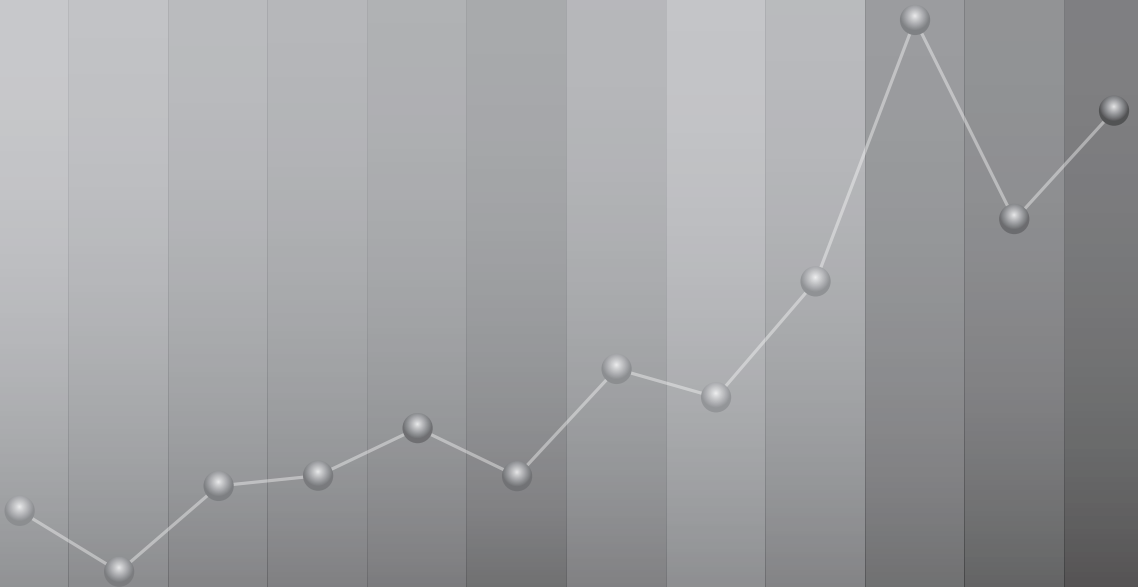


Government Support for Tertiary Education:

Current Status, Problems and Strategies for Improvement

December 2012

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Summary and Policy Implications

1 Problems and Policy Issues

In the Republic of Korea, approximately 80 percent of tertiary education expenditures are made by the parents of the students involved. This is reflected in high university tuition, leading to an expansion of government support emerging as an important social issue. Tuition for tertiary education in South Korea is currently the second highest among OECD member countries, behind the U.S., and the total cost of tertiary education at 2.6 percent of GDP is second only to the 2.7 percent of GDP reported in the U.S. In contrast, government support stands at roughly 0.6 percent of GDP, among the lowest-ranked among OECD countries along with Japan (0.5%) and the U.K. (0.6%). A social consensus needs to be reached concerning whether or not there should be an expansion of government support, and if so, to what extent and in what form.

This study on the need for government support, including identifying an appropriate scale and methods, was conducted in order to stimulate discussions toward this social consensus regarding an expansion of government financial support for higher education that would be optimal for the society as a whole.

2 The Need for and Policy Implications of Government Support for Tertiary Education

A. The Need for Government Support

The rationale underlying government support for tertiary education is largely threefold: education is an investment good, it produces positive externalities, and every citizen is entitled to equal opportunity. Among these, however, the issue of externalities requires reconsideration. Tertiary education leads to an improvement in the quality of labor, which in turn enhances the productivity of the society as a

whole; it therefore benefits, albeit indirectly, all members of the society. However, the extent to which tertiary education in South Korea produces such externalities is open to debate. This study, based on an empirical analysis of citizens aged 25 to 65, found that the employment rate of tertiary graduates initially increased together with the graduation rate, but after the rate of tertiary degree holders reached 27 percent, their increased number meant their overall employment rate declined. The rate of tertiary graduates in South Korea is 37 percent, much higher than the optimal figure of 27 percent. This means that an excessive number of degree holders are being produced relative to the demand in the labor market for such graduates. An additional implication is that a further increase in the supply of college graduates may not automatically be a plus factor for the country's economy.

Thus, the only remaining justifications for government financial support for tertiary education in South Korea are that such education is an investment good and therefore the demand for it can decrease due to flaws in the capital market or uncertainty of the future profit of higher education, and the need to allow equal opportunities to those in the low-income bracket who lack the financial means to invest in tertiary education should they choose to pursue it. Currently, the number of tertiary students has grown to the point of excess, so a shortage of demand per se is not an existing social issue.

B. Evaluation of Financial Support Methods

The two most important factors necessitating government financial support for tertiary capital market. The following is a summary of the results of an evaluation using an economic model based on these two factors. The two most important factors necessitating government financial support for tertiary education are the uncertain. The following is a summary of the results of an evaluation of defects in the capital market. The following is a summary of the results of an evaluation of various model based on these two factors. The two most important factors necessitating government financial support for tertiary capital market. The following is a summary of the results of an evaluation using an economic model based on these two factors.

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However, when uncertainty exists regarding the outcome of tertiary

education, each scheme varies in efficiency and equity in terms of the method of repaying the loan. A pure loan scheme means that the beneficiary and the debtor are one and the same, a graduation tax scheme implies that the most successful among college graduates repay the loans received by those who have failed in their educational investment, and an income-contingent loan scheme means that the burden of repayment is shared among the body of taxpayers. The income-contingent loan scheme recently introduced in South Korea is significant in that a portion of tertiary education is provided through tax revenues, which implies that there remains a regressive redistribution of income as with a tax-subsidy policy, and it is therefore problematic in terms of equity. However, in that the bulk of the student loan is repaid by the beneficiary of tertiary education, the recent system is less regressive than tax-subsidy policies. On the other hand, in terms of efficiency, an income-contingent loan scheme is an improvement because it raises the expected rate of income for college graduates. An increase in expected income increases the difference in income based on the accomplishments of tertiary education, and can thus serve as a factor that relatively reduces the enrollment rate of risk-averse individuals.

C. Estimates of Demand Functions for Tertiary Education

Estimates were made using micro- and macro-economic data on demand functions for tertiary education. The analysis of the micro-economic data revealed that the influence of income on the demand for tertiary education was statistically insignificant. Instead, non-income variables such as the occupation of the father, the academic background of the parents, and whether or not the student was raised by a single mother had a meaningful impact. Such a result shows that non-monetary household factors are important in the demand for tertiary education in South Korea. In other words, the decision to pursue tertiary education depends not on the ability to spend money, as reflected in the income level of the household, but on the educational values formed as a result of the academic background of the mother or of the occupation of the father.

The time-series analysis produced similar results. The influence of income was statistically insignificant, while in contrast the tuition cost variable revealed a positive correlation with the demand for tertiary education. Among income and cost variables, the one with statistical significance was the variable of expected future returns, implying a considerable demand for tertiary education as an investment.

Such estimates demonstrate that financial support policies for tertiary education will likely function simply as income assistance for households rather than as change agents in the demand for tertiary education. This in turn implies that financial support

policies that lower the marginal costs of tertiary education could give rise to an equity issue for low-income households characterized by low college entrance rates.

D. Scale of Financial Support for Tertiary Education

This study also evaluated, through comparisons with other countries, the scales of higher education expenses per student and of government support for upper secondary education in South Korea, and analyzed the projected effects of an expansion of government support. Based on the results of this analysis, various directions for policy change are as follows.

First, caution needs to be exercised in expanding financial support for the purpose of increasing the total amount of educational expenses. Considering the economy of South Korea and the rate of tertiary students in its overall population, the level of educational expenses per capita is not low in comparison to other countries. Also, based on the results of empirical analysis, when the financial management of a college is focused on government support, financial restrictions imposed by the government can obstruct the college in expanding in scale or improving in quality. Government financial support was also shown to make insignificant contributions to the prestige of domestic universities or to national economic growth.

Second, the fact that it is difficult to find a positive basis for expanding financial support in order to increase the total amount of educational expenses is consistent with the aforementioned direction in which methods of government support for tertiary education should develop. Government support for tertiary education should be focused on providing educational opportunities to low-income households and accelerating the restructuring of colleges rather than indiscriminately reducing the marginal costs through expanding the total expense.

Third, another point of consideration is changes in financial structures according to fluctuations in the number of students when government financial support for tertiary education is expanded. In comparison to countries with similar economic conditions, South Korea shows a markedly low rate of government support for educational expenses. This implies that there is a need to review whether or not to expand such support in the future. Meanwhile, as the student-age population is expected to rapidly decrease, if the rate of government support is rapidly expanded, sooner or later the rate of government support will exceed those of other countries, resulting in the financial operations of Korean colleges to switch from a market-oriented mode to a government-dependent mode. Whether or not such a change would be positive needs to be carefully considered.




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I

Introduction

Tertiary tuition in South Korea is costly: Approximately 80 percent of such tuition is paid by the parents of the students, making government financial support for tertiary education a major social issue. Among OECD countries, South Korea reports one of the highest annual tuition rates for higher education—average tuition for public institutions is 5,315 USD (based on PPP, 2008), while for private institutions it stands at 9,586 USD—second only to the U.S. (public: 6,312 USD; private: 22,852 USD). The total expenditure for tertiary education is 2.6 percent of GDP (2008), which also ranks second only to the U.S. (2.7%). However, government support for tertiary education only amounts to 0.6 percent of GDP, one of the three lowest rates among OECD countries along with Japan (0.5%) and the U.K. (0.6%).¹⁾

Facing this situation, South Korean society finds itself in need of arriving at an agreement over whether or not an expansion of government financial support is called for, and if so, to what extent and using which methods should such an expansion take place. While the notion of the need for an increase in government support has not faced significant opposition, there widely different opinions have been expressed concerning the scale of an expansion and the methods for providing such support. Student groups

1) Comparison of college tuitions in each country was based on data from the OECD (2011).

have been insisting that the government provide financial resources in order to halve the nominal tuition of every college or university, and several politicians have expressed sympathy with this movement. In order for the government to provide half of current tuition, an expansion of government support would be required to one percent of GDP. Meanwhile, in order for the government to pay half of all college tuition on top of the current government support, the current scale of government support would need to be expanded by 0.7 percent of GDP. Among OECD countries, the U.S. government spends one percent of GDP and private expenditures amount to 1.7 percent of GDP, making government assistance less than private expenditure; in contrast, in Australia (0.7% and 0.8%, respectively) and the U.K. (0.6% and 0.6%, respectively) government support and private expenditures are roughly equivalent. In all other OECD member countries, government support surpasses private expenditures.

In terms of methods for providing such support, student groups have demanded that tuition be reduced by means of direct support to colleges, and Song (2008, 2009, 2010) and others have argued for the enactment of legislation on financial grants for higher education, legally guaranteeing the scale of financial resources, and that the support should be provided in the form of formula grants. Financial grants to higher education are similar in nature to halving college tuition through government funding in that the support is not provided to individual students based on particular attributes and that tuition is instead lowered at the level of the institution. Meanwhile, An Jongseok et al. (2006) and others have emphasized that top priority should be provided to student loans, and that direct support to students should be discriminately provided based on income level, as with student loans for low-income households. This report questions the logic underlying the notion that the government should take responsibility for tertiary education as is common in many European countries, emphasizing the role of tuition as a price, and argues that the focus of government support for tertiary education should instead be focused on making up for market failures.

On this issue, South Korea has yet to arrive at a societal consensus, and because for the immediate future it appears unfeasible to expand government support for tertiary education to two or three times its current

scale, lengthy discussions should be conducted until society reaches some form of public consensus. In order to accelerate the process of achieving social consent on the matter of expanding government support for tertiary education and to help derive an optimal conclusion, this report conducts research on the need, appropriate scale and methods of government support.

Section II of this report discusses the characteristics of tertiary education and the grounds for government intervention. It seeks to clearly explicate the basis for government intervention through theoretical discussion and empirical evidence, and, based on the results of that analysis, discusses which method of financial support would be appropriate.

Section III estimates the demand function of tertiary education in South Korea. This component initially analyzes aggregate data regarding the entire country, and then conducts a concurrent analysis on micro-data (financial panels) that includes content on the subject of household characteristics and tertiary education. These analyses are expected to offer implications as to which factors demonstrate significant meaning for South Korea among the needs for financial support that were reviewed in Section II.

Section IV reviews the scale of government support. Through a comparison with selected nations, it evaluates both the scale of expenditures for tertiary education in South Korea and the scale of government support. Also reviewed is the effect of the overall number of students on changes in educational expenditures and in the ratio of private expenditure to government expenditure. This is followed by an analysis of the influence of the expansion of government support on the quantitative and qualitative expansion of education, on the cultivation of outstanding universities and on economic growth. Lastly, the results of these analyses are compiled, and used to derive implications for the scale of government support.



II

Characteristics of Tertiary Education and the Necessity of and Methods for Providing Governmental Support

1 Investment Goods and Market Imperfections

Private goods are divided between investment and consumer goods, depending on their use. Education contains features of both types: Some individuals simply enjoy attaining knowledge and ability through education and, in that case, education can be viewed as a consumer good. It can also be approached as an investment good, however, in that the knowledge and ability acquired may lead to career advancement and ensuing greater income.

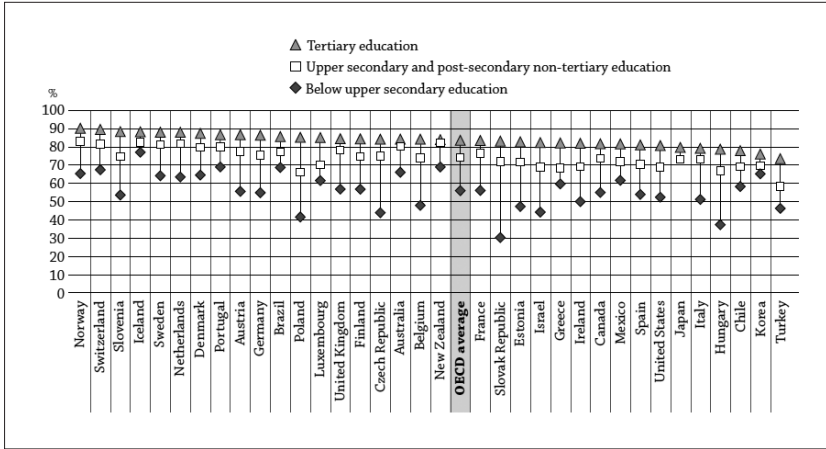
[Figure II-1] depicts the percentage of employment by level of education across OECD countries. It ranks countries in descending order of employment rates for those with tertiary educational attainment. In general, the employment rate is the highest among those who have completed tertiary education, the second highest among people with upper secondary education qualifications and the lowest for those with qualifications of lower secondary education or below. The magnitude of differentials in employment rates by levels of educational attainment varies across countries. Such differentials are pronounced in Poland and Slovakia, but less dramatic in South Korea and Iceland. In the case of Iceland, the differences are minimized mainly due to high employment rates for less-educated people, rather than because the participation rates in the labor

market of well-educated people is low. Meanwhile, South Korea has seen its differentials narrowed because its employment rate for those who have completed higher education ranks second to last, just ahead of Turkey, while the employment rates for less-educated people are relatively high.

[Figure II-2] describes relative earnings from employment by level of educational attainment across OECD countries. It illustrates the relative earnings of college graduates and graduates of lower secondary schools or below, with the average payroll of those with upper secondary education qualifications being set at 100. In general, the average salary of university graduates is high, while the average salary of those who have completed only lower secondary education or below is low. Differentials among salaries vary by country, however. In Brazil, for example, those with a college degree earn on average over 2.5 times more than those with only upper secondary education qualifications, but in many countries the ratio between earnings is 1.5 times or less. The average for OECD countries is 1.5 times. For wage differentials, South Korea ranks fifth from the bottom at 1.3 times, ahead of Sweden, Denmark, and Norway with differentials ranging from 1.2 to 1.3 times and New Zealand with 1.2 times. Wage gaps between those with lower secondary education or below and upper secondary graduates also vary according to country, but the difference between countries is not as marked as in the case of the wage gap between college graduates and upper secondary graduates. On average, the salary of people with only lower secondary education stands at 77 percent of the salary of those with upper secondary education qualifications, while in South Korea, the figure marks 69 percent, a greater gap than the average.

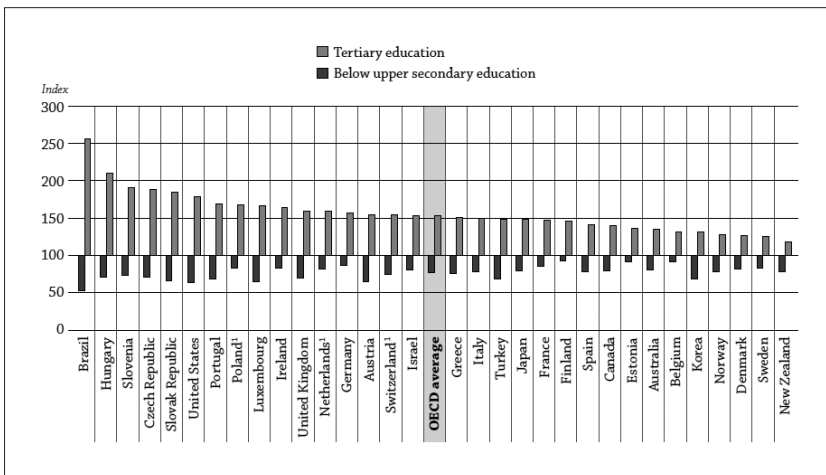
[Figure II-1] and [Figure II-2] suggest that tertiary education carries an important feature as an investment good since it leads to a greater likelihood of landing a job and consequent earnings premiums. In particular, the differential between graduates of postsecondary institutions and those lacking such a degree is large in terms of wage. According to an OECD survey, the average salary of tertiary graduates is 1.53 times higher than that of people who have completed purely upper secondary education. Those with lower secondary education or below only earn 77 percent of that earned by people with upper secondary education qualifications.

[Figure II-1] Percentage of 25–64 year-olds in Employment by Level of Education (2009)



Source: OECD, *Education at a Glance 2011*, 2011.

[Figure II-2] Relative Earnings from Employment by Level of Educational Attainment for 25–64 year-olds (2009)¹⁾
(Upper secondary and post-secondary non-tertiary education=100)



Note: 1) 2009 or latest available year
Source: OECD, *Education at a Glance 2011*, 2011.

If we consider tertiary education as an investment good, the necessity of government intervention can be argued on dual grounds. An investment in higher education must be made at the point of receipt of the education, but gains accrue over the remainder of the recipient's life after graduation. These gains are impacted not only by the efforts extended by those individuals who have attained university education, but also by overall economic conditions. In particular, the fact that it is the students themselves who expend the work and strive to improve their abilities to create future gains, rather than their parents, holds an important implication. Parents are not fully aware of their children's complete efforts and abilities. In this sense, risk-averse parents may tend to curtail investment in higher education for their children. In such a case, investment may not reach the socially optimal level, giving rise to a need for the government to intervene and expand the investment.

Conversely, given ambiguous information, parents who overestimate their children's efforts and abilities may make an excessive investment. There is a possibility that South Korea's unusually high postsecondary enrollment rates compared to other countries may have roots in parents' overestimation of their children's abilities.

Likewise, the trend of underinvestment that stems from a risk-aversion tendency and that of excessive investment drawn from overestimation coexist within a society, and when the latter overwhelms the former the total investment of a society can exceed the optimal level. In this case, the government must take steps to curb excessive investment generated due to misinformation by providing proper information. Even in this case, however, the need for governmental intervention to prevent underinvestment should not be ignored. In the absence of governmental intervention, underinvestment may arise among those who have sufficient ability, while excessive investment can be directed at individuals with insufficient ability, thereby further impeding the efficiency of the economy. The government must intervene in such a way as to support investment in educating those individuals able to generate social profits upon proper education.

The second argument supporting the necessity of government intervention lies in capital market imperfections. The expenditure for

tertiary education needs to be made at the initial stage, but the yields on the investment are generated across a lengthy period following graduation. Therefore, a relatively considerable amount of money and effort must be invested early on. This is why those who are unable to afford the initial expenditure are prevented from enrolling in tertiary education even though they may be informed of the expenditure and future gains and it is highly probable that the gains will exceed the cost. If the information is clear, people are able to finance education costs through a loan from banks, but if the information is uncertain, financial indicators of the moment such as parents' income have a stronger impact on the decision to pursue a loan than do future gains rates that are quite uncertain. In this case, government intervention is required to prevent the demand for higher education from falling below a socially optimal level.

In particular, government intervention to remedy market failures has an important implication in regard to equality of opportunity. The concept that everyone should depart from a metaphorical starting line with equal opportunities and be fairly compensated for their efforts is not only a core social value, but also has a vital implication in that the full labor force should be utilized to its utmost in order to maximize economic output. Therefore, individuals likely to generate gains exceeding education cost should be provided the opportunity to be educated, and it is undesirable to neglect a situation where individuals are left without a chance to enroll in higher education due to capital market imperfections.

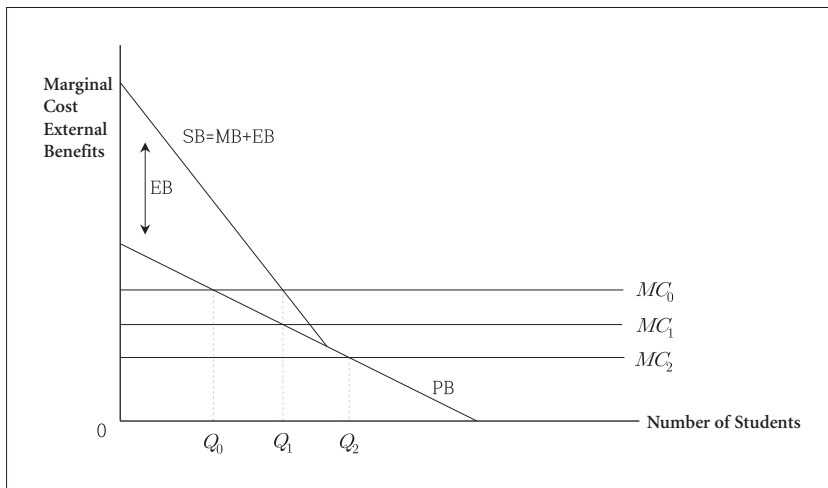
Externalities

Another significant ground for arguments supporting government intervention in the investment in higher education is externalities. Through educational attainment, individuals are able to improve the quality of labor and overall economic prowess, which increases not only the benefits they receive, but also the productivity of the entire economy, thereby indirectly transferring benefits to other members of society. In this light, education has the potential to trigger positive externalities.

Supposing that education generate externalities, leaving education

to the private market without any form of government intervention could possibly reduce the demand for education below an appropriate level. This can be depicted as in [Figure II-3]. Under the assumption that everyone enjoys equal ability and there is no uncertainty, an individual's marginal benefit (PB) can be illustrated as a curve sloping downwards from left to right. This is based upon the presumption that marginal benefit declines as the number of educated people increases. The externalities of education (EB) can also be graphed as a curve sloping downward from left to right under the hypothesis that the externalities of education are large when the educated population is small, but if the pool of educated people grows in number, the externalities decline with the addition of an individual who receives education.

It is also presumed that when the number of educated people exceeds a certain level, the expansion of education no longer results in positive externalities. When individual education is ranged from elementary education to tertiary education, elementary education is essential for people to become literate and learn basic calculation skills, as well as to become prepared for a productive life in society by internalizing basic social order and so on. In this regard, the fundamental instruction provided in elementary schools entails great externalities, and the positive externalities are generated by each and every participant. This is why universal elementary education is nationally provided and in most countries is compulsory for the entire population.

[Figure II-3] Externalities of Tertiary Education and Government Support

As the level of education rises, however, such essential externalities diminish while the individual benefit of labor ability improvement and ensuing externality—e.g., productivity improvement—increases. [Figure II-3] assumes that positive external effects do not arise if the number of educated individuals surpasses a certain level. This is because when there are an excessive number of people attaining tertiary education—that is, the population of those who have not completed tertiary education is too few—there arises a mismatch between labor force structure by level of skills and the supply of labor by level of skills, which leads to a situation in which both structural unemployment and labor shortages coexist. In this situation, an expansion of tertiary education is no longer beneficial to society.

In the figure above, the marginal cost of tertiary education (MC) required for educating an individual person is assumed to be fixed for convenience. When the marginal cost is MC_0 , if the tertiary education is left to the private market, equilibrium is established when the number of students is Q_0 . In this case, in order to allow productivity to reach a socially optimal level that reflects positive externalities, the marginal cost of tertiary education should be reduced to the level of MC_1 so that equilibrium can be produced when the number of students is Q_1 . If tertiary education takes

place when the number of students is Q_2 on the back of sufficient demand and supply in the private market, it is desirable for the government to refrain from intervention because there are no further positive externalities to be generated.

Recently in South Korea, arguments for halving college tuition have been on the social agenda. The main concern surrounding the issue is whether—from a policy perspective—the costs of tertiary education borne by consumers should be reduced in general via across-the-board support for students or selective support should be provided instead by augmenting subsidies provided to students from low-income families or to student loans. Concerning this matter, the externalities of tertiary education bear a crucial implication. If positive externalities of tertiary education serve as the grounds for government support, across-the-board support is logical. However, in the event that a marginal expansion of tertiary education is already unable to generate positive externalities quantitatively, externalities cannot serve as a grounds for government support. Instead, the rationale for governmental financial support should be sought in its regard as an investment good and for the provision of equality of opportunity. In this case, selective support appears to be the more effective option.

[Figure II-4] depicts the relationship between the proportion of 25~64 year-olds with tertiary education (horizontal axis) and public employment rates (vertical axis). The thick line in the center of the chart represents the OECD average. On average, the proportion of postsecondary graduates is 30 percent and the employment rate for them stands at 84 percent. South Korea holds a proportion of tertiary graduates of 39 percent, higher than the average, while their employment rate stands at 76 percent, below the average.

A closer examination of the figure shows that, with graduates of tertiary education at 30 percent as a standard, the left side shows a tendency of sloping upward from left to right, while the right side demonstrates a tendency to slope downward from left to right. This signifies that when the proportion of tertiary graduates is low within a society, the employment rates for such graduates increase as the proportion grows, but after the proportion exceeds a certain level their employment rates tend to decline with the expansion of the proportion. The estimation of the relationship

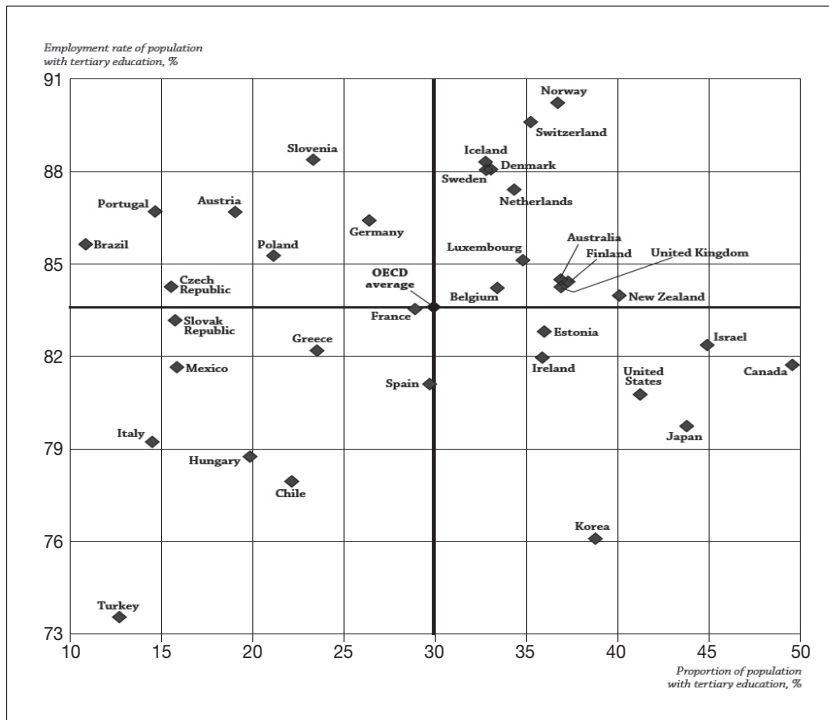
between the employment rates for tertiary graduates by nation (Y) and the proportion of tertiary graduates by nation (X) can be expressed through a regression equation as follows.

$$Y = 0.23074 + 0.11805 \log(\text{per capita GDP}) + 0.64747X - 1.20646X^2, R^2 = 0.3679$$

(t-value)(1.3203) (2.7261) (1.7275) (-1.9662)

In this equation log (per capita GDP) refers to the log value of the per capita GDP of each country, which is included among the explanatory variables because the employment rates of postsecondary graduates are expected to show a close relationship with the level of national economic development.

[Figure II-4] Relationship Between Tertiary Education and Employment Rates for 25~65 year-olds with a Tertiary Education (2009)



Source: OECD, *Education at a Glance 2011*, 2011.

As seen in the graph, the employment rates of tertiary graduates can be expressed as a quadric function of the proportion of tertiary graduates. The coefficient of the second term being a negative number signifies that if the proportion of tertiary graduates exceeds a certain level, employment rates fall as the proportion increases. Computing with the estimation equation shows that employment rates hit a maximum value when the proportion of tertiary graduates is 0.27, given that per capita GDP is fixed as a certain value. The proportion of tertiary graduates in South Korea is relatively lofty at 0.39. Unlike other advanced countries where postsecondary education was developed well in the past, South Korea has seen tertiary enrollment rates surge since only the late 1990s, thus, the proportion of tertiary graduates is much higher among younger generations than among the elderly. Considering this, recent enrollment rates are believed to be far above the level that maximizes employment rates. As aforementioned, the decline in employment rates for those with a postsecondary degree as their proportion grows is due to a mismatch between the demand and the supply of labor force by level of education. This suggests that the production of tertiary degrees no longer generates positive externalities because the number of such graduates is excessive. One concept that should be noted here, however, is that this does not mean that higher education itself does not generate externalities, but simply that the quantitative expansion of this form of education does not bring about additional external economic benefits.

Redistribution of Income and Equality of Opportunity

Out of the rationales offered to support the provision of financial support to students pursuing tertiary education, one item more frequently proposed by politicians and the media than by scholars is redistribution of income. The view is that opportunities for attainment of tertiary education should be offered to those in low-income brackets in order to facilitate their social mobility. Regarding this issue, the redistribution of income and equality of opportunity must be separately observed. The issue of providing individuals from low-income families with access to education can be

resolved by assisting those who view higher education as an investment good and seek to invest in it but possess neither the funds to cover the costs nor the capacity to borrow them from the market in assuming loans and enrolling in higher education. This is expected to prevent heredity of poverty among low-income earners.

However, two questions can be posed as to whether it is desirable to use government support to finance tertiary education as a more aggressive means to redistribute income beyond simply providing equality of opportunity. First, the demand for education is robust among those who are better off. When education is perceived as an investment good, the cost of college tuition is certainly a smaller burden for the wealthy. Therefore, under a given uncertainty of the returns of higher education, the demand for it will be higher among wealthier classes. When viewed as a consumer good, tertiary education shows characteristics of a luxury good, which is also consumed at a greater rate by the wealthy.

Second, those with a university degree earn more than those lacking one. As observed above, employment rates and average income are higher for those who have completed tertiary education than for those without. This suggests that people with tertiary education attainment earn higher average lifetime incomes than do others. Therefore, providing subsidies financed through general taxation, which levies all members of society regardless of their level of educational attainment, to higher education without considering the level of income will lower the marginal cost of tertiary education, but may result in reverse redistribution.

Methods of Providing Government Support

In sum, a justification for a subsidy to higher education in South Korea can be identified in that the demand for tertiary education is likely to decline without government intervention because it is an investment good and its future returns are uncertain. Further grounds can be found in the necessity of providing equal opportunity to children of low-income families who are unable to access the necessary initial investment funds. Even though there may be uncertainty entailing an investment in

higher education, excessive investment can still occur depending upon the level of tolerance for risk as well as upon income level, and an excess of postsecondary graduates may consequently be produced. On the other hand, on an individual basis, some individuals may elect not to invest in higher education due to risk-aversion tendencies, even when investment in education can be expected to yield positive results. To prevent such a situation, financial support must be provided in a manner that allows the marginal cost of education to be lowered. To ensure equal opportunity to low-income earners, it is necessary to compensate for imperfections in the capital market so that those in low-income brackets are able to borrow money to finance higher education.

García-Peñalosa and Wälde (2000) viewed tertiary education as an investment good and analyzed the expected effects of government support for tertiary education in terms of capital market imperfection and uncertainty of future income. They divided methods of providing government support into a tax-subsidy scheme financed through general taxation, a pure loan scheme, an income-contingent loan scheme, and a graduate tax system. Three policy goals were selected in order to evaluate the effects of these schemes: In terms of efficiency, Pareto efficiency, in terms of equality, ex ante equality of opportunity, which reflects that the decision to go to college can be made regardless of parental wealth, and ex post equality of lifetime income.

A pure loan scheme is a system of public loans featuring repayment plans through which an individual repays the amount that he/she borrowed to finance tertiary education, plus interest. A system of income-contingent loans, which is currently in place in South Korea, Australia, New Zealand, and the U.K., makes repayment conditional upon the income of the borrower exceeding a specified predetermined level and computes repayments as a percentage of earnings. A principle feature of the scheme is that high-earning graduates pay back the loans with interest, while low-earning graduates do not fully repay their loan and receive taxpayer subsidies. A graduate tax scheme is equivalent to an income-contingent loan in that it is a public loan and makes repayments contingent upon the borrower's income, but it differs from income-contingent loans in that repayments by high-earners exceed the principle and interest. The

discrepancy between repayments and cost is used to subsidize low-earning graduates who repay an amount less than the loan that they assumed. Under a graduate tax system, general tax revenue is not used to subsidize tertiary education.

To summarize the analysis by García-Peñalosa and Wälde (2000), a traditional tax-subsidy policy financed through general tax revenue can lower the marginal cost of tertiary education, but generates reverse redistribution of income. It is unable to simultaneously satisfy the three objectives of economic efficiency, equal lifetime income, and equality of opportunity. That is to say, it cannot avoid the efficiency-equity trade-off. A tax-subsidy policy, which is implemented in order to induce an efficiently optimal level of investment in higher education, consequently raises the lifetime income of skilled workers, and a further increase in subsidies elevates the demand for higher education and results in an equalization of the lifetime income of all workers. However, this implies an overprovision of skilled workers and thereby a loss in the entire economy's output.

As alternatives to traditional tax-subsidy policies, a pure loan scheme, income-contingent loans and a graduate tax system were all examined. These three schemes, based on the student loan system, generate the same consequences in the absence of uncertainty. They all satisfied the targets of efficiency, ex ante equality of opportunity and ex post equality of lifetime income. However, with uncertainty in tertiary education outcomes, the differences in the methods of repayment lead to variations in efficiency and equality. Under a pure loan scheme, the agent who receives benefits assumes the burden, but with a graduate tax, the educational costs expended by those who failed to reap appropriate outcomes from their investment in tertiary education is borne by those who garnered more successful outcomes. Lastly, under an income-contingent scheme, the cost is borne by general taxpayers. Therefore, an income-contingent scheme is unable to avoid the problem of reverse redistribution similar to a tax-subsidy policy, which implies the possibility of inequality. As a substantial portion of costs are borne by those receiving tertiary education, however, the problem of reverse redistribution can largely be eased compared to under a tax-subsidy policy. On the other hand, from the perspective of efficiency, a loan-contingent scheme raises the level of expected future income

resulting from tertiary education, improving efficiency while widening the difference in lifetime income according to outcomes of tertiary education, thereby contracting enrollment rates among individuals with tendencies towards risk-aversion. In the aspect of efficiency properties, it is difficult to distinguish which is more appropriate between income-contingent loan and graduate tax schemes, but in regard to equality properties, a graduate tax scheme outperforms an income-contingent loan scheme.



III

Estimation of Demand Function for Tertiary Education in South Korea

As previously discussed, tertiary education displays features of both investment and consumption goods, in particular those of luxury goods. In this section, we will examine whether South Korean tertiary education actually satisfies those features by estimating demand function for higher education. When regarding tertiary education as an investment good, expected income is forecast to have a marked impact on the demand for education, and the demand is expected to fall as the proportion of education expenditure out of the total investment grows. Under fixed education costs, it is projected that the level of income and the demand for higher education will show a positive correlation, because higher the income levels create a proportionately lower perception of the cost. In addition, the nature of tertiary education as a luxury good implies income level and investment rates have a positive correlation.

Estimation Based on Aggregate Data

A. Model

The demand for tertiary education can be explained by way of both investment theory and consumption theory. Investment theory states

that individuals elect whether to enroll in postsecondary institutions by comparing expected rates of return to appropriate interest rates. This means individuals go on to pursue higher education when the expected rates of returns exceed the opportunity cost that includes the comparison target of interest rates or, if it does not, they would decline to pay for tertiary education. In this case, enrollment will be determined according to the scope of the expected rates of returns for individuals, and total enrollment will be the aggregate of those individuals who project expected rates of returns greater than the opportunity costs. A change in comparison target interest rates has a negative correlation with the total demand for enrollment.

Such investment theory is based on the presumption that all individuals who are willing to purchase tertiary education are able to raise the funds needed to cover education costs. Given the interest rate, growth in the level of expected salaries after tertiary education and decline in the uncertainty of employment will serve as factors to increase investment in education while growth of opportunity cost, i.e. the level of salaries of those with upper secondary education qualifications, the cost of tertiary education and other elements will serve as factors to diminish investment in education.

Consumption theory views tertiary education as a durable good that yields services on its own. That is to say, with the purchase of tertiary education, the consumer is able to benefit from the ensuing amenities, including an improvement in social and intellectual consciousness, the establishment of a new human network, and the experience of campus culture. Since these amenities can be enjoyed over time, tertiary education can be defined as a directly consumed good. However, it is notably difficult to measure the utility of such consumption.

Of the two approaches, investment theory predominates, with consumption theory playing more of a supplementary role. The results of consumption theory serve to lower the costs defined through investment theory and boost the profit rates of tertiary education in general. If we assume tertiary education to be a normal good, a type of consumption good, then consumption increases as individuals' income grows. This provides theoretical grounds for the estimation of the income elasticity of

the demand for higher education.

Reflecting on the two theories, the following linear function can be formulated in which the demand for higher education depends on the level of income, education cost, and expected returns from tertiary education. This functional model is formulated based on the model by Campbell and Siegel (1967), with the addition of expected earnings as a variable in reflection of the nature of tertiary education as an investment good.

$$N_t = f(Y_t, P_t, W_t, E_t)$$

In this function, N_t is the number of enrollments, Y_t is the level of income, P_t is the level of tuition fees, W_t is the expected returns, E_t is the total population aged 19 to 25 (19~23 for females) indicating the body of potential enrollments.

However, in the case of South Korea, the fact that the government maintains control over university enrollment quotas should also be considered. That is to say, demand for higher education is not determined within a market with sufficient numbers of established private institutions; instead, market equilibrium is determined within the range of enrollment quota approved by the government. For this reason, the variable of the enrollment quota is added to take into account the influence in the demand curve of a change in the enrollment quota. The new function model is as follows:

$$N_t = f(Y_t, P_t, W_t, C_t, E_t)$$

The added C_t denotes the maximum number that may be admitted to tertiary education.

This model can serve as appropriate validation of the theoretical discussion on higher education. In the model, the total number of people who are able to apply for postsecondary admission was set solely based on age, but, in reality, only those who have graduated from upper secondary schools are entitled to apply. However, graduation from upper secondary schools was not considered in the formulation of the model because, currently in South Korea, the bulk of people younger than 25 do have

upper secondary education attainment and even when that is not the case, it is still a simple matter to earn tertiary entrance qualification by taking a qualification examination.

If the model function expressing the demand for higher education is homogeneous of degree one, it can be converted to the function for enrollment rates as follows:

$$\frac{N_t}{E} = R_t = f(Y_t, P_t, W_t, C_t)$$

The assumption of the homogeneous function of degree one is that a change in E_t does not bring about a change in enrollment rates, denoted by R_t . As long as a new group of students with a demand for higher education markedly different from the previous demand has not emerged, the assumption of the homogeneous function of degree one can be valid. Using this model function, empirical analysis will be attempted in the following sections.

B. Data

The data used in estimation is as follows. The school-age population is based on the data of estimated future population by age as provided by Statistics Korea. The information on enrolled students is based on materials from statistical yearbooks of education, and the data on enrollment quota are drawn from statistical yearbooks of education released at the point in time to be analyzed.

The index of four-year university tuition was computed by combining the tuitions for national and private universities. The level of income that affects the demand for higher education was estimated based on per capita GDP. The expected returns from higher education attainment were defined based on the level of earnings of tertiary graduates compared to the one of upper secondary school graduates. The data regarding the level of wages by educational level are drawn from the results of employment status surveys by job type conducted by Statistics Korea. The data for college education cost and income were discounted using the

consumer price index.

<Table III-1> Composition of Data for Macroscopic Data Analysis

	Data	Note
Population by Age	Statistics Korea KOSIS	-
University-enrolled Students	Annals of Educational Statistics	-
University Enrollment Quota	Annals of Educational Statistics	-
University Expenses	Statistics Korea KOSIS	discounted by CPI
Expected Returns	Statistics Korea KOSIS	-
Per Capita GDP	Statistics Korea KOSIS	discounted by CPI

The period to be analyzed is 1993~2010, which was determined by taking into consideration data availability as the expected returns for tertiary education play an important role in postsecondary education decisions according to investment theory explaining the demand for tertiary education. Data on the level of wages by educational level have been provided by Statistics Korea since 1993. The basic statistics of the data are described in <Table III-2>.

University enrollment rates, derived from the number of enrolled students compared to the population within the age groups who are able to apply for university entrance, have shown a steady increase since 1993. These enrollment rates, the number of enrolled students compared to the population aged 19 to 25 (19~23 for females), have swollen to 36.0 percent in 2010, from 15.7 percent in 1993. On the other hand, enrollment rates for two-year colleges had increased from 6.1 percent in 1993 to 12.2 percent in 1999, and have remained within the range of 12 percent and above since then. This implies that the demand for postsecondary education including at two-year colleges has steadily increased, but the demand for two-year colleges has been relatively flat since 1999. Changes in enrollment rates have shown trends fairly similar to those in enrollment quota, which suggests that the enrollment quota has a considerable influence on enrollment rates. For this reason, changes in enrollment quota need to be considered in the process of empirical analysis.

The gap in relative earnings by level of educational attainment,

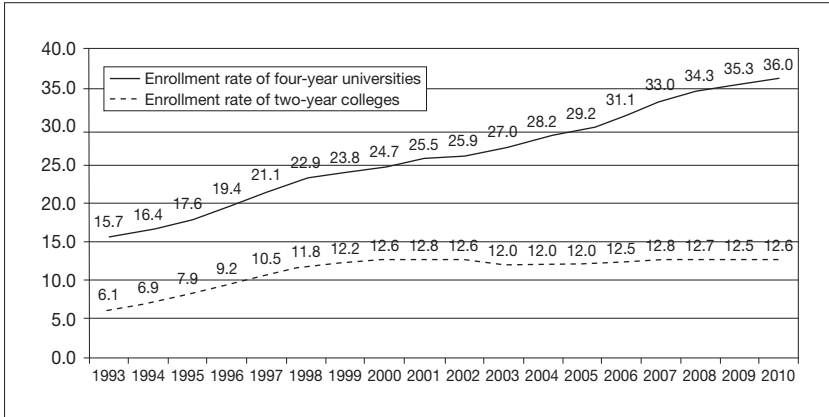
which determines the level of expected returns on investment in tertiary education, has not narrowed since 1993. The ratio of earnings by tertiary graduates to those by high school graduates has largely held steady at 1.5:1, while recently the gap has been showing a slight growth trend. On the other hand, two-year college graduates earn 1.0~1.1 times more than high school graduates. The gap narrowed until the early 2000s, before edging up once again. The gap between the earnings of two-year graduates and those of four-year graduates was found to be large.

<Table III-2> Basic Statistics by Variables of Macroscopic Data Analysis

	Average	Standard Deviation	Minimum Value	Maximum Value
No. of students at four-year universities	1,174,759	181,347	847,691	1,412,815
Number of students at two-year colleges	512,175.6	78,804.4	329,795	612,493
University enrollment quota	305,927.5	35,269.5	224,190	333,355
Population of 19-25 year-old males	2,801,252	256,779.3	2,400,488	3,215,704
Population of 19-23 year-old females	1,832,172	211,880.4	1,509,989	2,185,891
Per capita GDP (current price)	1.48e+07	5,075,691	6,760,134	2.37e+07
Wages of four-year university graduates compared to wages of high school graduates	1.515317	.0330467	1.455379	1.577283
Wages of four-year university graduates compared to wages of high school graduates (male)	1.433324	.0709697	1.32964	1.543391
Wages of four-year university graduates compared to wages of high school graduates (female)	1.568155	.0569003	1.505585	1.693418
Wages of two-year college graduates compared to wages of high school graduates	1.049158	.0239569	1.016718	1.089754
Wages of two-year college graduates compared to wages of high school graduates (male)	1.047172	.0149386	1.029414	1.079824
Wages of two-year college graduates compared to wages of high school graduates (female)	1.124121	.0424834	1.060306	1.204944
CPI	77.32117	13.85049	54.21	100
Four-year university tuition compared to CPI	62.71993	23.43221	29.89239	100
Two-year college tuition compared to CPI	64.59194	22.3555	28.556	100

[Figure III-1] Changes in Enrollment Rates of Four-year and Two-year Institutions

(Unit: %)

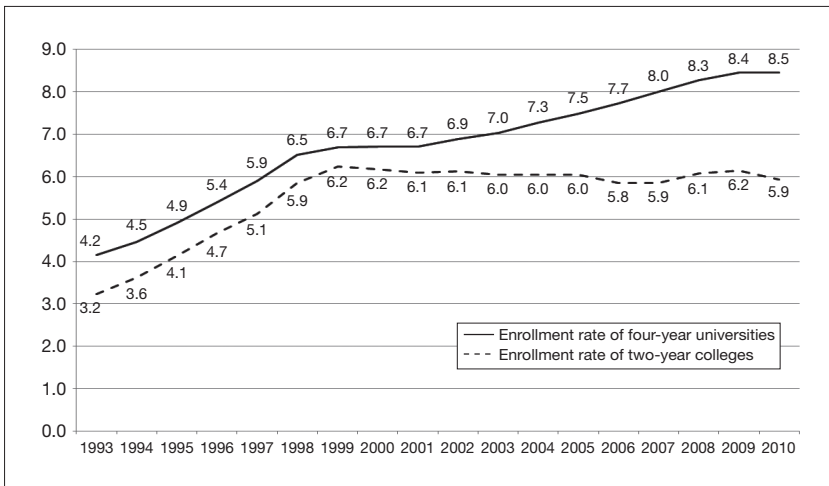


Note: Enrollment rate is the percentage of total enrollments to postsecondary student-age population.

Source: Statistics Korea, KOSIS; "Annals of Educational Statistics," Korean Educational Development Institute, annual publication.

[Figure III-2] Changes in Enrollment Quota Rates of Four-year and Two-year Institutions

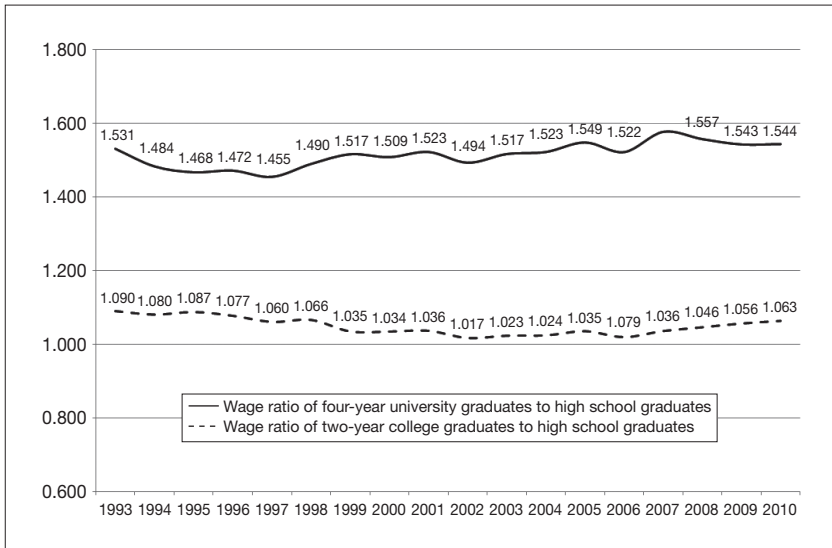
(Unit: %)



Note: Enrollment rate is the percentage of total enrollments to postsecondary student-age population.

Source: Statistics Korea, KOSIS; "Annals of Educational Statistics," Korean Educational Development Institute, annual publication.

[Figure III-3] Changes in Relative Earnings Ratio Between University and High School Graduates



Source: Statistics Korea, KOSIS.

C. Estimation Results

The estimation model is obtained by applying a log-linear function to the deterministic model of university enrollment rates, which was derived from theoretical discussion, as follows:

$$\ln R_t = \alpha + \beta_1 \ln Y_t + \beta_2 \ln P_t + \beta_3 \ln W_t + \beta_4 \ln C_t + \epsilon_t$$

P_t is price index of tuition, W_t is wage index ratios between university (or two-year college) graduates to high school graduates, and C_t denotes the percentage of enrollment quota to the university-age population.

The results of regression analysis on enrollment rates show that the important factors are the size of the enrollment quota and expected returns. The enrollment quota in actuality turns out to be a crucial factor in determining market equilibrium: Regardless of overall college enrollment rates and gender, the enrollment rates increase as enrollment the quota is

enlarged. The expected returns of tertiary education, which are defined as the ratio of earnings by university graduates to earnings by high school graduates, also serve as a factor to increase enrollment rates.

<Table III-3> Estimated Results of the Demand Function of Tertiary Education

Dependent Variables	Overall	Male	Female
	Enrollment Rate	Male Enrollment Rate	Female Enrollment Rate
Per Capita Income	0.1359 (0.360)	-0.1075 (0.498)	0.4913 (0.108)
Tuition Price Index	0.2749** (0.029)	0.4426*** (0.004)	0.1058 (0.586)
Differences of Relative Earnings	1.1596*** (0.003)	0.7402** (0.034)	0.7604*** (0.324)
Enrollment Quota Rate	0.7675*** (0.000)	0.5173*** (0.000)	1.0696*** (0.000)
Constant	-1.3480 (0.498)	0.8200 (0.698)	-5.5959 (0.160)
No. of Samples	18	18	18
Adj-R-square	0.9944	0.9907	0.9888
Prob > F-stat.	0.0000	0.0000	0.0000

Note: Figures in parentheses denote p-value, while ***, **, * represent the values that are statistically significant at the 1, 5, and 10 percent levels, respectively.

On the other hand, the variable of price shows results contradicting theoretical expectations. Enrollment rates by males have a significantly positive correlation with the overall enrollment rates. This implies the decision to enroll in tertiary education was made according to social variables that go beyond the effects of the level of tuition. The variable of income also turns out to be statistically insignificant. The finding that price variables have marked positive effects on enrollment decisions while income variables do not suggests that the demand for higher education in South Korea is determined by social preferences rather than by variations in price or income. The strong social preference for tertiary education attainment can be attributed to the social bias regarding educational attainment level,

discrimination according to academic background in the marriage market, and other factors.

Gender difference in the demand for higher education was marked. The variable of expected returns showed a notable effect on college enrollment rates by males, while no economic variable displayed statistical significance in the case of females. This implies that, for women, tertiary education has a special meaning beyond income, price, and expected returns.

The proportion of female students among total college students increased by more than ten percentage point over 15 years to 33.7 percent in 1995 from 23.5 percent in 1980. Since then, the proportion has continued to expand, posting 38.7 percent in 2010—a five percentage-point increase from 1995. This growth is attributable to the improvement in women’s status and gender equality across the society. In the case of females, such social evolution outplayed restrictive changes of price and income in changes in enrollment rates.

<Table III-4> Changes in the Proportion of Female Students in Higher Education (Including Two-year Colleges)

(Unit: person, %)

Year	No. of Students	No. of Female Students	Proportion of Female Students
1980	567,980	133,358	23.5
1985	1,174,001	337,211	28.7
1990	1,363,991	415,474	30.5
1995	1,757,555	592,728	33.7
2000	2,578,671	935,622	36.3
2005	2,712,724	1,000,564	36.9
2006	2,706,430	1,007,148	37.2
2007	2,715,023	1,021,188	37.6
2008	2,715,291	1,032,879	38.0
2009	2,744,972	1,050,724	38.3
2010	2,795,928	1,083,032	38.7

Source: Statistics Korea, KOSIS; *Annals of Educational Statistics*, Korean Educational Development Institute, annual publication.

2 Estimation Based on Micro-data

For an analysis of the demand for education, it is important to access data from households, a unit of demand, since the characteristics of households, which are disregarded in the analysis of overall trends, can thus be reflected in the analysis. In particular, taking into consideration the varied situations of families that make decisions on postsecondary enrollments can lead to more significant estimations.

A. Data

This paper analyzed factors affecting the decision to enroll in higher education with subjects being high school graduates aged 25 and under, using the fourth-year Public Finance Panel Data (surveyed in 2011)²⁾ released by the Korea Institute of Public Finance (KIPF). In the aggregate data analysis, high school graduates entitled to apply for tertiary education were not separated from the general postsecondary student-age population. However, in the micro-data analysis, high school graduation was considered as a separate variable. To reflect various circumstances such as parents' educational attainment, families composed of parents (single or married) and children were analyzed.

Among the total households to be analyzed, the number that included children with a high school diploma was 243, with high school graduates aged 25 and under standing at 253. Among these, 145, or 57.3 percent, were enrolled in a four-year university while non-students totaled 85 or 33.6 percent. Two-year college students numbered 23, accounting for 9.1 percent of the total.

2) The Public Finance Panel Survey has been conducted by KIPF since 2008 among around 5,000 households in order to obtain information specified for financial and tax policies.

<Table III-5> Tertiary Student Age Population

Classification		2011	
		case	%
Graduated from high school		85	33.60
Two-year college	Enrolled	23	9.09
	Dropped out	0	0
Four-year university	Enrolled	145	57.31
	Dropped out	0	0
Members of households under the age of 25 with high school diplomas		253	100
Households		243	-

The basic statistics winnowed out through the reformulation of data—for the analysis of enrollment rates—with a focus on those who have not enrolled in further education after high school graduation and those who have enrolled in four-year universities are shown in <Table III-6>. The average monthly ordinary income of households with children qualified to apply for postsecondary enrollment stands at 4.73 million won. Among these same households, 34 are headed by a single parent, with a single father in ten of the households and a single mother in 24. In terms of parents' educational attainment, in the case of the father, those with two-year college degrees and higher account for the largest proportion with 42 percent, while for mothers, high school graduates make up the largest proportion with 54 percent.

<Table III-6> Basic Statistics of Individual Data (Two-year College Excluded)

Variable	Obs	Mean	SD	Min	Max
Enrolled or not (enrolled=1)	230	0.65	0.48	0	1
Average monthly ordinary income (10,000 won)	230	473.08	334.02	0	3,000
Gender of enrolled students (female=1)	230	0.47	0.50	0	1
Single father (=1) 10 total	230	0.04	0.20	0	1
Single mother(=1) 24 total	230	0.10	0.31	0	1
Parents (=1) 196 total	230	0.85	0.36	0	1
Highest level of education achieved by father (non-education =1)	230	0.11	0.31	0	1
Highest level of education achieved by father (elementary school graduation=1)	230	0.03	0.16	0	1
Highest level of education achieved by father (lower secondary school graduation=1)	230	0.07	0.25	0	1
Highest level of education achieved by father (upper secondary school graduation=1)	230	0.38	0.49	0	1
Highest level of education achieved by father (two-year college graduation or higher=1)	230	0.42	0.49	0	1
Highest level of education achieved by mother (non-education =1)	230	0.05	0.22	0	1
Highest level of education achieved by mother (elementary school graduation=1)	230	0.04	0.20	0	1
Highest level of education achieved by mother (lower secondary school graduation=1)	230	0.07	0.26	0	1
Highest level of education achieved by mother (upper secondary school graduation=1)	230	0.54	0.50	0	1
Highest level of education achieved by mother (two-year college graduation or higher=1)	230	0.29	0.46	0	1
Father's occupation 1	230	0.39	0.49	0	1
Father's occupation 2	230	0.17	0.38	0	1
Father's occupation 3	230	0.26	0.44	0	1
Father's occupation 4	230	0.18	0.38	0	1

Note: In the absence of one parent, the lowest educational attainment was applied.

Father's occupation 1: managers, professionals and related employees, office workers, and military professionals

Father's occupation 2: service sector employees, sales workers, and workers in the agriculture and fishing industry

Father's occupation 3: technicians and related workers, technical installation and machine operators or assemblers, and manual workers

Father's occupation 4: other employees, unemployed, and retirees

B. Model and Estimation Results

Decisions regarding enrollment in tertiary education have dichotomous conclusions—to enroll (1) or not to enroll (0)—therefore, we took the logit model, which is appropriate for the analysis of data representing a binary choice. The model can be described as follows:

$$\text{Prob}(Y=1|X_1, \dots, X_k) = F(\bullet) = \frac{1}{1 + \exp\left(-\sum_{i=1}^k \beta^0_i X_i\right)}$$

The marginal effects of variable X_i , which is defined as the impact of change in independent variable X_i on the expected change in $\text{Pr}[Y=1|X_i]$, can be expressed as below:

$$\frac{dP[Y=1|X_i]}{dX_i} = \beta_i F(\bullet)(1-F(\bullet))$$

Applying this model to the postsecondary enrollment decision leads to the following results: Taken as a whole, the effect of household income on the decision to enroll in a four-year university is not statistically significant. However, enrollment rates lowered at a statistically significant level in the case of households led by a single mother. This suggests that the presence of both a father and mother is impactful in enrollment decisions and if households have a single parent, the role of the father has a significant influence on the demand for higher education.³⁾ At the same time, the estimation model showed that the variable of dual-income family serves as a factor to significantly improve the enrollment rates of children.

With respect to the effect of parents' level of educational attainment, the effect was not statistically significant in the case of the father, but the

3) The model, in which the variable of single father or single mother is excluded, was also estimated to check whether the general probability of single-mother households being low-income families has an impact on results. The estimation model did not show improved significance of the income variable, and the estimation model excluding the dual-income family variable displayed the same result.

mother's education exhibits a strong correlation with children's tertiary enrollment. The higher is the level of educational attainment achieved by mothers, the greater is the chance of children enrolling in higher education. The father's occupation has little impact on children's enrollment decisions in general, but jobs included in occupation group 3, classified as blue-collar work (technicians and related workers, technical installation and machine operators or assemblers, and manual workers) serve as a factor to lower the chances of children enrolling in higher education.

<Table III-7> Results of Demand Function for Four-year Universities

Explanatory Variable	Enrollment				Enrollment			
	coef.	s.e.	p.v.	Marginal effect	coef.	s.e.	p.v.	Marginal effect
Single father	-0.86	0.69	0.211	-0.21	0.15	1.07	0.891	0.03
Single mother	-0.88*	0.49	0.074	-0.21	-2.09*	1.08	0.052	-0.48
Gender of enrolled student (female=1)	0.20	0.29	0.497	0.04	0.19	0.31	0.537	0.04
Log of households' average monthly ordinary income	0.10	0.20	0.621	0.02	0.05	0.22	0.823	0.01
Dual-income family (=1)	0.85**	0.33	0.011	0.18	1.02***	0.38	0.007	0.22
Highest level of education achieved by father (lower secondary school graduation)					-0.39	1.21	0.749	-0.09
Highest level of education achieved by father (upper secondary school graduation)					-1.12	1.10	0.309	-0.25
Highest level of education achieved by father (two-year college graduation or higher)					-1.67	1.16	0.149	-0.37
Highest level of education achieved by mother (lower secondary school graduation)					-0.30	0.95	0.753	-0.07
Highest level of education achieved by mother (upper secondary school graduation)					1.37*	0.77	0.074	0.30

<Table III-7> Continue

Explanatory Variable	Enrollment				Enrollment			
	coef.	s.e.	p.v.	Marginal effect	coef.	s.e.	p.v.	Marginal effect
Highest level of education achieved by mother (two-year college graduation or higher)					1.54*	0.84	0.067	0.30
Father's occupation 2					-0.36	0.51	0.483	-0.08
Father's occupation 3					-0.89**	0.45	0.047	-0.21
Father's occupation 4					0.02	0.68	0.978	0.004
Constant	-0.21	1.18	0.859	-	0.38	1.55	0.807	-
obs.	230				230			
log-like.	-139.361				-133.814			

Note: 1. The standard of the highest level of education achieved by the father is elementary school graduation and below. The standard of father's occupation is occupation 1.
 2. ***, **, and * represent the values that are statistically significant at the 1, 5, and 10 percent levels, respectively.

With the expansion of subjects of analysis to two-year college students, the results did not show notable differences. All in all, the factor of a single-mother household lowers children's enrollment in higher education and the chances of children being enrolled increase with dual-income families and the mother's higher educational attainment.

<Table III-8> Estimation Results of Demand Function for Tertiary Educational Enrollment Including Two-Year Colleges

Explanatory Variable	Enrollment				Enrollment			
	coef.	s.e.	p.v.	m.e	coef.	s.e.	p.v.	m.e
Single father	-0.80	0.65	0.215	-0.19	0.24	1.05	0.819	0.05
Single mother	-1.00	0.47	0.032	-0.24	-1.88	1.09	0.083	-0.44
Gender of enrolled student (female=1)	0.20	0.28	0.472	0.04	0.20	0.31	0.516	0.04
Log of households' average monthly ordinary income	-0.01	0.17	0.952	-0.002	-0.08	0.20	0.688	-0.02
Dual-income family (=1)	0.86	0.33	0.008	0.18	1.02	0.37	0.006	0.20
Highest level of education achieved by father (lower secondary school graduation)					-0.15	1.22	0.904	-0.03
Highest level of education achieved by father (upper secondary school graduation)					-0.95	1.12	0.400	-0.20
Highest level of education achieved by father (two-year college graduation or higher)					-1.57	1.17	0.181	-0.34
Highest level of education achieved by mother (lower secondary school graduation)					-0.23	0.93	0.806	-0.05
Highest level of education achieved by mother (upper secondary school graduation)					1.50	0.77	0.052	0.32
Highest level of education achieved by mother (two-year college graduation or higher)					1.68	0.84	0.046	0.29
Father's occupation 2					-0.31	0.49	0.531	-0.07
Father's occupation 3					-0.75	0.43	0.086	-0.17
Father's occupation 4					-0.17	0.65	0.801	-0.04
Constant	0.57	1.03	0.58		1.02	1.49	0.493	-
obs.	253				253			
log-like.	-148.323				-142.559			

Note: The standard of the highest level of education achieved by the father is elementary school graduation and below. The standard of father's occupation is occupation 1.

Summary and Implications

The analysis results of the demand for tertiary education using microscopic data sets demonstrate that the effects of income on demand are not statistically significant. Rather, non-income variables, including father's occupation, parents' educational attainment level, and households headed by a single mother have a significant impact. These findings indicate that non-financial factors are important in the demand for higher education in South Korea. Households with a father with a blue-collar job or with a single mother exhibit relatively low college enrollment rates of children. A mother's higher educational background serves positively in children's enrollment rate improvement. This implies that the decision to continue study at higher educational institutions does not depend upon the affordability of education, which reflects the income level of households, but rather upon the point of view toward higher education, which is more attributed to a mother's educational background and a father's occupation.

A time-series analysis based on aggregate data shows similar results. The impact of income was not statistically significant, although the price variable of tuition did show a positive correlation with the demand for tertiary education. However, it would be reasonable to note that the estimation results on the price variable showed statistical consistency as the impact of strong social preference for higher education overwhelms the impact of an increase in price. Among income and price variables, one that has a significant impact on demand was found to be expected returns, which implies that the demand for higher education in view of investment is considerable. That is to say, a large gap between the earnings of high school graduates and those of college graduates contributes to an increase in the demand for tertiary education.

The estimation results indicate that there is a high possibility that a policy of providing a governmental subsidy to tertiary education may result simply in support to increase household income rather than bringing about a change in the demand for tertiary education. This suggests a government subsidy to lower the marginal cost of college education could reversely generate a distribution equity problem among the low-income families whose children show relatively lower college enrollment rates.



IV

Discussion of the Scale of Financial Support for Tertiary Education

This section discusses the scale of government support provided to tertiary education. In South Korea, the level of government support for tertiary education is approximately 0.6 percent of GDP, which is lower than the average among OECD countries. The rate of government expenditure for tertiary education is around 22 percent of the total expenditures for tertiary education, the lowest among OECD countries. Such numbers have recently served as grounds for argument in favor of an expansion in government support for tertiary education. However, it is difficult to offer an appropriate response to the question of the extent to which government support should in actuality be expanded.

If the grounds for providing government support for tertiary education lie in its externality, it is desirable for support to be provided to allow marginal costs to be reduced to a level that corresponds with the externalities produced by a limited expansion of education. In addition, if the demand for tertiary education as an investment good is undesirably low across society, then marginal costs need to be lowered in order to elevate demand to an ideal rate. However, as reviewed in previous sections, such factors cannot serve as a valid basis for an argument for government support in the context of South Korea. Instead, the fundamental basis of government support is the expansion of educational opportunities for students from low-income households and thereby guaranteeing equality

of opportunity; however, it is currently difficult to clearly state the scope of benefits for low-income households that would guarantee equality of opportunity. Recently, policies have been developed to allow students from the lowest-income households to be granted scholarships, thereby minimizing marginal costs, while those from middle- to high-income households are allowed income-based student loans in order to mitigate the flaws of the capital market.

Under such circumstances, it is difficult to evaluate the scale of government support in South Korea or to offer an answer regarding the extent to which the amount of support should be raised. Therefore, instead of attempting a direct answer to such problems, this section seeks to better understand through comparison with other countries the relative position of South Korea and then derive implications concerning the direction in which policies should develop in the future.

Subsection 1 evaluates, by means of international comparison, the scales of both educational expenses per student and of government support in South Korea. Subsection 2 discusses the fact that, if tertiary education were to become heavily dependent on government support, then the number of college students and the cost of education per student could be restricted. Subsection 3 analyzes how government support has improved the accomplishments of tertiary education. Lastly, subsection 4 derives policy implications from the preceding subsections.

1 Educational Expenditure per Student and Government Support

A. Evaluation of Educational Expenditure per Student

This subsection seeks to compare the scales of tertiary education expenditures in South Korea with those reported in other OECD countries, based on the annual OECD publication *Education at a Glance*. From this comparison, it will move on to evaluate those characteristics unique to South Korea. The most recent edition of *Education at a Glance* is the issue from 2011, which includes data through 2009. The main indicators

related to tertiary education that this report seeks to note are the indicator of educational expenditure per student, the rate of government support within total educational expenditures, and the rate of university students within the entire population, the indicator of the rate of enrollment.

First to be examined was the relationship between the expenditure per student, GDP and the number of students. In discussions on the scale of the cost of tertiary education in South Korea, educational expenditure per student and the fact that the rate of government support is low have often been mentioned, but there has been a lack of serious discussion of the notion that South Korea has the highest rate of university students compared to the overall population. The following examines how the scale of expenditure for tertiary education in South Korea can be evaluated by introducing the rate of such students within the total population as a variable. The aim of this is to demonstrate, first, the point that expenditures are not at a low level in consideration of GDP and the rate of students in the entire population; and second, while it is true that the rate of government support in terms of total expenditure for tertiary education in South Korea is low, the fact is that in consideration of a range of conditions found in South Korea, including the ratio of educational expenditure to GDP, rate of students in the overall population and the scale of the government, it is inadvisable to raise the rate of government support to 35 percent or higher.⁴⁾

Below is a regression equation on the expenditure for tertiary education per student.

$$\ln(\text{exp})_{it} = \beta_0 + \beta_1 \ln(\text{gdp})_{it} + \beta_2 (\text{StuRatio})_{it} + a_i + v_{it}$$

This equation sets the expenditure per college student (exp) as a

4) The numbers for university students used in the analysis below are all derived from various editions of the annual OECD publication *Education at a Glance*. The publications do not directly list the numbers of students, but enable readers to easily calculate such information. The total expenditure on higher education can be calculated using the data of GDP versus scale of expenditure for higher education, and then dividing this number by the expenditure for higher education per student reveals the number of students in the respective country. The data on total population was retrieved from the appropriate version of the Penn World Table produced by the Center for International Comparisons of Production, Income and Prices (CIC).

function of GDP per capita (gdp) and the ratio of tertiary students to the total population (StuRatio). The two subscript letters were included as the data concerns OECD countries from 1998 to 2009. Based on this regression equation, estimates were made by year using both a fixed-effect and random-effect models to analyze the panel data, and then organized into <Table IV-1>.

<Table IV-1> Estimated Cost Function for Higher Education per Student (in OECD countries)

	2000	2003	2006	2009	Fixed Effect	Random Effect
In (GDP Per Capita)	1.006*** (0.122)	1.049*** (0.138)	1.060*** (0.122)	1.068*** (0.113)	1.014*** (0.0310)	1.002*** (0.0297)
Rate of Students	-7.179 (4.903)	-11.32** (4.712)	-5.660 (4.336)	-5.734 (3.743)	-18.15*** (1.503)	-16.68*** (1.409)
Constant	-0.718 (1.162)	-0.976 (1.375)	-1.351 (1.238)	-1.366 (1.183)	-0.410 (0.296)	-0.329 (0.284)
No. of Observations	28	28	26	31	326	326
R-squared	0.740	0.704	0.766	0.769	0.787	
No. of Countries					33	33

Note: The numbers in parenthesis are the standard errors, ** refers to a significance level of 5 percent, and *** a significance level of 1 percent.

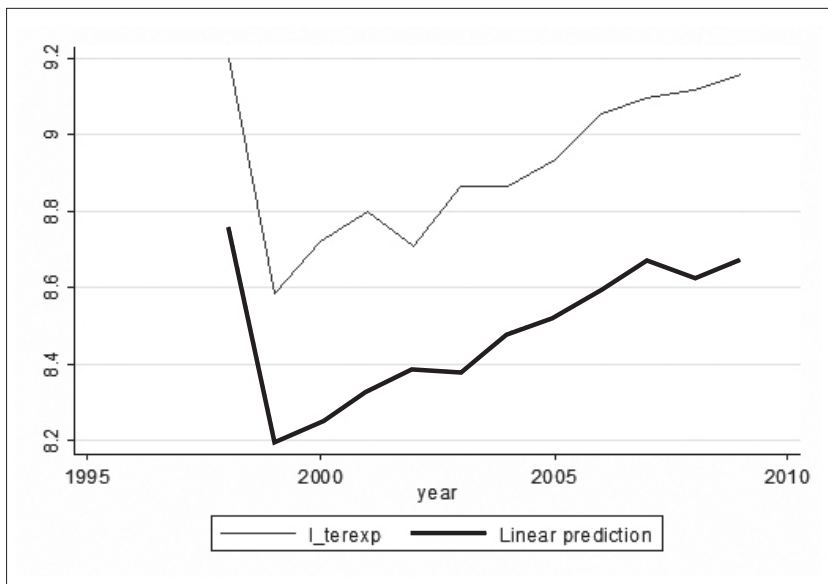
As revealed in the estimations, the income elasticity of per capita expenditure for tertiary education show a value of one in both the annual estimates and the panel estimates. That is, in a comparison between OECD countries, it can be said that if per capita GDP rises by one percent, this means that the educational expenditure is also one percent greater. Meanwhile, the coefficient of the variable of the ratio of tertiary students to the total population displays a negative value, but in the annual estimates, many of the cases are statistically insignificant. However, in the panel estimates, the coefficient shows negative values that are statistically significant. That is, a rise in the rate of college students within the overall population leads to a reduction in per capita educational expenditure. Every single percentage point increase in the rate of tertiary students means

a 17 to 18 percent decrease in expenditures on higher education. If a kind of trade-off between quantity and quality occurs in tertiary education due to a rise in the rate of these students among the overall population and the consequent decrease in educational expenditures, the results would not be difficult to accept.

Meanwhile, the case of South Korea needs to be provided focused attention. A comparison of real per capita educational expenditures in South Korea based on the regression equation and the predictive value derived from the above estimation reveals, as in [Figure IV-1], that the predictive value is lower than the real value. This result signifies that, in consideration of South Korea's income level and number of college students, the per capita expenditure for tertiary education cannot in itself be said to stand at a low level.

[Figure IV-1] Per Capita Expenditure for Tertiary Education in South Korea (log value) Real Value (above) and Predicted Value (below)

(Unit: %)



B. Evaluation of Governmental Support

1) Evaluation of the rate of educational expenditures supported by government support

In South Korea, while the level of expenditure for tertiary education itself is not low, it is true that the rate of public expenditure among the total expenditure on tertiary education is lower than in other countries. Therefore, it was estimated precisely how low it actually may be. To do so, the following model was created for estimation.

$$PubRatio_{it} = \beta_0 + \beta_1(ExpRatio)_{it} + \beta_2(StuRatio)_{it} + \beta_3(GovRev)_{it} + a_i + v_{it}$$

The equation above sets as factors deciding the rate of public expenditure for tertiary education as a ratio of per capita expenditure for tertiary education to per capita GDP (ExpRatio), the ratio of the number of tertiary students to the overall population (StuRatio) and the ratio of government revenue to GDP (GovRev). The dependent variable and the explanatory variable both consist of relative rates. It can generally be asserted that one of the most important factors determining the rate of public expenditure for tertiary education is the relative size of the government. This is due to the possibility that a government will take a more active role in tertiary education with a greater role played throughout the country's economy.

The estimations were taken from the data from individual versions of the OECD publication *Education at a Glance*, as well as from a collection of all existing versions of *Government at a Glance*. Data on the ratio of size of government to GDP can be obtained from *Government at a Glance*, but the only versions currently available are the 2000, 2006, 2007 and 2009 editions. Therefore, these were the only editions used for this estimation.

In predicting the coefficients of variables other than government size, a relative increase in the volume of the entire expenditure for tertiary education makes it highly probable that the rate of public expenditure will decrease. This is because while expenditures for tertiary education in a country can increase relative to the country's economic level, there is a limit to the procurement of public financial resources. Meanwhile, a rise

in the rate of tertiary students will also bring about a similar effect. While the number of students may continue to rise, there is again a limit to the procurement of public financial resources.

The estimations provided in <Table IV-2> confirm that the above hypothesis is supported by statistical evidence. The rate of public expenditures among total expenditure for tertiary education tends to decrease as the ratio of educational expenses to income increases and the ratio of the number of tertiary students to the population rises. It similarly escalates as the ratio of government revenue to GDP expands.

The next step was to estimate the rate of public expenditure for tertiary education in South Korea based on the previous estimation. The result was that when considering those conditions unique to South Korea, the rate of public expenditure for tertiary education, which follows the average tendency in OECD countries, proved to range from 35 to 40 percent, as is depicted in [Figure IV-2].

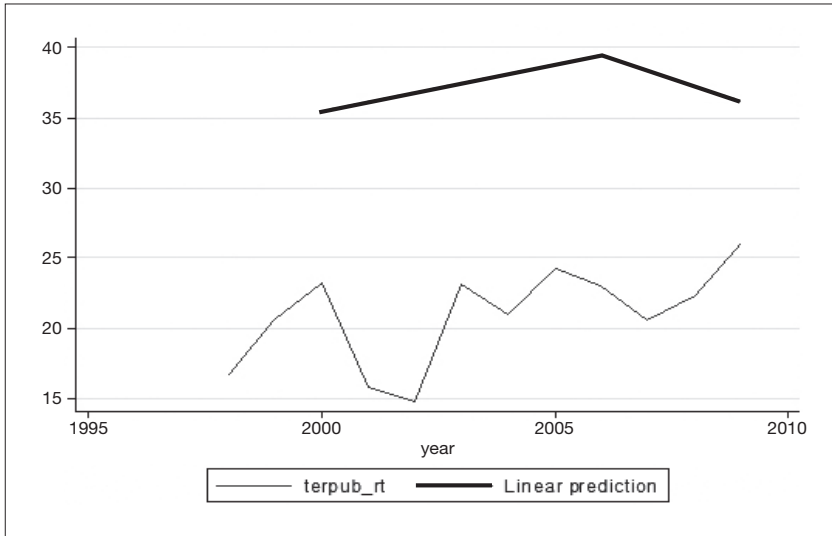
<Table IV-2> Estimated Results on Rate of Public Expenditure for Tertiary Education (OECD countries)

	2000	2003	2006	2009	Fixed effect	Random effect
Education Expenditure to GDP	-0.950*** (0.264)	-0.863** (0.336)	-0.641* (0.370)	-0.578 (0.354)	-0.574*** (0.176)	-0.719*** (0.147)
Students to the population	-8.604*** (235.0)	-11.01*** (255.8)	-9.368*** (308.4)	-6.496* (327.2)	-7.422*** (193.3)	-8.782*** (151.2)
Government revenue to GDP	1.204*** (0.268)	1.353*** (0.272)	1.439*** (0.356)	1.510*** (0.339)	0.137 (0.350)	0.979*** (0.214)
Constant	94.18*** (19.39)	89.12*** (22.25)	70.63** (26.43)	57.79* (29.22)	117.7*** (18.30)	93.26*** (14.05)
No. of Observations	25	25	25	29	104	104
R-squared	0.692	0.717	0.607	0.566	0.188	
number of countries					31	31

Note: The numbers in parenthesis are the standard errors, ** refers to a significance level of 5 percent, and *** a significance level of 1 percent.

[Figure IV-2] Ratio of Public Expenditure to Total Expenditure: Real Value (below) and Predicted Value (above)

(Unit: %)



2) Estimates of the rate of government support based on demographic changes⁵⁾

Lee Young (2011) estimated the scale of educational expenditure by substituting the rate of change in the population in the below equation for analyzing factors that decide educational expenditure, on the premise that the educational expenditure per student increased an average of 2.68 percent annually from 1997 to 2007; and finally estimated the scale of the resulting increase in government expenditure.

$$\begin{aligned}
 & \left(\frac{\text{educational expenditure}}{\text{GDP}} \right) \\
 &= \left(\frac{\text{educational expenditure}}{\text{number of college students}} \right) \times \left(\frac{\text{number of college students}}{\text{college age population}} \right) \\
 & \times \left(\frac{\text{college age population}}{\text{total population}} \right) \times \left(\frac{\text{total population}}{\text{GDP}} \right)
 \end{aligned}$$

5) The data in this subsection were cited from Lee (2011).

Two scenarios were established in relation to change in the number of students. Under Scenario 1, which supposes that the tertiary enrollment rate is maintained at the level of 78 percent and the enrollment rate for graduate school features an upper limit of 23 percent, the number of tertiary students is estimated to decrease by 12 percent from its current level of two million in 2010 to 1.71 million in 2020, and by 2030 to fall to 1.25 million, a 34 percent decline from 2010. The number of students enrolled at four-year universities is projected to decrease by six percent from the current level of 1.5 million in 2010 to 1.37 million in 2020, and by 2030 to 1.04 million, a 27 percent decline from 2010; while students enrolled at two-year colleges are expected to drop from the current 490 thousand by 30 percent to 340 thousand in 2020 and by 54 percent to 220 thousand in 2030. The number of graduate students is expected to increase from the current level of 170 thousand in 2010 to 460 thousand in 2020 and to 320 thousand in 2030.

Under Scenario 2, which supposes that the tertiary enrollment rate is maintained at 73 percent and the enrollment rate for graduate school has an upper limit of 15 percent, the number of tertiary students should fall by 18 percent from the current two million (12% under Scenario 1) to 1.64 million in 2020, and by 38 percent (34% under Scenario 1) to 1.23 million in 2030. The number of students enrolled at four-year universities is seen to decrease by twelve percent (six percent under Scenario 1) from the current level of 1.5 million in 2010 to 1.32 in 2020 and by 32 percent (27% under Scenario 1) to 1.02 million in 2030; while the number of students enrolled at two-year colleges would slide from the current 490 thousand by 34 percent (30% under Scenario 1) in 2020 and by 57 percent (54% under Scenario 1) to 210 thousand in 2030. The number of graduate students is projected to increase from the current 170 thousand in 2010 to 300 thousand in 2020 and to 210 thousand in 2030. Compared to Scenario 1, Scenario 2 shows a greater decline of between three and seven percentage points.

Under these scenarios, it was estimated how the ratio of the scale of educational expenditure to GDP would evolve through 2030, and also how much of it would be supported by the government. Government expenditures were supposed to rise from 0.6% of GDP in 2011 by .1

percent point each year to 1.0 percent by 2015, and be maintained at that level afterwards. The level of one percent of GDP approximates the OECD average. The results of the estimation were organized into <Table IV-3>.

<Table IV-3> Estimate of Future Expenditure for Tertiary Education (Ratio of Tertiary Education Expenditure to GDP): (Scenario 1 and Scenario 2)

(Unit: %, trillion won, thousand persons)

Year	Higher Education Expenditure Provided by the Government / GDP	Higher Education Expenditure Provided by the Government / Total Higher Education Expenditure		Government Budget for Higher Education	Government Budget	Total Population	GDP
		Scenario 1	Scenario 2				
2008	0.60	26	27	6.19	289.00	48,607	1,032
2009	0.60	25	27	6.44	300.68	48,747	1,074
2010	0.60	25	26	6.70	312.74	48,875	1,117
2011	0.60	23	25	6.97	325.19	48,989	1,161
2012	0.70	27	29	8.45	338.01	49,083	1,207
2013	0.80	30	33	10.03	351.22	49,163	1,254
2014	0.90	34	37	11.73	364.83	49,227	1,303
2015	1.00	39	41	13.53	378.86	49,277	1,353
2016	1.00	39	42	14.05	393.30	49,312	1,405
2017	1.00	40	43	14.58	408.18	49,332	1,458
2018	1.00	41	43	15.13	423.52	49,340	1,513
2019	1.00	42	45	15.69	439.34	49,338	1,569
2020	1.00	45	48	16.27	455.65	49,326	1,627
2021	1.00	48	51	16.87	472.45	49,300	1,687
2022	1.00	51	55	17.49	489.75	49,263	1,749
2023	1.00	55	59	18.13	507.61	49,219	1,813
2024	1.00	57	61	18.79	526.05	49,168	1,879
2025	1.00	59	63	19.47	545.06	49,108	1,947
2026	1.00	60	65	20.17	564.65	49,039	2,017
2027	1.00	61	65	20.89	584.81	48,959	2,089
2028	1.00	61	66	21.63	605.53	48,866	2,163
2029	1.00	64	68	22.39	626.80	48,758	2,239
2030	1.00	66	71	23.16	648.59	48,635	2,316

The estimation results show that the budget for higher education was projected to rise to seven trillion won in 2011, 8.5 trillion won in 2012 and ten trillion won in 2013. If the government's investment in higher education were to be increased in this manner, then the rate of government expenditure among the total expenditure on tertiary education would rise from the current level of 25 percent by 45 to 48 percent in 2020 and by 66 to 71 percent in 2030.

Despite the fact that the government has decided to adjust its investment in higher education to a level of one percent of GDP by 2015, the portion of expenditure for higher education provided by the government has continued to increase and is expected to reach nearly 70 percent by 2030 due to the rate paid by the student involved being expected to decrease caused by a decline in the total number of students. In the previous regression analysis of the rate of government expenditure, it was shown that considering the economy, the ratio of total population to student population, and the volume of government revenue, countries experiencing conditions similar to those found in South Korea, the average rate of expenditure for tertiary education supported by the government was 35 to 40 percent of the total expenditure. Compared to this, the target of increasing the rate of government expenditure to 70 percent of the total expenditure for higher education by 2030, through an increase in the government's investment in higher education to one percent of GDP, is rather high.

Effect of Government Support on the Tertiary Enrollment Rate and the Per-Student Education Cost

It is well known that even in consideration of its economic status, South Korean investment in higher education is considerably smaller than its investment in primary and secondary education. However, evaluating this situation is not a simple matter. The single most important issue is the influence of government support on the accomplishments of tertiary education. Prior to exploring this issue in earnest, this subsection will examine the relationship between per capita GDP and the enrollment rate

in tertiary education, and between educational expenditure per student and the percentage of educational expenditure provided through the government budget.

A. Market-oriented vs. Government-dependent Types

[Figure IV-3] presents the relationship between per capita GDP and higher education enrollment rate, and between per capita GDP and the percentage of educational expenditure provided out of the government budget, dividing the cases into European and non-European countries. Unless cases are divided between European and non-European countries, there seems to be no clear relationship between these variables. However, when they are separated into these two types of countries, there appears a clear contrast in the relationship between GDP and enrollment rate, and between GDP and rate of public expenditure.

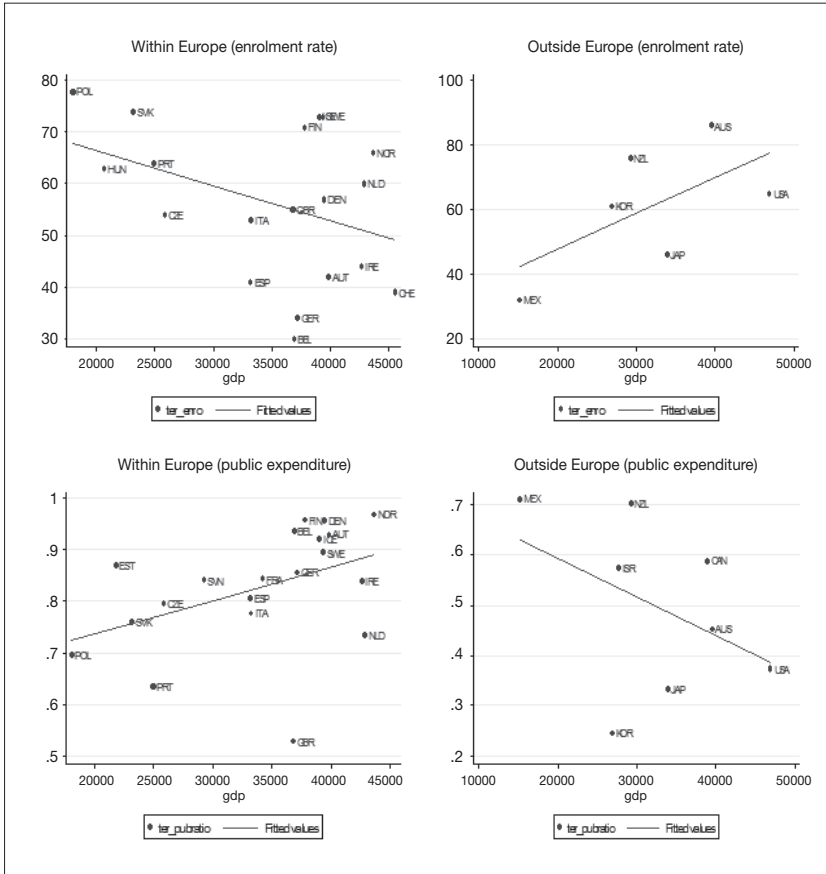
Firstly, enrollment rate figures show that in European countries higher GDPs indicate lower tertiary enrollment rates. A cluster of countries with relatively low income levels including Poland, Hungary and other former Eastern Bloc countries show high enrollment rates, while Switzerland, Belgium, Germany and similar high-income countries have lower rates. In contrast, a comparison between smaller non-European countries shows that higher income levels are paired with higher enrollment rates.

In European countries, the percentage of public expenditure among expenditures on higher education has a tendency to rise as income level increases. In contrast, in non-European countries, the higher the income level, the lower was the public expenditure rate. Of course, it should be noted that nearly all European countries maintain a public expenditure contribution of 70 percent or higher. This means that the overall public expenditure rate is high when an increase in income occurs alongside an increase in the public expenditure rate. In contrast, among non-European countries the public expenditure rate only rarely exceeds 70 percent.

Meanwhile, even amongst European countries, three whose public expenditure rate remains below 70 percent (Poland, Portugal and the U.K.) show the tendency of higher GDP being associated with a lower

[Figure IV-3] Per Capita GDP, Enrollment Rate and Rate of Public Expenditure

(Unit: %, USD (based on PPP))

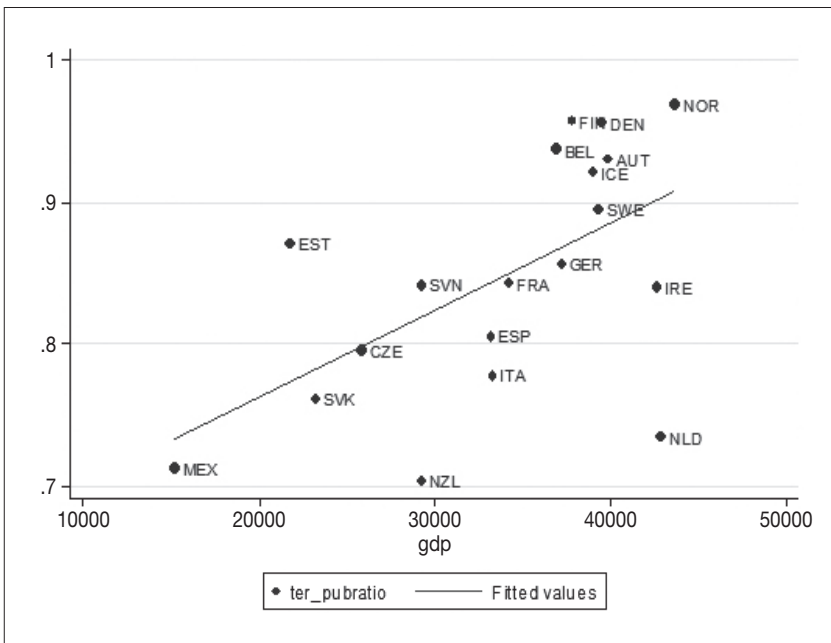


public expenditure rate. In this regard, countries can be divided into two categories based on a public expenditure rate of 70 percent: those with a public expenditure rate higher than 70 percent tend to have a GDP that is proportionate to the level of financial responsibility assumed by the government, while those with a public expenditure rate below 70 percent tend to have a GDP that is inversely proportionate to the level of governmental financial responsibility. In other words, countries with a rate of public expenditure for tertiary education that exceeds 70 percent tend to emphasize the financial responsibility of the government as

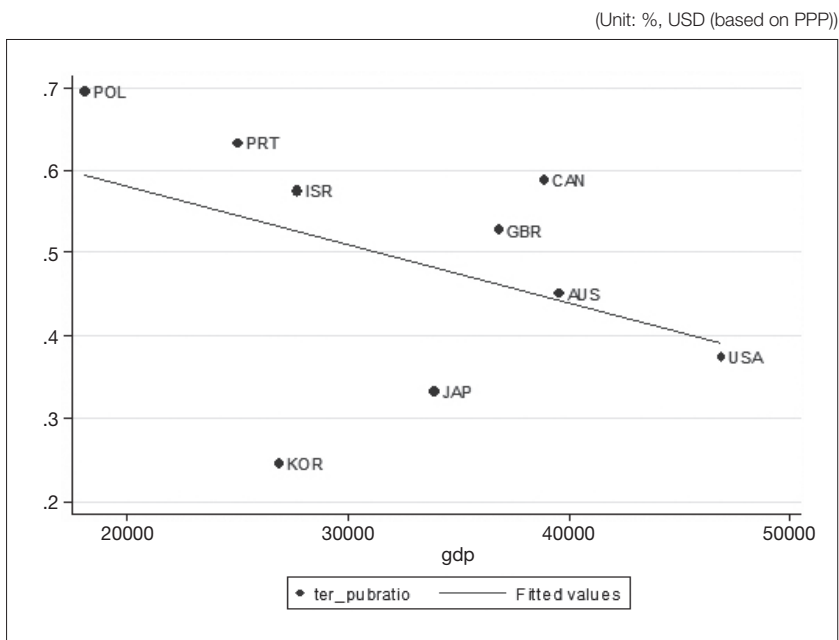
GDP rises, while countries maintaining a rate of public expenditure for tertiary education that is lower than 70 percent tend to emphasize the financial responsibility of the private sector as GDP rises. In this regard, countries can be divided between twin expenditure models for higher education, a market-oriented or government-dependent type, based on whether the public expenditure rate is above or below 70 percent. Of course, this classification does not apply without exception to all countries, and examples such as New Zealand or the Netherlands with a public expenditure rate near 70 percent demonstrate their own distinct tendencies. In addition, South Korea can be said to be an exceptional case as it exhibits a high enrollment rate relative to GDP, but also has a considerably low government expenditure rate.

[Figure IV-4] Relationship Between Per Capita GDP and the Rate of Public Expenditure (in countries with a public expenditure rate of 70% or higher)

(Unit: %, USD (based on PPP))



[Figure IV-5] Relationship Between Per Capita GDP and the Rate of Public Expenditure (in countries with a public expenditure rate of 70% or lower)



Classifying a government's intervention principle regarding tertiary education into either market-oriented or government-dependent types based on the overall attitude of the government, the countries within each model share certain characteristics as depicted in <Table IV-4>. ⁶⁾ On average, the ratio of GDP to government expenditure is much lower in market-oriented countries (42%) than in government-dependent countries (near 50%), while the ratio of GDP to expenditure for higher education is slightly higher in market-oriented countries (1.9%) than in government-

6) In the table, Mexico, Chile, Estonia, Israel, and Slovenia, i.e., countries that joined OECD later than South Korea, were placed into a third category of Latecomers. They were not classified in either the market-oriented or the government-dependent types due to the perspective that the meaningful target of comparison for South Korea is the group of countries that preceded it in joining the OECD. Of course, among them Chile is clearly market-oriented, while Slovenia and Estonia are government-dependent countries. However, in the case of Mexico, it is unclear which direction it will pursue in the future.

dependent countries (1.4%). It therefore becomes clear that for a small-scale government to maintain a high level of expenditure for higher education, the country should adopt a market-oriented stance. Meanwhile, the per capita educational expenditure and the ratio of per capita GDP to educational expenditure are both higher in market-oriented countries.

In conclusion, the choice of whether to adopt a government-dependent or market-oriented type appears to be a natural one based on the overall cost of tertiary education and the budgetary limitations faced by the government. Since it is difficult for a relatively small-scale government to provide a higher educational expenditure, such governments have no choice but to adopt a market-oriented type that shares the burden with the private sector. While it is difficult to intuitively determine which type is the better choice, their accomplishments can be examined after the fact.

<Table IV-4> Differences Between Market-oriented and Government-dependent Countries (2009)

(Unit: %, USD (based on PPP))

Type	Country	Government Expenditure to GDP	Expenditure for Higher Education to GDP	Per Capita Expenditure for Higher Education	Per Capita Expenditure for Higher Education / Per Capita GDP	Per Capita GDP
Market-oriented	United Kingdom	0.516	0.013	16337.952	0.474	34483.0
	Portugal	0.482	0.014	10480.629	0.420	24935.5
	Poland	0.444	0.015	7776.133	0.411	18910.2
	Canada	0.441	0.025	20931.966	0.543	38521.6
	United States	0.422	0.026	29200.652	0.648	45087.4
	Japan	0.371	0.016	15957.311	0.494	32324.2
	Australia	0.353	0.016	16074.179	0.402	39971.5
	South Korea	0.305	0.026	9513.213	0.350	27171.0
	Average	0.417	0.019	15784.004	0.468	32675.6
Government-dependent	Denmark	0.584	0.019	18556.063	0.485	38299.1
	Finland	0.563	0.019	16568.782	0.462	35847.8
	France	0.560	0.015	14641.833	0.434	33724.0
	Sweden	0.552	0.018	19960.964	0.537	37191.9
	Belgium	0.542	0.015	15443.065	0.421	36697.7
	Austria	0.523	0.014	14257.398	0.367	38834.1
	Italy	0.519	0.010	9561.534	0.295	32397.2
	Netherlands	0.514	0.017	17849.338	0.434	41089.5
	Iceland	0.509	0.013	9938.541	0.271	36718.0
	Hungary	0.505	0.010	8517.968	0.423	20154.5
	Ireland	0.489	0.016	16420.054	0.413	39750.1
	Germany	0.475	0.013	15711.069	0.436	36047.8
	Norway	0.463	0.014	19268.867	0.352	54707.6
	Czech Republic	0.459	0.013	8236.751	0.322	25614.3
	Spain	0.458	0.013	13613.840	0.423	32146.3
	New Zealand	0.419	0.016	10619.249	0.364	29204.3
Slovak Republic	0.415	0.009	6758.049	0.299	22619.8	
Switzerland	0.337	0.013	21577.196	0.482	44772.9	
Average	0.494	0.014	14305.587	0.401	35323.2	
Latecomers	Slovenia	0.490	0.013	9311.401	0.343	27149.9
	Estonia	0.452	0.016	6372.860	0.322	19788.7
	Israel	0.443	0.016	11214.404	0.408	27454.4
	Chile	0.246	0.025	6862.641	0.454	15106.7
	Mexico	0.235	0.014	8020.293	0.557	14397.4
	Average	0.373	0.017	8356.320	0.417	20779.4

B. Government Support and the College Enrollment Rate

The previous subsection reviewed the relationship between per capita GDP, expenditures on tertiary education provided by the government and the tertiary enrollment rate. This following subsection will review the complex relationship between these three variables through a regression analysis on OECD countries. On the premise that income level and government support are factors that restrict the number of tertiary students, the tertiary enrollment rate was set as a dependent variable, while log (per capita GDP) and the percentage of government support in the total expenditure for tertiary education were set as independent variables. These were used to create an assortment of models of estimations, results of which are organized into <Table IV-5>. Here, tertiary enrollment rate refers to the percentage of tertiary graduates among the population aged 25 to 64.

<Table IV-5> Relationship Between Tertiary Enrollment Rate, Per Capita GDP and Rate of Government Support

	Model 1	Model 2	Model 3	Model 4	Model 5
In (Per Capita GDP)	18.419*** (5.181)	18.620*** (5.014)	12.059*** (3.967)		
Rate of Government Support	-0.278 (0.369)	-0.194*** (0.071)		-0.102 (0.081)	-0.404 (0.442)
(Rate of Government Support) ²	0.001 (0.003)				0.003 (0.004)
Constant Term	-145.936*** (54.377)	-150.010*** (50.498)	-96.384** (41.195)	36.655*** (5.884)	44.030*** (12.136)
Adj-R ²	0.3097	0.3349	0.1998	0.0198	0.0007

Note: The number in parenthesis is the standard deviation, *** p<0.01, ** p<0.05.

The estimation results show that per capita GDP and the percentage of government support in the total expenditure for tertiary education both have a statistically significant influence on the enrollment rate (Model 2). As could have been predicted prior to the estimation, when the rate of government support is fixed, a rise in the per capita GDP influences the

college enrollment rate to also rise. Meanwhile, when the income level is fixed, a rise in the rate of government support influences the college enrollment rate to fall. This suggests that government expenditures suppress the supply of educational services and thereby reduce the number of college students. A quadratic term for the rate of government support was included as an independent variable, considering that until the rate of government support reaches a certain point government support increases the overall number of students, while after that point government support instead leads to a decline in the number of students. However, this did not result in any statistically significant impact on the results. Also, when per capita GDP was excluded and only government expenditure was included as an independent variable, the estimation results were highly insignificant, meaning that the rate of government expenditure itself does not have an independent influence on the results, but instead has a statistically significant influence only when coupled with a fixed income level.

C. Percentage of Government Support and Educational Expenditure per Student

An et al. (2006) used OECD data to estimate the influence on the scale of educational expenditure per student of the private share of total expenditures for tertiary education. In addition to this variable, per capita GDP and population density were also included as explanatory variables, with estimation results showing that without exception the private share had a positive influence on raising per capita educational expenditure. This suggests that the higher the rate of government support, the smaller is the scale of educational expenditure per student. The reasons for this are largely twofold, with the first being that the demand for education is at present increasing rapidly in many countries, and thus individuals are willing to pay a greater price to receive the education they demand. Meanwhile, from the financial procurement perspective, if the government provides the cost of education instead of the private sector, budgetary restrictions on the part of the government can limit the rise of educational costs. In the case of government support, the amount paid by the group of taxpayers who will not receive the benefits of education has to be considered as well, and

therefore per capita educational expenditure will be lower than if only the beneficiaries of education pay all of the costs.

3 Accomplishments of Government Support and Higher Education

A. Government Support and Quality of Tertiary Education

This section will review the changes brought about by the characteristics of the financial investment in higher education by a country in terms of accomplishments. As in the previous sections, based on how much the government invests, countries can be classified in terms of their approach to higher education into market-oriented and government-dependent types. However, with the exception of OECD countries, it is difficult to obtain data on the government's share of expenditure for tertiary education. Therefore, in order to access a greater number of country samples, similar data was used, namely, the ratio of the public expenditure per student to per capita GDP.

A further criterion is the college enrollment rate, which can be divided into mass education for the general public and elite education that restricts admission to a selected few. By setting the enrollment rate and the government's contribution as the two criteria, four types can be derived with regards to tertiary education. While arbitrariness can only interfere to a certain extent, the percentage that defines whether the enrollment rate is high or low was set at 60 percent, and whether the ratio of per capita GDP to per capita government spending is high or low was set at 30 percent.

Type I: high enrollment rate and high per capita government expenditure

Type II: high enrollment rate and low per capita government expenditure

Type III: low enrollment rate and low per capita government expenditure

Type IV: low enrollment rate and high per capita government

expenditure

From a student's point of view, the best option is Type I, in which a greater opportunity for higher education is available and the student is required to provide a relatively small portion of the total expenditure. The least welcome for a student would be Type III, in which the opportunity for higher education is narrow and the student must provide a relatively high portion of the total expenditure. How great may be the accomplishments expected of higher education in the other types can then be compared to Type III. Data from the World Development Indicators (WDI) released by the World Bank was classified among the four types and organized into <Table IV-6>.

<Table IV-6> Countries by Type of Tertiary Education

	Low Enrollment Rate	High Enrollment Rate
High Government Expenditure	(Type IV) Austria, Bangladesh, Bhutan, Burundi, Cameroon, Cape Verde, Central African Republic, Cyprus, France , Gambia, Ghana, Guinea, Ireland , Jamaica, Madagascar, Mali, Malta, Mauritania, Mexico, Moldova, Morocco, Niger, Rwanda, Senegal, Serbia, Switzerland , Tunisia, Vietnam	(Type I) Belgium , Cuba, Denmark, Finland, Netherlands, Norway, Sweden
Low Government Expenditure	(Type III) Armenia, Azerbaijan, Belize, Bulgaria, Chile, Colombia, Croatia, Czech Republic , Georgia, Hong Kong, Indonesia, Iran, Israel, Japan , Kazakhstan, Kyrgyzstan, Lebanon, Macao, Mauritius, Slovak Republic , Tajikistan, Thailand, U.K.	(Type II) Argentina, Australia , Estonia, Hungary, Iceland, Italy, South Korea , Latvia, Lithuania, New Zealand , Poland, Portugal, Russia, Slovenia, Spain, U.S.

Note: Countries in bold are OECD members.

Source: Data from World Bank, *World Development Indicators (WDI)* was reorganized.

In terms of the accomplishments, while there are diverse policy goals for government support to higher education, one accomplishment of the highest priority might be the production of leading universities, which has recently been a goal of government support for higher education in South

Korea.

As indicators of the excellence of tertiary education, four of the numerous sources that rank tertiary institutions around the world were used. The following are the most frequently cited rankings that possess a relatively extensive history.

- Academic Ranking of World Universities: has announced its top 500 universities since 2003.
- QS World University Rankings: has announced its top 300 universities since 2004.
- Times Higher Education World University Rankings: announced its top 200 universities from 2004 to 2009 and has announced its top 400 universities since 2009.
- HEEACT–Ranking of Scientific Papers: has announced its top 500 universities since 2007.

Among these sources, the numbers of leading colleges by country were organized based on the Academic Ranking of World Universities (ARW) data because (1) it has consistently provided data over the longest period, and (2) colleges from the greatest number of countries are included in its top 500, and therefore it seems to offer a less-partial indication. Selecting a different indicator, however, would not have significantly changed the quality of the outcome, since regardless of the source used to evaluate the indicator of a country's number of top universities, the correlation coefficients between the sources all exceed 0.95.

Meanwhile, the method of weighting the top colleges was used to create indicators for the number of quality tertiary education institutions. That is, the top 100 were assigned five points, the top 100 to 200 were each given four points, the top 200 to 300 were allowed three points, the top 300 to 400 were given two points, the top 400 to 500 were provided one point, and these points were totaled for each country. The difference between weighting and not weighting the colleges in each country are organized into <Table IV-7>. In both cases, the U.S. has the greatest number of top universities, the weighted number exceeding 30 percent, and is followed by the U.K. and Germany.

<Table IV-7> Number of ARW Universities by Country (2008)

(Units: number, %)

Country	Number of Top 500 Universities	College Number Indicator	Weighted Number of Top 500 Universities	Weighted University Number Indicator
United States	159	556	31.6	36.9
United Kingdom	42	146	8.3	9.7
Germany	40	119	8.0	7.9
Japan	31	74	6.2	4.9
France	23	64	4.6	4.2
Italy	22	46	4.4	3.1
Canada	21	67	4.2	4.4
China	18	31	3.6	2.1
Australia	15	47	3.0	3.1
The Netherlands	12	43	2.4	2.9
Sweden	11	37	2.2	2.5
Spain	9	19	1.8	1.3
Switzerland	8	31	1.6	2.1
South Korea	8	19	1.6	1.3
Belgium	7	24	1.4	1.6
Taiwan	7	13	1.4	0.9
Austria	7	14	1.4	0.9
Israel	6	21	1.2	1.4
Finland	6	12	1.2	0.8
Brazil	6	13	1.2	0.9
Hong Kong	5	13	1.0	0.9
New Zealand	5	10	1.0	0.7
Denmark	4	16	0.8	1.1
Norway	4	11	0.8	0.7
Ireland	3	7	0.6	0.5
South Africa	3	6	0.6	0.4
Russia	2	7	0.4	0.5
Singapore	2	6	0.4	0.4
Greece	2	5	0.4	0.3
Hungary	2	4	0.4	0.3
India	2	4	0.4	0.3
Poland	2	4	0.4	0.3
Chile	2	2	0.4	0.1
Portugal	2	2	0.4	0.1
Mexico	1	4	0.2	0.3
Argentina	1	4	0.2	0.3
Czech Republic	1	3	0.2	0.2
Turkey	1	1	0.2	0.1
Slovenia	1	1	0.2	0.1

As can be seen in the distribution of countries, those with powerful economies and large populations (the U.S., Germany, Japan, China) are home to the highest number of top-ranked universities. In general, the variable that best explains the number of prestigious universities is economic power. As European and English-speaking countries also appear to have a large number of top universities, it suggests that language is another important factor.

These features must all influence the number of highly-ranked universities in each country, but one additional factor may be the varied characteristics of higher education. Through a regression analysis, using the sum of the points of each country as a dependent variable, the influence of the varied characteristics of higher education by country is examined.

Three explanatory variables that represent financial characteristics of tertiary education in each country were included: the tertiary enrollment rate, the percentage devoted to higher education within the government's education budget, and the ratio of per capita GDP to per capita government expenditure for education. Meanwhile, total GDP, calculated by multiplying per capita GDP by the population, and the indicator of linguistic distance were used as basic control variables.⁷⁾

In the regression analysis, samples of countries with at least one top-500 university and samples of countries with available data were used. The results of the regression analysis show that per capita GDP plays a decisive role, making it a decisive variable with an R-squared value of 0.95 calculated by the OLS method. The indicator of linguistic distance also demonstrates a statistically significant influence.

7) Linguistic distance is the measurement of the distance from English between languages other than English based on measurements of the difficulty in acquiring English as a second language as measured by testing immigrants to the U.S. on their English-language proficiency. English-speaking countries are given three points, and the closer the number is to three, the closer the linguistic distance to English. Data on this indicator was derived from Chiswick and Miller (2004). The countries whose people have the greatest difficulty in learning English as a second language are South Korea and Japan, whose linguistic distance scores were both one point.

<Table IV-8> Characteristics of Tertiary Education and Estimate of Prominent Domestic Universities I (2008)

	OLS	TOBIT
GDP	3.84e-08*** (1.87e-09)	4.10e-08*** (2.27e-09)
Enrollment Rate	0.988** (0.381)	0.657** (0.279)
Percentage of the Government's Educational Budget for Higher Education	-3.196** (1.459)	0.772 (0.923)
Government Expenditure for Education Per Student / Per Capita GDP	1.303* (0.633)	-0.0105 (0.156)
Linguistic Distance from English	44.86*** (9.867)	
Constant	-141.7*** (33.12)	-79.77*** (21.46)
No. of Observations	29	74
R-squared	0.958	

Note: The numbers in parenthesis are the standard errors, ** refers to a significance level of 5 percent, and *** a significance level of one percent.

Among the indicators related to financing tertiary education that are of particular interest to this report, the tertiary enrollment rate has a statistically significant influence on the number of highly-ranked universities within that country. The ratio of per student government expenditure to per capita GDP on higher education also showed a statistically significant influence. One unexpected outcome was that the percentage of the governmental educational budget for higher education had a negative value with a statistical significance level of five percent. Meanwhile, in a TOBIT analysis on a sample of 74 countries, some of which do not feature a top-500 university, none of the variables related to higher education except enrollment rate showed a positive value of statistical significance.

Next is the result of regression analysis in the case of adding dummy variables for each of the four country types that were described above.

As before, total GDP and linguistic distance from English were set as the control variables. The result produced by the regression analysis was an unexpected one. Firstly, the Type I dummy variable, which is characterized by a high enrollment rate and relatively high per capita government expenditure, did not produce a value of statistical significance. In contrast, Type IV countries, which are characterized by higher education for elites based on a low enrollment rate and relatively high per capita government expenditure, consistently show statistically significant negative coefficients in both OLS and TOBIT analyses. This appears to be a phenomenon resulting from the large proportion of developing countries belonging to this category. In contrast, Type II countries, including South Korea, which are characterized by higher education for elites based on a high enrollment rate and relatively low per capita government expenditure, show in the TOBIT analysis a statistically significant positive value of approximately ten percent. This reveals that the choice of South Korea, which has a high enrollment rate but due to budgetary restrictions has been unable to expand government expenditures for higher education, was not a poor one in terms of cultivating top-ranked universities.

<Table IV-9> Characteristics of Tertiary Education and Estimate of Prominent Domestic Universities II

	OLS	TOBIT
GDP	3.17e-08*** (2.99e-09)	3.27e-08*** (3.59e-09)
Linguistic Distance to English	48.61*** (13.45)	
Type 1 Dummy Variable	-7.635 (22.52)	-16.63 (19.85)
Type 2 Dummy Variable	-12.24 (22.03)	41.40* (23.44)
Type 4 Dummy Variable	-51.64** (24.10)	-53.24** (22.55)
Constant	-103.2*** (35.13)	-57.64*** (18.33)
No. of Observations	39	190
R-squared	0.793	

Note: The numbers in parenthesis are the standard errors, ** refers to a significance level of five percent, and *** a significance level of one percent.

The above analysis was based on all available data. The results could potentially be highly dependent on the data concerning developing countries, a category to which South Korea no longer belongs. The following is an examination of the accomplishments of government-dependent and market-oriented countries based on data limited to that of OECD countries.

First, the relationship between the number of top-500 universities and variables related to tertiary education was examined. <Table IV-10> is the result of a regression analysis on OECD countries, with the number of top-500 universities per country as a dependent variable. Basically, with the variables of total GDP and linguistic distance under control, the ratio of GDP to expenditure for higher education and a dummy variable for market-oriented countries were added. The estimation showed that while both variables resulted in positive values, they also both lacked statistical significance. That is, a comparison of OECD countries suggests that having

a greater percentage of GDP invested in higher education or having the financial characteristics of market-oriented higher education does not necessarily indicate that the country will contain a greater number of highly-ranked universities.

<Table IV-10> Estimation Model of Number of Top 500 Universities by Country (OECD countries)

	(1)	(2)	(3)	(4)
GDP	3.74e-08*** (1.52e-09)	3.67e-08*** (1.64e-09)	3.71e-08*** (1.67e-09)	3.67e-08*** (1.72e-09)
Linguistic Distance	31.17*** (7.229)	31.79*** (7.220)	31.68*** (7.422)	31.76*** (7.425)
Expenditure for Higher Education to GDP		10.80 (973.1)		10.98 (1,112)
Market-oriented Dummy Variable			4.250 (9.256)	-0.366 (10.37)
Constant	-76.38*** (17.69)	-94.37*** (23.94)	-78.50*** (18.54)	-94.49*** (24.62)
No. of Observations	30	30	30	30
R-squared	0.960	0.962	0.960	0.962

Note: The numbers in parenthesis are the standard errors, and *** is a significance level of 1 percent.

This section examines whether the number of top-ranked universities or the characteristics of tertiary education correlate with economic growth. Due to the fact that variables related to educational finances or the number of leading universities both only recently became available, and the fact that only around 1995 did developed countries begin to see renewed economic growth after a long collective economic recession that began in 1973, the dependent variable of economic growth rate was based on the average annual growth rate during the 14 years from 1995 to 2009.⁸⁾

As independent variables, the most important control variable of the log value of early income and early level of education (the average years of

8) Discussions on this issue can also be found in the macroeconomics textbook by Mankiw.

education among the population aged 25 and over) were added to all of the regression equations, as along with the number of top-ranked universities and the dummy variable of market-oriented countries. The results of the regression analysis show that these two variables have no correlation with economic growth, which could be because too limited a duration was set in the measurement of economic growth. However, whether the beginning point is set at 1980 or 1970, nearly identical results are derived.

Because the number of high-ranked universities in a country could have an impact on its economic growth in the distant future, it is still too soon to conclude from this simple regression analysis that the quality of tertiary education does not affect economic growth or that the national stance on tertiary education is essentially meaningless. However, to systematize what has been examined, it appears that the number of renowned universities in a country is not so much a financial characteristic of higher education, but rather an aspect heavily influenced by the economic power of a country, and is therefore a result rather than a source of economic growth.

It was also difficult to uncover any evidence to support a country's higher education being based on either a market-oriented or government-dependent financial type influences the country's number of top-ranked universities or its economic growth. The financial management of higher education in a country is dependent on a range of conditions, including the size of the economy, the overall scale of government spending and the number of college students; it is hard to state intuitively which method of financial management brings about better results. In that case, lacking clear evidence, it must also be difficult to accept arguments that per capita educational expenditure should meet the OECD average or that the ratio of GDP to government expenditure for higher education should do so.

<Table IV-11> Estimated Relationship Between Economic Growth and Government Support for Educational Expenses (in OECD countries)

	(1)	(2)	(3)	(4)
Level of Income at the Initial Stage (1995)	-1.542*** (0.321)	-1.760*** (0.280)	-2.037*** (0.272)	-1.788*** (0.304)
Level of Education at the Initial Stage	0.258*** (0.0939)	0.312*** (0.0749)	0.296*** (0.0820)	0.307*** (0.0852)
Number of Highly-ranked Domestic Universities in 2003		-0.00718 (0.00442)		-0.00738 (0.00508)
Market-oriented Dummy Variable			-0.113 (0.270)	0.116 (0.300)
Constant	15.10*** (3.012)	16.72*** (2.601)	19.56*** (2.655)	17.01*** (3.006)
No. of Observations	34	32	31	30
R-squared	0.443	0.655	0.691	(0.679)

Note: 1. The dependent variable is the average annual growth rate from 1995 to 2009.

2. The numbers in parenthesis are the standard error, and *** refers to a significance level of 1 percent.

3. 2003 was the earliest year with data available on highly-ranked universities.

Policy Implications

This section evaluated through comparison with other nations the scale of educational expenses per student and the scale of government support provided to higher education in South Korea. It also analyzed the expected effects in the case of an expansion of such government support. Based on the results of that analysis, the following is a summary of the implications for policy directions.

First, caution should be exercised when it comes to expanding government support for the purpose of increasing the total amount of educational expenditure. Considering the economy of South Korea and the percentage of tertiary students among the entire population, per capita educational expenditure is not low. According to the results of empirical testing, if the financial management of tertiary education is centered on

government support, budgetary restrictions on the part of the government can end up hindering the quantitative expansion or qualitative growth of tertiary education. Government support was shown to be unable to make a significant contribution to either the cultivation of top-ranked universities or to economic growth.

Second, the point that it is difficult to identify positive grounds for expanding support in order to increase the total amount of educational expenditure is consistent with the direction in which the method of providing financial support for tertiary education should develop. Rather than an indiscriminate lowering of the marginal costs through expanding the total amount of government support to tertiary education, it is advisable to focus on providing equal opportunities to students from low-income households and promoting the restructuring of universities.

Third, when expanding government support for tertiary education, changes in the financial structure resulting from changes in the number of students must also be taken into consideration. Compared to countries experiencing similar economic conditions, South Korea has a significantly low proportion of government support among total educational expenditures. This suggests a need to review the expansion of government support in the future. Meanwhile, as the student population is expected to rapidly decline, if the rate of government support is abruptly expanded, sooner or later the rate of government support for tertiary education will exceed that of other countries and the current mode of financing universities may shift from the current market-oriented mode to a government-dependent mode. Therefore there is a need to carefully consider whether such a change would be for the better.



V

Conclusions

This report discussed the direction of future policies focusing on financial support for tertiary education. It began with identifying the grounds for providing financial support for tertiary education, and, based on these grounds, discussed appropriate methods and scale of support. The following is a summary of the policy direction and related logical grounds as presented in this report.

First, it is not desirable to lower the marginal cost of tertiary education for all students, and thereby induce a quantitative expansion of universities. The core of price policies lies in promoting demand by lowering marginal costs. A price policy of lowering marginal costs is implemented when education shows externalities but the externalities are not properly applied, making private demand below the optimal level for the society, or, alternatively, when excessively low demand results from uncertainty of future returns as an investment or defects in the capital market. However, in consideration of the characteristics of tertiary education as reviewed in this report, as well as the current state of the demand for tertiary education in South Korea, it is difficult to identify a basis for the need to implement a quantitative expansion of tertiary education by lowering marginal costs. In its current state, it does not seem that a quantitative expansion of tertiary education would produce positive externalities, and despite the defects of the capital market, the overall

demand for education as an investment does not seem excessively small.

Even from the perspective of equity, a policy of lowering marginal costs for all students is problematic. This is because the taxes serving as the financial resources to do so are paid by all taxpayers regardless of whether or not they receive tertiary education, while the benefits are purely focused on those who receive tertiary education. From an *ex ante* perspective, students from high-income households also have better grades and a higher tertiary enrollment rate. Even from an *ex post* perspective, the average income of those who have received tertiary education is higher than those who have not. Therefore, a policy that uses tax funding to provide support to all college students will result in a regressive redistribution of income.

Second, one important reason to provide support for tertiary education is to ensure equality of opportunity. Even if there is currently an excessive overall demand, there could be talented, passionate individuals who find themselves unable to receive tertiary education because they belong to a low income household or have difficulty in locating an appropriate means to acquire financing in the capital market. The government needs to actively work to solve this problem. Guaranteeing equal opportunity to all is important not only in terms of equity, but also from the perspective of efficiency. This is because it prevents outstanding students whose abilities would enable them to achieve the highest degree of educational attainment and make great contributions to society from failing to receive education due to income level or other factors, and thereby increase the private benefits to the students as well as the benefit to society. As mentioned previously, it is difficult for externalities to become a basis for providing financial support for tertiary education in South Korea.

Third, financial support for the purpose of guaranteeing equality of opportunity should be focused on subsidizing the low-income bracket and reducing defects in the capital market. Individuals who view education as an investment good will invest when their expected return is higher than the cost, and if they do not currently possess the funds to invest they will borrow them from the capital market. However, if the capital market is flawed, there could occur cases in which students are unable to pursue tertiary education because they are unable to acquire the financial means despite a positive expected return worthy of investment. In order to prevent

such problems from occurring, the government needs to supplement the flawed capital market through student loans and other similar policies. Also, even when loans are available, an excessively low demand for tertiary education among those within the low-income bracket could occur due to uncertainty of future returns. In order to prevent this, methods other than financial loans need to be provided to subsidize this bracket. Methods of providing support based on income level can include postponing the repayment of the principal and interest if the individual earns insufficient income, or providing scholarships to students from low-income households.

Lastly, the expansion of the scale of support for tertiary education in South Korea must be approached gradually and with caution. It cannot be denied that the percentage of government support within the total expenditures for tertiary education in South Korea is lower than in other countries experiencing similar conditions. However, the number of students is expected to decline and the financial burden on the student is expected to fall, while that of the government will rise. Therefore, expanding support in order to meet an unattainable goal could shift South Korea from a market-oriented country to a government-dependent country in terms of tertiary education. It is up to the society whether South Korea will become a market-oriented country or a government-dependent country, but it needs to note that the percentage of government support in the total expenditure for tertiary education can reduce the college enrollment rate and the educational expenditure per student.

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