



Munich Personal RePEc Archive

Financial Aid and Higher Education Enrollment in Chile: A Government Policy Analysis

Meneses, Francisco and Blanco, Christian

Ministry of Education, Chile, Universidad de Chile

9 June 2010

Online at <https://mpa.ub.uni-muenchen.de/23321/>
MPRA Paper No. 23321, posted 16 Jun 2010 00:12 UTC

Financial Aid and Higher Education Enrollment in Chile: A Government Policy Analysis

FRANCISCO MENESES CHRISTIAN BLANCO*

Chilean Ministry of Education and University of Chile

June 6, 2010

Abstract

This paper evaluates the impact of the Chilean government's financial aid on college and vocational education enrollment. We found that there is an endogenous process in the application for financial aid. To solve this problem we use a two-step procedure with instrumental variables (IV) and found that financial aid increases the probability of students going to college by over 30%. In the case of vocational education, we found that being pre-selected for college financial aid decreases the enrollment. However, vocational financial aid increases that probability of enrollment. Therefore, students choose college education over vocational education when they have financial aid for both. Theoretical conclusion and public policy recommendations are provided.

JEL: I21, I22, I28

Keywords: Financial aid, college enrollment, Chile, education, public policy.

*Ministry of Education Chile and Pontificia Universidad Catolica de Chile. francisco.meneses@mineduc.cl fjmenese@gmail.com. chblancoj@gmail.com

1 Introduction

An important amount of time have been spent and many papers written to prove that the wealth of a nation is increased if the population achieves higher levels of education. Once the argument was recognized, we could say that it is in the nations's best interest to ensure that people can attend college, as this improves social welfare.

In Chile, students from the lowest income quintile are eligible to student financial aid from the Ministry of Education, which covers an important part of the tuition costs of students enrolled in higher education. The financial aid options offered by the Ministry are credit alternatives and different kinds of scholarships. This aid, presumably, has two important effect on students: it increases the enrollment rate and improves the retention rate in higher education.

A common argument is that there are income and credit constraints for low income family students, preventing these students to enter higher education (Baumgartner & Steiner). Students from low income families are not able to pay for higher education even considering that it is profitable for them in the long run. This is due to high tuition cost and low average income in Chile. Imperfect credit markets prevent low income families from obtaining credits to pay for education. As there is no asset market for human capital, people cannot sell rights to their future labor earning to potential lenders in order to secure financing for their human capital investments (Carneiro & Heckman).

Therefore there is a potential role for the government by improving access to credit to induce or help young people to study even if they face these short run constraints. Another popular argument is that even in absence of such constraints, youth from low income families would effectively be prevented from enrolling into higher education because they are reluctant to incur debt (Baumgartner & Steiner). From this emerges a second role from the government,

through scholarships, to induce student who would not use a credit to pursue higher education.

In Chile, the Higher Education System has been historically correlated with family income. According to the CASEN survey, from 1990 to 2006, the enrollment rate in higher education has increased from 15.6% to 38%. But this increase has not been homogeneous among groups from different income levels. The enrollment rate for the poorest quintile was 15% in 2006, and 80% for the richest.

Table 1: Higher Education Enrollment: CASEN survey (Percent)

Quintile	I	II	III	IV	V	Total
1990	4.6	7.5	12.2	22.4	39.7	15.6
2006	17.3	22.4	31.7	49.6	80	38.3

Also, the type of higher education that these students pursue is also correlated with their family background. Students from high income families often go to better universities or programs with higher expected returns. On the other side, students from low income families tend to attend lower level college education or vocational education.

In Chile the impact of governmental scholarships has not been explored like in the case of USA, Australia or Europe. In this paper we intend to evaluate the impact of financial aid on college enrollment for the case of one cohort of students in Chile. We will consider only those who have recently graduated from high school and apply to tertiary education or financial aid. Incorporating a public policy maker perspective, in addition to the academic focus, we will evaluate the impact of financial aid on students that actually graduated from high school in the scheduled period of time.

2 Chilean Education

The educational system in Chile is one of the most market oriented in the world. Over 90% of students attend voucher schools and more than 50% of students in higher education pursue their degrees in private institutions.

In 1981 an educational reform started in Chile, allowing private organizations to create schools and receive vouchers from the national government. Since then, private voucher schools had increased systematically and today they educate more than 46% of Chilean students. There has been extensive discussion regarding the effectiveness of this reform, but undoubtedly the first objective was achieved: increasing high school coverage to 100% at a national level.

However, the current educational system faces a strong criticism because of problems regarding quality and equity in education. Various authors had shown that socioeconomic disadvantages generate educational disadvantages as well, expanding the gap between the poorest sectors and the most privileged ones.

High School Education In Chile, high school education influences further educational development. First of all, in order to be admitted to better colleges, Chilean students must obtain not only high scores on the standardized selection tests, but also high grades in high school. Recent studies had shown that private school's students obtain significantly higher scores both in the College Selection Test (PSU in spanish) and also in high school grades (Meneses, Parra & Zenteno, 2005). It has been argued, as well, that this biased selection system drives poor students to vocational education, as mostly privileged students pursue higher level college degrees (Brunner, 2009).

Higher Education The tertiary educational system in Chile has faced several changes during the last 30 years. Until 1981 the system consisted in a few state universities and some vocational institutes. During that same year the

system was opened up, allowing the entrance of private institutions and generating a broad educational market. Since then, private universities and institutes have grown intensively, reaching more than half of the educational supply.

This educational system is characterized by low entry requirements and few structural restrictions. There are no performance commitments nor precise obligations regarding information. It is a highly competitive system; State-owned universities are only partially financed by the government, therefore they have to compete with private universities to enroll the students (Brunner, 2009). The higher education market is regulated mostly by demand and supply; student demand and tuition costs are the most important limits of institutional strategies. Government intervention is directed toward a frame of incentives through regulations of structural nature, which are preferred over regulations of institutional behavior. It is believed that these interventions are more cost-efficient and do not have to deal with problems of asymmetrical information, control and follow-up (Brunner, 2009).

Because of historical reasons, the Chilean higher educational system distinguishes between traditional universities ¹and Private universities ². Traditional universities are usually assessed as rather public oriented institutions, with higher admission requirements, as private universities are considered to be academically less demanding and with higher tuition costs. The evolution of the system since 1981 is leading to a relative equilibrium, as tuition costs tend to coincide and private universities are gaining more prestige at a national scale. Currently, for both traditional and private universities, most of the resources come from tuition fees and less financial support from the State. Governmental funding comes in the form of an direct state contribution, in addition to a voucher system assigned to the educational institutions that recruit students

¹Universities that belong to the national Council of Deans

²Private Universities created after 1981

with higher scores in the College Selection Test (PSU in spanish).

Professional Institutes and Centers for Technical Formation are lower level educational institutions that impart mostly vocational education. These educational alternatives are mainly selected by students from a middle to low income sector. Tuition fees is the main income source for these institutions.

The important proportion of private resources and the intensive use of market incentives for the assignation of public resources stimulates the competition between universities. The system has evolved into a situation in which the competition for students and resources is carried out without central planning. The public policy maker acts from a distance, generating policies to develop capacities and research, improving quality of the supply by strengthening informational systems and accrediting institutions, and also trying to achieve equity with credits and scholarships for the students (Brunner, 2009).

We can appreciate in following table the number of students on each of the categories of institutions.

Table 2: Higher Education Enrollment: Number of students

Year	Traditional Universities	Private Universities	Vocational Intitutions	Total
1984	109.933	3,868	67,181	180,800
1990	112.193	19,509	117.780	249,482
2000	215.284	103,805	133.236	452,325
2009	303.127	273.473	299.643	876.243

We can also see an important increase in the enrollment rate of students since 1984, as students attending traditional education has tripled. In private universities the expansion of enrollment has been even more pronounced. According to the CASEN 2006 survey, currently, close to 30% of students between 18 and 24 years old attend some kind of Higher Education.

The increase of students in higher education is also explained by an expansion in graduations rates in high school and higher expectations among students. Another possible explanation is that the increase of students in higher education

is due to and an increase in scholarships and state-managed credit programs available. This hypothesis has not been verified yet. In this work we intend to evaluate the impact of this financial aid programs in the enrollment in higher education.

3 Literature Review

It is important to distinguish two main lines of research. The first one corresponds to authors like Cameron, Carneiro, Heckman and others. These researchers focus on the long run decision process of education, where an individual decides to study or not, optimizing his futures earnings. In this setting, students progress from one level of education to another, generating a dynamic selection bias at every stage of education. Consistent with this line of thought, it is necessary to control for all the biases so as to assess the effects of income and family background when analyzing the decision process.

A second kind of literature focuses on specific educational achievements, particularly on higher education, where they look at the impact evaluation of certain programs. There is a extensive literature regarding the effect of scholarships or incentives to students and college enrollment. Within this perspective we can differentiate two sub-lines of work. The first one observes incentives and enrollment of students in a single university. The second one refers to works that evaluate the impact of financial aid or benefits from a state or country perspective. This document corresponds to the latter.

University approach

When reviewing the enrolment effects of financial aid at the university level, we have to keep in mind that we are looking at the effect of a single college, but not the total effect of that policy. Financial aid in a single university generates two effects: (1) it capture students that otherwise would have gone to another

university and (2) it capture students that would have not gone to tertiary education. The results obtained by these papers will measure the effect of the scholarship on a single college and it is possible that these incentives may have no effect on the total amount of student enrollment in the country or state, if they just divert students from one university to another. Then, the estimations on these papers may overstate the real effect of a scholarship if generalized to a country level.

In “The good, the poor and the wealthy: Who responds most to college financial aid?” Singell and Stone (2002) develop a bivariate probit model, with sample selection for the enrollment process, using data from a large public university in USA. They found that merit-based aid increased the enrollment for all students, but that financially able students respond disproportionately. They argue that higher emphasis on merit-aid may exacerbate the trend of income inequality. They found that an increase in \$1000 dollars of financial aid increases the probability of enrollment in 7.7%, 4.6% and 3% in non-need-based, subsidized, and un-subsidized aid, respectively. These results, from a Chilean public policy perspective indicate exactly the opposite effect that a scholarship program should generate.

Wilbert van der Klaauw (2002) estimates the effect of financial aid using a regression-discontinuity approach. He uses data from an East Coast College program, and evaluated the impact of the aid at the different discontinuities of the assignment rule. He found that college aid is an effective instrument in enhancing competitiveness with other colleges, with an elasticity of .1-.14.

“The impact of merit-based financial aid on college enrollment: A field Experiment” by James Monks (2008) evaluates an experiment to estimate the efficacy of merit-based awards. They randomly assigned scholarships to 230 of its highest rated admitted applicants, leaving 319 students, with the same char-

acteristics, as a control group. Using a log approach the author finds that a \$7000 grant, increases the probability of enrollment by approximately 3%. He also compares these results with a non-experimental merit-based aid where he finds higher results. Regardless of the ethic implications, this research shows a small impact on the enrollment probability.

Linsenmeier, Rosen and Rouse (2006) evaluate the effect of new grant packages on college matriculation in an anonymous university. Using a probit model, they found that the grant program increases the likelihood of enrollment in between 8 to 10 percentual points among low-income minority students.

Goodman (2008) estimates how strongly students react to a quasi-experimental merit scholarship intended to attract talented students to state public colleges. He finds that the analyzed scholarship increased the probability of enrollment by 6%. The author evaluates a difference-in-difference (DD) versus a Regression-Discontinuity (RD) approach, finding that the RD estimates were larger than the DD method, because winners with low academic skills, who were nearest to the treatment threshold, reacted much more strongly than did the skilled winners. He argues that conditional on academic skill, low-income winners reacted similarly to their higher income peers, suggesting that previous research may have mistaken income heterogeneity for skill heterogeneity.

State or Country Approach

These larger scoped perspectives correspond more precisely to the Chilean reality, as we intend to evaluate the nation wide scholarship and credit programs.

Kane (2003) studies the impact of the CalGrant program in California for private and public institutions. He uses a regression discontinuity design to evaluate a quasi-experiment, assessing the impact of financial aid on going to college. He evaluates close to 150,000 financial aid applicants. He finds a 3 to 4% impact of grant eligibility on college enrollment.

In "The New Merit Aid" Susan Dynarski(2004) evaluates the HOPE Scholarship in seven states from USA utilizing OLS (simple regression). She finds that the HOPE Scholarship increases the attendance probability college of college aid youth by 5 to 7 percentage points. She indicates that the merit based programs seemed to be more effective than the need-based aid. She also finds a secondary effect of the merit aid programs, as they shifted students towards four-year schools and away from two-year colleges. The latter result is highly important to the interpretation of Chilean reality: we pose the hypothesis that financial aid should drive students into universities rather than into vocational education institutions, mainly because of the higher prestige and better expectations of future earnings.

In "Restricciones Economicas en la Decision de Continuar Estudios Superiores Técnicos o Profesionales" Paredes and Hernández (2007) use a Multinomial Logit to analyze the of Chilean students's higher education choice, controlling by income restrictions. This study was developed with the CASEN survey from Chile. They find a strong influence of economic conditions on higher education decisions, showing how poor students tend to follow shorter vocational programs or simply prefer to start working and not pursue a degree in higher education.

Baumgartner and Steiner (2006) evaluate the impact of the Federal Students' Financial Assistance scheme in Germany. Using a a difference-in-difference methodology, they found that the aid program produced a small but significant effect on enrolment rates of students from low-income families. Champman and Ryan (2003), on the other hand, evaluate a change in the tuition cost in Australia. Using a probit model with a small sample survey data, they found that the income contingent charges had no impact on the enrollment of lower income student.

Deming and Dynarski (2009) made a literature review in "Into College, out

of Poverty? Policies to increase the postsecondary Attainment of the Poor”, which we recommend as they present an extensive description of financial aid policies.

4 Data

In this work we will use information from five different sources: information from a national standardized test for middle and high school education quality: SIMCE (in spanish). We include data from the College Selection Test (PSU in spanish), taken at the end of the senior year of high school. This test is taken by roughly 75% of students that finish high school and is an important determinant of tertiary education admission and financial aid.

The SIMCE test is a national mandatory test that evaluates all students in different grades. During the year 2006, 10th graders took the test and their parents answered a very complete questionnaire that included socioeconomic variables. From these answers we will obtain a measure of the students academic ability and socioeconomic status. This test evaluates all of the Chilean students at that time. The second test is the PSU. This is a voluntary test, that is a pre-requisite for entering most of the universities and for obtaining most of the financial aid.

The third data set comes from the System of Information of Superior Education in Chile (SIES in spanish). This department gathers information regarding all of the students in tertiary education in Chile. The fourth data set comes from the Financial Aid Department from the Chilean Ministry of Education. We have detailed some information of the scholarships that have been pre-assigned and assigned to the students.

The fifth data set comes from the Registry of Students From Chile (RECH), that includes high school grades of all the student that graduates from High

School.

These data bases were merged at the individual level using the RUT identification number (similar to the Social Security Number).

Table 3: Merging Data Sets

	SIMCE	HS Graduate	PSU	Tertiary Education	College	Vocational	Financial AID
	244,453	244,550	278,275	289,309	156,034	133,275	199,204
SIMCE 2006	244,453	175,423	162,490	88,724	58,717	30,007	74,367

Table 4: Financial AID Pre-Selection

Financial Aid	University	Vocational	None Enrollment	Total
No	10,389	17,262	73,344	100,995
Yes	26,104	5,211	10,454	41,769
Total	36,493	22,473	83,798	142,764

From the 244,453 students that took the SIMCE test on 2006, only 175,423 graduated from their high school in 2008. In other words, 28% of the students dropped off or repeated one course in high school. Later 162,490 took the PSU test. From those, roughly half of them enrolled into some program in tertiary education.

5 Financial Aid Description

The Chilean government has made extensive efforts to increase financial aid for tertiary education over the past years. This financial aid can be divided into scholarships and subsidized credits. To apply to any of the current benefits administered by the government, the students need to fill a single application form. Once this is done, if the students meet the income and academic requisites, the scholarship or credit is pre-assigned. Then, if the student enrolls in higher education, the scholarship is awarded and the benefits are paid directly to the institution.

Most of the scholarships and credits are assigned only to students who come from the lowest income families in the country. There are three procedures to evaluate the family income: the personal declaration of the student, the Internal Tax Service reports that assesses the earnings of the last year of the student's family and third, by an evaluation done by the educational institution once the student is enrolled. Some benefits have academic requisites related to the student's test scores in the PSU and their grades in high school. As an example, the Academic Excellency Scholarship is awarded only to the students that were in the best 5% of a voucher high school.³

Table 5: Financial Aid Description

Scholarship	Income Quintile	Academic Requisites	Institutions	Type of Institutions
Bicentenario Scholarship	I y II	550 PSU	CRUCH	College
Academic Excellency Scholarship	I, II, III & IV	Best 5% in High School	All	College and Vocational
Son of Teachers Scholarship	I, II, III & IV	500 PSU & 5.5 HS GPA	All	College and Vocational
Juan Gomez Millas Scholarship	I & II	640 PSU	CRUCH	College
Education Scholarship	Does not have	600 PSU & 6.0 HS GPA	All	College
New Milenium Scholarship	I & II	5.0 HS GPA	Vocational	Vocational
Solidary Credit	I, II, III & IV	475 PSU	CRUCH	College

It is important to point out that the benefits offered by the government covers around 85% of annual tuition fees.

Table 6: Data Description

Variable	Obs	Mean	Std Dev.	Min	Max
SIMCE	142764	258.6738	51.24657	106.945	457.115
PSU	142764	360.7351	228.104	0	836
HS GPA	142764	552.4411	48.27303	400	700
$CollegeFinancialAID_i$	142764	0.2925738	0.4549459	0	1
$VocationalFinancialAID_i$	142764	0.3194993	0.4662843	0	1
Monthly Income	142764	585.1685	574.2742	100	3800

³The Chilean Schools can be divided between Private Schools, Private Voucher Schools and Public Voucher Schools. The Private Schools account for only 7% of the students in the system

6 Methodology

To evaluate the effect of the financial aid in the enrollment of students we could initially use a standard probit model. If, hypothetically, we assume that the effect of having a benefit assigned is not endogenous to other variables, we could use the following equation:

$$F(\text{College}_i) = F(\text{SIMCE}_i + \text{PSU}_i + \text{INCOME}_i + \text{HSGPA}_i + \text{FinancialAID}_i)$$

Where $\text{College} = 1$ if the student goes to College and 0 if he does not.

Because having financial aid is endogenous to other variables, we know that the equation above would obtain biased results.

To obtain a scholarship or a credit, the student is required to apply for a previous selection before receiving the actual benefit. To control the effect of being pre-selected for financial aid on the impact that it has got on college enrollment, we have to first solve the endogeneity problem.

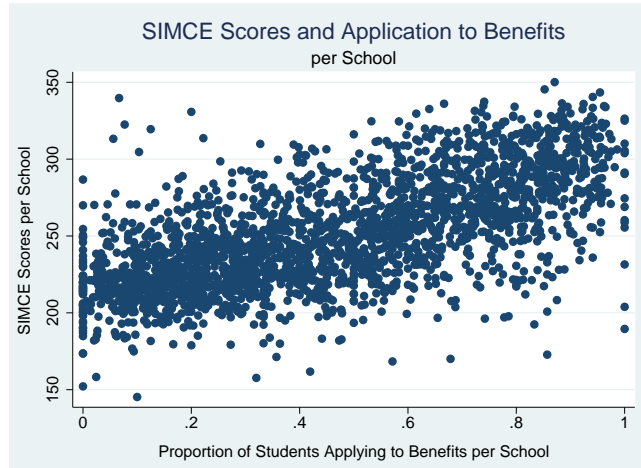
Controlling for endogeneity

The individual application to benefits from the government (credits or scholarships) is not a random process. We know that close to 50% of the total of students apply to the government benefits.

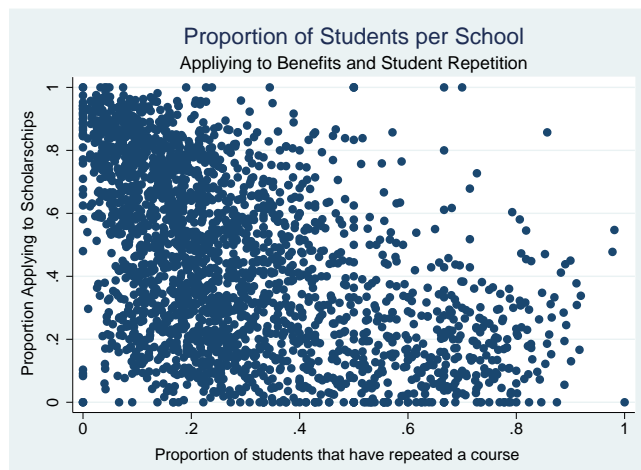
The reasons of this low rate of application could be several. Students may have low expectations on their own probability to get a scholarship; they may believe that they do not qualify because of academic or income standards. On the other hand, they may not know about which scholarships they are eligible to or they may fail to apply on time. It is also possible that they do not know details about the benefits and processes. These issues are to be approached by qualitative methods in future researches.

In graph 7 it is possible to see that schools with a higher SIMCE scores have a higher proportion of students applying to financial aid. At the same time, in graph 8 we can see that in the schools where most students apply to scholarships, a lesser amount of them have repeated a course. Therefore, in schools that have more successful students, more of them apply to benefits.

Graph (7)



Graph (8)



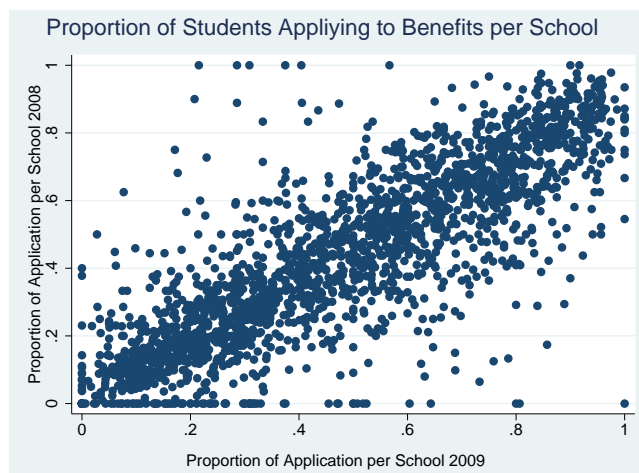
In graph 8 we can see the proportion of students that apply to benefits per school during the years 2008 and 2009. We can appreciate that there is a strong inertia in the application process. If we look at single school we can see that if a certain amount of students applied one year for benefits, a similar proportion of students will apply the next year. Therefore, the application process has

more to do with the characteristics of a given school than with the intrinsic characteristics of students.

The high inertia in the application process may be due to several factors: there may not be enough information about financial benefits, low expectations from the students, low quality of students or low teachers's perception of the students abilities, among other reasons.

This effect allows us to model in a simple way how students apply to benefits, taking as an explanatory factor the proportion of students that apply to benefits the year before.

Graph (9)



TWO STEP PROCEDURE We will proceed by a two-step probit model, first modeling the probability of a single student to be preselected for a benefit. Second, we will evaluate the probability of a student to enroll in tertiary education, controlling for the endogeneity.

STEP 1

$$F(\text{FinancialAID}_i) = F(\text{SIMCE}_i + \text{PSU}_i + \text{INCOME}_i + \text{HSGPA}_i + \text{ExclusionVariables}_i)$$

The exclusion variables on our model will be the proportion of students that apply to benefits per school during the year 2008 and the proportion of students that have repeated a course per school. These two exclusion variables refer more to the characteristics of the school than to the conditions of the student, as we showed previously in graph 8.

STEP 2 We will use the explained probability of obtaining financial aid $\widehat{FinancialAID}_i$, with an instrumental variable approach. This variable will contain the unbiased probability of obtaining financial aid for each student. Then, we will run the following probit regression:

$$F(College_i) = F(SIMCE_i + PSU_i + INCOME_i + HSGPA_i + \widehat{FinancialAID}_i)$$

7 Results

In the following section we describe the effects of the endogeneity control strategy, which was successfully applied as we found significant differences between the estimated coefficients.

We will first assess the impact of financial aid on college enrollment. Then, we will proceed to analyze the results for vocational educations and last, we will evaluate in a single model the effect of financial aid the both kinds of higher education. We analyze them separately because of the different financial aid schemes could have different impacts on the diverse educational programs.

Impact on College Enrolment.

The first part of the procedure is to identify the variables that explain the students' probability of being pre-selected for financial aid, in which our exclusion variable will be the proportion of students that apply to benefits per school during the year 2008, and if the student has repeated a course.

We also include two dummy variables to control if the student has over 550 or 500 points in the PSU test. Having over 550 points is requirement for most of the scholarships.

Table 7: Financial Aid regression

	Probit $CollegeFinancialAID_i$ dy/dx
Income	-.0000931***
SIMCE	.0002837***
PSU	.0009127***
psu550 (d)	-.0539479***
psu500 (d)	.1729553***
HS GPA	.0009446***
Prop Application 2008	.1546168***
Failed	.0063366*
Constant	
Pseudo R^2	0.5279
No. of cases	142764

* p<0.05, ** p<0.01, *** p<0.001

Now, we analyze the results for the two step probit procedure to obtain unbiased coefficients. Column (1) has the biased results of the probit model. Column (2) contains the coefficients of the second part of the **Two Step Procedure**.

The probit model indicates that being pre-selected for financial aid increases the probability of enrollment in College by 19%. The unbiased result of the two-step procedure shows that being pre-selected for financial aid increases the probability of enrolment by 33%. These regressions are done controlling by PSU scores, SIMCE scores, high school grades and dummy variables, for different levels of income. The "p" variables indicate increasing income levels.

Table 8: Impact on College Enrolment

	dProbit dy/dx	dProbit IV dy/dx
p1 (d)	-.1275817***	-.1682227***
p2 (d)	-.1464725***	-.2114861***
p3 (d)	-.106606***	-.1506748***
p4 (d)	-.0868304***	-.1240893***
p5 (d)	-.0730684***	-.1098496***
p6 (d)	-.0587054***	-.0989962***
p7 (d)	-.0497406***	-.0900046***
p8 (d)	-.0267442*	-.067161***
p9 (d)	-.0227609	-.0585207***
p10 (d)	-.0226057	-.0446563***
p11 (d)	.0026385	-.0053184
p13 (d)	.0238059	.0406393
simce	.0002341***	-.0002053***
psu	.0007455***	.0006171***
HS GPA	.0007447***	.000471***
$CollegeFinancialAID_i$.1908597***	
$\widehat{CollegeFinancialAID}_i$.3345512***
Constant		
Pseudo R^2	0.4007	0.3893
No. of cases	142764	142764

* p<0.05, ** p<0.01, *** p<0.001

(d) dF/dx is for discrete change of dummy variable from 0 to 1 z and $P > |z|$ correspond to the test of the underlying coefficient being 0

These results show a very high impact of financial aid in the probability of enrollment, when compared with the international literature regarding tertiary education access. First, it is necessary to say that even though these benefits vary from US1000 to US4000 dollars, they cover -on average- 85% of the student's college tuition. Therefore it is natural to obtain very high coefficients when measuring the impact of financial aid in Chilean colleges, as they nearly ensures tuition coverage. Unfortunately, some families suffer from harsher deprivation, so tertiary education for their children still requires an important sacrifice as working time for students is reduced in the short run.

When we compare the probit approach and the probit with instrumental variables approach, it is evident that there is an important effect of the application process that should be controlled in future research, as we proposed initially.

Impact on Vocational Enrollment.

Proceeding again by the two-step probit method to obtain unbiased coefficients, the same analysis can be done for vocational education enrollment. We avoid the endogeneity problem of the financial aid for vocational education, controlling for the application process. One of the restrictions of vocational financial aid is to have a high school GPA higher than 5,0 in a scale from 1 to 7. Therefore, our following regression excludes those students and has only 124,355 cases.

Table 9: The auto data

	Probit $VocationalFinancialAID_i$ dy/dx
Income	-.0003365***
since	-.0006843***
psu	.0010382***
Prop Application 2008	.2521562***
Failed (d)	-.0043685
Constant	
Pseudo R^2	0.1722
No. of cases	124355

* p<0.05, ** p<0.01, *** p<0.001

The results of the second part of the regression are shown in the upper table. Column (1) has the biases results of the probit model. Column (2) contains the coefficients of the second part of the **Two-Step Procedure**. As we did for college education, we first analyze the effect of financial aid on vocational education enrolment alone. The probit model indicates that being pre-selected for vocational financial aid increases the probability of enrolling in vocational

education by 19%. The unbiased result of the two-step procedure suggest that being pre-selected for vocational financial aid increases the probability of enrolment by 22%. These regressions are done controlling by PSU scores, SIMCE scores, high school grades and dummy variables for different levels of income, as we did for the universities.

On the other hand, the impact of $CollegeFinancialAID_i$ and $College\widehat{FinancialAID}_i$ are negative: -10% and -34% respectively. This means that having financial aid for college reduces the probability of a student to enroll in vocational education, as we posed in our hypothesis.

Table 10: Impact on Vocational Enrolment

	dprobit dy/dx	dProbit IV dy/dx
p1 (d)	-.0058941	.0395345
p2 (d)	.0199101	.0660251**
p3 (d)	.0410448	.0885519***
p4 (d)	.0564309*	.0966262***
p5 (d)	.0602893*	.0973125***
p6 (d)	.0427445	.0789765**
p7 (d)	.0427856	.0825165**
p8 (d)	.0230985	.0635673*
p9 (d)	.0133023	.0462334
p10 (d)	.028914	.0557882*
p11 (d)	-.0188445	-.0099696
p13 (d)	-.0217619	-.0307168
simce	-.0006414***	-.0001376***
psu	.0002404***	.0003327***
HS GPA	-.0006737***	-.000126***
$CollegeFinancialAID_i$	-.1050293***	
$VocationalFinancialAID_i$.196791***	
$College\widehat{FinancialAID}_i$		-.347362***
$Vocational\widehat{FinancialAID}_i$.2252759***
Constant		
Pseudo R^2	0.0870	0.0684
No. of cases	142764	142764

* p<0.05, ** p<0.01, *** p<0.001

Impact on College and Vocational Enrolment

Following the example of (Paredes and Hernandez 2007) we proceed by a multinomial probit (M probit) regression with instrumental variables, considering no enrollment, vocational education enrollment and college education enrollment as the possibilities for the M probit. By following this method we will evaluate the consistency of the previous regressions.

Column (1) contains the coefficients **Two Step Procedure** and Column (2) contains the marginal effects of **Two Step Procedure**, considering in this case $\widehat{CollegeFinancialAID}_i$ and $\widehat{CollegeFinancialAID}_i$.

We can appreciate that the probability of enrollment in vocational education has a negative relation with $\widehat{CollegeFinancialAID}_i$ and a positive relation with $\widehat{VocationalFinancialAID}_i$. Having financial aid for college, therefore, reduces by 26% the probability of enrollment in vocational education. On the other hand, having financial aid for vocational education increases the probability of enrollment in this kind of education by 21%.

Table 11: Multinomial Probit IV

	M Probit Coef.	Marginal effects dy/dx
Vocational enrolment		
p1	-.4677756***	-0.0303629
p2	-.273643**	0.025616
p3	-.1219257	0.0287458
p4	-.0362215	0.0358541
p5	.0263315	0.0442027
p6	-.0019411	0.0351397
p7	.070553	0.0475749
p8	.1068648	0.0490424
p9	.0580655	0.0356062
p10	.1812545	0.0582206
p11	-.026814	0.0053231
p12	.0805426	0.0254045
simce	-.0010467***	-0.0001607
psu	.0022782***	0.0002717
HS GPA	.0002541	-0.0000779
$\widehat{CollegeFinancialAID}_i$	-.9254857***	-0.2606626
$\widehat{VocationalFinancialAID}_i$	1.290605***	0.2120375
Constant	-1.72638***	
College Enrolment		
p1	-2.423564***	-0.1937833
p2	-2.121053***	-0.2718784
p3	-1.83331***	-0.1820598
p4	-1.595794***	-0.1467947
p5	-1.389763***	-0.1309553
p6	-1.235157***	-0.1202686
p7	-1.051542***	-0.1112627
p8	-.7494271***	-0.0912098
p9	-.648178***	-0.0811957
p10	-.4793657***	-0.0693355
p11	-.2569858*	-0.0367145
p12	-.1971543	-0.0329632
simce	-.0010739***	-0.0001278
psu	.0040224***	0.0005546
HS GPA	.0027849***	0.0004453
$\widehat{CollegeFinancialAID}_i$	1.611881***	0.3073727
$\widehat{VocationalFinancialAID}_i$	1.023055***	0.1081247
Constant	-2.965756***	
No. of cases	142764	

* p<0.05, ** p<0.01, *** p<0.001

The case of college enrollment is completely different. We can see that both financial aids have a positive impact. This is probably explained by the high collinearity between both variables. A student that is preselected for vocational financial aid is very likely to be selected also for college financial aid.

Finally, the impact of both financial aids reaches over 40% in college enrollment and the effect of college financial aid alone is near 30%.

8 Conclusions

This paper intended to evaluate the impact of government financial aid -in the form of scholarships and credits- on the enrollment in tertiary education, both in colleges and in vocational institutions. By merging statistical data from multiple institutions, we generated a new data set with information at the individual level, which allowed us to extract relevant conclusions regarding financial aid and enrollment in Chile.

Another contribution of our work consists in the use of nation wide information for Chile, overcoming the biases posed by the single university approach.

In order to assess the impact of financial aid on the enrollment, we required to avoid the problems derived of the endogeneity of the financial aid application process. We applied a two-step procedure to measure and control the endogeneity, which is a relevant innovation on this field of study, as current literature had not solved this issue so far. In this regard, we conclude that not all students that are eligible for benefits are participating in the application process. We suggest that further qualitative research is required to analyze these issues, as it seems that the lack of information and low expectations may be affecting individual decisions of senior year high school students each year.

The different effects -with and without endogeneity control- on the results suggest that educational public policies should maintain and increase financial

aid, but should not neglect the strengthening of informational campaigns and motivational programs to augment expectations of eligible students that are not applying to available benefits.

Regarding the results of the probit model, we must distinguish between the effects of financial aid on college education and on vocational education.

In college education, governmental financial aid -considered as a whole- increases by 30% the probability of enrollment. This result proves that Chilean financial aid programs are more effective than what has been documented by international evidence, that identified impacts around 3 and 10%. This result, however, should be assessed carefully: in Chile, financial aid covers an average of 85% of tuition cost, generating very high incentives on enrollment. Future research should evaluate the impact distinguishing the effectiveness from a comparative perspective, assessing the differences in the proportional magnitude of the aid regarding national cost of life.

Regarding vocational education, the results are very interesting as well: financial aid increases the probability of enrollment by 22% -a little less than in the case of college education- but there are other relevant implications.

Financial aid for college education generates a “substitution effect” regarding vocational education. In other words, obtaining financial aid for college, reduces by 26% the probability of enrollment in vocational education. Also, having financial aid for vocational education increases the probability of enrollment in this kind of education by 21%. This is due to the high demand for universities - because of the prestige and future returns- that combined to high tuition costs of college education, leave many students with no other choice other than to pursue vocational education. Vocational education in Chile is significantly cheaper so if a student obtains financial aid both for vocational and college education, he is most likely to choose the latter.

However, this paper has several limitations that could be corrected by further research. First, it will be necessary to distinguish between the impact of scholarships and credits, as each benefit provides different kinds of incentives to students, given the long term consequences of incurring in debt. On the other hand, future research may analyze the differential effect of the multiple kinds of scholarships offered by the Chilean government to identify the most effective scholarships and explore strategies to improve those that are not.

The high impact of financial aid in enrollment that we documented in this paper opens a line of research regarding the restriction of educational private credits for higher education in the Chilean context. A study on this issue could shed some light regarding the current high impact of scholarships.

Considering the used data set, future studies may include students that did not finished high school in the expected time period.

This paper can also provide some interpretations that may be useful to public policy makers. The evidence suggest that the kind of incentives that the government provides is generating a college predominant higher education system. New strategies must be evaluated if an equilibrium between vocational and college education is desired. Scholarship incentives are oriented to this goal, but the “substitution effect” leads to favor college education. Alternatives in the line of improving return expectations and prestige of vocational education could be considered.

Another policy recommendation -a more general one- is that financial aid should be maintained and increased, as the effectiveness in Chile is comparatively very high, denoting a high student demand for aid. This suggest that there is still an important amount of students that are not meeting their financial aid needs required to pursue their higher education.

9 References

Baumgartner H., and Viktor Steiner,(2006) “Does More Generous Student Aid Increase Enrolment Rates into Higher Education?: Evaluating the German Student Aid Reform of 2001”. Discussion Papers of DIW Berlin 563, DIW Berlin, German Institute for Economic Research.

Brunner J.J., (2009) “Educación Superior en Chile: Instituciones, Mercados y Políticas Gubernamentales (1967-2007)”. Ediciones Universidad Diego Portales.

Cameron S. and Heckman J., (1998) “Life Cycle Schooling and Dynamic Selection Bias: Models and Evidence for Five Cohorts of American Males”. *Journal of Political Economy*, vol. 106, no. 2.

Chapman B. and Ryan C. (2005) “The access implications of income-contingent charges for higher education: lessons from Australia” *Economics of Education Review*, Elsevier, vol. 24(5), pages 491-512, October.

Carneiro P. and Heckman J.,(2002) ’“The Evidence on Credit Constraints in Post-Secondary Schooling”. *The Economic Journal*, Volume 112, Number 482, October 2002 , pp. 705-734(30).

Deming D. and Susan Dynarski, (2009) “Into College, Out of Poverty? Policies to Increase the Postsecondary Attainment of the Poor” NBER Working Papers 15387, National Bureau of Economic Research.

Dynarski s., (2004) “The New Merit Aid,” NBER Chapters, in: *College Choices: The Economics of Where to Go, When to Go, and How to Pay For It*, pages 63-100 National Bureau of Economic Research.

Goodman J.,(2008) “Who merits financial aid?: Massachusetts’ Adams Scholarship”. *Journal of Public Economics* Volume 92, Issues 10-11, October 2008, Pages 2121-2131.

Kane, Thomas J.(2003) “A Quasi-Experimental Estimate of the Impact of Financial Aid on College-Going” (). NBER Working Paper No. W9703.

Linsenmeier D., Rosen H. and Rouse C. (2006) “ Financial Aid Packages and College Enrollment Decisions: An Econometric Case Study”. *Review of Economics and Statistics* 88:1, 126-145.

Monk, James, (2009) “The impact of merit-based financial aid on college enrollment: A field experiment”. *Economics of Education Review* Volume 28, Issue 1, February 2009, Pages 99-106.

Paredes R. and Luis Hernández, (2007) “Restricciones Económicas en la Decisión de Continuar Estudios Superiores Técnicos o Profesionales”. *Calidad en la Educación*, ISSN 0717-4004, N. 27 , pp. 238-261.

Singell, Larry D. and Stone, Joe A.(2002) “The Good, the Poor and the Wealthy: who Responds Most to College Financial Aid?”. *Bulletin of Economic Research*, Vol. 54, pp. 393-407.

Van der Klaauw, Wilbert,(2002) “ Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression-Discontinuity Approach”. *International Economic Review*, Vol. 43, pp. 1249-1287.