who received a scholarship during the previous year drop out of school less than those who did not receive one. In column 2, factors that influence a dropout decision, such as a student's major, the location of the school, monthly income, the existence of a job and debt are included as controls. In addition, as a dropout decision may be linked to the specific year, year effects are considered in column 3. The results in columns 2 and 3 with controls and year effects are similar to those in column 1 despite the magnitude differences in the three panels.

TABLE 5—RESULTS FOR THE DETERMINANTS OF DROPOUT DECISION

Variables	(1)	(2)	(3)	(4)
Panel A. Private and public school				
No. of loans received	0.200***	0.123***	0.119***	0.031**
	(0.009)	(0.010)	(0.010)	(0.014)
Scholarship received during the previous year	-0.064***	-0.096***	-0.103***	-0.049**
	(0.016)	(0.015)	(0.015)	(0.021)
Observations	6895	6205	6205	6205
Panel B. private school				
No. of loans received	0.223***	0.149***	0.144***	0.069**
	(0.025)	(0.027)	(0.027)	(0.033)
Scholarship received during the previous year	-0.055***	-0.078***	-0.089***	-0.054
	(0.026)	(0.027)	(0.027)	(0.033)
Observations	1506	1403	1403	1403
Panel C. public school				
No. of loans received	0.195***	0.108***	0.104***	0.023
	(0.010)	(0.0110)	(0.010)	(0.016)
Scholarship received at a previous year	-0.074***	-0.115***	-0.120***	-0.046*
	(0.020)	(0.019)	(0.019)	(0.028)
Observations	5337	4756	4756	4756
Controls	No	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes
Individual fixed effects	No	No	No	Yes

Note: 1) Major, school location, monthly income, the existence of a job, and debt are included as controls. 2) Robust standard errors are in parentheses. 3) *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Finally, column 4 considers individual fixed effects with other controls. Panel A shows that the probability of dropout decision increases by 3% as the number of loans received increases. Akin to the results in the previous columns, students who received a scholarship during the previous year drop out of school less than those who did not receive one. However, because the tuitions between private and public universities differ significantly, it is important to determine if the dropout decision may also differ according to the type of university.

Panel B and Panel C consider dropout decisions according to the type of school. Interestingly, as the number of loans received increases for students attending a private university, the probability of a dropout decision increases by 6.9%. The result for students at private universities is two times higher than that for Panel C on average. Meanwhile, for students attending a public university, the number of loans received does not have a statistically significant effect on a dropout decision. As discussed above, the higher tuition of private universities may have led to these results. Thus, one would expect that students attending a private university are more likely to have trouble paying their tuition. If we link these results to the delinquency rate, clearer policy suggestions can be provided.

C. *Analysis of Defaulters' Characteristics*

The ICL program, which allows students to pay back their loans when they are employed, began in 2010. Defaults cannot occur in the ICL framework conceptually, though a practical repayment plan has been devised. On the other hand, the GSL program has been implemented for nearly five years, and the total amount overdue has substantially increased since then. We have reached a pivotal moment with regard to managing those who default. It is necessary to determine which group has a higher probability of defaulting for the efficient management of delinquent students. Therefore, this analysis focuses on students who received a GSL. It is natural that variables strongly related to delinquency are household income, loan amounts and loan balances. Table 6 presents the characteristics of those who default after received a GSL.

These results show that students who have high loan balances are more likely to be in default. Students' academic performance levels have little impact on delinquency. Interestingly, as household income increases, the probability of being in default increases. It is possible to interpret this result in two different ways.

First, the GSL interest rate is 2.9% per year, lower than any loan in the private sector. If a student (or household) borrows money both on the GSL program and in the private sector, GSL repayment may be pushed back on the priority list. The expectation that the government will protect those who default also plays a major role in delinquency decisions. However, this interpretation is not appropriate because students are restricted by financial transaction laws if their loans go unpaid for six months.

The second interpretation is that the high university tuition places a burden on household economies even if students are not from low-income families. In 2012, tuition amounts at public and private universities are on average 4 million won and 7.4 million won per semester, respectively. Average yearly income from the fourth

TABLE 6—CHARACTERISTICS OF THOSE WHO DEFAULT AFTER RECEIVING A GSL

Variables	(1)
Loan balance	0.388***
	(0.016)
Grade	0.021
	(0.030)
Age	0.028***
	(0.044)
Income decile	0.031***
	(0.001)
Controls	yes
Year effect	yes
N	25,010

Note: 1) Sex, age, loan balance, type of school (public university or private university), school region and total loan amount are included as controls. 2) Robust standard errors are in parentheses. 3) *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

TABLE 7—DELINQUENCY RATE BY INCOME DECILE

Income Decile	No. of recipients	No. of delinquency	Delinquency rate (%)
1st	59,921	3,797	5.96
2nd	96,785	4,849	4.77
3rd	63,417	3,435	5.14
4th	61,463	5,331	7.79
5th	52,581	4,443	8.31
6th	44,903	4,073	8.32
7th	48,844	4,265	8.03
8th	105,877	9,169	7.97
9th	134,448	11,336	7.78
10th	84,130	6,424	7.09

to the seventh income deciles per household is 33 million won and 50 million won, respectively, while for the eighth income decile per household it is 58 million won. Once two students in a household attend a private university, 74% and 56% of the yearly income goes to pay tuition for households in the fifth and seventh income deciles, respectively. Thus, the high tuition may be a major cause of defaults in these cases.

Table 7 presents the delinquency rate for GSL recipients according to their income decile. The delinquency rate from low-income families is lower than that for other income groups. This is related to the fact that the government continuously attempts to support students from low-income families.[7] The problem is how efficiently to manage those who default from middle-income families.

The Korea Student Aid Foundation introduced a system in 2014 which allows the transfer of relatively high-interest debt from government-guaranteed loans (second semester of 2005 to the first semester of 2009) and the GSL program (second semester of 2009) to the Foundation's low-interest student loan. However, to apply, debtors with government-guaranteed loans and loans from the GSL program must meet low-interest transfer qualifications. Among the criteria are no overdue balances, an account in good standing, and no ongoing legal processes. An applicant who is delinquent must clear the overdue payment to receive a transfer loan, making this program practically meaningless to those who are delinquent. A means of unconditionally relieving those who are delinquent can lead to moral hazard. However, it is necessary to give them a second chance. It is suggested to classify these debtors according to their repayment rate instead of treating all of them in the same way and to help them in efforts to gain a loan transfer. It appears that people with small amounts overdue are included in some cases along with those who are delinquent with high overdue amounts. The plan to provide the federation of banks with overdue information can be delayed or altered for students in financial need. Currently, students behind by more than six months on GSL

[7]Type I of the national scholarship program provides students with various amounts of financial aid according to their income decile. Students in the first income decile up to the eighth can receive 4.5 mil won, 2.7 mil won, 1.8 mil won, 1.35 mil won, 1.125 mil won, 0.9 mil won, and 67.5 mil won, respectively. This program places more emphasis on helping students from the low-income classes.

payments are registered as delinquents by the federation of banks. A graded information system should be considered, classifying those who are delinquent into several classes and give exemptions to those with small overdue amounts.

Furthermore, it is necessary to consider a method which allows families with two children to use the ICL program, as the current program only allows families with three children or more to apply for an ICL when the family is in the upper 20% income class. The government's financial capability should be carefully examined in advance before pursing such a change.

VI. Discussion and Policy Implications

This study mainly focuses on the effects of the government college loan program on academic performance, dropout decisions and loan defaults. A simple theoretical model shows that the human capital investment level can vary depending on the type of student loan. The GSL program, which makes students start to pay their debt immediately after receiving the loan, can present a greater economical and psychological burden on students as compared to the ICL program, which has a grace period. This implies that the GSL program induces low human capital investment levels because students who receive a GSL due to financial constraints are forced to work for pay these loans off, thus having less time to study.

An empirical analysis shows that the academic performance of GSL recipients is lower than that of ICL recipients. Moreover, having more loans increases the probability of a dropout decision, especially for students attending a private university. Finally, an analysis of the characteristics of delinquent borrowers reveals that students from the middle class have a greater probability of being overdue on their payments than students from low-income households.

The government introduced college loan programs to provide equal opportunities to receive a higher education regardless of the income level of students and their families. These programs have clearly helped students in financial need to gain the opportunity to receive a higher education. However, it is necessary to provide an environment for students to continue their education comfortably as well as an opportunity to initiate study. Several suggestions are given below for politicians to improve the government loan programs based on the results found in this study.

First, it is necessary to expand the ICL program within the allowance of the government's finance condition. Currently, students use two types of loans depending on their income class. Discrimination based on income level should be gradually removed due to the high tuition rates of Korean universities. Some may debate the appropriateness of supporting high-income families. However, considering that government scholarships are provided at a level of 650 thousand won to students from households up to the 80% income level, further discussion is warranted.

Secondly, various jobs should be created to allow students to work in an area related to their major. These can include on-campus jobs as well as positions at co-op systems, providing links to future employment. The government and companies

currently have these types of programs and jobs, but they are too few in number. It is essential to build an infrastructure which can provide job information for student loan recipients.

Lastly, it is necessary to devise a means of relieving those who are delinquent depending on their effort to pay the loan off as a means of managing delinquent payments. Creating a delinquent class can be an option. Those who are delinquent and who are also making an effort to pay off their loans can be given an option to delay the registration of a credit alert or to transfer their loan to the ICL program. This should be positively considered to reduce the delinquent rate and to provide a second opportunity to study. In conclusion, this study suggests that the government should try to pursue an education policy not for education providers but for education consumers.

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