The Promise of Free Tuition: The Case of Chile

by

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Dedication

To Gonzalo, Isabel, and Elena

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Abstract

In recent decades, there has been a revival of free tuition policies around the world. The goals of these policies are typically to increase access to and success in higher education. Although research on free tuition policies is growing, it is mainly focused on providing empirical evidence of its effects on student outcomes in the U.S. context. Research related to the policy formulation or to its effects on other actors is scant. In this three-study dissertation, I will contribute to the literature on free tuition policies by exploring the case of Chile, a country that implemented such a policy in 2016. Using the case of Chile, I examine the arc of the policymaking process, from policy formulation to policy evaluation on student *and* institution outcomes.

In the first study, I explore how a radical change in the conceptualization of higher education--from understanding higher education as a private good to positioning it as a social right—unfolded in Chile. Guided by the Advocacy Coalition Framework as my theoretical lens, and using mixed methods, I analyze who the main policy actors involved in the policy discussion were and how they interacted to move the free college idea forward until it became a policy.

In my second study, I focus on examining the effect of the policy on student access and persistence in higher education. Guided by a college choice theoretical framework and using a difference-in-difference estimation strategy, I provide empirical evidence of the free tuition policy's effects on reducing inequities in access to and persistence in higher education. Results indicate positive effects on increasing financial aid applications, the quality of the first institutional choice in the university application form, and persistence in institutions included in

the policy. Although a negligible effect on increasing eligible student enrollment rates is found, the policy has an effect on changing student preferences from institutions not included in the policy to institutions covered by the policy.

In my third study, I shift the focus to exploring possible responses of higher education institutions to the free tuition policy. Using Resource Dependency Theory and microeconomic concepts as the theoretical framework, and a fixed effects estimation strategy, I explore whether the policy changes the socioeconomic diversification of the student body, as well as admissions and finance outcomes of the participating universities. Overall, I found that the free tuition policy did not diversify the student socioeconomic composition of the participating universities. Examining admission outcomes, I found that the policy increased applications to participating universities, however, only highly selective universities respond by increasing enrollments. Additionally, I found that after the policy implementation, participating universities maintain constant the weight assigned to the standardized admission test in the admission system, interrupting the pre-implementation trend that was constantly decreasing this weight. I did not find any changes in institutional revenues after the policy implementation, but did find a decrease in the undergraduate expenditure rate after the free tuition policy was implemented.

Collectively, these studies help to inform policymakers, researchers, practitioners, and advocacy groups about free tuition policies, the complexities in their design and implementation, and their effects on student and institution outcomes. Thus, these studies contribute to the discussion about the effectiveness of free tuition policies on decreasing inequities in higher education, a discussion that is relevant for many countries around the world.

Chapter 1
Introduction

In different parts of the world, free-tuition policies and programs have been drawing the attention of students, policymakers, and the general public as a tool to improve equity in access and success in higher education (De Gayardon, 2017; Langa, 2016; Perna et al., 2017; Salmi & D'Addio, 2020). In South Africa, between 2015 and 2016, students protested against an increase in tuition and fees and against an unequal system, demanding free higher education through the #FeesMustFall movement (Langa, 2016). In 2016, Chile implemented a free tuition policy for low- and middle-income students enrolled in eligible public and private institutions. A year later, in 2017, the Philippines approved a universal free tuition law for public institutions (Lim et al., 2018), and in 2019, Mexico reformed its constitution to include higher education among the compulsory and free levels of education (Castiello-Gutiérrez, 2020). In the last United States' (U.S.) presidential campaign, presidential candidates also debated free higher education. Examples of these types of programs are "college promise" programs implemented in some states in the U.S., such as in Tennessee (Tennessee Promise) or Oregon (Oregon Promise), which focus on free college in the community college sector (Perna et al., 2017). As free college policies and programs began to be implemented, research that evaluates the effects of such policies on outcomes has also emerged. However, this research is mainly focused on student outcomes in the U.S. context. Thus, more research that focuses on broader populations, different groups of students, different contexts, and program implementation and management is needed (Perna & Leigh, 2018; Perna & Smith, 2020).

Although free-tuition policies and programs around the world differ and most have restrictions on who can benefit and what institutions are covered, these policies and programs have in common that they send a clear message to students and their families: beneficiaries can enroll in higher education without having to pay. This message is important as research suggests that policies with transparent eligibility criteria and simple application processes have greater impacts on educational attainment (Deming & Dynarski, 2009). This aspect is critical for marginalized populations that face informational and other types of barriers to accessing higher education (Acevedo-Gil, 2017). Thus, free tuition policies have the potential to impact the educational outcomes of marginalized populations, and in so doing decreasing inequities in higher education.

Research on free tuition policies is mainly focused on student outcomes in the U.S. context. The U.S. research indicates that free tuition policies influence the college-going culture (Swanson et al., 2020) by, for example, increasing student's aspirations for post-secondary education (Miron et al., 2012), and changing prospective student's college choice set (Andrews et al., 2010). However, the research has found mixed effects on enrollments (Gándara & Li, 2020; Gurantz, 2020; Nguyen, 2019). Outside the U.S., the evidence is limited and it also indicates mixed results on enrollments (Arzola, 2021; Martin, 2021; Post, 2011a, 2011b).

Little attention has been paid, however, to other important aspects of free tuition policies. For instance, little is known about how these policies are formed and the political dynamics behind their design, adoption, and sustainability (Bell, 2020). Another topic where there is scant research is how higher education institutions (HEIs), an important actor directly involved in the policy implementation, react to free tuition policies. Understanding both aspects (i.e., how free tuition policies are formulated and implemented and how HEIs react) is important to elucidate

why some countries have been successful in implementing free tuition policies, or why some policies have been more effective in achieving their intended goals.

I contribute to the literature on free tuition policies by examining the case of Chile, a country that implemented such a policy in 2016. Using Chile as a case study, I examine the arc of the policymaking process, from policy formulation to policy evaluation on student and institution outcomes. The Chilean case is interesting because it is a country characterized as a neo-liberal laboratory (Bellei et al., 2014; Guzmán & Álvarez Vandeputte, 2021), where higher education was considered a private good and, therefore, the cost of attending college was high and mainly borne by students and their families (Organization for Economic Co-operation and Development [OECD], 2019a). Thus, the implementation of a free tuition policy represents a radical change in the conceptualization of higher education as it positions higher education as a social right instead of a private good. In my first study (Chapter 2), I explore how this radical change unfolded, from the inception of the free college idea until it became a policy. Guided by Advocacy Coalition Framework as my theoretical lens and using mixed methods, I analyze who the main policy actors involved in the policy discussion were and how they interacted to move the free college idea forward until it became a policy. By focusing on the policy formulation process in Chile, I aim to shed light on the complexities involved in the policy formation process and the critical aspects that helped to move the idea of free college forward. I also aim to illuminate the critical aspects that introduce differences in the policy design and implementation to help policymakers and researchers to understand why free tuition policies often have different outcomes across countries.

In my second study (Chapter 3), I focus on evaluating the effect of the policy on student outcomes. Guided by a college choice theoretical framework and using a difference-in-difference

estimation strategy, I provide empirical evidence of the free tuition policy's effects on reducing inequities in access to and persistence in higher education. By focusing on a different context than the U.S., I expand the emerging literature on free tuition policy's effects on student outcomes, which has been mainly focused on the U.S. experience. Examining the case of Chile is interesting because it is a country characterized by a rapid expansion of higher education, which had a broad student financial aid system based on scholarships and loans, and where inequities in access to and success in higher education persist.

In my third study (Chapter 4), I shift the focus to exploring possible responses of higher education *institutions* to the free tuition policy. Using Resource Dependency Theory and microeconomic concepts as the theoretical framework, and a fixed effects estimation strategy, I explore whether the policy changed the socioeconomic diversification of the student body, as well as admissions and finance outcomes of the participating universities. Examining institutions' responses in Chile is interesting because the Chilean policy includes private and state universities and posits rules that restrict institutional behavior by regulating tuition and limiting enrollment capacity in a context where HEIs are highly autonomous and dependent on tuition revenues. This study contributes to the literature by exploring the reactions of one important actor (i.e., HEIs) on policy effectiveness. To my knowledge, this is the first study to consider HEIs' reactions to a free tuition policy.

Collectively, these studies help to inform policymakers, researchers, practitioners, and advocacy groups about free tuition policies, the complexities in their design and implementation, and their effects on student and institution outcomes. My intention is for these studies to provide a comprehensive understanding of the Chilean policy's benefits. At the same time, they also shed light on critical aspects of the policy design that could be interfering with achieving the intended

goal of decreasing inequalities. Thus, my work contributes to the discussion of the effectiveness of free tuition policies in decreasing inequities in higher education, a discussion that is relevant for many countries around the world. In a local context, understanding what aspects of the Chilean policy are working as expected and what unintended consequences are derived from the particularities of the policy can help to improve it. In the long run, a policy that effectively improves educational attainment in the country can have important implications in terms of decreasing inequalities in Chilean society, which is one of the most unequal countries in the Organization for Economic Cooperation and Development (OECD, 2011).

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Chapter 2

Study 1: How Free Tuition Became a Policy in Chile: The Importance of Policy Actors and their Beliefs

During the last decade, there has been a revival of free tuition policies around the world—the goals of which are to improve equity in access to and success in higher education (Salmi & D'Addio, 2020). In a context of spiraling tuition, a decrease in public appropriations, and a student loan crisis (de Gayardon et al., 2018; Organization for Economic Co-operation and Development [OECD], 2019; Salmi, 2013), free tuition policies have emerged sending a clear message to students and their families: they will not have to pay to enroll in college. These policies guarantee that the cost of attending college will be at least partially covered by the government, thereby providing the potential to improve opportunities for previously underserved populations. Understanding the current revival of free tuition policies is particularly important as it challenges the predominant discourse that situates higher education as a private good, where paying for college is justified under the premise that higher education degrees lead to private benefits later in life (OECD, 2019) to one of college being a social right or public good.

Demands for free college have arisen in countries around the world. In some countries, such as the United States (U.S.) or South Africa (Langa, 2016; Reinicke, 2021), presidential candidates or student movements have raised the idea of free college but have failed to implement it. Other countries, such as Chile, the Philippines, and New Zealand, have implemented free tuition policies during the last decade (de Gayardon & Bernasconi, 2016; Hipkins, 2017; Lim et al., 2018). These examples show that free tuition policies have been a

matter of discussion in countries with different economies and higher education systems and situated on different continents. However, how a radical change in the conceptualization of higher education and the student financial aid system happens remains unclear.

Little is known about the formation of these policies and the political dynamics behind their design, adoption, and sustainability (Bell, 2020). Research on the emergence and design of free tuition policies focused on describing and classifying factors that influence policy formation, such as the key actors involved and the main arguments in favor or against these policies (de Gayardon, 2019; Perna & Leigh, 2018). However, how the idea of free college emerges and evolves until it becomes a policy or program is missing from the literature. This study contributes to the literature on free tuition policy formation by examining how this process unfolded in Chile. The Chilean case is interesting because it is a country that has been characterized as a neo-liberal laboratory (Bellei et al., 2014; Guzmán & Álvarez Vandeputte, 2021), where the cost of attending higher education was high and mainly borne by students and their families (OECD, 2019) until the free tuition policy was implemented in 2016. By focusing on Chile as a case study, I intend to shed light on who the main policy actors involved in the policy discussion were, and how they interacted to move the free college idea forward until it became a policy.

Understanding how free-tuition policies are formulated and implemented is important to elucidate why they have been successful in some countries and not others, and to evaluate their intended and unintended consequences. Doing so will help advocacy groups and policymakers understand the complexities involved in the policy formation process and the critical aspects that introduce differences in policy design and implementation. Understanding such dynamics can

help policymakers and researchers explain why free tuition policies often have different outcomes across countries.

This chapter is organized as follows. Next, I discuss the literature on free tuition policy formation. Then I present the theoretical framework that guides this study, which is composed of the advocacy coalition and policy cycle frameworks. In the next section, I present the methodology used to answer the research questions, which contains a brief subsection about the Chilean context where this policy arose. After this section, I present the main results and I end with the Discussion and Conclusion sections.

Literature Review

There is scant research about the formation of free tuition policies –from emergence, to policy design, to implementation—and the political dynamics behind them (Bell, 2020). Research on the emergence and design of free tuition policies has focused on describing and classifying factors that influence policy formation (de Gayardon, 2019; Perna & Leigh, 2018). Some researchers have focused on identifying the main actors in this process (Altbach & Klemencic, 2014; Bellei et al., 2014; Bellei & Cabalin, 2013; de Gayardon, 2019; F. Figueroa, 2013; Guerra Botello et al., 2019; Langa, 2016; Millett et al., 2020; Olivares & Carrasco-Hidalgo, 2020; Ordorika, 2021; Veliz et al., 2022) or describing the arguments in favor or against these policies (de Gayardon, 2019; Deming, 2019; Guerra Botello et al., 2019; Marcucci et al., 2008; Marcucci & Johnstone, 2007). However, this literature does not relate actors to arguments in favor or against free tuition policies and how they build relationships to influence the policy process.

Main Actors in Free Tuition Policy Formation

In the literature that is available about free tuition policy formation, researchers have highlighted the role of students, philanthropists, presidential candidates, and public opinion as key to moving these policies forward. Moreover, they have identified that each of these actors is key at different stages of the process. In terms of placing free tuition demands on the political agenda, students have been key policy actors in many countries (Altbach & Klemencic, 2014; Bellei & Cabalin, 2013; Langa, 2016; Ordorika, 2021). During the last decade, student protests opposing tuition increases, the notion of higher education as a private good, and/or increases in graduate unemployment have sought to generate policy changes in countries such as Germany (2008-13), the UK (2010), and Chile (2011-2013; Altbach & Klemencic, 2014; Brooks, 2016).

In addition to students, research about the history of these tuition-free programs identifies philanthropists as key actors in the policy formation and implementation periods. For instance, in the U.S., the first initiatives promoting free college were "promise programs" funded by philanthropists (e.g., the Kalamazoo Promise from Kalamazoo, Michigan, 2005, and El Dorado Promise from El Dorado, Arkansas, 2007; Millett et al., 2020). In countries more recently approving free tuition policies—such as New Zealand, the Philippines, Mauritius, and Chile—elected presidential candidates were key actors in implementing these policies (de Gayardon, 2019; Guerra Botello et al., 2019; Veliz et al., 2022).

Public opinion has also played a role in moving these policies forward. In Chile, public support for student demands for free higher education played an important role in including those demands on the political agenda of a presidential candidate who later become president and implemented such a policy (Veliz et al., 2022).

Arguments in Favor or Against Free Tuition Policies

Researchers studying tuition policies in general, and free tuition policies in particular, have identified the main arguments stated by proponents and opponents of these policies. Arguments in favor highlight the social benefits of higher education and argue that free tuition is a way of solving inequities in access to higher education. Under this line of argument, higher education is touted as a public good that provides economic and social benefits to society, thereby justifying the role of government in subsidizing higher education (de Gayardon, 2019; Deming, 2019). Others highlight higher education as a social right and argue that all barriers to accessing higher education, including tuition, should be removed (de Gayardon, 2019). Free college has also been justified under the premise of information asymmetries between prospective students and the government. Prospective students have imperfect information to fully realize the benefits of higher education and therefore they often make suboptimal decisions about attending college. In contrast, the government often has more information about the benefits of higher education for students and society, thus, "they should invest in higher education to enable citizens to benefit from their education to an extent that they cannot acknowledge" (de Gayardon, 2019, p. 490). Moreover, some believe the government should subsidize higher education because private banks are often reluctant to offer student loans without guarantees of repayment as the future earnings of students are uncertain (Deming, 2019).

In contrast, stakeholders opposing free tuition policies highlight the private benefit of higher education and the inefficiencies of publicly funding it. Marcucci and Johnston (2007), in their comparative study about tuition fee policies around the world, present arguments in favor of charging tuition, which could also be understood as arguments against free tuition policies. These arguments include: (1) private returns to higher education are high and therefore the

individual who benefits should pay; (2) free higher education is a regressive "tax" because middle- and high-income students are disproportionally enrolled in higher education; low-income people pay taxes but attend higher education at lower rates; (3) paying fees increases the incentive of students and their families to hold higher education institutions accountable, which promotes efficiency; and (4) the rising per-student costs of educating college students makes it difficult to maintain free higher education in a context where increasing taxes is difficult and there are competing demands for those taxes.

When the *design* of free tuition policies is discussed, arguments against these policies are the high costs of implementing such a policy in the context of a growing youth population and limited resources (de Gayardon, 2019; Marcucci et al., 2008). In Mexico, for instance, the debate about the implementation of free tuition in public universities centered on the fiscal viability of the policy and the measures to assure funding for quality education (Guerra Botello et al., 2019). Also noted are the tradeoffs that policymakers and legislators often have to make between access, cost, and quality in the policy design (de Gayardon, 2019; Deming, 2019). As de Gayardon (2019) explains, the government's financial constraints can end up restricting access to free tuition for some students and/or decreasing institutional quality by, for instance, increasing the number of students per faculty or decreasing the level of per-student expenditures. In the case of the Philippines, detractors of the free-tuition policy argued that the increase in enrollments in public institutions was not accompanied by an increase in public appropriations, resulting in a decrease in quality (Guerra Botello et al., 2019). In the long run, any decrease in quality may negatively affect retention and graduation rates, thereby diminishing the intended effects of the policy (Deming, 2019).

Overall, research on free tuition policy formation shows, on the one hand, that there are key actors in moving these policies forward. On the other hand, research shows that free tuition policies elicit arguments in favor and against, depending on the policy actor's perspective about the role of education in society, who benefits from higher education, and the actual possibility of states subsidizing higher education in a context of scarce resources and competing demands for those resources. However, how these policy components relate to each other and play a role in policy formation is missing. Literature on policy formation and change in other fields, such as K-12 education or pension systems, has shown that how policy actors interact with each other with similar or opposite arguments is important in getting a policy enacted (Galey-Horn & Ferrare, 2020; Leifeld, 2013). Thus, individual actors, although important to move ideas forward, often interact with other policy actors to introduce changes in a particular policy. In order to understand how the radical change in the conceptualization of higher education and in the student financial aid system took place in Chile, I use concepts from Advocacy Coalition Framework (ACF, Sabatier, 1987, 1988, 1998; Sabatier & Jenkins-Smith, 1993; Sabatier & Weible, 2007; Weible et al., 2020) and the policy cycle model (Brewer & DeLeon, 1983; Howlett et al., 2009). The next section describes both frameworks in more detail.

Theoretical Framework

ACF focuses on how policies change over time and highlights the role of policy actors, their interests, and their interactions within the policy process (Sabatier, 1987). However, ACF is less clear about the policy development process (Howlett et al., 2017). Therefore, I complement ACF with the policy cycle model (Howlett & Giest, 2012), which divides the policy-making process into a series of stages.

Advocacy Coalition Framework

ACF posits that within a specific policy issue, policy actors seek to form advocacy coalitions, which "are people from a variety of positions … who share a particular belief system-i.e., a set of basic values, causal assumptions, and problem perceptions-and who show a non-trivial degree of coordinated activity over time" (Sabatier, 1988, p. 139). Thus, ACF highlights the importance of interactions among policy actors to create networks, seek allies, share resources, and develop strategies to form advocacy coalitions that result in increasing their chances of introducing their preferences into the actual policies. Particularly important is the stability of coalitions over time and the availability of resources to policy actors within coalitions as those resources are their source of power that determines their level of influence in the policy process (Weible et al., 2020).

Under ACF, advocacy coalitions have a belief system based on four categories (Sabatier, 1988, 1998): (1) deep core, which refers to principles that define a personal philosophy and apply to all policy areas (e.g., what is the role of the government and the market to organize society or beliefs about the relative priority of values such as freedom or equity, Gándara & Ness, 2019); (2) policy core, which refers to normative commitments and causal perceptions for achieving the deep core beliefs in a specific policy area (e.g., who should pay and who benefits from higher education); (3) preferences, which refers to instrumental decisions that are salient, involved almost all members of coalitions, and are sources of conflict (e.g., a preference for a system based on scholarships and loans vs. free tuition); and (4) secondary aspects, which are instrumental decisions to implement the policy core (e.g., what are the criteria for including/excluding beneficiaries of the policy).

Policy changes, according to ACF, can be achieved by policy learning which can lead to modifications of policy actors' belief systems and/or can be triggered by external events that change the socioeconomic conditions, the coalitions in power, or externalities from other policy subsystems. Thus, these external events change the resources available to policy actors.

The Policy Cycle Model

Policymaking can be conceptualized as a process consisting of a set of stages called the policy cycle. Although I recognize that policymaking is a non-linear process, this approach provides a useful framework to reduce the complexity of policymaking into more manageable stages. By so doing, it is possible to investigate the role of actors, their beliefs, and how both change over time when the policy moves from one stage to another (Howlett & Giest, 2012). Although there are several models, the most common identifies five stages (Howlett et al., 2009; Howlett & Giest, 2012). The first stage, agenda-setting, refers to the phase where a problem is initially detected by policy actors and solutions are proposed. The second stage, policy formulation, refers to narrowing the choices and developing a specific policy option within the government. The third stage, decision-making, refers to the adoption of a particular policy. The fourth stage, policy implementation, refers to the government putting into action the particular policy. The fifth stage, policy evaluation, refers to monitoring the results of the policy and reformulating the policy problem and solutions in light of the implementation.

In sum, ACF identifies policy actors grouped into advocacy coalitions according to their beliefs as the main forces that lead to policy change. In turn, the policy cycle model provides analytical stages to identify change over time. Based on these frameworks, this study aims to improve our understanding of how policy actors interested in free college interact to move their

demands across the policy life cycle into policy implementation. The specific research questions guiding the empirical work are:

1. What advocacy coalitions emerged and what were their belief systems (policy core, preferences, and secondary aspects) related to the free college discussion in Chile?
2. Who were the main policy actors in these coalitions and how did they promote or oppose the free college policy at each stage of the policy cycle in Chile?
3. What were the main discussions among policy actors at each stage of the policy cycle?

Context and Method

In order to answer the research questions, I used a case study methodology. This methodology is useful when researching how a complex contemporary process, such as the formation of the Chilean free tuition policy, unfolds over time (Yin, 2014). Using multiple sources, a case study allows for achieving an in-depth understanding of the phenomenon under study. Next, I describe the case of Chile, the data, and the analytic strategies used to answer the research questions.

The Case of Chile

The Chilean higher education system is characterized by a mixed provision of vocational and university level education shared between state institutions, publicly subsidized private universities, and private institutions. Historically, state (n=16) and publicly subsidized private universities (n=9) represent the oldest, most selective, and prestigious institutions in the country. Together, they are the so-called traditional universities and form the Council of Chilean University Presidents (*Consejo de Rectores de Universidades Chilenas*, CRUCH), which is an interest group and an advisory group to the Ministry of Education (MINEDUC). In terms of

enrollment, however, they represent less than 30% of the student population (Servicio de Información de Educación Superior [SIES], 2019). The private universities represent about 30% of the student population (SIES, 2019) and most of them are open access. The vocational sector is open access and represents about 40% of the student population (SIES, 2019). Until 2018, the vocational sector was only composed of private institutions. For-profit institutions are only allowed by law in the vocational sector.

In recent decades, the Chilean higher education system experienced a rapid expansion that concentrated students in private higher education institutions. The availability of student financial aid allowed low- to middle-income families to access higher education. However, the rapid expansion was followed by an affordability problem, as tuition and fees in Chile were among the highest in the world and financial aid was not enough to pay for the total cost of education (Santelices et al., 2018). This financial burden was mainly borne by students and their families (OECD, 2019). The main financial aid instrument was a student loan (*Crédito con Aval del Estado*, CAE, State-Guaranteed loan) with a high-interest rate and administered by private banks, which led to a student debt crisis (Guzmán & Álvarez Vandeputte, 2021). There was also segregation of low-income students to low-quality institutions (Orellana, 2011; Torres & Zenteno, 2011), an issue that was deepened by scandals of profit in universities, which is forbidden by law, and bankruptcies that leave thousands of students without an institution (J. P. Figueroa & Riquelme, 2012).

In 2011, large student protests took place in Chile. Secondary and college students mobilized more than 100.000 people to rally in the streets demanding the end of the illegal profit in some private universities and a more equitable higher education system that provides access to

free, high quality, and public higher education[1] for all (Barrionuevo, 2011). These student protests were in response to the neoliberal policies implemented in the 1980s that resulted in large inequalities in the Chilean society in general and in the access to and success in higher education in particular (Arrué, 2012; Bellei et al., 2014; Guzman-Valenzuela, 2016; Palacios-Valladares & Ondetti, 2019).

At the end of 2015, four years after these massive protests, "an initial form of tuition-free status for some students and some institutions" (de Gayardon & Bernasconi, 2016, p. 24) was approved in the Chilean congress through the 2016 Ministry of Education Budget. In 2018, this tuition-free policy, or *Gratuidad* as it was called in Spanish, was finally approved as part of the new higher education law, establishing higher education as a right and citing equity, inclusion, and quality as guiding principles (*Law 21091. About Higher Education*, 2018).

Although the free tuition demands in Chile became a reality, major changes were introduced to the policy enacted in 2018 compared to the initial demands in 2011. From the original demands of free, quality, and public higher education for all, the policy as implemented only includes free tuition for low- to middle-income students enrolled in state or private non-profit higher education institutions (HEIs)[2] that have been accredited for at least four years.[3] For private institutions, participation in the free tuition policy is voluntary, while for state institutions it is mandatory. Those institutions that opted to be part of the policy must accept a regulated

[1] Due to the structure of the higher education system in Chile, where state higher education institutions coexist with private but publicly subsidized and private institutions, the term public is not equivalent to state higher education.
[2] In Chile, universities, by law, must be non-profits. However, vocational institutions, including *Centros de Formación Técnica* (CFT, Technical Formation Centers), and *Institutos profesionales* (IP, Professional Institutes) are allowed to be for-profit.
[3] Institutional accreditation is granted by the Comisión Nacional de Acreditación (CNA, National Accreditation Commission) as a way to safeguard institutional quality. The accreditation ranges between zero (accreditation denied) to seven years based on a determination of the institutional quality. Institutional accreditation is also linked to student financial aid as students in institutions that lose their accreditation cannot apply for scholarships or loans granted by the state.

tuition and a regulated enrollment capacity set by the government for each eligible program of study.

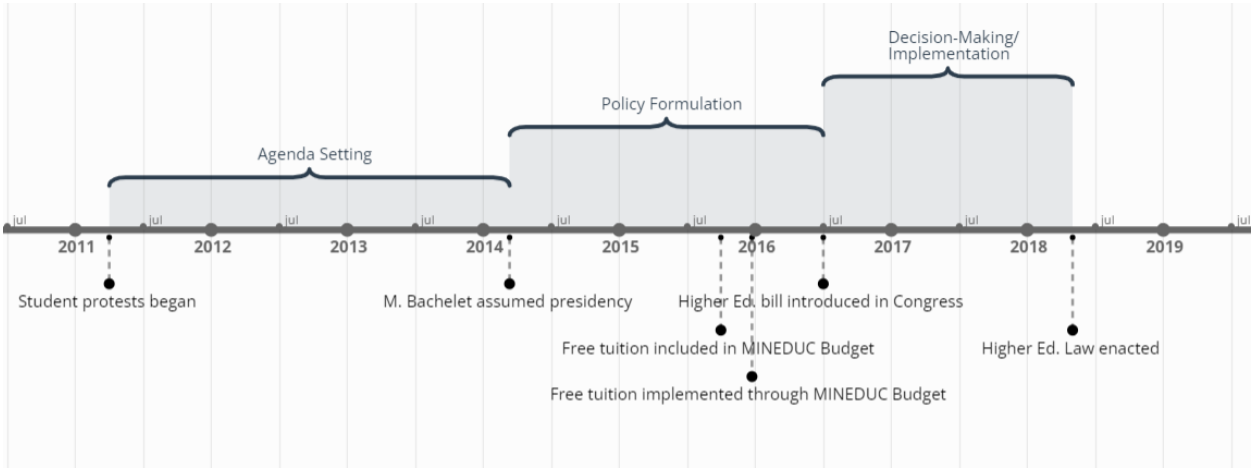
Since the implementation of this policy in Chile, researchers have been paying attention to how this policy arose. However, current research is mainly focused on the role of the student movement in raising the idea of free tuition and challenging neoliberal principles that were prevalent in the policy agenda (Bellei et al., 2014; Bellei & Cabalin, 2013; Guzman-Valenzuela, 2016; Olivares & Carrasco-Hidalgo, 2020; Palacios-Valladares & Ondetti, 2019). To date, few researchers have focused specifically on how student demands translated into public policy. Whereas Palacios-Valladares and Ondetti (2019) have focused on the interaction of the student movement and party politics to influence the policy agenda, Veliz and colleagues (2022) focused on the influence of the student movement on government traditional channels. Thus, no research has focused on the advocacy coalitions behind the free college discussion and how they were able to move their preference through the policy process, which is the focus of this research.

Free Tuition Policy Stages in Chile

To track changes over time, I identified the stages in the development of the free tuition policy using the policy cycle model (Howlett & Giest, 2012). Figure 2.1 graphically describes the time-period and the stages. The overall time frame begins in April 2011, when the student movement demanding free higher education arose, and it ends in May 2018, when the new Higher Education Law (Ley 21091), which includes the free tuition policy, was enacted. As shown in Figure 1, I identified four stages of the policy cycle during this time-period: 1) Agenda setting, from April 2011 to March 2014, when presidential candidate Michelle Bachelet, who included the free tuition demands in her policy agenda, assumed the presidency. 2) Policy formulation, from March 2014 to July 2016, when the Higher Education bill was presented for

discussion in Congress. 3) Decision-making/implementation period, from July 2016 to May 2018. During this period, the free tuition policy was discussed in Congress and was also first implemented in 2016 through the annual Ministry of Education Budget. This mechanism has been previously used by other Chilean governments when bills, in order to be enacted, needed to achieve a high degree of consensus among legislators (Bernasconi & Rojas, 2004). Using the annual budget process had the advantage that, by law, legislators have a limited period to discuss the budget, and approval is achieved only by a simple majority of legislators. It has the disadvantage that the budget to finance the policy must be approved each year. As decision-making and implementation were intertwined, I included them in the same period.

Figure 2.1. Timeline of the Policy Stages in the Free Tuition Policy Discussion in Chile



Source: Own elaboration.

Data

To identify the actors, coalitions, and their beliefs related to free college in Chile, I used multiple sources of data: newspaper articles, policy documents, artifacts, verbatim transcriptions of the policy discussion in the legislature, and in-depth interviews. Collecting data from different sources is important in a case study design because different sources allow me to triangulate the

data and corroborate the findings (Yin, 2014). I chose to focus on newspaper articles, policy documents, artifacts, and verbatim transcriptions as they capture the policy discussion at the time it happened avoiding any recall errors or hindsight bias (Leifeld, 2013). First, I identified four newspapers with print and/or online national circulation in Chile: two from a conservative editorial line (El Mercurio and La Tercera), and two from a liberal editorial line (El Mostrador and El Ciudadano). Those newspapers or digital news platforms are identified as the ones with the highest circulation in Chile (Newman et al., 2020). In those newspapers, I searched for news using the following keywords: funding, higher education, free tuition, free, and student movement.[4] In total, the search resulted in 812 newspaper articles between April 2011 and May 2018. After identifying the articles, I reviewed the news titles and dropped the articles not related to student financial aid. In total, I included 351 newspaper articles in the analysis.

A second data source was policy documents and verbatim transcriptions of the free tuition policy discussion in the legislature publicly available from the legislature website. I included 14 documents related to the MINEDUC Budget discussions from 2015 to 2017. I also included 8 documents related to the discussion of the Higher Education Law from July 2016 to May 2018. In total, I included 22 policy documents and verbatim transcriptions.

In addition, I used a third data source, in-depth interviews with key policy actors, to triangulate and complement newspaper and policy document analysis. I compiled a database of potential interviewees by collecting actors mentioned in the newspaper articles, and policy documents, and by asking key informants that were involved in the policy formulation following a snowball procedure (Small, 2009). The potential interviewees were divided into the following

[4] The search was performed in Google advanced search in Spanish using the keywords *financiamiento*, *educación superior*, *gratuidad*, *gratis*, *movimiento estudiantil* and specifying the online site of each newspaper, except for El Mercurio where the search was done by the newspaper office using the same keywords.

categories: government actors, state universities, publicly subsidized private universities, private universities, and vocational institutions. I choose to include actors in HEIs, besides the government actors, to better understand the role of HEIs as they emerged as one key actor in the newspaper and policy document analysis and their role has not been previously described. Interviewees were recruited through personal contacts and emails. I expected to do a minimum of two interviewees per category to capture differences and similarities within each category and to ensure representation of each category. Interviewees were not compensated for their time.

The interview protocols were developed according to the theoretical framework and the analysis of the documents previously described to allow for triangulation. Protocols were tailored according to the interviewee's expertise (HEI or government actor) and allowed for a semi-structured approach. The protocol for actors in HEIs included questions about their position and role in the periods when the policy was discussed, the causes that lead to the idea of free tuition, their position regarding the policy, the actors that shared and opposed their position, and their arguments, the discussion about the policy in their institutions, their strategies to influence the policy discussion, and the consequence of the policy for their institution. In turn, the protocol for government actors included questions related to their role in the policy discussion in each period, the causes that lead to the idea of free tuition, their perspective about the main actors, and the main topic of discussion in the policy formulation and decision-making/implementation periods, how the designing process took place, and what were the strategies adopted by the legislature to move the free tuition policy forward. Interviews were conducted in Spanish, but an English version of the interview protocols is provided in Appendix A. On average, interviews lasted 56 minutes (ranging between 38-81 minutes) and were conducted online between October 2021 and

January 2022. All interviews were audio-recorded and transcribed. Quotes in the result section were translated by me and the original quotes in Spanish are available in Appendix B.

In total, I interviewed 14 actors. Five worked in the MINEDUC or the Ministry of Finance during the period the policy was designed and/or discussed. The rest of the interviewees occupied leadership positions in HEIs (e.g., university presidents, vice-president of finance) or in an interest group formed by HEIs at that moment (4 from state universities, 2 from private publicly subsidized universities, 1 from a private university, and 2 from the vocational sector).

Positionality

My interest in the topic of free tuition policies in general, and the formation of these types of policies, in particular, stems from my experience in the Chilean case and a commitment to improving equity in access and success in higher education. I am Chilean and I witnessed the policy formulation process from the beginning of the student protest in 2011 to the policy implementation in 2016. I am also a higher education researcher interested in topics related to equity in student access and success. Accordingly, my lens in looking at the free tuition policy focuses on understanding the formulation of the policy and how factors in this process can affect the equity goals of such a policy.

My research interests are grounded in my professional background linked to my role as an institutional researcher studying the role of financial aid in student drop-out behavior. This experience informs my understanding and interpretation of the role of policies in student access and success in higher education. Additionally, the success of this study was influenced by my professional experience, which gave me access to a network of higher education executives and government personnel that is often difficult to interview.

Case Study Analytic Strategy

I relied on my theoretical framework (i.e., ACF and the policy cycle model) to guide my case study analysis (Yin, 2018). Thus, the specific analytic strategies used to analyze each source of data are designed to identify actors, coalitions, and their beliefs in each period. In specific, I used a two-step process to analyze the data. First, I used discourse network analysis (DNA, Leifeld, 2013, 2017) of newspaper articles and policy documents to identify the actors involved, the coalitions they formed, and their espoused belief systems. Second, I analyzed the interviews to triangulate and complement the DNA.

DNA is an analytical tool based on ACF, which uses content analysis to identify actors and their beliefs about a policy. Using the Discourse Network Analyzer software (Leifeld et al., 2019), I identified policy statements on the data and I coded the actor who made the statement, her/his organization, their belief or concept about the policy, and their agreement or disagreement with the concept. The coding process was inductive beginning with the articles of one newspaper and then using these codes to code the other documents adding new codes as needed. After coding all the documents, I reviewed the codes for consistency merging similar codes. Examples of codes identified are "Free tuition," which identifies statements that denoted agreement or disagreement with free tuition or the free tuition policy in general; "Education as a right," which identifies statement where the actors identify higher education as a social right; and "Preferential treatment for state HEIs," which refers to statements where actors express support or opposition for having different rules or economic support for state HEIs. Coding statements using this scheme allow organizing the data as networks linking actors according to their agreement with concepts (Leifeld, 2013).

After coding the data, I grouped the organizations by type to reduce complexity and identify the type of actors involved in the policy discussion. The type of organizations are as followed: Community organizations; faculty or staff unions; government entities; HEIs including individual institutions and interest groups, and divided into state, private publicly subsidized, and private institutions; intermediary organizations, including think tanks, research centers, and private organizations; international organizations; political parties and independent politicians, divided in left and right according to their adherence to the two main political coalitions (*Nueva Mayoría* and *Coalición por el Cambio*, respectively); and student organizations, including student unions, parent's organizations, and student loan's debtor organizations.

In order to group organizations into coalitions and to identify their belief systems in each period, I used congruence networks and cluster analysis using the rDNA package in the R software. A congruence network is a graphic representation of organizations (or concepts) that are connected to other organizations (or concepts) because they agree or disagree with the same concept(s). The cluster analysis groups organizations according to the beliefs they share and allows one to assign organizations to a specific group or coalition. By visualizing the congruence networks and the cluster solution, I was able to identify the coalitions and their beliefs. Additionally, I was able to compare the beliefs among coalitions to identify the main agreements and disagreements. To track better the policy discussion, I grouped the beliefs according to the ACF categories of policy core, preferences, and secondary aspects.

In all the analyses, duplicates were set at the period level, which means that, if a duplicate statement was found in the period being analyzed (i.e., a statement was coded containing the same actor, concept, and agreement pattern), only one of them was counted in the analysis. I normalize the data in this way as the interest was on the relationship between organizations

through concepts and not on the intensity of those relationships. In addition, in the analysis of the policy formulation and decision-making/implementation period, I excluded concepts that were not directly related to the free tuition policy (e.g., codes related to the student loan system). I excluded those terms to decrease the number of edges among organizations and be able to visualize meaningful relationships. Isolated nodes were not considered in any analysis.

Interviews were analyzed using provisional codes (Miles et al., 2014) from the DNA analysis to identify policy actors (e.g., private university, Ministry of Finance, Council of Rectors) and the beliefs they mentioned (e.g., "Education as a right", "Free tuition as a subsidy for students", "Regulated tuition"). If a new topic arises, I added codes as needed. I then grouped the beliefs according to the system proposed by ACF (i.e., policy core, policy preferences, and secondary aspects), and the actors according to the categories previously described. Additionally, I coded critical aspects related to the policy development mentioned by the interviewees (e.g., "Recalculation of regulated tuition", "How many years should the free tuition cover?", "Institutional growth"). After the coding process, I triangulated the findings with the DNA results comparing the actors, coalitions, and beliefs that emerged in each analysis by policy cycle period. Interviews were also used to complement DNA results and provide an in-depth description of the critical aspects of the policy discussion. During the triangulation process, I also used artifacts (e.g., chronicles of student leaders, brochures) and policy documents to check for discrepancies.

Trustworthiness

To strengthen the trustworthiness of this study, I implemented several approaches proposed by Guba (1981). In terms of *credibility*, I collected three complementary data sources (i.e., newspaper articles, policy documents and verbatim transcriptions of the policy discussion in

the legislature, and interviews), which allowed me to triangulate the data and interpretations. The use of different data sources, two methods of analysis (i.e., DNA and interviews), and the implementation of the analysis in tandem are also important aspects to establish *dependability*. I also engaged in peer debriefing with researchers who were knowledgeable about the policy context to test my interpretations and expose myself to their questions and critiques. After I completed the analysis stage, I established structural coherence by "testing every … interpretation against all others to be certain that there are no internal conflicts or contradictions" (p. 85). I noted in the text where discrepancies were found and how I solved them. Additionally, I established referential adequacy by testing my findings against artifacts and policy documents. I included the reference to these documents in the narrative when appropriate. I also performed a member check of the final study. Regarding *transferability*, I used purposive sampling to collect data from actors that were directly involved in the policy discussions.

Limitations

Although this study makes several contributions to the analysis of free tuition policy formation, it also has some limitations. First, I did not include data from social media. Given that students were one of the main actors involved in the policy agenda period, social media is likely an important source of data. However, including social media data, such as Twitter, is beyond the scope of this paper. Per the nature of the tweet (short sentences) and the time frame included in this research (7 years), the data collected through Twitter would likely represent a large amount. This issue would require me to implement another methodology to collect and analyze the data that can manage big datasets. Second, I aggregate actors into their organizations, which may mix personal and organizational opinions about the policy. However, I made this decision to reduce complexity in the data and to maintain some semblance of stability as the period of

observation was seven years over which time actors may change, but organizations tend to be stable. Third, interviews were conducted ten years after the student movement began and three years after the policy was finally enacted. Therefore, the accuracy of the interviewee's memories could be blurred. I tried to minimize this issue by providing anchors in the interview protocols that help interviewees to improve the accuracy of their memories by attaching them to specific periods. I also triangulated the interview findings with the newspaper data to check for the accuracy of the interviewees' memory when possible.

Results

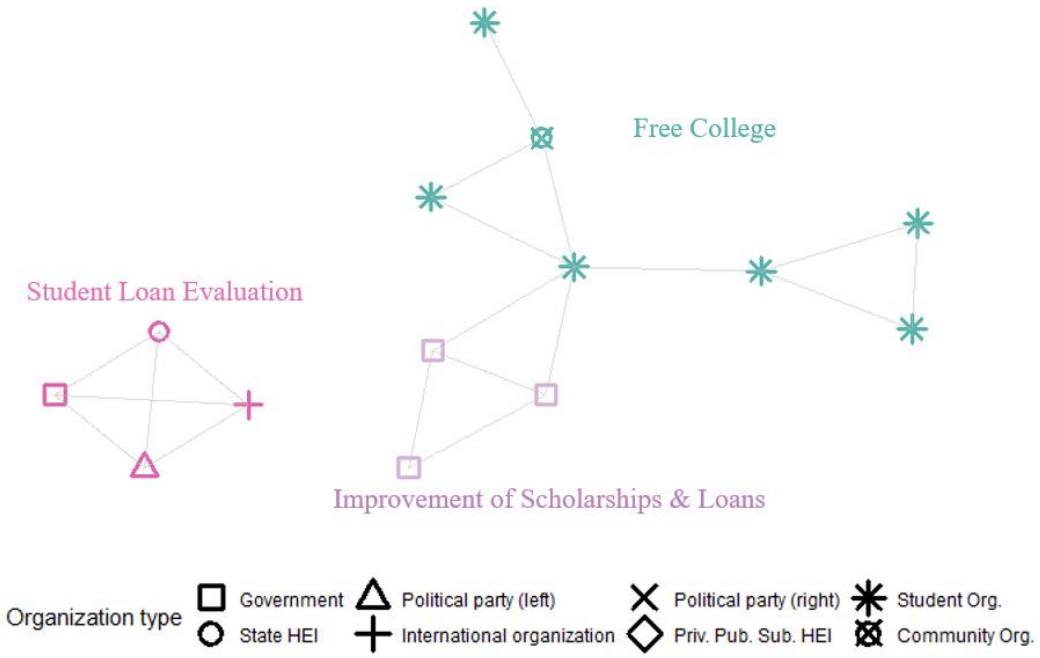
This section is organized by policy cycle period. For each period, I answer the three research questions that guide this study, namely what were the advocacy coalitions and their belief systems, who were the main actors involved in the policy discussion and how they advanced their beliefs, and what were the main discussions among these advocacy coalitions.

Agenda Setting Period (2011-2014)

The Agenda Setting period began in 2011, when large student protests took place in Chile demanding free, public, and high-quality education for all. Figure 2.2 presents the results of the congruence network and cluster analyzes. The congruence network analysis connects actors (represented by different symbols according to their organization type) according to the beliefs they shared in this period. If two actors are connected it means that they agree or disagree with the same belief. The cluster analysis groups actors with similar beliefs into coalitions, which are represented by different colors. Thus, in Figure 2.2, three main coalitions emerge. Not surprisingly, student organizations, represented by the star symbol in Figure 2.2, were one of the main actors involved during this period and they can be grouped into one advocacy coalition

(blue color). I called this coalition *Free College* because, as described in Table 2.1, the student organizations shared similar core beliefs related to increasing state regulations, improving public education, considering education as a right, and rejecting education as a private good and for-profit education. At the preference level, this coalition advocated for a free tuition policy and rejected a system where there would be tuition and student financial aid based on scholarships and loans. Interviews confirm the role of students in moving forward the beliefs related to considering higher education as a right and a student financial aid system based on free tuition. In addition, interviewees highlighted that the Free College coalition was able to move the idea of free college into the policy agenda by gaining the support of the public and the state university presidents (author´s interviews; Consorcio de Universidades del Estado de Chile, 2013).

Figure 2.2. Organizations' Congruence Network: Agenda Setting Period



Source: Own elaboration based on DNA analysis of newspaper articles.

The other two coalitions, the *Student Loan Evaluation* (in pink in Figure 2.2) and the *Improvement of Scholarships & Loans* (in purple in Figure 2.2) coalitions, were mainly focused

on maintaining the status quo. The Student Loan Evaluation coalition was focused on making a diagnosis of the current student loan system, as revealed by their beliefs shown in Table 2.1. The Improvement of Scholarships & Loans coalition, composed of government actors belonging to the right-side political coalition, was focused on improving the current student financial aid system as shown in Table 2.1. One interview confirmed the position of this coalition. In addition, interviewees from the vocational sector and private universities (n=2) manifested their agreement with the need of improving the scholarship and loans system instead of a free tuition policy. As mentioned by a private university president:

> …, for higher education, I think it is reasonable that the rich pay and that those who can't afford have a loan that they can pay in a humanizing way --that it is not extortion but is a way of contributing to your own country (Interviewee 11, private university president, see quote in Spanish in Appendix B, quote 1).

This quote exemplifies the prevalent belief in this period that education was a private good and therefore, students should pay as they will benefit from better salaries when they finish their studies.

Table 2.1. Coalitions and their Beliefs for the Agenda Setting Period

Beliefs		
Core	**Preferences**	**Secondary Aspects**
Coalition: Free College		
Education as a right	Pro free tuition policy	Student loans should be administered by the state, not banks
Pro public education	Pro free tuition for traditional HEIs	Students should be part of HEI's government
Increase state regulations	Against scholarships & loans	
Against for-profit education		
Against education as a private good		
Coalition: Student Loan Evaluation		
	Student loan was a good implementation	
	Student loan is a financial burden for State	

	Student loan is a good business for banks	
Coalition: Improvement of Scholarships & Loans		
Private HEIs should be valued by their public function	Pro scholarships & loans	Student loans should be administered by the state Loan with payment contingent on future income

Notes: The student loan referred to in this table is the state-guarantee student loan (CAE). Source: Own elaboration based on DNA analysis of newspaper articles.

During the first years of the students' protests, the Free College coalition had few opportunities to put their demands on to the policy agenda. At that time, Sebastián Piñera was the country's president and the head of the right-side political coalition, which was part of the Improvement of Scholarships & Loans coalition. He was also a businessman and one of the wealthiest people in the country. During this period, Piñera publicly supported the belief of higher education being a private good (Emol, 2011) and his response to the student protests was to implement changes to the main student loan program (CAE), such as decreasing the interest rate and making it contingent on a student's future income (*Law 20634. Benefits to CAE Debtors and Modification to Law 20027,* 2012).

In 2013, an opportunity arose (or an external shock in terms of ACF) for the Free College coalition. Presidential elections were scheduled for the end of the year. During this period, the Free College coalition was able to influence the policy agenda of one of the presidential candidates, Michelle Bachelet, who was the head of the left-side political coalition, a member of the socialist party, and a former Chilean president. The Free College coalition was able to influence Bachelet's policy agenda for three reasons. First, her deep core beliefs demonstrated by her affiliation with the socialist party were in agreement with the students' belief of education as a social right. Second, in her first term as president (2006-2010), she experienced secondary student protests that were demanding structural changes to the educational system because of high inequalities in attainment, quality, resources, and opportunities (Bellei & Cabalin, 2013).

Although she was able to institute some changes, she was not able to end the segregation of students according to their socioeconomic status because of a lack of consensus in the legislature (author's interviews; Figueroa Cerda, 2009). Thus, this experience made her more prone to listen to the students' demands. Third, the massive support of public opinion for the free tuition policy made the inclusion of student demands part of her policy agenda and a decisive factor in terms of her winning the presidential election (author's interviews; Veliz et al., 2022). Thus, presidential candidate Bachelet was a key actor in moving the students' demands forward. As stated by one interviewee who worked on the MINEDC in a leadership position:

> … free tuition demands begin in 2011 with the student protest. I think that one of the main milestones was the incorporation of these demands into the government agenda. One of the key actors here was the former president Bachelet because if she had not incorporated it or her team had not incorporated it in her agenda, it would have been very difficult to advance in this direction, because a change this radical, in terms of the finance system, must have the full back-up of the executive power, from the respective government authorities (Interviewee 6, MINEDUC, leadership position, see quote in Spanish in Appendix B, quote 2).

Thus, this quote demonstrates the need to get different policy actors on board, especially the executive power, to move the idea of free college forward.

During the Agenda Setting period, interviews revealed that the main discussions were at the policy core level. In general, there was an agreement on the definition of the problem among the policy actors of the different coalitions. Interviewees agreed that the student movement highlighted a perception that higher education, despite increasing access, was not leading to social mobility. The system was deregulated, and it segregated low-income students to low-

quality institutions. Thus, the lack of social mobility and the high debt of students due to student loans led to questioning the belief of higher education as a private good and raised the idea of higher education as a social right (author's interviews). As mentioned by one of the interviewees:

> … there are factors associated with the economic cycle that begin to show that the promise of higher education about individual social mobility and better salaries was a promise with caveats because it was not true for all students in all universities..... It started a debt cycle that was going to mark their access to social rights, … so it begins to be a topic of public discussion (Interviewee 8, leadership position in state university, see quote in Spanish in Appendix B, quote 3).

This quote describes the factors that help to erode the core belief of higher education as a private good and the rise of the belief of higher education as a social right.

Although there was agreement on the definition of the problem, there was disagreement regarding its solution. While the Free College coalition advocated for implementing a free tuition policy that ends with the market logic of the current student financial aid system based on scholarships and loans, the Improvement of Scholarships and Loans coalition opposed free college arguing that it was regressive (author's interviews; Figueroa, 2013). Instead, they proposed to increase scholarships to cover the needs of low-income students and to reform the main student loan program (CAE).

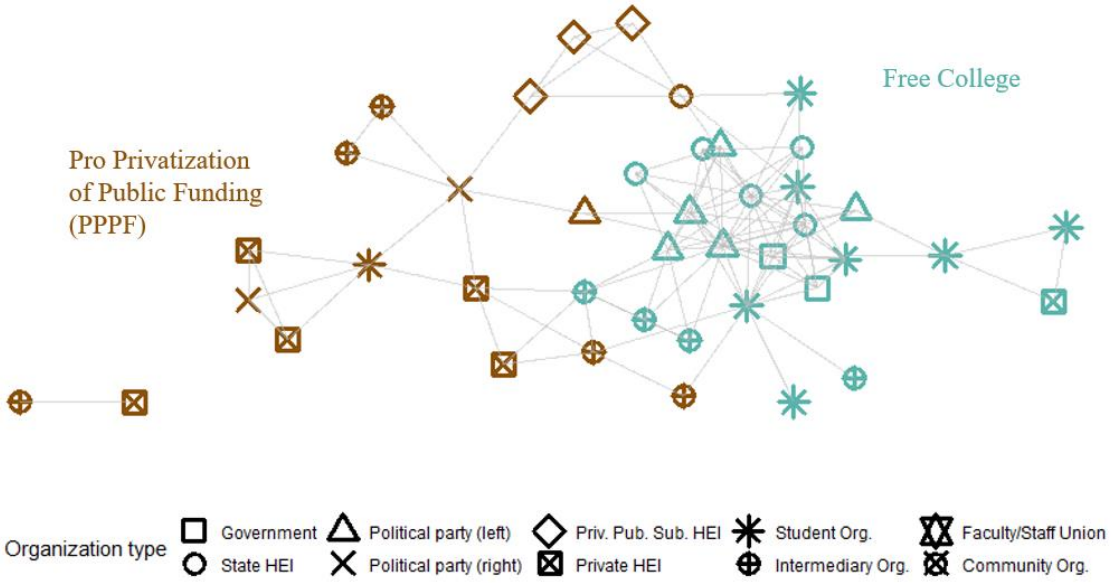
This period ends in March 2014, when Bachelet assumed the presidency. In her policy agenda, she stated that during her period as president, free tuition would benefit students from the first seven family income deciles, including low- and middle-class families. This free tuition would be available in any HEIs that are accredited, follow the norms that forbid profit,

incorporate the new norms about equity access, develop programs to help vulnerable students, and use the regulated tuition determined by the MINEDUC (Bachelet, 2013, pp. 20–21).

Policy Formulation (2011-2016)

The Policy Formulation period begins in March 2014, when Bachelet assumed the presidency. In Bachelet's policy agenda, the free tuition policy was one piece of a bigger reform to the higher education system that included not only a reform to the funding system but also a reform to its structure. As writing and approving such a bill in Congress would have required much time and consensus among legislators, interviewees reported Bachelet decided to speed up the free tuition policy by first implementing it using the 2016 Ministry of Education budget law. According to the interviewees, the logic behind this decision was that once free tuition was implemented, it would be very difficult for the opposition to reject this bill in Congress. This decision was announced by Bachelet in May 2015, when she mentioned that, for 2016, free tuition will be available for students belonging to families from the first six income deciles in the country, who enrolled in non-profit institutions in the vocational sector or traditional universities (Bachelet, 2015).

Figure 2.4. Organizations' Congruence Network: Agenda Setting Period



Notes: Concepts for Policy Formulation and Decision-Making period were restricted to concepts related to free tuition policy only. Source: Own elaboration based on DNA analysis of newspaper articles.

Figure 3 displays the results of the congruence network and cluster analysis for this period. In this Figure, two main coalitions emerged. The first coalition, identified by the blue color, can be understood as a continuation of the Free College coalition as the core beliefs are similar (see Table 2.2). As shown in Figure 2.3, the actors included in this coalition are student organizations (represented by an asterisk in Figure 2.3), state HEIs (represented by a circle in Figure 2.3), government agencies (represented by a square in Figure 2.3), and left-leaning political parties (represented by a triangle in Figure 2.3) which were now part of the government coalition. Interviewees added that publicly subsidized private universities were also part of this coalition.[5] The belief system of this coalition is based on the policy core beliefs related to

[5] It is worth noting that publicly subsidized private universities were classified by the DNA as part of the opposite coalition. However, they only agreed with the policy core "private HEIs should be valued by its public function". Interviews with the government and HEI actors clarified that those universities were always on board with the idea of free tuition and that they disagree with other aspects of the reform, specifically with the end of the direct public funding to these private institutions. Moreover, interviewees in state universities mentioned that they agreed with

considering education as a right and increasing state regulations (see Table 2.2). At the preference level, they supported the free tuition policy and argued in favor of including only the traditional universities in the policy. At this level, new beliefs, not related to the demands of the student movement, arise, such as the idea that the free tuition policy should include a regulated tuition. As indicated in Table 2.2, beliefs at the secondary aspect level show that this coalition supported implementing a subsidy to the institutions instead of subsidizing the students. As mentioned by one of the interviewees that had a leadership position in a traditional university:

> …the prevailing concept in the CRUCh was a broader concept of free tuition where the free tuition was not oriented to a voucher but to a contribution to the institutions that allow them to offer quality education to the students, but that it was not associated with the student,… (Interviewee 13, leadership position in the CRUCh, see quote in Spanish in Appendix B, quote 4).

This quote exemplifies that the beliefs in this period are getting more specific, compared with the previous period, by discussing how the policy should be implemented.

The second coalition, identified by the brown color in Figure 2.3, groups mainly private HEIs (not publicly subsidized; identified by the square with an X inside in Figure 2.3) and political parties of the right-side political coalition (identified by an X in Figure 2.3). The belief system of this coalition is shown at the bottom of Table 2.2 and is based on the core belief that private HEIs should be valued by the public function they perform. At the preference level, this coalition argued in favor of continuing with scholarships and loans. However, if there was going to be a free tuition policy, they argued in favor of including the vocational sector in the policy and including the accreditation results as a criterion for including institutions in the policy.

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recognizing the public function of these publicly subsidized private universities and with including them in the free tuition policy from the beginning.

Beliefs at the secondary aspect level were related to implementing the free tuition policy through a subsidy to the students. All these beliefs have in common that they allow private HEIs to receive public funding, therefore I called this coalition *Pro Privatization of Public Funding* (PPPF). The mechanism through which these preferences allow private institutions to receive public funding is related to subsidizing the students through scholarships and loans instead of subsidizing institutions; including the highly privatized vocational sector as part of the policy; and including the accreditation results as a criterion for including institutions in the policy instead of including a type of HEIs (e.g., state HEIs or traditional HEIs).

Table 2.2. Coalitions and their Beliefs in the Policy Formulation Period

	Beliefs	
Core	**Preferences**	**Secondary Aspects**
Coalition: Free College		
Education as a right	Pro free tuition policy	Subsidy for HEIs
Pro public Education	Preferential treatment for State universities	Increase direct funding for HEIs with a public role
Increase state regulations	Implementation of free tuition should be gradual	
Against for-profit education	Regulated tuition	
Against education as a private good	Against accreditation as a criterion for including HEIs in free tuition policy	
	Against private HEIs should be part of the free tuition policy	
Coalition: Pro-Privatization of Public Funding		
Private HEIs should be valued by their public function	Scholarships & Loans	Mixed free tuition as a subsidy for students
	Free tuition for vocational education	
	Accreditation as the criterion for including HEIs in free tuition policy	
	Design of free tuition policy is discriminatory	
	Against free tuition	
	Against regulated tuition	

Note: Concepts for Policy Formulation and Decision-Making period were restricted to concepts related to the free tuition policy only. Source: Own elaboration based on DNA analysis of newspaper articles.

Interviewees with actors from the PPPF coalition provide more detail into the policy core and preferences in this coalition. For instance, one of the interviewees who was part of the

vocational sector stated that, once Bachelet was elected and policymakers in the government began to design the free tuition policy, the vocational sector position was that the more efficient way of implementing free tuition was through a subsidy to students through scholarships and flexible loans. He stated:

> I said about the typical argument of central planning, how the State would define vacancies, or tuition in what city, in what place, the typical problem of central planning versus the market…I agree with a subsidy role, that the State finances and helps access quality education to those students who do not have enough resources. Now, what is the way of doing that, the more efficient way of doing it, according to my judgment, is subsidizing the demand. That was the position of Vertebral [the association of accredited vocational institutions]… We said that we were happy if the State can finance 100% of the tuition…, if they want to finance free tuition for students, that is great. However, let's do it through scholarships and flexible loans, not through direct funding to institutions (Interviewee 1, president of a vocational HEI, see quote in Spanish in Appendix B, quote 5).

This quote describes the arguments held by actors in the PPPF coalition that back up the belief that the policy should be implemented as a subsidy to the demand instead of a subsidy to the institutions.

In this period, the main discussion moved from policy core beliefs to policy preferences, and those preferences were related to a political and technical level. At the political level, the main discussion was related to what institutions should be part of the policy. In the original idea of the free tuition policy, only state universities were included. However, in this period, this aspect became a matter of debate. Specifically, the discussion was about how to assure that the

institutions that would receive public funding through the free tuition policy were "of quality." In this discussion, both coalitions had different opinions. According to interviewees working in the government, the main actors in the Free College coalition were the presidents of the traditional universities, who were advocating for a policy that included not only state universities but also publicly subsidized private universities. In this period, they were able to influence the government to include all traditional universities in the policy design as stated by one interviewee working in the government while the policy was designed. However, this strategy opened the door to private institutions' requests to be included in the policy. According to participants working in the government, if private but publicly subsidized universities are included in the policy, then there was no legal reason to leave private institutions (not publicly subsidized) out of the policy.

In contrast, the PPPF coalition advocated for a criterion that goes beyond a type of institution to include HEIs in the policy. They were advocating for including institutions according to their accreditation results. They argued that including only one type of institution in the policy was discriminatory, because students from the same income level cannot access free tuition if they enrolled in private institutions. This coalition brought this discussion to the Constitutional Court in December 2015. The Constitutional Court declared that the free tuition policy was unconstitutional prompting the government to revise its inclusion criteria. Thus, the government adopted the accreditation results as the criterion and stated that private institutions should have at least four years of institutional accreditation[6] to request to be included in the free

[6] In Chile, institutional accreditation results were in years, between 0, accreditation denied, to 7 years, the maximum years. The number of years determined the period in which the institution should undergo the accreditation process again. After the higher education law was enacted in 2018 (Law 21091), accreditation results are no longer associated to years but to levels.

tuition policy. Thus, the PPPF coalition was able to coopt the discussion about how to define institutions of enough quality to be included in the policy.

At the technical level, the discussion was on how to implement the policy, and whether free tuition should be implemented through a subsidy to the institutions (Free College coalition) or the students (PPPF coalition). Additionally, according to a policymaker working on the MINEDUC, the fact that private institutions were included in the policy added the challenge related to how to calculate the cost of instruction and how to design a finance model that is transparent and auditable. In this discussion, the government decided that the implementation should be through a subsidy to the institutions, adopting the Free College coalition belief. However, this decision brought a practical problem related to how to calculate the amount to transfer and how to regulate enrollment capacity. As explained by a policymaker working on the MINEDUC,

> After deciding that the transfer should be direct to the institution, the main critical aspects were always the same, how to define the amount to transfer, how to define tuition, and, at the same time, how to control that those institutions do not set their tuition and demand that you [the government] transfer whatever amount by free tuition concept. On the other hand, how many students, …, how to control enrollments, meaning, once you set free tuition how you do that those institutions do not say "now I will grow and grow, and you have to give me the money" (Interviewee 2, policymaker in MINEDUC, see quote in Spanish in Appendix B, quote 7).

This quote exemplifies a technical problem faced by policymakers when trying to adjust the policy design to the guiding belief of a subsidy to the institutions in a context where private HEIs would be able to access public funding through the policy.

The discussion about these issues led to tuition being regulated and set by the government. To avoid institution growth just to capture public funding, the government also set enrollment growth for each participating institution to not to exceed 2.7%, a percentage based on the average growth of traditional universities during the past years (author's interviews). A third aspect that was decided during this period was how many years of a student's study program free tuition policy cover. These discussions were mainly held inside the government between the MINEDUC, who argued in favor of financing the nominal duration of studies plus one year, and the Ministry of Finance, who argued for only the nominal duration. In the end, the final decision was to implement the policy favored by the Ministry of Finance. As stated by one interviewee who had a leadership position in MINEDUC:

> … a policy like this that involves major public spending, the participation of the Ministry of Finance,…, was very important. I mean, all the designs, including the ones that were approved through the budget law and the one that was in the final law, were subject to the opinion of the Ministry of Finance. This was not a design from the Ministry of Education only, this other actor also applied a filter, for instance, in definitions about how many years would cover the free tuition policy,… In this type of policy, the definition is not only guided by the technical aspect but also by the component of how many resources are involved (Interviewee 6, leadership position in MINEDUC, own translation, see quote in Spanish in Appendix B, quote 8).

Thus, the Ministry of Finance was also a key actor in the policy design as they have to approve the fiscal resources for the policy.

Finally, in practical terms, the problem was how to calculate the amount of resources to transfer to the institutions due to the free tuition policy. In this discussion, the finance vice-

presidents of traditional universities played a crucial role by working together with the MINEDUC facilitating information, and giving feedback about critical aspects of the policy design (author's interviews). A policymaker working at MINEDUC mentioned:

> … the finance vice-presidents [from traditional universities] were key in the design. Originally, before we present the law in Congress, we had a vision a little bit more technocratic …, we had a very basic design based on the reports, income statements, … we met with him [a finance vice-president] and he said that they cannot do that, we do not have this data, and with them, we created a model more in the voucher logic, because 'what I know is the number of students,' so we should work with that… (Interviewee 4, policymaker in MINEDUC, own translation, see quote in Spanish in Appendix B, quote 6).

This quote shows that traditional universities have direct access to policymakers in MINEDUC and that influenced the policy design directly.

Thus, although the main decision was to subsidize institutions, due to technical difficulties about how to calculate an amount to transfer to institutions, and the lack of time to try other criteria due to this being part of the 2016 MINEDUC budget discussions, the way to determine the institutional subsidy was based on the number of students enrolled and a regulated tuition.

The budget law was finally approved in December 2015 and made free tuition available for students belonging to families from the first five income deciles who enrolled in universities with four years of accreditation or more. Universities that agreed to be part of the policy must accept regulated tuition and enrollment capacity (*Budget Laws for the Public Sector Year 2016 N. 20882 and N. 20890*). Thus, according to the results shown previously, both coalitions were

able to introduce some of their beliefs into the policy design. The Free College coalition was able to include the publicly subsidized private universities in the policy, as confirmed by a policymaker working in MINEDUC. The PPPF coalition, instead, was able to include the institutional accreditation results as a criterion for inclusion in free tuition policy, as supported by the Constitutional Court ruling. The findings discussed in this period also indicate that the final implementation of the policy during its first years also included a mix of beliefs from the two coalitions: a public recognition that the implementation should be a subsidy to the institutions but a practical implementation of the policy through a subsidy based on the student enrollments. This period ends in July 2016, when the Higher Education bill that included the free tuition policy was presented in Congress for discussion.

Decision-Making/Implementation Period (2016-2018)

The Decision-Making/Implementation period begins in July 2016 when the higher education bill that included the free tuition policy began to be discussed in Congress. During this period, the free tuition policy also began to be implemented through the MINEDUC budget for 2016, 2017, and 2018 academic years. As I mentioned in the Methods section, due to a political decision, the implementation period is intertwined with the decision-making period, which is slightly different from how policy is discussed and implemented in other contexts. Two main changes were introduced by the government to the policy in these years: the inclusion of the vocational sector in 2017, and the inclusion of students in the 6th family income decile in 2018. Both of these changes were part of Bachelet's policy agenda.

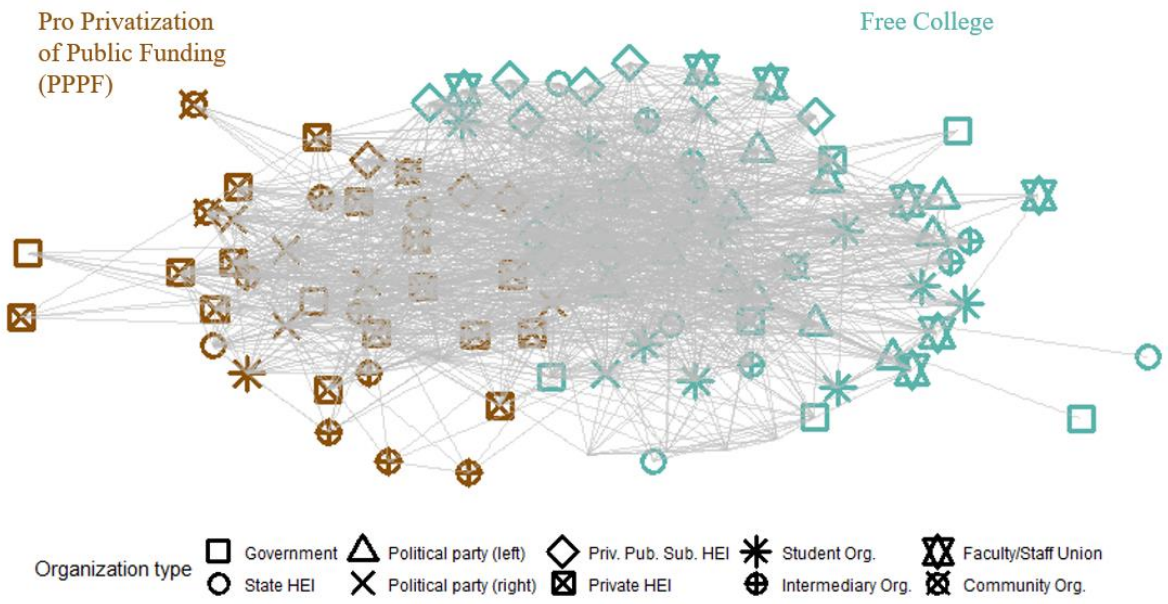
In this period, the two coalitions from the previous period are also observed, as shown in Figure 2.4. In general, the two coalitions are similar to the ones in the previous period in terms of core beliefs (see core beliefs in Table 2.2 and 2.3 to compare both periods). However, there are

some beliefs from the PPPF coalition that permeate the Free College coalition belief system (See Table 2.3). For example, the core belief *Private HEIs should be valued by their public function* was part of the PPPF coalition in the previous period and now it is adopted by the Free College coalition, although some actors disagree with this belief in this coalition. At the preference level, the Free College coalition agreed with establishing the accreditation results as a criterion for institutions that request access to the free tuition policy. Thus, the Free College coalition began to compromise their belief to match the criteria of the implemented policy.[7]

The policy implementation through the MINEDUC budget generated the coalitions began to agree on some secondary aspects. For instance, as stated by participants working in HEIs, coalitions began to agree on the need to complement free tuition resources with direct funding for institutions, the need to recalculate the regulated tuition and the enrollment capacity rule, and the opposition to free tuition financing only the nominal program duration.

[7] In the first year of the policy implementation, four private universities entered the policy. In 2018, some of them also became members of the CRUCh. It is reasonable to think that the incorporation of those HEIs would result in a shift in the coalition's membership and could explain the adoption of some PPPF beliefs by the Free College coalition. However, that was not the case as there is no evidence in the DNA analysis or in the interviews of such a change in the membership. In general, those private institutions' beliefs were align with the PPPF coalition in the Policy Formulation and Decision-making/Implementation periods.

Figure 2.5. Organizations' Congruence Network: Decision-Making/Implementation Period



Notes: Concepts for Policy Formulation and Decision-Making period were restricted to concepts related to Gratuidad policy only.
Source: Own elaboration based on DNA analysis of newspaper articles.

In this period, the discussion was more between the coalitions and the government than between coalitions. HEIs continued to be key actors in the policy discussion as they had strong links with legislators, as explained by an interviewee working in the MINEDUC, and they began to evaluate the policy implementation. Furthermore, coalitions were able to introduce some changes to the policy design. One interviewee working in a traditional university mentioned that they were able to influence the MINEDUC in order to recalculate the regulated tuition. In his words:

> In 2017, … they listened to the CRUCh [traditional universities], in the sense that the gap between the regulated and real tuition was getting bigger and bigger, and the MINEDUC decided to increase the [regulated] tuition considering some factors… 12%, 6%, and 3% increase for regulated tuition for universities that were accredited by seven, five, and four

years, respectively (Interviewee 7, leadership position in a private traditional university, see quote in Spanish in Appendix B, quote 9).

This quote demonstrates that traditional universities have access to the policymakers and were able to influence the policy design.

The higher education bill was finally approved in Congress as a state law in January 2018, at the end of Bachelet's presidential period, and enacted in May 2018 under Piñera's second presidential period. Nevertheless, free tuition was first made available to students in 2016 through the MINEDUC budget law. The final policy enacted benefits low- to middle-income students classified into the first six family income deciles, who enrolled in specific HEIs. The policy enacted also includes a mechanism to advance universal free tuition linked to the country's GDP.

Table 2.3. Coalitions and their Beliefs for the Decision-Making/Implementation Period

Beliefs		
Core	**Preferences**	**Secondary Aspects**
Coalition: Free College		
Education as a right	Accreditation results as the criterion for including HEIs in free tuition policy	Complement free tuition policy with direct funding
Pro public education	For-profit HEIs should not be part of free tuition policy	Recalculation of regulated tuition
Mixed on private HEIs should be valued by their public function	Mixed on capacity should not be decided by the government	Recalculation of capacity rule in HEIs
Students should be able to freely choose HEI	Public funding should be linked to regulations	Against free tuition policy should cover only nominal program duration
HEIs not in free tuition policy should not receive public funding	Free tuition policy should differentiate between state and private HEIs	Free tuition as a subsidy for HEIs
Increase support for regional univ.	Mixed scholarships & loans	Free tuition for hybrid programs
Against education as a private good	Mixed on preferential treatment for state universities	Capacity should not be regulated for state HEIs
Mixed on increased state regulations	Against design of free tuition policy is discriminatory	Increase capacity in state HEIs
Against for-profit education	Fiscal responsibility for expanding free tuition	Free tuition for indigenous students

		Against regulated tuition only for students in free tuition policy Against 4 years of accreditation as requisite for state HEIs too Increase public funding for state universities Mixed on free tuition should subsidize the students Mixed on free tuition should expand according to GDP
Coalition: Pro-Privatization of Public Funding (PPPF)		
Education as a private good	Pro scholarships & loans	Against free tuition should cover only nominal program duration
Private HEIs should be valued by their public function	Mixed on accreditation results as the criterion for free tuition policy	Recalculation of regulated tuition
Free tuition policy does not guarantee equity and inclusion	Design of free tuition policy is discriminatory	Complement free tuition policy with direct funding
Support for regional univ.	Free tuition policy defunds HEIs	Enrollment capacity should be established by an autonomous committee
Student financial aid should not discriminate by type of HEI	Most against regulated tuition but some orgs are mixed	Regulated tuition only for students in free tuition policy
Diversity in funding sources	Most against free tuition policy but some orgs are mixed	Regulated tuition should be decided by an autonomous committee
Students should be able to freely choose HEI	Fiscal responsibility for expanding free tuition policy	Free tuition for vocational education
Mixed on for-profit education	Capacity should not be decided by the government	Scholarships & loans for students not in free tuition policy
Against increased state regulations	Against preferential treatment for state universities	Mixed on student loans administered by the State Against free tuition for indigenous students Mixed on direct funding for traditional universities Against free tuition policy should expand according to GDP

Note: Concepts for Policy Formulation and Decision-Making period were restricted to concepts related to free tuition policy only.
Source: Own elaboration based on DNA analysis of newspaper articles.

Discussion

Free tuition policies have emerged in countries around the world. However, there is a dearth of research about the formation and design of these policies. In this paper, I shed light on the policy formation process by focusing on the case of Chile, a country that implemented such a policy in 2016. Using a theoretical framework that relates policy actors to their beliefs (ACF), I contribute to the literature by describing the main advocacy coalitions, the main policy actors in

each advocacy coalition and their strategies to influence the policy design, and the main discussions in each period of the policy formation.

In general, I found that implementing a free tuition policy, which represents a radical change in the conceptualization of higher education and the student financial aid system, needs the support of different actors that share similar beliefs and form coalitions to try to influence the policy. In the case of Chile, students' demands for free college were not enough to change the policy agenda. They needed the support of the public, traditional university presidents, and the executive all of whom shared their beliefs about free college. By understanding the policy formation as a result of policy actors that form advocacy coalitions according to the beliefs they share, I fill the gap in the literature about free tuition policy formation that focused only on key actors (Altbach & Klemencic, 2014; Bellei et al., 2014; Bellei & Cabalin, 2013; de Gayardon, 2019; F. Figueroa, 2013; Guerra Botello et al., 2019; Langa, 2016; Millett et al., 2020; Olivares & Carrasco-Hidalgo, 2020; Ordorika, 2021; Veliz et al., 2022) or in the arguments behind the free college idea (De Gayardon, 2017; Marcucci & Johnstone, 2007). My case study also highlights the role of HEIs in promoting or opposing a free tuition policy, an actor that was not described in the prior literature.

This case study also contributes to the literature by describing the evolution of the free tuition policy discussion. In the case of Chile, the discussion evolved from more general premises (policy core beliefs) in the agenda-setting period, to more specific aspects (policy preferences) in the policy formulation and (secondary aspects) in the decision-making/ implementation periods. Previous literature has mainly focused on describing general premises behind the adoption of a free tuition policy in the policy agenda (de Gayardon, 2019; Marcucci & Johnstone, 2007) but has not detailed specific topics of discussion about when the policy is

designed and discussed in the legislature. Furthermore, and due to the particularities of the Chilean case, my research describes that coalitions began to agree on policy preferences and secondary aspects even *after* policy implementation. In the case of Chile, policy implementation and the legislative discussion was intertwined, which allowed coalitions to introduce some changes to the policy in that period.

The design of the free tuition policy is a result of the efforts of the Free College and PPPF coalitions to include their beliefs into the policy. The case of Chile shows that coalitions were able to influence the policy design at a political and technical level. At the political level, coalitions influenced what institutions were included in the policy, whereas at the technical level, the Free College coalition influenced the decision to implement the policy through a subsidy to the institutions and how to calculate this subsidy. At both levels, the capacity of the coalitions for influencing the policy depends on the level of resources available to each of them (Weible et al., 2020). For instance, during the Agenda Setting period, the student movement was able to gain the support of the public, which allowed them to incorporate their demands into the policy agenda of a presidential candidate. Later, in the policy formulation process, traditional universities were able to incorporate their perspectives into the policy design because they are the oldest and most prestigious institutions in the country. This source of power gave them direct access to the policymakers working on the policy design and put the government in a position of needing their approval in order to legitimize the policy. However, the PPPF coalition was also able to incorporate some of their beliefs by using resources available in the policy structure (bringing the discussion to the Constitutional Court).

The case of Chile shows that after the policy was adopted, the discussion turned to the prioritization of institutions' beliefs instead of other beliefs (e.g., students' needs). This issue is

important to emphasize because students were the ones that first promoted the idea of free college, and the policy goal was to improve equity and inclusion of low-income students in higher education. Thus, the policymaking process was co-opted by policy actors in higher education institutions, who introduced their demands and beliefs in the policy discussion. This issue about the co-optation of social movement discourse has been described in other cases such as in gender equality policies in the EU (Stratigaki, 2004) or health policies in Latin America (Brin et al., 2016). ACF is limited in its capacity to explain why some beliefs were not the focus of discussion or why some groups were not involved as its analysis is centered on observable behaviors of actors and coalitions and their beliefs (Sievers & Jones, 2020). Explicitly including the concept of power or power differential could help to advance the understanding of policymaking (Rodriguez et al., 2021; Sievers & Jones, 2020) and the possible unintended consequences that these policies can have on student outcomes.

Conclusion

This study sheds light on the importance of actors and their beliefs in the formation and implementation of a free tuition policy and how these actors and their beliefs change over the policy cycle. Understanding the policy formation in terms of coalitions trying to include their beliefs in the policy design allows one to understand the peculiarities of each policy design. Policymakers and researchers should be aware of the political dynamics behind policy formation as it directly influences political and technical decisions which in turn influence policy design and its effectiveness. Future research on free tuition policy formation should focus on other contexts where this type of policy has been discussed and implemented. By examining other context where, for instance, state HEIs are more powerful, can further our understanding of the role of actors and coalitions in the free tuition policy cycle. Additionally, future research should

focus on power inequalities that result in some beliefs reaching the policy discussion and others not and how this cooptation can affect the policy effectiveness. Expanding research in these areas will complement the emergent research on free tuition policy's impact on student outcomes and will allow us to understand variation in outcomes.

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Appendix A

Interview Protocols

Interview Protocol for Policy Actors in the Government

Good Morning/Good afternoon,

First, I would like to thank you for participating in this study. My name is Paula Clasing and I'm a doctoral candidate in higher education at the University of Michigan. I'm conducting a study about how the Gratuidad policy became a policy in Chile. This study is part of my doctoral dissertation research.

Before we begin with the interview, I would like to verbally ask for your consent to participate as an interviewee in this study. With that purpose in mind, I will read the informed consent document I emailed to you recently.

[Read informed consent]

Thank you for agreeing to the interview.

To begin,

1. What was your role in the discussion of the Gratuidad policy?
    - *Ask about what tasks s/he were responsible for regarding the discussion about the policy,*
    - *Ask about with whom s/he interacted as part of her/his role.*
2. According to your opinion, what were the main causes that lead to the idea of free tuition as a policy?
3. According to you, who were the main actors that move the idea of free tuition forward and put it on the political agenda?

Now, I would like you to think about the period after Michelle Bachelet became president and before the higher education bill with the free tuition policy was introduced in Congress in 2015 through the Ministry of Education budget law in 2015 ...

4. Can you describe the process of designing the Gratuidad policy?
    - *Ask about who was involved?*
    - *Who was invited to the pre-legislative process? Why?*
    - *What information was available to help in the design of the policy?*
5. In your office in the Ministry of Education, what aspects were considered important and should be part of the free tuition policy? Why?

- *Ask about core and instrumental aspects*

6. During the design of the policy, what aspects generated the main discussions in your office? Were there any changes in the design during the pre-legislative process? What? Why?
7. Was there any aspect of the design process you think is important to know in order to understand de free tuition design?
8. Now, what was the legislative strategy that the government adopted for the free tuition policy? Why did they adopt this particular strategy?

After the bill was introduced in Congress through the budget law in 2015, …

9. What were the main topics of discussion regarding the Gratuidad policy in the legislative process? From your position, why do you think those aspects generated so much discussion?
10. And now, what were the main areas of consensus? Why?
11. From your perspective, can you describe what were the main milestones in the legislative process to pass the free tuition policy in Congress?
    - Ask about what organizations or actors helped the government to move this policy forward.
    - Ask about who was against the policy and the specific aspects they opposed
    - Ask about what strategy was implemented by the government to achieve consensus and pass the policy
12. Now, I would like to ask for your opinion about the importance of the following actors in the approval of the free tuition policy and why you think they were important:
    - State universities
    - Private CRUCh universities
    - Private universities
    - CFT/IP
    - Student organizations
    - Political parties
    - Research centers and think tanks
    - Is there any other actor that was important to move the policy forward?
13. What is your opinion of the Gratuidad policy that was finally approved? What would you say are its scope and limits?

To end,

14. Have you anything else to add regarding the Gratuidad policy formulation and implementation process?

Thanks!

Interview Protocol for Policy Actors in Higher Education Institutions (HEIs)

Good Morning/Good afternoon,

First, I would like to thank you for participating in this study. My name is Paula Clasing and I'm a doctoral candidate in higher education at the University of Michigan. I'm conducting a study about how the Gratuidad policy became a policy in Chile. This study is part of my doctoral dissertation research.

Before we begin with the interview, I would like to verbally ask for your consent to participate as an interviewee in this study. With that purpose in mind, I will read the informed consent document I emailed to you recently.

[Read informed consent]

Thank you for agreeing to the interview.

To begin,

1. Can you describe what your position was in [the HEIs s/he was working] when the idea of free tuition in higher education in Chile was initially being discussed?
2. What was your role in the discussion of the proposed Gratuidad policy in your HEI?
    - *Ask about what tasks s/he were responsible for regarding the discussion about the policy,*
    - *Ask about with whom s/he interacted as part of her/his role.*

Now, can you think about the period in which the idea of free tuition began to be discussed, between the students protest in 2011 and before Michelle Bachelet became president (2014) …

3. In your opinion, what were the main causes that lead to the idea of free tuition?
4. What was your position regarding a free tuition policy? Why?
5. In general, what other actors shared your position?
6. Who opposed your position? What were their arguments?
7. At that moment, can you tell me what were the main conversations about the possibility of a free tuition policy in your institution? Who was involved in these conversations? What were their positions and their arguments for or against such a policy?
    - *Ask whether there was a unique opinion in their institution, was it pro or against free tuition. If there were not a unified opinion, who was in favor and against it.*

- *Ask whether they discussed the possible benefits or consequences for their institution. If so, what were they?*

8. At that moment, did your HEI take any action related to the demands of free tuition?
    - *Ask about the information they collected to support their arguments*.

Now, I would like you to think about the period after Michelle Bachelet became president in 2014 and before the bill with the free tuition policy was introduced in Congress in 2015 in the Ministry of Education budget law, ….

9. In this period, can you describe the conversations that were taking place in your institution regarding free tuition? What aspects changed from the previous period?
    - *Ask about the stance of their institution regarding the free tuition policy*
    - *Ask about what information they had available related to the free tuition policy*
10. Were there other institutions or actors that shared the stance of your institutions regarding the free tuition policy? Who? What were the areas of consensus?
11. In your institution, what actions were implemented regarding a possible free tuition policy?
    - *Ask about whether they talked to other institutions with similar stances, or whether they created a committee or something similar to work on the topic*
    - *Ask about what information they had available or generated.*
12. Did your institution participate in any way in the policy formulation process? If yes, how? Did you work together with other institutions?
    - Ask about what was his/her role in this process.
13. Independent of your institution's participation in the policy formulation, what were the main criteria that your institution thought should be included in the policy? Why?
    - *Ask about core aspects and instrumental aspects*

Now, I would like we think about the period after the bill was introduced in Congress in 2015 through the Ministry of Education budget law,

14. At that moment, what were the main topics of discussion regarding the bill presented in Congress in your institution? Why?
15. What were the main topics you have consensus on in your institution? Why?
16. Did your HEI try to take any actions or generated a strategy to influence the legislative process? If yes, what actions or strategy/strategies did it take? Did your institution work with other institutions or actors in this process? If so, who?
17. At that moment, what other institution shared the stance of your institution regarding the free tuition policy? What institutions or actors opposed the policy?
18. From your perspective, what do you think were the main milestones to legitimize and approve the Gratuidad policy? Why?

Since the Gratuidad policy was implemented in 2016,

19. From your perspective, what have been the main consequence for your institution?
    - *Ask about positive and negative consequences*.
20. Since the implementation of the policy, has your institution made any academic or financial adjustments due to the policy change?

To end,

21. Have you anything else to add regarding the Gratuidad policy in general, your roles, or the role of your institution in particular?

Thanks!

Appendix B

Original Quotes in Spanish

Quote 1

> …, la [educación] superior me parece razonable que los ricos la paguen y aquellos que no pueden tengan un préstamo que lo puedan pagar de manera humana, que no sea extorsionante, pero es una manera de contribuir con su propio país… (Entrevistado 11, rector universidad privada).

Quote 2

> …esta demanda de educación gratuita que parte por ahí el 2011 las primeras protestas. Creo que lo relevante, uno de los hitos relevantes fue que esto lograra ser incorporado en el programa de gobierno, yo creo que uno de los actores principales acá es la expresidenta Bachelet, porque si ella no lo hubiera incorporado o su entorno no lo hubiera incorporado en el programa de gobierno de la presidenta, habría sido muy difícil que se lograra avanzar en esta dirección, porque un cambio así de radical, en términos del sistema de financiamiento, tiene que tener el respaldo pleno del ejecutivo, de las autoridades de gobierno respectivo… (Entrevistado 6, jefatura en MINEDUC).

Quote 3

> …hay factores asociados al ciclo económico que empiezan a mostrar que la promesa de la educación superior de movilidad social individual y mejores rentas era una promesa con bastante letra chica porque no era cierta para todos los universitarios en todas las universidades ... Es un ciclo de deuda que iba a marcar su relación con el acceso a los derechos sociales, …, que empezó a ser un tema de discusión pública… (Entrevistado 8, posición ejecutiva en universidad estatal).

Quote 4

> …el concepto que primaba en las universidades del Consejo [CRUCh] era un concepto más amplio de gratuidad donde efectivamente la gratuidad se orienta no al váucher sino a un aporte de la institución que le permita a la institución ofrecer a los estudiantes una formación de calidad, pero no que vaya asociada al estudiante…(Entrevistado 13, posición ejecutiva en CRUCh).

Quote 5

> … Yo decía el típico argumento de la planificación central, cómo el Estado va a definir cuántas vacantes, qué valor de aranceles, en qué ciudad, en qué lugar, el típico problema de planificación central versus mercado …, yo estoy de acuerdo con la subsidiaridad activa, que el Estado sí tiene que financiar y ayudar al acceso a la educación de calidad a los estudiantes que no tengan recursos. Ahora cuál es la forma de hacerlo, la forma más eficiente de hacerlo, a mi juicio, era el subsidio a la demanda. Y esa fue la postura que tomó Vertebral ... Nosotros decíamos felices si el Estado tiene recursos y puede financiar el 100% de los aranceles, ... Ahora si quieren financiarlo y darle gratuidad a los estudiantes fantástico, pero hagámoslo por el lado de las becas y los créditos blandos, no por el lado del financiamiento institucional,… (Entrevistado 1, rector institución de educación superior del sector técnico).

Quote 6

> … los vice rectores económicos fueron claves en el diseño fino, originalmente antes de ingresar la ley nosotros teníamos una visión un poco más tecnocrática … teníamos todo un diseño muy basal basado en sus informes, estados de resultados, …, nos reunimos con él y nos dijo que esto es impracticable, no tengo estos datos y con ellos se avanzó a un

modelo más de lógica voucher, pero lo que sí sé es el número de estudiantes, eso te lo puedo dar, entonces trabajémoslo así… (Entrevistado 4, hacedor de política pública en MINEDUC).

Quote 7

…, si ya definiste que la transferencia va a ser directa, los nudos críticos eran siempre los mismos, cómo definir cuánto vas a transferir, cómo defines el arancel y al mismo tiempo cómo controlas que las instituciones no decidan cobrar lo que quieran y exigirte a ti que transfieras lo que sea por esa gratuidad. Y por otro lado, a cuánta gente, … cómo controlas la matrícula, o sea, una vez que instalas la gratuidad cómo haces que las instituciones no digan 'ya entonces yo crezco y crezco, usted me tiene que pasar la plata'…)Entrevistado 2, hacedor de política pública en MINEDUC).

Quote 8

… dado que es una política de una envergadura de gasto público muy importante, la participación del Ministerio de Hacienda … en esto fue muy importante. Es decir, todos los diseños tanto de la glosa presupuestaria, como posteriormente de la ley misma, estuvieron bastante sujetos a la opinión de la Dirección de Presupuestos y del Ministerio de Hacienda. Esto no fue un diseño propio del Ministerio de Educación, sino que tuvo que tener como mucho filtro con estos otros actores, por ejemplo, definiciones tales como cuánto dura la gratuidad, ... Siempre está esa lógica, cuando son estas políticas sectorialistas, pero que tienen un impacto muy grande en el gasto público evidentemente la definición no va solo por lo técnico, sino que también por el componente de cuántos recursos implica (Entrevistado 6, posición ejecutive en MINEDUC).

Quote 9

…el 2017 … se escuchó, de alguna manera, al Consejo de Rectores en el sentido de que esta brecha que se estaba generando era cada vez mayor, entre arancel de referencia y arancel efectivo, y el ministerio [MINEDUC] tomó la decisión de incrementar los aranceles en base a ciertos factores, se le incrementó … en un 12%, en un 6% y en un 3% los aranceles a las universidades que estaban acreditadas por siete años, cinco y seis, y cuatro, respectivamente (Entrevistado 7, posición ejecutiva en universidad privada tradicional).

Chapter 3

Study 2: The Impact of Free Tuition on Student Access and Persistence in Chilean Higher Education

Free tuition policies have emerged worldwide, often with goals to improving equity in access and success in higher education (Salmi & D'Addio, 2020). Although enrollment rates in higher education have expanded worldwide in rich and poor countries (Marginson, 2016), inequities in access and success in higher education, especially by socioeconomic level, persist (Deming & Dynarski, 2009; Orellana, 2011; Salmi & Bassett, 2014; Santelices et al., 2013). Traditional financial aid instruments based on need- and merit-based scholarships and loans have proven to have a limited effect in terms of decreasing inequities in access to and persistence in higher education (Herbaut & Geven, 2019). Researchers point out that traditional financial aid systems tend to be complex for students as they have to navigate multiple options, fill out applications that are not always easy to understand, the amount awarded is uncertain until the end of the process, and the final award does not always cover the total cost of attending higher education (Deming & Dynarski, 2009; Goldrick-Rab et al., 2009; Usher & Burroughs, 2018). Research suggests that programs with transparent eligibility criteria and simple application processes have greater impacts on educational attainment (Deming & Dynarski, 2009). Both elements are especially important for marginalized populations, who often face informational and other barriers to accessing financial aid (Acevedo-Gil, 2017). Such students also tend to be more price-sensitive than their more affluent peers (Brent, 2021; Heller, 1997; Kane, 1995; Kim, 2010).

In this context, free tuition policies have emerged, sending a clear message to students and their families: beneficiaries can enroll in higher education without having to pay tuition and fees. Thus, free tuition policies have the potential to influence the educational outcomes of marginalized populations.

Research studying free tuition policies and programs is emerging. Much of the evidence is based on the U.S., where most free tuition initiatives have been place-based, targeting specific communities, and/or focused on the community college sector (Mishory, 2018; Swanson et al., 2020). Research in the U.S. indicates that free tuition policies affect the college-going culture of the eligible communities (Andrews et al., 2010; Miron et al., 2012; Swanson et al., 2020) but the effects on enrollments are mixed (Billings, 2018; Gándara & Li, 2020; Gurantz, 2020; Nguyen, 2019; Page et al., 2019). Outside the U.S., the evidence is limited. Moreover, there is great variation in the design of these types of policies or programs, which can also influence the effectiveness of these policies on student outcomes. As pointed out by Rosinger and colleagues (2021), free tuition policies or programs can place an administrative burden on students to access the benefits or restrict their postsecondary options, and in so doing generate unintended consequences.

As these types of programs expand and gain public support around the world, it is important to examine the impact of free college policies and programs on decreasing inequities in higher education. Empirical evidence, although growing, is still scarce compared to the rapid proliferation of these types of policies and programs (Page et al., 2019) and is mainly focused on the U.S. context. I contribute to this literature by examining the case of Chile, a country that implemented such a policy in 2016. By using administrative data from Chile and a difference-in-difference estimation strategy, I provide empirical evidence of a free tuition policy's effect on

reducing inequities in access to and persistence in higher education. The case of Chile is interesting because it is a country characterized by a rapid expansion of higher education, which had a student financial aid system based on merit- and need-based scholarships and loans, and where inequities in access to and success in higher education persist.

This chapter is organized as follows. In the next section, I present a literature review about the effects of recently implemented free tuition policies on student access to and persistence in higher education. I then introduce the theoretical framework that guides this study. The next section describes the context and the free tuition policy implemented in Chile. This section ends by stating the research questions. The next section describes the method used to answer the research questions. I then present the empirical results followed by Discussion and Conclusion sections.

Literature Review

In recent decades, free tuition policies and programs have been implemented in a number of countries around the world (Salmi & D'Addio, 2020). Research about the effects of free tuition policies and programs on student outcomes is emerging. Most of this research is based on the U.S. context, where free tuition programs tend to be place-based. Therefore, I begin this section by presenting the U.S. research followed by research focused outside the U.S. In the end, I describe heterogeneity in the effects found on student outcomes.

Effect of U.S. Free Tuition Programs on Student Outcomes

Much of the evidence is based on studies from the U.S., where most free tuition initiatives have been place-based, targeting specific communities, and/or focused on the community college sector (Mishory, 2018; Swanson et al., 2020). Evaluations of place-based

programs that include two-and four-year institutions, such as the Pittsburgh or Kalamazoo Promise initiatives, have found positive effects on K-12 academic outcomes, such as math and reading scores (Swanson et al., 2020). Researchers have also found effects on changing college choice sets (Andrews et al., 2010), and on increasing student goals and aspirations for postsecondary education (Miron et al., 2012).

In terms of enrollment and persistence, researchers have found positive effects of programs that include two- and four-year institutions for eligible students (Billings, 2018; Page et al., 2019; Swanson et al., 2020). Nevertheless, studies that focused on free tuition implemented by states only for the community college sector have found positive effects on enrollments, but also a shift of enrollments from four- to two-year institutions (Gándara & Li, 2020; Gurantz, 2020). Nguyen (2019), who studied a program that offers free tuition at two- and four-year institutions at the state level (the New York's Excelsior program), found no effect on enrollments. In sum, the U.S. literature demonstrates that free tuition programs have a positive effect on student's aspirations and expectations of going to college, and in k-12 academic outcomes, but mixed effects on enrollments. Additionally, the results indicate great variation in policy design and that those differences may affect student outcomes.

Effect of Free Tuition Policies Outside the U.S. on Student Outcomes

Outside the U.S., the evidence of the effect of such policies is more limited. Post (2011a, 2011b) studied the case of Ecuador, a country that implemented such a policy in public universities in 2009. He concludes that the free tuition policy increased the gap in enrollment rates between poor and more affluent students in the university sector. This increase is due to more affluent students being better prepared than their less affluent peers to gain access to the universities covered by the policy.

Recently, researchers have begun to examine the effects of the free tuition policy implemented in Chile. In general, research using descriptive or multivariate models found that the policy is associated with an increase in applications to more prestigious universities (Torres-Cortés, 2019). In the vocational sector, Flores et al. (2020) found that the policy increases persistence to the second year for students who would have had to incur a partial tuition and fee payment in the absence of the policy.

To my knowledge, only two studies have examined the effect of the Chilean free tuition policy using a quasi-experimental design. Arzola (2021), using a difference-in-difference approach, found that in its first year of implementation, the policy had up to a three-percentage point increase in immediate enrollment, depending on the proxy used to identify eligible students. Martin (2021), in his doctoral dissertation, explored the effect of the policy on college enrollment in its first two years of implementation. Using a difference-in-difference approach, he found that the policy increased college enrollment by five percentage points in its first year of operation. However, this effect is composed of an increase in university enrollments and a slight decrease in the vocational sector enrollments, institutions not included in the policy in the first year of implementation. In the second year of implementation, when vocational programs became eligible, the policy did not affect enrollments in vocational programs but increased university enrollments by seven percentage points. Moreover, Martin found that the policy affects eligible students' college choices as they changed from preferring technical or less selective programs to academic and more selective programs. Briefly, the evidence related to the effects of the Chilean free tuition policy on enrollment outcomes is mixed. Additionally, there is a dearth of studies that focus on the effect of financial aid in general, and the free tuition policy in particular, on outcomes other than enrollment and persistence in the Chilean context.

Heterogeneity effects

Most research is focused on examining the overall effects of free tuition policies on student outcomes. However, some researchers have examined the effects on specific populations. For instance, Gándara and Li (2020) examine heterogeneity effects by race and gender of U.S. Promise programs on two-year college enrollments. They found that the group with the greatest increase in their enrollment rate was racially minoritized (Black and Hispanic) female students. They also found variations of the effects on enrollment according to the program design (first- vs-last dollar, or merit- vs need-based eligibility). Espinoza et al. (2021), studying the Chilean free tuition policy, found a marginal increase in first-generation college student enrollment rates concentrated on students from public high schools and the vocational high school track. Martin (2021), who also focused on the Chilean experience, found that the positive effect of the policy on college enrollment was larger for low-income, high-achieving students than their low-achieving peers. In sum, these studies indicate that free tuition effects often differ by sociodemographic groups.

Overall, research studying the effect of free tuition policies on student outcomes is emerging, indicating that such policies have positive effects on the targeted-population college-going culture and persistence in higher education, but mixed effects on enrollments. Thus, this evidence indicates that free tuition policies affect the whole college access process. Additionally, research shows heterogeneity effects by sociodemographic characteristics of the students and great variation in policy designs that also influences policy effectiveness. However, this research is mainly focused on the U.S. experience, where most programs are place-based. Therefore, there is a gap in the literature that examines the comprehensive effects of free tuition policies on student access to and persistence in higher education in contexts outside the U.S. In the next

section, I describe the theoretical framework that guides this study and that will help me to understand the free tuition policies' effects on students' trajectories into and through higher education.

Theoretical Framework

Figure 3.1 provides the theoretical framework that guides this study. To conceptualize how a free tuition policy may affect college access, I use Perna's college choice model (2006), which is based on Hossler and Gallagher's three-phase choice model (1987). Perna's model is complemented by including aspects of human capital theory (Becker, 1964, 1975, 1993; Mincer, 1958; Schultz, 1963), and sociological concepts. To understand the effect of the policy change on student persistence in postsecondary education, I draw on concepts from economics as well as sociological concepts (Aina et al., 2021) that can help explain student decisions to persist in college or not.

College Choice

Perna's (2006) model acknowledges that accessing college is a process that involves a set of decisions, potentially leading to enrollment in higher education (Hossler et al., 1989; Hossler & Gallagher, 1987). It draws on human capital theory (Becker, 1964, 1975, 1993; Mincer, 1958; Schultz, 1963) to explain that the college choice decisions are based on individual calculations of expected costs (direct and indirect, such as tuition, room and board, and forgone income) and benefits (e.g., increased future earnings, well-being, job satisfaction). When the net benefits of enrolling are positive, the individual chooses to attend a specific college. Some of the factors considered by individuals are their academic ability relative to that of the students in the institutions they are interested in attending. In addition, they may assess whether any higher

earnings from attending higher education will outweigh the financial and non-pecuniary costs incurred by attending college (Borjas, 2005). They also consider their willingness and ability to pay college costs, with some families being better resources to pay the direct costs and help with the income forgone from not working while in school (Becker, 1964).

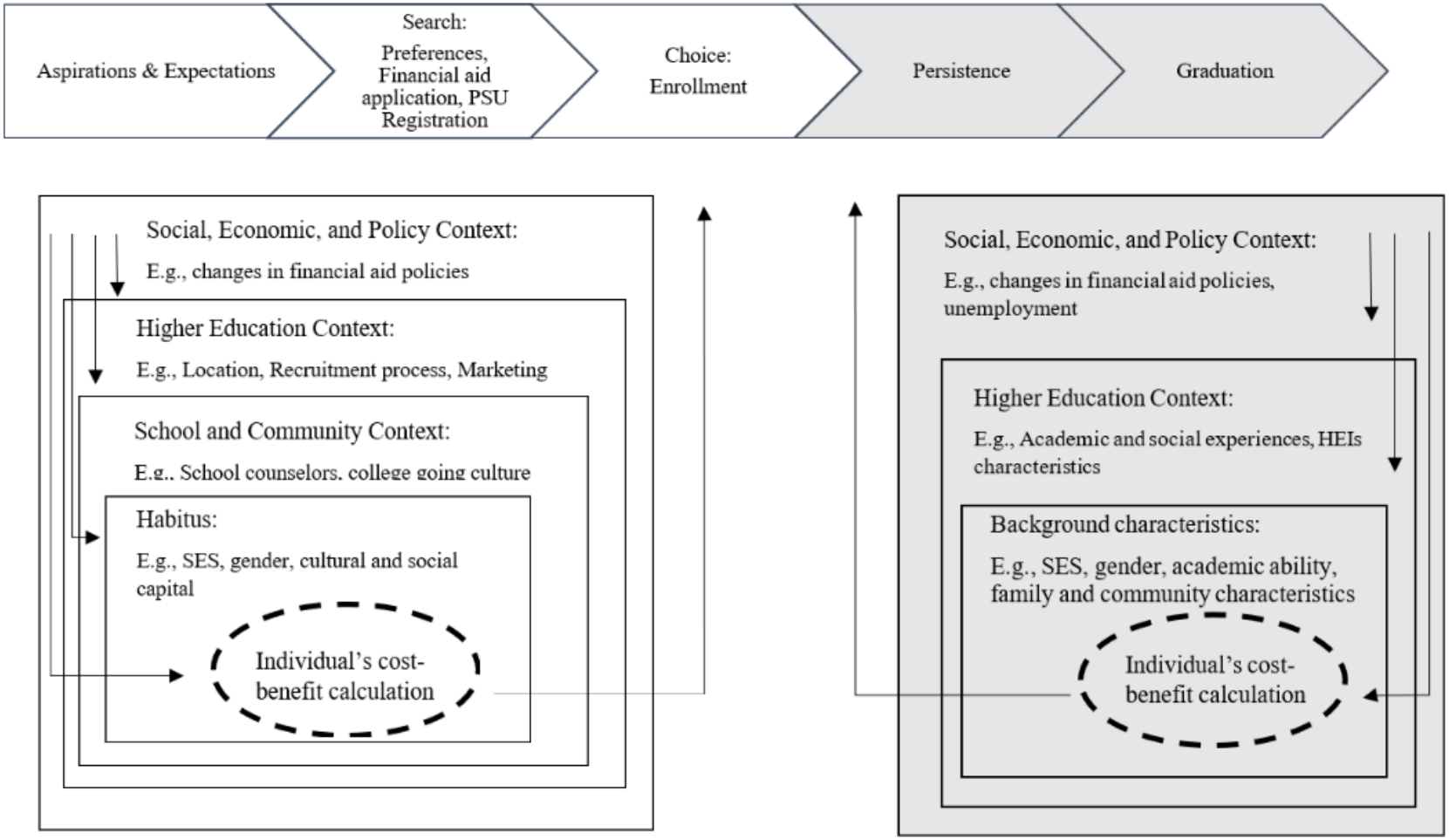
However, these decisions are not made in a vacuum. Figure 1 displays the way Perna (2006) describes the interconnected layers that influence student college choice calculations. The layers are (a) the habitus, which refers to a set of values and beliefs about college shaped by student's demographic characteristics, and the social and cultural capital available in their communities; (b) the school and community context, which refers to the social structures and organizational resources that can boost or limit student's college choices; (c) the higher education context, which refers to processes needed to apply to higher education institutions (HEIs), prospective student's perceptions of higher education institutions, and actions performed by HEIs to attract students; and (d) the social, economic, and policy context, which refers to macro-level changes influencing college choice decisions (e.g., a free tuition policy).

Thus, Perna's college choice model offers a framework to understand college-going as a process, as represented by the arrows at the top of Figure 1, and how individual choices in this process, based on a calculation of direct and indirect costs and benefits about college-going are framed by their broader contexts.

Based on this framework, the free tuition policy implemented in Chile can affect students' decisions to attend college through different mechanisms. In the short run, the policy may directly influence student cost-benefit calculations by lowering the cost of attending college. Second, the policy may create awareness of financial aid available for attending higher education at the individual level but may also operate by providing information at the school and

community level. If so, a free tuition policy may create awareness of college-going possibilities for students who would not typically consider going to college, and if so, increase such students' likelihood of accessing postsecondary education. In the higher education context in Chile, because only some institutions are part of the free tuition policy, the policy may shift student college-going preferences. Specifically, within the university sector, the policy may increase prospective students' likelihood of registering to take the admissions test (i.e., the PSU) which is necessary for admission consideration. In the long run, the free tuition policy may also affect student expectations of going to college, their motivation to study, and the motivation to graduate from high school, among other outcomes. This framework can also explain the heterogeneous effects of the policy by demographic characteristics as those characteristics, such as gender or cultural capital, influence the student's habitus.

Figure 3.1. Theoretical Framework



Source: Based on Perna (2006) and Aina et al. (2021)

Persistence

After students enroll in higher education, they engage in similar cost-benefit calculations to decide whether to persist in college or withdraw (DesJardins & Toutkoushian, 2005). Moreover, once enrolled in college, students can gather additional information about their ability to succeed in college. They can gain a better perspective about college costs, current labor market conditions, and attempt to forecast future earnings possibilities. In so doing they can continually update this information and re-evaluate their decisions about remaining enrolled in college (Aina et al., 2021; Oreopoulos & Petronijevic, 2013; Stange, 2012). This decision-making process is especially important in the Chilean context, where students enter a specific program of study and changing programs is bureaucratically rigid and very costly.

Using college choice concepts and following Aina et al. (2021), I posit that students' decisions to persist in college are also influenced by their background characteristics and are embedded in the specific context of the institutions as well as broader social, economic, and policy contexts. Thus, a free tuition policy can directly influence students' decisions to persist by lowering the cost of attending college. The policy may also indirectly affect student decisions by, for example, decreasing the need for students to work while studying, thereby allowing them to integrate into the academic and social spheres of their institutions more effectively.

Background

In this section, I describe the Chilean context where the demands for free college arise. I also describe the free tuition policy implemented in 2016 and its modification during the first three years of implementation.

The Case of Chile

The Chilean higher education system is characterized by a rapid enrollment expansion in recent decades, promoted by a student financial aid system based on scholarships and loans. Researchers have consistently found that grants and loans have positive effects on enrollment and persistence in the Chilean context (Lopez Prado, 2013; Santelices et al., 2013). Although all income quintiles have benefited from this expansion, this benefit has been unequal. Whereas 58% of 18-24-year-olds in the fifth income quintile (the wealthiest) enroll in higher education, only 27% of the first quintile do (Accioneducar, 2016). Differences are also found in the type of institutions that students enroll, with students from high-income backgrounds tending to enroll in selective universities, and students from low-income backgrounds more likely to enroll in non-selective institutions (OECD, 2012). This socioeconomic segregation by institutional type is important because non-selective institutions tend to be lower-quality, measured by their accreditation results or retention rates (Orellana, 2011; Torres & Zenteno, 2011).

Differences are also found in enrollment by type of track in high school and sex. By type of high school track, the immediate enrollment rate of students in an academic track is 17 percentage points higher than the rate of students in a vocational track. (Servicio de Información de Educación Superior [SIES], 2018). This difference is partially due to the concentration of low-income students in the vocational sector, but also the result of the lack of academic preparation to access higher education in the vocational track curriculum (Espinoza, 2017). The

expansion of enrollments has differentially benefited females and males. In 2015, females had slightly higher enrollment rates than their male peers, but they were overrepresented in private universities where the quality is more heterogeneous (Espinoza, 2017). To summarize, the rapid increase in enrollments was followed by inequities in access to higher education and by segregation of students by type of higher education institution.

In 2011, large student protests took place in Chile demanding free, public, and quality education for all (Barrionuevo, 2011) partly in response to the large inequalities in access and success in higher education (Bellei et al., 2014; Guzman-Valenzuela, 2016). In 2016, a free tuition policy was implemented allowing low-income students to enroll in selected institutions without paying tuition and fees (de Gayardon & Bernasconi, 2016). The free tuition policy or *Gratuidad*, as it is called in Spanish, aimed to promote inclusion by eliminating economic barriers to allow academically prepared prospective students to access and persist in higher education (Queupil & Durán del Fierro, 2018).

The free tuition policy began in 2016 providing free tuition for students from the lowest five family income deciles who enrolled in eligible universities. In its first year of operation, half of the total number of universities in the country were eligible (30 universities including public and private institutions). A year later, in 2017, free tuition was extended to non-profit vocational higher education institutions (HEIs).[8] During 2017, two new public universities and twelve vocational HEIs were added to the policy. In 2018, the benefit was extended to students from the sixth family income decile and five HEIs decided to join the policy. The free tuition policy benefit is only available to obtain a first degree or a degree higher than that previously awarded,

[8] In Chile, the vocational sector is composed by *Centros de Formación Técnica* (CFT, similar to community colleges in the U.S.) and *Institutos Profesionales* (IP, Professional Institutes).

and it only covers tuition and fees for the nominal duration of in-person programs of study.[9] Students can only change their program once, without losing the benefit.

From the student's perspective, the steps needed to be eligible and a beneficiary of the free-tuition policy are visualized in Figure 3.2. To be classified into the eligible income deciles, students must fill out a socioeconomic accreditation form (*Formulario Único de Acreditación Socioeconómica*, FUAS), usually during their last year of high school, which requires that students name the people living in the same household and their incomes. Later, the Ministry of Education (MINEDUC) compares these entries with tax data and other available information and classifies prospective students into family income deciles according to the national distribution of income deciles. If the prospective student applies to the university sector, they must apply through the university admissions system (*Sistema Único de Admisión*, SUA) that uses as criteria the university standardized test (*Prueba de Selección Universitaria*, PSU), high school ranking, and the high school GPA. To fill out the university application form, they must average at least 450 points on the SUA (on a scale of 150 to 850). In the application form, they can select up to ten program/university combinations. Using an algorithm that maximizes preferences and scores, students are offered enrollment in one of their options. For the vocational sector, there is no single admissions system, and higher education institutions (HEIs) are usually open access. Finally, to be a beneficiary of the policy, students must enroll in a HEI included in the policy.

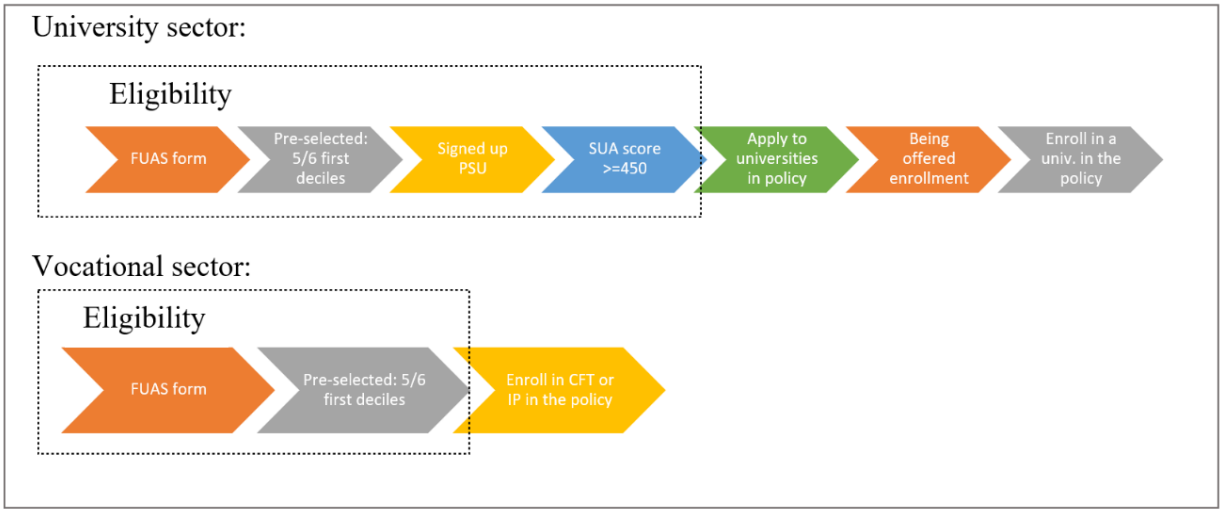
From the HEIs perspective, the free tuition policy is available in all state institutions and private non-profit institutions with at least four years of institutional accreditation (where the range is from 0—accreditation denied--to 7 years of institutional accreditation),[10] which is used

[9] In Chile, students must select a program in an institution when they enroll in college. Programs of study usually last two years in the vocational sector, four years in the IP sector, and five years in the university sector

[10] In Chile, institutional accreditation is a quality certification where institutions undergo through a process to confirm the quality of their internal processes and outcomes. The result of the certification is a number of years

as a proxy for the institutional quality. While state institutions are automatically included in the policy, private institutions have to request inclusion in the MINEDUC. Those institutions that opt to be part of the program must accept a regulated tuition and limits on enrollment capacity.

Figure 3.2. Steps to be Eligible and Beneficiary of the Free-Tuition Policy



The sudden implementation of the free tuition policy, enacted through the Ministry of Education budget process at the end of 2015, allows estimating the causal effect of the policy on access and persistence in higher education using a difference-in-difference (DiD) strategy. Doing so permits me to estimate the overall impact of the policy on eligible students by comparing their pre- and post-outcomes to ineligible students. Following, I describe the data and analytical approaches.

(from 0, accreditation denied, to 7 years) awarded depending on the level of compliance of the accreditation standards set by the National Accreditation Commission (Comisión Nacional de Acreditación, CNA). This process although voluntary in the years examined in this study, was needed in order to access student financial aid.

Research Questions

Based on the theoretical framework discussed above and the Chilean context, I derive the following research questions related to the effects of Chile's free tuition policy on student college choice and persistence:

1. Does eligibility to receive free tuition change the probability that a student will:
    a. Apply for financial aid?
    b. Register for the university standardized test (PSU)?
    c. Enroll in higher education?
    d. Persist to the second year in college?
2. Does eligibility to receive free tuition change the student's college choice set toward selecting universities of higher quality?
3. Do any observed differences in enrollment or persistence behavior vary by institutional type (vocational sector, universities) or institutional quality?
4. Are there heterogeneous effects in these outcomes by key sociodemographic characteristics (i.e., sex and high school track)?

Method

Data and Sample

I used longitudinal student-level administrative datasets of the universe of high school graduates available through the MINEDUC. The MINEDUC datasets provide rich information about student- and high-school-level characteristics. I restricted the time frame to high school students who graduated between 2012 and 2017. This data structure permits me to have three pre-policy implementation cohorts (2012, 2013, and 2014) and three post cohorts (2015, 2016,

and 2017). I restricted the data to students who graduated from regular high schools (as opposed to adult education). In total, 1,138,950 students graduated from high school between 2012 and 2017; these students were able to apply and enroll in higher education at the beginning of the next academic year.[11]

To examine college-going behavior, I draw data from MINEDUC financial aid application and college enrollment datasets. Several binary outcomes are constructed from these two datasets including one's financial aid application status, immediate enrollment in any college, enrollment in the vocational or university sector, enrollment in an institution that ever participated in the free tuition policy, enrollment in an institution that was awarded the maximum accreditation levels (six or seven years, as a proxy for college quality), and persistence to the second year. I focused the analysis on immediate enrollment (i.e., first-time college enrollment in the year following high school graduation) to avoid contaminating the policy effects due to older students being induced to finish high school, retake the PSU, or go back to college due to the implementation of the policy (i.e., endogeneity).

I complement this data with the students' college application data from the Department for Educational Evaluation, Measurement, and Registry (*Departamento de Evaluacion, Medicion y Registro Educacional*, DEMRE) which provides students' college admission test scores and their university application choices. In Chile, students must select a specific program in a specific institution in their university application. They can select up to ten different combinations of programs and institutions. I use this data to build the following outcomes: whether the student registered to take the PSU test, the institutional accreditation level (measured in a number of years) of the student's first choice (only for students that took the PSU and have a

[11] In Chile the academic year matches the calendar year. Students begin classes in March and end the year in December.

PSU average score equal to or greater than 450), and the number of choices in the student application considering the first three choices. I focus the analysis on the institution's accreditation level as a proxy for the quality of the institution as accreditation level is associated with selectivity and higher retention rates (Torres & Zenteno, 2011). Although the student choices are at the program level, not all programs have accreditation results because the accreditation process is only mandatory for institutions and not for programs.

Eligible and Ineligible High School Graduates

The dataset available poses a fundamental problem in terms of identifying eligible and ineligible students to receive free tuition because students are categorized into income deciles only if they apply for financial aid. Therefore, students who do not apply for financial aid may be fundamentally different from those who apply, and those characteristics may be correlated with financial aid application and subsequent college choices. To overcome this issue, I rely on an out-of-sample prediction method based on the 2015 Chilean National Socioeconomic Characterization Survey (*Encuesta de Caracterización Socioecónomica*, CASEN) data to estimate a student's eligibility status. The CASEN is a nationally representative household survey used by the Chilean government to estimate the magnitude of poverty and the income distribution in the country. Using the CASEN data to assign eligibility status to prospective students allows me to overcome the bias introduced by self-selection into financial aid applications and the possibility of financial aid manipulation, a problem found by other researchers when studying this policy (Arzola, 2021; Martin, 2021).

The free tuition policy changed the eligibility criteria during the years of observation (specifically in 2018) by including, as eligible, individuals classified in the sixth family income decile. Therefore, following Page et al. (2019), I restricted eligibility to those individuals who

consistently would or would not be eligible dropping the cases classified in the sixth family income decile from the analysis. In addition, and because predicting eligibility for individuals at the fifth income margin was very imprecise, I decided to drop individuals classified into that family income decile. Thus, in the final sample, high school graduates eligible to receive free tuition are those classified into the first four family income deciles. Ineligible individuals are those classified into the last four family income deciles.

The technical Appendix A details the out-of-sample prediction strategy used to assign eligibility status to high school graduates in the sample. Briefly, I used the 2015 CASEN to estimate the parameters of key independent variables related to the income classification of high school students. As these independent variables are available in both samples (the 2015 CASEN and the high school graduate sample), I was able to use the parameters estimated using CASEN to predict high school graduates' income level and their eligibility status. To test the sensitivity of definitional choices, I created three eligibility status variables: 1) for Predicted Eligibility 1 (PE1) I used the direct estimates from the 2015 CASEN (individuals classified through this method are identified as Predicted in Table 3.1); 2) for Predicted Eligibility 2 (PE2) I also corrected the PE1 prediction using information from MINEDUC about whether the student was or not classified as low-income during high school[12] (individuals classified using this correction are identified as Priority student in Table 1); 3) for Predicted Eligibility 3 (PE3), in addition to correcting by low-income status in high school, I corrected by financial aid awarded during higher education (individuals identified using this correction are identified as Financial aid in Table 3.1). Table 1 presents the distribution of eligible, ineligible, and missing cases for each

[12] I use the priority status classification from MINEDUC to identify whether the student was classified as low-income during high school. Priority students are those who participate from the government program "Chile Solidario" aimed for low-income families, are among the poorest 33% of the population, or are classified as very poor in the public health system.

Predicted Eligibility status. As observed in this Table, PE2 and PE3 substantially decrease the missing cases by improving the classification of the ambiguous cases.

Table 3.1. Distribution of Eligible, Ineligible, and Missing Cases for each Predicted Eligibility (PE) Status

	PE 1	PE 2	PE 3
Eligible (deciles 1-4)	428,591	630,096	608,549
Predicted		428,591	395,591
Priority student		201,505	201,505
Financial aid			11,453
Ineligible (deciles 7-10)	303,230	263,836	255,330
Predicted			228,974
Financial aid			26,356
Total analytical sample	731,821	893,932	863,879
Total Missing	407,129	245,018	275,071
Missing demographic characteristics	64,460	64,460	64,460
Deciles 5-6	754	476	26,172
Ambiguous	341,915	180,082	184,439
Total	1,138,950	1,138,950	1,138,950

Notes: Predicted eligibility 1 corresponds to cases classified as eligible/ineligible using the 2015 CASEN prediction only. Predicted eligibility 2 corresponds to a correction of predicted eligibility 1 by low-income student status. Predicted eligibility 3 corresponds to a correction of predicted eligibility 1 by low-income student status and financial aid assigned. Ambiguous cases are those classified into eligible and ineligible by the different strategies to assign cases. See Appendix A for more information.
Source: Own elaboration based on CASEN 2015, MINEDUC, and DEMRE data.

Analytical Strategy: Difference-in-Difference

To estimate the impact of the free tuition policy on access and persistence I compare the outcomes of eligible students to ineligible students before and after the policy implementation. The methodological approach is formalized by Equation 1:

$$\gamma_{it} = \alpha + \beta_1 Elig_{it} + \beta_2 After2014_t + \beta_3 (Elig * After2014)_{it} + \beta_4 After2015_t + \beta_5 (Elig * After2015)_{it} + \beta_6 X_{it} + \mu_{it} \quad (1)$$

where *i* denotes the student and *t* the year of high school graduation; γ is the outcome of interest (apply for financial aid, register for the university admission test, accreditation level of the first institutional choice in the SUA application, enrollment, persistence); "Elig" is a dummy variable

indicating whether the student is eligible for free tuition (1=would have been eligible before policy implementation or 0=not); "After2014" and "After2015" are dummy variables identifying whether the student graduated after (=1) or before (=0) the implementation of the policy in the university sector (After 2014, includes high school graduation years 2015 to 2017) or after vocational institutions were included in the policy (After 2015, includes high school graduation years 2016 and 2017); "Elig*After2014" and "Elig*After2015" are interactions between the two respective dummies; X_{it} is a vector of student- (sex, high school track, student's high school GPA deciles, parents' education) and high school level variables (high school administrative dependency, rural high school status, JUNAEB high school vulnerability index,[13] high school region),[14] which control for possible compositional cohort changes over time (see descriptive statistics in Table 2); α and the β's are parameters to be estimated; and μ_{it} is an error term measured at the student level. For all models estimated, the standard errors are clustered at the high school level. The coefficients of interest are β_3 and β_5, which represent the causal effect of eligibility for free tuition on students' outcomes. These estimates represent the intent to treat effect (ITT), β_3 represents the effect of including universities in the policy, whereas β_5 represents the effect of including the vocational sector. To interpret the policy effect after the first year of implementation, I added β_3 and β_5 and performed a Wald test to evaluate the significance of the joined effect. A caveat in the interpretation of the β_5 estimate is that it is possible that it also includes the effect of knowing that the vocational sector would become eligible a year later.

[13] This index is a measure of the percentage of students that are low-income and are prone to school absenteeism in each public and subsidized school. I use this variable as a proxy for the high school socioeconomic context. It is provided by the Free Meal High School Program (*Junta Nacional de Auxilio Escolar y Becas*, JUNAEB, ranges from 0 to 100).

[14] These characteristics are drawn from the following datasets: MINEDUC, the national student achievement test (*Sistema de Medición de Calidad de la Educación*, SIMCE), DEMRE, and JUNAEB.

Because I estimated several different models producing numerous parameter estimates, I used a Bonferroni correction to adjust the *p*-value and account for the increased likelihood of type-I errors.

To be valid, the DiD analysis rests on two assumptions. The first is that the outcome of interest has a similar trend between eligible and ineligible students before the implementation of the policy. I relax this assumption by incorporating, in each model, a differential time trend for eligible and ineligible students. In this case, the policy effect comes from a sharp deviation from the previous trend (Angrist & Pischke, 2015). The second assumption is that there are no other changes besides the free tuition policy implementation that differentially affects eligible and ineligible students. Regarding this last assumption, jointly with the free tuition policy, the government implemented the Program for Access and Effective Support in Higher Education (*Programa de Acceso y Acompañamiento Efectivo a la Educación Superior*, PACE),[15] which aims to help low-income high school students to be college-ready by pairing universities with eligible high schools. To overcome this issue, I control for this possible confounding by including a dummy variable that identifies whether the student's high school of origin was part of this program or not.

In the next section, I present the results based on the PE2 eligibility status variable. This is my preferred model because it reduces the missing cases compared to PE1 and PE3. In addition, PE3, which supplements the imputation using financial aid awarded information while in higher education, is less reliable as there is evidence of financial aid application manipulation,[16]

[15] The program started in 2014 as a pilot and more high schools have been added in the subsequent years.

[16] Personal communication with a former Ministry of Finance in Chile confirmed applicants' manipulation. In a prediction of eligible students using financial aid information, I also found an increase in eligible students right after the policy implementation (results available upon request).

especially in the first year of the free tuition policy implementation (Martin, 2021). Results using PE1 yielded similar results to those found using PE2 (see Appendix B). As expected, results using PE3 yielded estimates slightly higher in magnitude compared to results using PE2 due to the positive selection into the treatment (see Appendix C).

Limitations

Although this study is based on a large sample size that is representative at the country level and employs robust statistical techniques to evaluate the effect of the policy on student outcomes, this study nonetheless has limitations. The first limitation is related to the fact that the implementation of the free tuition policy may have produced general equilibrium effects, thereby changing important structural relationships. For instance, if effective in increasing college attendance, the policy may increase the number of graduates in the higher education sector which could affect the prospective students' postsecondary-related cost-benefit calculations. Also, the taxes used to finance the policy, which were based on an increase in corporate taxes, specific taxes on certain products (e.g., tobacco, alcohol, and cars), and stricter anti-tax avoidance rules, may have induced changes in the demand for higher education graduates, and in so doing affected post-policy wage changes. Any such wage changes may also affect the cost-benefit calculations of prospective students after policy implementation. Notwithstanding these possibilities, an evaluation of any such general equilibrium changes is beyond the scope of this study.

A second limitation is related to the lack of information about prospective students' family income, which is the main criterion used to assign eligibility to receive free tuition. The information available through the FUAS application is only available for students who apply for financial aid, creating a sample-selection problem that may threaten the internal validity of the

results. I mitigate this problem by using an out-of-sample prediction method. Then, I used different statistical techniques, additional student-level socioeconomic information, and restrict classification of student eligibility to students in the margins to produce the most accurate classification of student eligibility.

A third limitation is related to the use of administrative datasets where there is no information available about students' academic progress, performance, behavior (except for enrollment), or perceptions while in college, which are important theoretical characteristics that affect student persistence in college. Therefore, the policy estimate could be capturing some of the effects of those characteristics on persistence. Future research can include those characteristics overcoming this limitation.

Results

In this section, I begin by presenting the descriptive statistics of eligible and ineligible high school graduates for the pre- and post-policy implementation periods in Tables 3.2 and 3.3. In Tables 3.4 and 3.5, I present the results from the DiD analyses on access and persistence outcomes, respectively. Student access considers the following outcomes: applying for financial aid, registering to take the PSU test (standardized university admission test), the institutional accreditation level (measured in years) of the high school graduate's first university choice in their university application form, and enrollment in higher education. Persistence outcomes consider persistence to the second year in the higher education system and in the same program. Additionally, I disaggregate effects on enrollment and persistence according to the sector (vocational or university sector), institutions included in the policy, and maximum institutional accreditation level (six or seven years) as those are important factors in the policy design and implementation and may influence student's behavior. After presenting the main results, I

present the pre- and post-trends on access and persistence outcomes in Figures 3.3 and 3.4, respectively. Robustness checks are presented in Tables 3.6 and 3.7. Finally, heterogeneity effects by sex and high school track are presented in Tables 3.8 and 3.9.

Descriptive Results

Table 3.2 presents the descriptive statistics for the main outcome variables. Overall, a high proportion of eligible high school graduates applied for financial aid and a lower proportion of them registered for the PSU, enrolled, and persisted in higher education compared to their non-eligible peers in the pre-policy implementation period. Moreover, eligible students selected institutions with, on average, slightly fewer accreditation years as their first university option than their non-eligible peers. By sector, a higher proportion of the eligible population enrolled in the vocational sector than the non-eligible population. After policy implementation, the differences between post- and pre-outcomes between eligible and not-eligible high school graduates are positive (see Diff. column in Table 3.2), meaning that eligible students improve their outcomes after the policy implementation even controlling by changes in their ineligible peers in the same period. The only exception is the accreditation years of students' first choice in their university application form. These results suggest that the implementation of the free tuition policy has a positive effect on the access and persistence of eligible high school graduates. However, variations in the cohort composition could also be an explanation for the positive differences. Therefore, next I examine changes in the pre- and post-policy implementation cohort composition.

Table 3.2. Descriptive Statistics for Main Outcome Variables

	Non-Eligible			Eligible			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Diff.
Access							
Apply for financial aid	0.610	0.648	0.038**	0.658	0.739	0.081**	0.043**
Register for PSU test	0.986	0.987	0.001	0.882	0.901	0.019**	0.018**
1st univ. choice accr-y	5.638	5.697	0.060**	5.174	5.247	0.073**	0.013
Enroll in H. Ed.	0.744	0.688	-0.056**	0.479	0.501	0.022**	0.078**
Enroll vocational HEIs	0.107	0.092	-0.015**	0.251	0.250	-0.001	0.014**
Enroll univ.	0.637	0.597	-0.041**	0.228	0.251	0.023**	0.064**
Persist							
Persist 2nd year in H. Ed.	0.706	0.655	-0.051**	0.412	0.439	0.027**	0.078**
Persist program	0.578	0.544	-0.034**	0.353	0.381	0.028**	0.062**
Persist vocational HEI	0.088	0.077	-0.011**	0.195	0.200	0.005**	0.016**
Persist univ.	0.599	0.563	-0.036**	0.198	0.220	0.021**	0.057**
N	126,520	137,316		300,642	295,970		

Notes: Eligibility status based on PE2. Diff. column contains the values for the difference in the Post-Pre differences for Non-Eligible and Eligible high school graduates. **p<0.01. PSU (*Prueba de Selección Universitaria*) is the acronym in Spanish for the standardized university admission test. Source: Own elaboration based on MINEDUC and DEMRE data.

Table 3.3 summarizes the descriptive statistics for the main student and high school characteristics of the analytic sample. In general, a higher proportion of eligible high school graduates attended a vocational track in high school, have parents with a high school education or less, and graduated from a public high school compared to their non-eligible peers. In addition, high schools attended by eligible individuals have a higher JUNAEB vulnerability index compared to the high school attended by ineligible peers. As shown in Table 3.3, there is some small but statistically significant variation between the pre- and post-period in terms of eligible and ineligible students' vocational high school track, high school grade point average percentiles, parent's education levels, high school administrative dependency, and JUNAEB vulnerability index. These differences suggest that there are variations in the pre- and post-cohort

composition and that these characteristics should be used as controls in the regression-based models.

Table 3.3. Descriptive Statistics of Control Variables

	Non-Eligible			Eligible			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Diff.
High school (HS) graduate's characteristics							
Female	0.504	0.505	0.002	0.541	0.537	-0.004**	-0.006
Vocational HS track	0.063	0.063	0.001	0.554	0.541	-0.013**	-0.013**
HS GPA decile	5.176	5.021	-0.155**	5.220	4.980	-0.240**	0.085**
Parents' Education							
Less than HS	0.001	0.001	-0.000	0.446	0.423	-0.022**	-0.022**
HS	0.032	0.033	0.001	0.420	0.445	0.026**	0.025**
College	0.967	0.967	-0.001	0.135	0.131	-0.003**	-0.003
HS characteristics							
HS administrative dependency:							
Public	0.095	0.103	0.008**	0.540	0.537	-0.002	-0.011**
Subsidized	0.529	0.534	0.004	0.455	0.459	0.003	-0.001
Private	0.376	0.363	-0.013**	0.005	0.004	-0.001	0.012**
Rural HS	0.007	0.006	-0.001	0.046	0.044	-0.002	-0.002
JUANEB HS vulnerability index	29.877	31.046	1.169**	73.325	76.077	2.752**	1.583**
N	126,520	137,316		300,642	295,970		

Notes: Eligibility status based on PE2. Diff. column contains the values for the difference in the Post-Pre differences for Not-Eligible and Eligible high school graduates. **p<0.01. HS means high school. JUNAEB (*Junta Nacional de Ayuda Escolar y Becas*) is the acronym for the institution in charge of the free meal program in Chile. GPA stands for Grade Point Average which in Chile is known as the *Ranking de Egreso*. Source: Own elaboration based on MINEDUC and DEMRE data.

Effects on Student Access

Table 3.4 presents the difference-in-differences estimates of the free tuition policy on student access. As the policy was first implemented in the university sector and then, a year later, in the vocational sector, two estimates are of interest (i.e., Eligible*After2014 and Eligible*After2015, respectively). The first step for being a beneficiary of the free tuition policy is applying for financial aid. Overall, results in Table 3.4, Model 1, indicate that the policy increases financial aid applications of eligible and ineligible students, but the increase in eligible

students is at a slower pace compared to their ineligible peers. Specifically, after the policy was implemented in the university sector (i.e., After2014), ineligible students increased their applications for financial aid by 4.2 percentage points and eligible students decreased their applications by two percentage points. Considering these estimates jointly (i.e., 4.2*After2014 - 2.0*Eligible*After2014=2.2) suggests that eligible students increase their applications for financial aid after the first year of policy implementation, but they did so at a slower pace compared to their ineligible peers. A year later, when the vocational sector was included in the policy, the effect is reversed, and eligible students reach the same financial aid application level as their ineligible peers (-0.020*After2014 + 0.022*After2015=0.002, $p>0.05$).

For those prospective students that would like to enroll in a selective university, which are the ones targeted by the free tuition policy, the second step in the college-going process is registering for the university admission test (PSU). Results in Table 3.4, Model 2, indicate that eligibility to receive free tuition decreases PSU test registration by 2.9 percentage points in the first year, and by 2.1 percentage points after the implementation in the vocational sector (-0.029*After2014 + 0.009*After2015=-0.021, $p<0.05$).

After receiving the PSU test results, prospective students can apply to up to ten combinations of programs and universities through the centralized university admission system. As the free tuition policy only allows institutions with a high enough level of accreditation (minimum of four years of accreditation in a range from 0, accreditation denied, to 7 years) to be part of the policy, I examine whether the policy changes the number of institutional accreditation years of the prospective student's first choice in their university application form. As observed in Table 3.4, Model 3, the policy, like the financial aid effect, had a similar positive effect on ineligible and eligible student choices. Ineligible students increased their first-choice

accreditation years by 0.12 after the policy was implemented in the university sector (After2014) and by an additional 0.11 after the policy was implemented in the vocational sector (After 2015). The effect for eligible students was not statistically significant for the first year of implementation (-0.036*After2014, $p>0.05$) nor the second year and after (-0.036*After2014 + 0.084= 0.048, $p>0.05$).

Overall, eligibility to receive free tuition has a positive but insignificant effect on immediate enrollment as observed in Table 3.4, Model 4 (0.2 percentage points for the first year of implementation; and 1.00 percentage point for the second year and after [0.002*After2014+0.008*After2015=0.100, $p>0.05$]). However, when disaggregating by sector in Models 5 and 6, the apparent lack of effect in the first year of implementation is the result of an increase in the university enrollment (by 1.8 percentage points, shown in Model 6), and a decrease in the vocational sector enrollment (by 1.6 percentage points, shown in Model 5). After the policy was implemented in the vocational sector, the positive and negative effects observed during the first year are reversed and, although both sectors slightly increase their enrollments, none of them was statistically significant (vocational sector: -0.16*After2014+0.020*After2015=0.004, $p>0.05$, shown in Model 5 for the vocational sector; and 0.18*After2014-0.013*After2015=0.006, $p>0.05$, shown in Model 6 for the university sector).

Further, when focusing only on those institutions in the free tuition policy in each sector (Models 7 and 8), the policy had a positive effect on enrollments in both sectors. In the first year of operation, eligibility to receive free tuition increased enrollments by 3.3 percentage points in participating universities, as shown in Model 8. After the second year of implementation, the

policy increased enrollments by 2.0 percentage points in participating vocational institutions (-0.009*After2014+0.029*After2015=0.020, P<0.05).

Lastly, I observe whether the policy impacted enrollment in the highest quality institutions in each sector (Models 9 and 10). Using the institution's years of accreditation as a proxy for quality, I observe that eligibility to receive free tuition had an effect on enrollments in the highest quality institutions only after the vocational sector was included in the policy. The policy increased enrollments by 2.0 percentage points in vocational institutions (-0.005*After2014+0.025*After2015=0.020, p<0.05, shown in Model 8) but, at the same time, decreased enrollments by 2.4 percentage points in the university sector (-0.001*After2014-0.023*After2015=-0.024, p<0.05, shown in Model 9). Observing the estimates for ineligible students in Model 10 after the second year of implementation, I found that ineligible students increased their enrollments by a similar amount as the decrease observed in eligible students.

Table 3.4. Access to Higher Education

	Apply for financial aid (1)	Register for PSU test (2)	1st univ. choice accr-y (3)	Enroll in higher ed. (4)	Enroll vocational HEIs (5)	Enroll univ. (6)	Enroll vocational HEI in Free Tuition (7)	Enroll univ. in Free Tuition (8)	Enroll vocational HEI with 6/7 accr-y (9)	Enroll univ HEI with 6/7 accr-y (10)
Eligible*After2014	-0.020**	-0.029**	-0.036	0.002	-0.016**	0.018**	-0.009	0.033**	-0.005	-0.001
	(0.006)	(0.004)	(0.016)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.022**	0.009	0.084**	0.008	0.020**	-0.013	0.029**	-0.009	0.025**	-0.023**
	(0.005)	(0.003)	(0.017)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible	0.099**	0.029**	-0.008	0.020**	0.024**	-0.004	0.010**	0.016**	0.010**	0.003
	(0.004)	(0.003)	(0.012)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
After2014	0.042**	0.000	0.120**	-0.002	-0.014**	0.012	-0.009**	0.000	-0.010**	0.012
	(0.004)	(0.001)	(0.011)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
After2015	-0.014	-0.004**	0.113**	-0.008	-0.004	-0.004	-0.003	-0.009	-0.002	0.023**
	(0.004)	(0.001)	(0.012)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	860,448	860,448	361,276	860,448	860,448	860,448	860,448	860,448	860,448	860,448

Notes: Coefficients presented from linear probability models, except for the outcome 1st university choice accreditation years which coefficients are from a linear model. **p<0.01, *p<0.05. P-values' significance was adjusted for multiple comparisons using Bonferroni correction. See results without Bonferroni correction in Appendix E. Accr-y means accreditation years. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level. Enrollment estimates represent immediate enrollment.

Effects on Student Persistence

Table 3.5 summarizes the difference-in-differences estimates of the free tuition policy on student persistence to the second year. The first two models of Table 3.5 reveal that eligibility to receive free tuition has a positive but not statistically significant effect on persistence in the higher education system (Model 1) and the same program within the same institution. Similar to the effect on enrollment, the overall effect on persistence masks opposite effects for the vocational and university sectors. As shown in Table 3.5, Models 3 and 4, the null effect in the first year of implementation is the result of a decrease in persistence in the vocational sector (Model 3) and an insignificant increase in the university sector (Model 4). During the second year of operation, this negative effect for the vocational sector and positive effect for the university sector are reversed and no statistical effect of the policy is found (-0.011*After2014+0.021*After2015=0.01, $p>0.05$, see Model 3 for the vocational sector; 0.017*After2014-0.016*After2015=0.001, $p>0.05$, see Model 4 for the university sector).

Models 5 and 6 focus only on those vocational institutions and universities participating in the free tuition policy, respectively. In the first year of operation, when free tuition was available only in the university sector, eligibility increases persistence by 3.1 percentage points in participating universities (Model 6) and does not affect participating vocational institutions (Model 5). After vocational institutions were included in the policy, eligibility to receive free tuition increases persistence in participating vocational institutions by 2.4 percentage points (-0.005*After2014+0.029*After2015=0.021, $p<0.01$, see Model 5) and has a positive but not significant effect on the university sector (0.031*After2014-0.010*After2015=0.021, $p>0.05$, see Model 6).

Models 7 and 8 focus on persistence in the institutions with the highest quality in the vocational and university sectors, respectively. In these institutions, the policy has a positive effect on vocational institutions and a negative effect on universities, but only after the vocational sector was included in the policy (-0.002*After2004+0.026*After2015=0.023, $p<0.01$, see Model 7 for the vocational sector; -0.0001-0.025=-0.026, $p<0.01$, see Model 8 for the university sector).

Table 3.5. Persistence by Type of Institution, Free Tuition Policy Participation, and Institutional Accreditation Years (accr-y)

	Persist 2nd year in H. Ed.	Persist program	Persist vocational HEI	Persist univ.	Persist vocational HEI in Free Tuition	Persist univ. in Free Tuition	Persist vocational HEI with 6/7 accr-y	Persist univ. with 6/7 accr-y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Eligible*After2014	0.006	0.004	-0.011**	0.017	-0.005	0.031**	-0.002	-0.000
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.006	0.003	0.021**	-0.016**	0.029**	-0.010	0.026**	-0.025**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
Eligible	0.013**	0.013	0.020**	-0.008	0.008**	0.013**	0.007	0.001
	(0.004)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
After2014	0.001	-0.006	-0.011**	0.013	-0.007**	0.002	-0.008**	0.012
	(0.004)	(0.005)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
After2015	-0.003	-0.008	-0.003	-0.000	-0.003	-0.005	-0.003	0.024**
	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	860,448	860,448	860,448	860,448	860,448	860,448	860,448	860,448

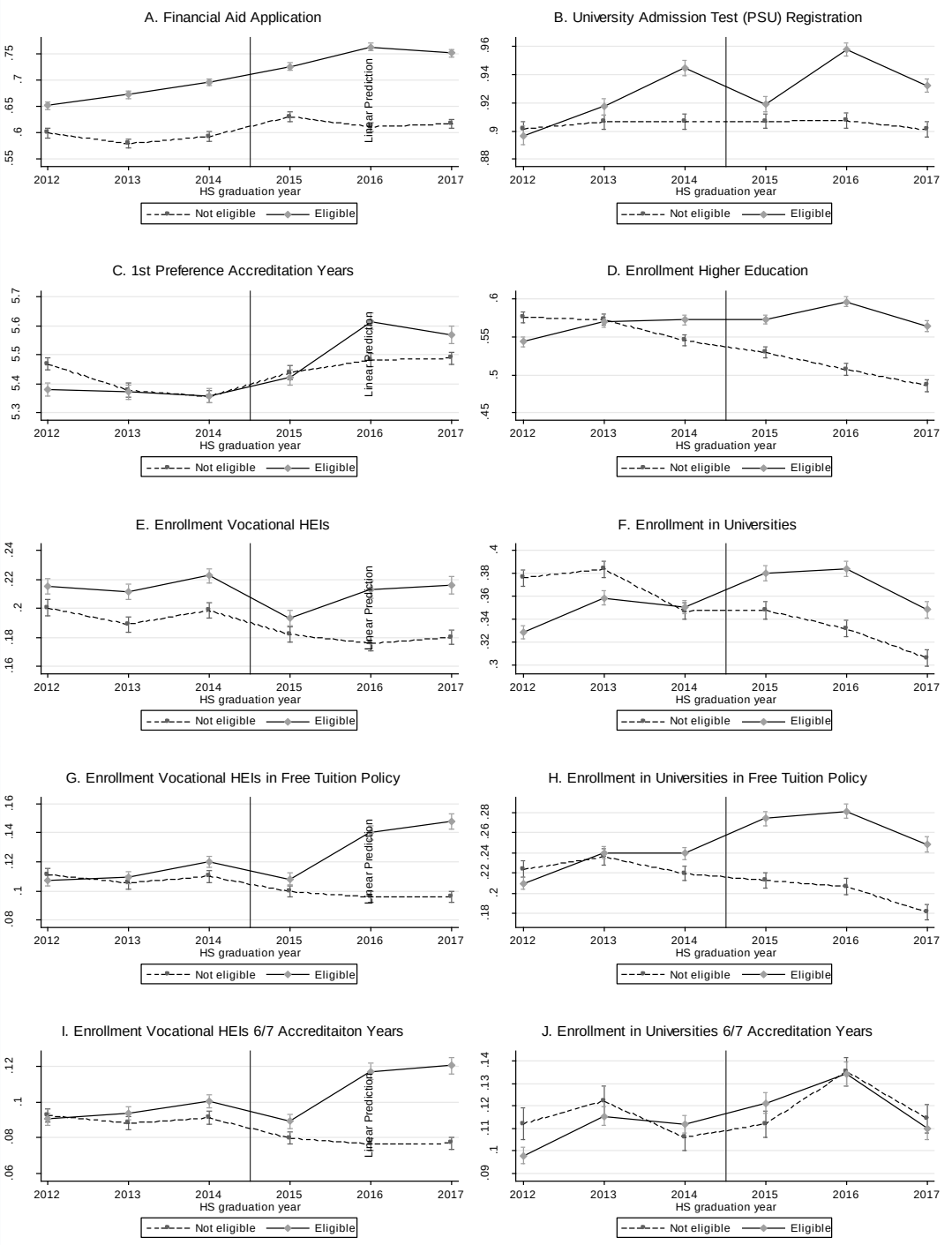
Notes: Persistence conditional on enrollment. **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. See results without Bonferroni correction in Appendix E. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Examining Pre- and Post-Trends in the Outcomes

In order to evaluate whether the parallel trends assumptions, on which the causal interpretation of the DiD estimates relies, are plausible, I examine the pre- and post-policy implementation trends in the outcomes for the eligible and ineligible students (see Figures 3.3 and 3.4, see the estimates in Appendix D). Overall, I found no differences in trends in the enrollment in vocational institution outcomes (see Figure 3.3.E), including enrollment in vocational HEIs participating in the free tuition policy and vocational HEIs with the highest accreditation levels (see Figures 3.3.G and 3.3.I). For the rest of the enrollment outcomes, I observe two issues: non-parallel prior trends and a differential trend in the eligible and ineligible student outcomes, but only in the first year of observation (i.e., 2012). Although these issues can be a threat to the internal validity of the DiD estimates, I mitigate these problems by including differential time trends for eligible and ineligible students, relaxing the parallel trend assumption (Angrist & Pischke, 2015), and performing a robustness check excluding the first year of observation in the analysis.

In detail, I observe that the outcomes that have no parallel prior trends are enrollment in higher education (Figure 3.3.D), university admission test registration (Figure 3.3.B), and the outcomes related to university enrollments (Figures 3.3.F, 3.3.H, 3.3.J). For instance, before the policy implementation, ineligible students present a decreasing trend in their higher education enrollment, while eligible students present an increasing trend (see Figure 3.3.D, Enrollment in Higher Education). I observe the second issue, related to a differential pre-policy pattern in the first year of observation between eligible and ineligible student outcomes, in the financial aid application (Figure 3.3.A) and accreditation years of the university of the first choice (Figure 3.3.C) outcomes.

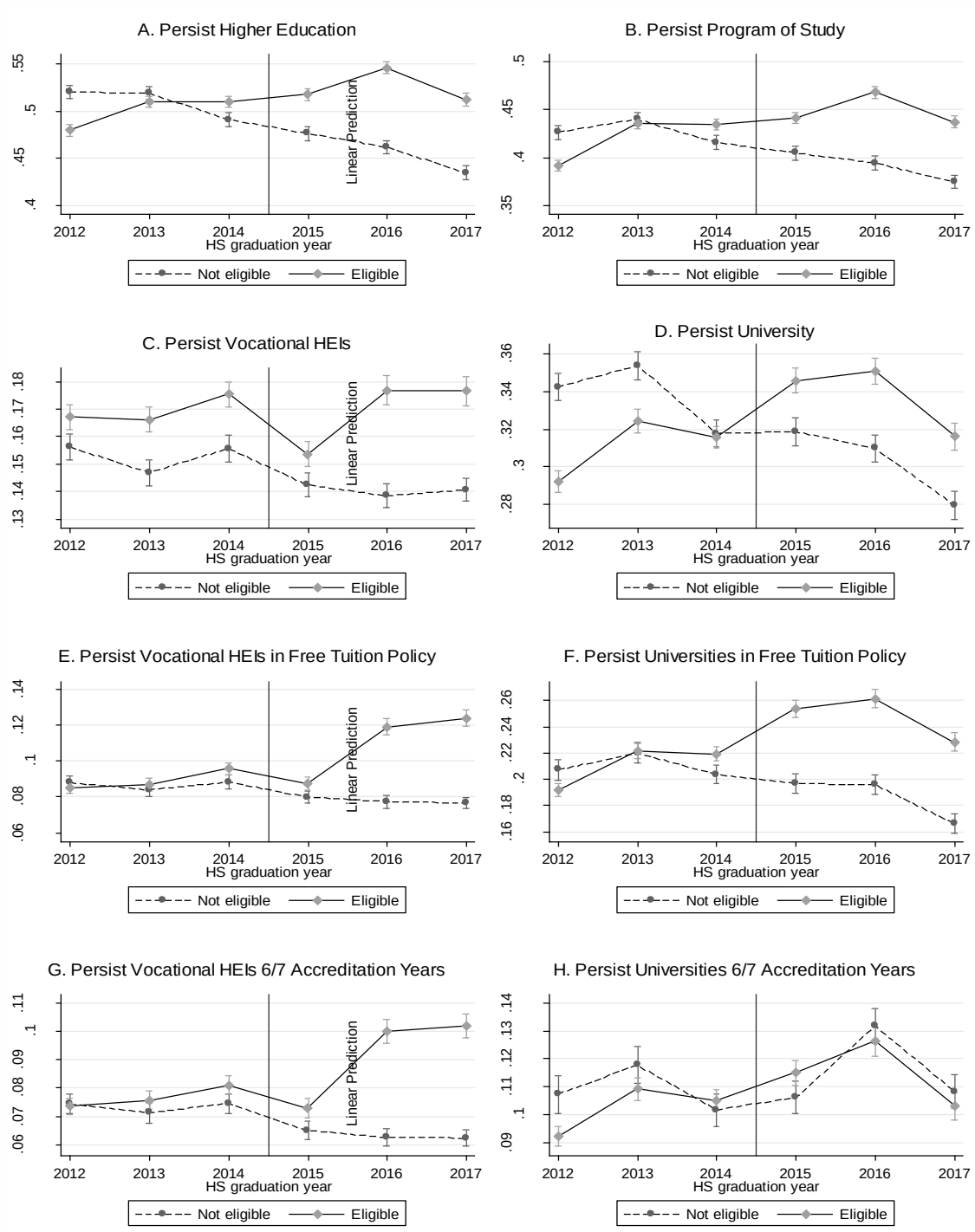
Figure 3.3. Marginal Effects of Eligibility to Receive Free Tuition on Access Outcomes



Notes: Estimates and its 95% confident interval presented are the marginal effects of the interaction between eligibility and fixed-effect high school graduation year based on linear probability models. All models control by student sociodemographic characteristics and high school characteristics. Standard errors clustered at the high school level. The vertical line represents the free tuition policy implementation.

For the persistence outcomes, I found similar issues of non-parallel prior trends and a differential trend in the first year of observation. I mitigated them using a similar approach to the one described in the enrollment outcomes. The only outcomes that present no differences in trends are persistence in vocational HEIs (Figure 3.4.C), including persistence in vocational HEIs in the free tuition policy (Figure 3.4.E) and in vocational HEIs with 6/7 accreditation years (Figure 3.4.G). Outcomes that present a differential trend in the previous policy implementation period are persistence in higher education (Figure 3.4.A), in their program of study (Figure 3.4.B), and in universities (Figure 3.4.D). The outcomes that have a differential trend only in the first year of observation are persistence in universities participating in the free tuition policy (Figure 3.4.F) and persistence in universities with 6/7 accreditation years (Figure 3.4.H).

Figure 3.4. Marginal Effects of Eligibility to Receive Free Tuition on Persistence Outcomes



Notes: Estimates and its 95% confident interval presented are the marginal effects of the interaction between eligibility and fixed-effect high school graduation year based on linear regression models. All models control by student sociodemographic characteristics and high school characteristics. Standard errors clustered at the high school level. The vertical line represents the free tuition policy implementation.

Robustness Checks

Tables 3.6 and 3.7 present the results for two robustness checks on access and persistence outcomes, respectively. In the first check, I excluded the first high school graduation cohort as some outcomes showed a differential trend in the first year of observation between eligible and ineligible students. As shown in Table 3.6 for access outcomes, and Table 3.7 for persistence outcomes, excluding the first cohort slightly changes the estimate's magnitude, resulting in some effects becoming significant and others insignificant. For instance, the estimate for the second year of implementation and after the enrollment in higher education outcome (Table 3.6, Model 4), changed from 0.008 to 0.026 becoming statistically significant ($p < 0.01$). Something similar happens to the outcomes of enrollment in a vocational HEIs (Table 3.6, Model 5), persistence in higher education (Table 3.7, Model 1), persistence in the same program of study (Table 3.7, Model 2), persistence in a vocational HEIs (Table 3.7, Model 3), and persistence in a university (Table 3.7, Model 4). The only outcome that changes from a negative to a positive but insignificant effect is applying for financial aid. As shown in Table 3.6, Model 1, excluding the first cohort of observation changes the first year of implementation estimate for eligible students from -0.020 to 0.004. Overall, this analysis corroborates that the main results are robust to slight departures in the differential trends during the first year of observation.

For the second robustness check, I included the missing cases for parents' education in the category less than high school and included a dummy to identify those cases. Parent's education is the variable with the most missing cases (n=29,682, 3%). As shown in Tables 3.6 and 3.7, no difference is found between the main results and the results including the missing cases for parents' education. In sum, these analyses confirm that the main results presented in the

previous section are robust to slight departures in the differential trend and are not bias due to missing cases in parent's education.

Table 3.6. Robustness Checks for Access Outcomes

	Apply for financial aid (1)	Register for PSU test (2)	1st univ. preference accreditation years (3)	Enroll in higher ed. (4)	Enroll vocational HEI (5)	Enroll univ. (6)	Enroll vocational HEI in Free Tuition (7)	Enroll univ. in Free Tuition (8)	Enroll vocational HEI with 6/7 accr-y (9)	Enroll univ. HEI with 6/7 accr-y (10)
Main Results										
Eligible*After2014	-0.020**	-0.029**	-0.036	0.002	-0.016**	0.018**	-0.009	0.033**	-0.005	-0.001
	(0.006)	(0.004)	-0.016	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.022**	0.009	0.084**	0.008	0.020**	-0.013	0.029**	-0.009	0.025**	-0.023**
	(0.005)	(0.003)	-0.017	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
N	860,448	860,448	361,276	860,448	860,448	860,448	860,448	860,448	860,448	860,448
Robustness 1: HS Graduation Years 2013-2017										
Eligible*After2014	0.004	-0.019**	0.020	0.018	-0.012	0.030**	-0.009	0.043**	-0.003	0.003
	(0.006)	(0.004)	(0.018)	(0.006)	(0.004)	(0.005)	(0.003)	(0.006)	(0.003)	(0.004)
Eligible*After2015	0.053**	0.022**	0.158**	0.026**	0.025**	0.001	0.029**	0.003	0.028**	-0.020**
	(0.006)	(0.004)	(0.020)	(0.006)	(0.004)	(0.005)	(0.003)	(0.006)	(0.003)	(0.005)
N	717,800	717,800	307,849	717,800	717,800	717,800	717,800	717,800	717,800	717,800
Robustness 2: Including missing cases in parents' education										
Eligible*After2014	-0.020**	-0.029**	-0.036	0.002	-0.015**	0.018**	-0.008	0.032**	-0.005	-0.001
	(0.006)	(0.004)	(0.016)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.021**	0.008	0.084**	0.007	0.020**	-0.013	0.029**	-0.009	0.025**	-0.023**
	(0.005)	(0.003)	(0.017)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.002)	(0.004)
N	890,130	890,130	362,625	890,130	890,130	890,130	890,130	890,130	890,130	890,130

Notes: **p<0.01, *p<0.05. P-values' significance adjusted for multiple comparisons using Bonferroni correction. See results without Bonferroni correction in Appendix E. Accr-y means accreditation years. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level.

Table 3.7. Robustness Checks for Persistence Outcomes

	Persist 2nd year (1)	Persist program (2)	Persist vocational HEI (3)	Persist univ. (4)	Persist vocational HEI in Free Tuition (5)	Persist univ. in Free Tuition (6)	Persist vocational HEI with 6/7 accr-y (7)	Persist univ. with 6/7 accr-y (8)
Main Results								
Eligible*After2014	0.006	0.004	-0.011**	0.017	-0.005	0.031**	-0.002	-0.000
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.006	0.003	0.021**	-0.016**	0.029**	-0.010	0.026**	-0.025**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
N	860,448	860,448	860,448	860,448	860,448	860,448	860,448	860,448
Robustness 1: HS Graduation Years 2013-2017								
Eligible*After2014	0.021**	0.021**	-0.007	0.027**	-0.005	0.041**	-0.001	0.002
	(0.006)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.023**	0.023**	0.027**	-0.005	0.029**	-0.001	0.028**	-0.024**
	(0.006)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
N	717,800	717,800	717,800	717,800	717,800	717,800	717,800	717,800
Robustness 2: Including missing cases in parents' education								
Eligible*After2014	0.005	0.004	-0.012**	0.016	-0.005	0.031**	-0.002	-0.000
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.002)	(0.004)
Eligible*After2015	0.005	0.003	0.021**	-0.016**	0.029**	-0.011	0.025**	-0.025**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	890,130	890,130	890,130	890,130	890,130	890,130	890,130	890,130

Notes: Persistence conditional on enrollment. **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. See results without Bonferroni correction in Appendix E. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Heterogeneity Effects

I examined heterogeneity effects by sex and high school track on access (Table 3.8) and persistence outcomes (Table 3.9). I found that, when free tuition was available only in universities, the decrease in enrollment in vocational HEIs was stronger for females than for males. Moreover, when the vocational sector was included in the policy, I found opposite but not significant gender effects of eligibility to receive free tuition on financial aid application, enrollment, and persistence in vocational HEIs. The estimates on these outcomes are positive for males and negative for females. No substantial effects of high school track were found on access and persistence outcomes.

Table 3.8. Heterogeneity Effects on Access Outcomes

	All	Female	Male	Vocational HS track	Academic HS track
Apply financial aid					
Eligible*After2014	-0.020**	-0.022	-0.018	-0.021	-0.017
	(0.006)	(0.007)	(0.008)	(0.017)	(0.006)
Eligible*After2015	0.022**	0.011	0.034**	0.033	0.012
	(0.005)	(0.006)	(0.007)	(0.014)	(0.005)
N	860,448	454,562	405,886	343,362	517,086
Register PSU test					
Eligible*After2014	-0.029**	-0.022**	-0.038**	-0.03	-0.002
	(0.004)	(0.004)	(0.006)	(0.011)	(0.002)
Eligible*After2015	0.009	0.005	0.013	0.029	0.004
	(0.003)	(0.003)	(0.005)	(0.010)	(0.002)
N	860,448	454,562	405,886	343,362	517,086
N. accreditation years 1st univ. preference					
Eligible*After2014	-0.036	-0.030	-0.040	-0.050	-0.022
	(0.016)	(0.021)	(0.022)	(0.069)	(0.017)
Eligible*After2015	0.084**	0.083**	0.099**	0.126	0.088**
	-0.017	(0.021)	(0.023)	(0.086)	(0.019)
N	361,276	198,322	162,954	50,278	310,998
Enrollment in Higher Education					
Eligible*After2014	0.002	-0.001	0.007	-0.003	0.005
	(0.005)	(0.007)	(0.007)	(0.017)	(0.006)
Eligible*After2015	0.008	0.001	0.015	0.017	0.001

	(0.005)	(0.006)	(0.006)	(0.015)	(0.005)
N	860,448	454,562	405,886	343,362	517,086
Enrollment in Vocational HEI					
Eligible*After2014	-0.016**	-0.018**	-0.014	-0.006	-0.012
	(0.004)	(0.005)	(0.005)	(0.015)	(0.004)
Eligible*After2015	0.020**	0.012	0.030**	0.026	0.018**
	(0.003)	(0.004)	(0.005)	(0.015)	(0.004)
N	860,448	454,562	405,886	343,362	517,086
Enrollment in University					
Eligible*After2014	0.018**	0.016	0.02	0.003	0.017
	(0.005)	(0.007)	(0.006)	(0.014)	(0.006)
Eligible*After2015	-0.013	-0.011	-0.015	-0.008	-0.017
	(0.004)	(0.006)	(0.006)	(0.012)	(0.005)
N	860,448	454,562	405,886	343,362	517,086

Notes: **p<0.01, *p<0.05. P-values' significance was adjusted for multiple comparisons using Bonferroni correction. See results without Bonferroni correction in Appendix E. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level.

Table 3.9. Heterogeneity Effects on Persistence Outcomes

	All	Female	Male	Vocational HS track	Academic HS track
Persistence in Higher Education					
Eligible*After2014	0.006	0.003	0.008	-0.001	0.006
	(0.005)	(0.007)	(0.007)	(0.016)	(0.006)
Eligible*After2015	0.006	-0.002	0.014	0.019	0.001
	(0.005)	(0.006)	(0.006)	(0.015)	(0.005)
N	860,448	454,562	405,886	343,362	517,086
Persistence in Program of Study					
Eligible*After2014	0.004	-0.000	0.009	0.002	0.007
	(0.005)	(0.007)	(0.007)	(0.016)	(0.006)
Eligible*After2015	0.003	-0.002	0.008	0.042	-0.006
	(0.005)	(0.006)	(0.007)	(0.015)	(0.006)
N	860,448	454,562	405,886	343,362	517,086
Persistence in Vocational HEI					
Eligible*After2014	-0.011**	-0.012	-0.011	-0.004	-0.009
	(0.003)	(0.004)	(0.005)	(0.014)	(0.004)
Eligible*After2015	0.021**	0.012	0.032**	0.039	0.019**
	(0.003)	(0.004)	(0.005)	(0.014)	(0.004)
N	860,448	454,562	405,886	343,362	517,086
Persistence in University					
Eligible*After2014	0.017	0.015	0.018	0.006	0.016
	(0.005)	(0.007)	(0.006)	(0.012)	(0.006)

Eligible*After2015	-0.016**	-0.013	-0.019	-0.007	-0.019**
	(0.004)	(0.006)	(0.006)	(0.011)	(0.005)
N	860,448	454,562	405,886	343,362	517,086

Notes: **p<0.01, *p<0.05. P-values' significance was adjusted for multiple comparisons using Bonferroni correction. See results without Bonferroni correction in Appendix E. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Discussion

Free tuition policies have been drawing the attention of public opinion, politicians, and policymakers in different countries around the world (Salmi & D'Addio, 2020). However, evidence about their effects on student outcomes is still scarce and is mainly focused on the U.S. context. In this study, I provided evidence of the effects of a free tuition policy implemented in Chile in 2016 on student access and persistence in higher education. Overall, I found that the Chilean free tuition policy has a negligible effect on higher education enrollments. This lack of significant effects agrees with Arzola (2021), who studied the effect of Chilean policy in its first year of implementation but slightly disagrees with Martin (2021), who found a positive effect of the policy in its first two years of implementation. This difference may be due to Martin using financial aid data to classify eligible and ineligible students, which would tend to induce a positive selection bias. Results using PE3, which corrects eligibility imputation using financial aid data and would be subject to the same bias as Martin yielded similar results. Internationally, these results agree with Nguyen (2019), who found no effect on enrollments of a free tuition program implemented in the vocational and university sector in the state of New York (Excelsior program).

Nevertheless, this lack of an effect on overall enrollments is masking an effect on shifting students from the vocational to the university sector when only universities were included in the policy. When both sectors were included in the policy, no effect was found by sector. Thus, these results suggest a substitution effect induced by the free tuition policy on student preferences

(Admon, 2005; Rouse, 1995). Similar results of diverging students from one sector to another are found in the U.S. literature when only two-year institutions are included in the free tuition policies (Gándara & Li, 2020; Gurantz, 2020). Thus, these results point to a change in the enrollment composition by sector, more than an overall increase in enrollments, when only one sector is included in the policy.

When considering only the institutions that are part of the policy, I found a positive effect of the policy, equivalent to three percentage points, on eligible student enrollment in universities in the first year of implementation, and a slightly lower effect on enrollments in the vocational institutions after the second year of implementation. These increases in enrollments in participating institutions in addition to the lack of effect on overall enrollments suggests that the policy is able to change student preferences to the institutions designated as those with "enough quality." In this sense, the policy could be fulfilling one of its goals of promoting equity and inclusion in quality education (Bachelet, 2013). However, in the long run, this increase in enrollments may lead to an increase in institutional selectivity as there will be more demand, but the policy also restricts the institution's enrollment growth. A scenario like this was predicted by Bucarey (2018) in a simulation of the effect of the Chilean free tuition policy on student enrollments.

When considering the effect of the policy only on institutions with the maximum years of accreditation, I found that the policy increases eligible student enrollments in vocational institutions with the highest quality, but decreases enrollments in universities with similar quality after the policy was implemented in the vocational sector. Overall, these results suggest that the policy changed student preferences to institutions with higher quality only in the vocational sector, which is open access. However, in the university sector, it is possible that the institutions

with higher quality are increasing their pool of applicants, as suggested by the increase in the years of accreditation of students' first university preference in the admission system. If this is the case, these universities could be increasingly more selective and crowd out eligible students, who tend to be at the margins to gain admission to selective institutions under the standardized admission system. Indeed, the policy seems to be diverging students from high-quality universities to universities with slightly less quality as the estimate is negative for university enrollment with 6/7 years of accreditation in the second year and after, but is positive for enrollment in universities that are part of the policy, which include universities with 4 years of accreditation or more.

Beyond the effect on enrollments, the free tuition policy has a positive effect on financial aid applications and the quality of the student's first preference in the university admission process. These positive effects are found for eligible and ineligible students, indicating possible spillover effects. These results are in line with studies in the U.S. that found community effects of place-based free tuition programs (Swanson et al., 2020). As pointed out by the theoretical framework (Perna, 2006), a policy can affect students' decisions to enroll in college by affecting their context. Regarding the effect on financial aid, discussions about the free tuition policy received great attention in the Chilean public media and could have created awareness of financial aid among the population inducing eligible and ineligible students to apply. Regarding the change in college preferences, the policy can be affecting the higher education context signaling the institutions that are considered of enough quality. In this way, eligible and ineligible students are receiving the same signal about what institutions they should consider in their application process. Future research can focus on understanding the effect of the policy on ineligible populations.

When considering outcomes related to the university sector, I found a negative effect on registration to the university admission test, a test that is needed to apply and enroll in the universities included in the policy. It is unlikely that this negative effect is related to the policy during the first year of implementation, as registration for the test happens generally in August and the policy was first approved in December 2015, when registration for the test was already closed. After the policy was implemented in the vocational sector, the negative effect persist but decreases its magnitude. I also found a positive effect on increasing the quality of the student's first preference after the second year of implementation, indicating an effect of the policy on changing student preferences. This result is in line with Andrews et al. (2010), who found that a place-based free tuition program in the U.S. (The Kalamazoo Promise) changed the student college choice set after policy implementation. Overall, results related to university access indicate a possible delay of the policy effects on eligible students. More research is needed including more years after implementation to fully understand the effect of the policy on registration for the university test and students' preferences.

On persistence, results indicate that the effect of the policy depends on the sector. During the first year of implementation, when only universities were eligible to be part of the policy, eligibility to receive free tuition decreased persistence to the second year in vocational institutions and increased persistence in universities. After the policy was implemented in the vocational sector, eligibility to receive free tuition had no effect on persistence on either sector, suggesting that the design of the policy is important. However, when considering only those institutions in the policy, I found positive effects on persistence in both sectors, suggesting that free tuition is able to increase persistence of the treated students. More research that focuses on

the effect on treated students is needed to affirm this suggestion as my research focuses on the intent-to-treat effect.

Similar to enrollment patterns, eligibility to receive free tuition increased persistence in vocational institutions with the maximum quality but decreased persistence in universities with the same quality. In this case, as suggested by the theoretical framework (Aina et al., 2021), the university context may not be aligned with the needs of eligible students that gain access and enroll in the most selective universities in the country.

Finally, I found that the policy had opposite but not significant effects on males and females only after the policy was implemented in the vocational sector. While males tend to increase their application for financial aid, enrollment, and persistence in vocational HEIs, females tend to decrease these same outcomes. However, these estimates were not statistically significant. Interestingly, these results differ from Gándara and Li (2020), who examine heterogeneity effects by race and gender of place-based free tuition programs in vocational institutions in the U.S. context. They found that females were the group with the greatest increase in their enrollment rate after program implementation. More research is needed to identify whether there is a differential effect and what contextual, or policy design factors may be affecting males and females differentially.

Implications for Research and Policymakers

I derive several implications from this study. First, I found that a free tuition policy is able to change student preferences from the vocational to the university sector when only universities were included in the policy. In this sense, policymakers should consider carefully which sector to include in the policy and the order of their inclusion as only including one sector seems to trigger a substitution effect. A policy that is implemented in both sectors at the same

time or first implemented in the vocational sector and then, maybe, includes the university sector and an effective transfer program, could be more aligned with students' preferences and avoid the transfer of students from one sector to another. This issue has also implications for researchers as only considering one sector when evaluating the effects of a free tuition policy could result in a partial evaluation of the policy effects and mask the effect of the policy on overall estimates.

Free tuition policies are powerful instruments as they are able to change targeted and non-targeted student behaviors, as shown by the results of application for financial aid and the change in the accreditation years of the first preference when applying to universities. Therefore, policymakers, when designing such a policy, should keep in mind the possible spillovers to the community that could affect the policy's effectiveness. For instance, including only some institutions in the policy could signal which institutions are of high quality, increasing the demand for those institutions and the institution's selectivity. An increase in selectivity could result in crowding out low-income eligible students from those institutions, especially if admission is based on standardized tests as low-income students tend to be the less prepared to score high on those tests.

In the case of Chile, the free tuition policy is successful in increasing financial aid applications, changing student preference for institutions of higher quality, and increasing persistence in those institutions that are part of the policy. However, it is not inducing more students to enroll in higher education in general. Probably, just providing free tuition without any other financial assistance that covers other costs of attending college or other types of assistance that help future students to navigate the application process may not be enough to induce low-income students to go to college. Policymakers should consider maintenance loans and grants,

such as those implemented in the UK (Dearden et al., 2014), or work-study programs, such as those implemented in the U.S. (Scott-Clayton & Minaya, 2016; U.S. Department of Education, 2014), along free tuition policies to support students living expenses. Practitioners in HEIs may also revise their application processes and the information they provide to prospective students to help eligible students to navigate this process. Future research can focus on understanding eligible student perceptions about the policy and the application process to understand why the free tuition policy is not increasing enrollment rates. In addition, more research is needed to understand the long-term effects of the policy. It is possible that, in the long-run, the policy increases eligible students' college-going expectations, which could result in increasing their enrollments in higher education.

In the case of Chile, there is evidence that applicants are able to manipulate financial aid applications and be classified into the eligibility threshold to receive free tuition. Therefore, there is a need for more accountability to assign policy benefits as public resources are being used to finance some ineligible students. In terms of policy evaluation, the inclusion of these students is biasing estimates upward as they have higher probabilities of attending and persisting in higher education independently of receiving or not free tuition.

This study also makes contributions to the literature. First, I examine the effect of the policy on college access, including financial aid application, registration for the university standardized test, student preferences, and enrollment. Most of the Chilean literature examining the effect of financial aid policies focus only on enrollments and does not conceptualize enrollment as the final decision of a college choice process. By including early indicators of the college choice process, I acknowledge that the free tuition policy can affect other steps of this process. I also disaggregated overall persistence by sector and quality of the institution. The

studies that have explored the effect of free tuition policies on persistence usually focus on overall persistence. For instance, Page et al. (2019) found a positive effect of a place-based free tuition policy on persistence to the second year, but they do not disaggregate the effect by sector. By disaggregating the effect, it is possible to observe shifts within the system. Methodologically, my contribution is to use an out-of-sample prediction based on the socioeconomic characterization survey to identify eligible and ineligible students. By using this method, I overcome the bias introduced by self-selection into financial aid applications and the possibility of financial aid manipulation.

Conclusion

In sum, the case of Chile demonstrates that a free tuition policy is a powerful instrument to move students from one sector to another or to institutions included in the policy. It is also successful in increasing eligible student persistence in universities and vocational institutions included in the policy. However, I found a negligible effect on increasing eligible student enrollment rates.

Therefore, the design of the policy is important to introduce changes in college choice and promote equity by, for instance, moving students to institutions of higher quality. However, free tuition does not appear to be sufficient to change eligible students' enrollments. Further research is needed to understand why the policy is not effective in increasing enrollment rates. More financial and non-financial assistance may be needed to increase the enrollments of low-income students.

As this study focuses on the three first years of the policy implementation, future research should focus on a longer observation period to assess the long-term effects of the Chilean free tuition policy. Additionally, a longer observation period would allow for assessing the effect on

graduation and labor market outcomes. Results related to persistence to the second year are promising, but future research is needed to assess whether the free tuition policy is successful in decreasing the gaps in graduation rates and labor market opportunities between low- and high-income students.

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Appendix A

Predicting Eligibility to Receive Free Tuition Based on CASEN 2015.

The data available for the analysis did not identify who is or is not eligible (or would have been eligible) to receive free tuition. I solve this issue by making an out-of-sample prediction based on the 2015 Chilean National Socioeconomic Characterization Survey (*Encuesta de Caracterización Socioecónomica*, CASEN). The CASEN is a nationally representative household survey used by the Chilean government to estimate the magnitude of poverty and the income distribution in the country.

Sample

The sample used to predict eligibility for free tuition is based on high school students interviewed in the 2015 CASEN. In total, the CASEN interviewed 15,005 high school students in the country. Of those, three cases have their family income decile missing and were not considered in the analysis.

Dependent Variable

The eligibility to receive free tuition during the first two years of operation was based on having a family income in one of the first five income deciles in the country. In the third year of operation, eligibility was expanded to students from the sixth family income decile. Following Page et al. (2019), I restricted eligibility to those individuals who consistently would or would not be eligible. Thus, eligible individuals are those classified in the first five family income deciles and ineligible students are those classified in the last four family income deciles. Moreover, I decided to drop the individuals classified in the fifth family income decile from the eligible category. I made this decision to improve accuracy when predicting eligibility as predicting individuals in the margins of eligibility was very imprecise. Thus, the total number of

eligible high school students in the sample is 8,766 high school students who were classified as belonging to the first four family income deciles, and therefore eligible to receive free tuition. 3,359 students were classified in the last four income deciles and therefore, they are ineligible. 2,877 students are classified in the fifth and sixth family income deciles. Of the 15,002 high school students with family income data, 55 (0.4%) have at least one of the independent variables described below missing and were not included in the analysis.

Independent Variables

I used the following independent variables available in the CASEN dataset to predict students' eligibility status. At the student level, CASEN provides the following sociodemographic characteristics: sex (1=male, 2= female), maximum educational level achieved by their caregivers (from 1=No formal education to 8=Graduate education), whether the student attended a vocational (=1) or academic high school track (=0). At the high school level, CASEN provides the following characteristics: administrative dependency (1= Public, 2= Subsidized, 3= Private); and region where the high school is located. To better characterize the student socioeconomic context, I supplemented this dataset with the vulnerability high school index provided by the Free Meal High School Program (*Junta Nacional de Auxilio Escolar y Becas*, JUNAEB, ranges from 0 to 100). This vulnerability index is a measure of students that are low-income and are prone to school absenteeism in each public and subsidized school. I also merged the average amount of parental monetary contribution to private but publicly subsidized schools (1=low, 2=medium-low, 3=medium-high, 4=high) provided by the Ministry of Education (MINEDUC).

Prediction Strategy

My prediction strategy involves a series of logistic and multinomial regressions. First, I predicted classification into the family income deciles 1-4, 7-10, 1-6, and 5-10 using four separate logistic regressions. In some models, I used interactions term to improve the accuracy of the prediction. Results of these models are presented in Table A.3.1. The first two estimations predict eligible and ineligible students' status. The last two estimations include students that I will not consider in the analysis. Running these regression models allows me to later cross-identify students classified in both models and therefore classified as ambiguous for my analysis as they are most likely classified into the fifth and sixth family income deciles. After predicting the category of interest, I assigned cases to 1 (belong to income deciles of interest) or 0 (not belonging to the deciles of interests) using a cutoff that maximized the sensitivity and specificity of each estimation. The accuracy of each prediction and the cutoffs used to classify students in each category are presented in Table A.3.2. As shown in Table A.3.1, each model correctly classified, as true positives or true negatives, between 69% and 76% of cases.

For the second approach, I use a multinomial logistic regression to predict belonging to the deciles 1-4, 5-6, and 7-10. Results are shown in Table A.3.3. After calculating the predicted probability of belonging to the eligible and ineligible groups, I classified them as definitely predicting belonging to 1-4 deciles, definitely predicting belonging to 7-10 deciles, and ambiguous using the method described in the Stata *mlogit* post estimation manual. The accuracy of the multinomial logistic regression prediction is presented in Table A.3.4. As shown in this Table, the multinomial logistic regression approach correctly classified more than 90% of the students in deciles 1-4 but it only correctly classified 53% of the students in deciles 7-10.

After I run each model using the CASEN sample, I stored the estimates and used them to predict each dependent variable of interest in the high school graduate sample. For the logistic regression approach, I used the same cutoffs that I use in the CASEN sample to assign students their eligibility status. For the multinomial logistic regression approach, I used the same method described above to assign cases to each group.

Table A.3.1. Logistic regressions predicting income deciles. CASEN 2015

	Decile 1 to 4		Decile 7 to 10		Decile 1 to 6		Decile 5 to 10	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Max. parents' educational level. Ref. cat. High school complete								
No education	0.948**	(0.352)	-1.303*	(0.586)	1.303*	(0.586)	-0.948**	(0.352)
Elementary/Middle incomplete	0.867**	(0.081)	-1.215**	(0.149)	1.176**	(0.147)	-0.869**	(0.081)
Elementary/Middle complete	0.564**	(0.067)	-0.664**	(0.105)	0.664**	(0.105)	-0.564**	(0.067)
High school incomplete	0.388**	(0.058)	-0.539**	(0.088)	0.539**	(0.088)	-0.388**	(0.058)
Higher education incomplete	-0.577**	(0.085)	0.713**	(0.096)	-0.719**	(0.096)	0.575**	(0.085)
Higher education complete	-1.450**	(0.057)	1.565**	(0.058)	-1.565**	(0.058)	1.450**	(0.057)
Graduate education	-2.918**	(0.395)	3.151**	(0.275)	-3.151**	(0.275)	2.918**	(0.395)
Average high school copay. Ref. cat. No copay								
Low level	-0.092	(0.060)	0.394	(0.223)	-0.386	(0.224)	0.092	(0.060)
Medium low level	-0.227**	(0.087)	0.600	(0.328)	-0.598	(0.328)	0.227**	(0.088)
Medium high level	-0.568**	(0.085)	0.796*	(0.346)	-0.794*	(0.346)	0.568**	(0.085)
High level	-1.075**	(0.112)	2.118**	(0.293)	-2.117**	(0.293)	1.075**	(0.112)
Full	11.143**	(1.020)	26.792**	(1.150)	-28.301**	(1.173)	-11.145**	(1.020)
Vulnerability high school index for free lunch	0.004**	(0.001)	-0.006**	(0.001)	0.006**	(0.001)	-0.004**	(0.001)
*Interaction Av. HS copay * HS vulnerability index for free lunch*								
Low copay * HS vulnerability index for free lunch			-0.005	(0.003)	0.005	(0.003)		
Medium-low copay * HS vulnerability index for free lunch			-0.006	(0.005)	0.006	(0.005)		
Medium-high copay * HS vulnerability index for free lunch			-0.005	(0.007)	0.005	(0.007)		
High copay * HS vulnerability index for free lunch			-0.029**	(0.007)	0.029**	(0.007)		
Full copay * HS vulnerability index for free lunch			-0.105	(0.084)	0.105	(0.084)		
HS administration dependency. Ref. cat. Subsidized								
Public	0.023	(0.054)	-0.028	(0.082)	0.030	(0.082)	-0.023	(0.054)
Private	-13.018**	(1.005)	-24.894**	(1.150)	26.402**	(1.174)	13.020**	(1.005)
Vocational HS track (vs. academic track)	0.123**	(0.046)	-0.222*	(0.093)	0.226*	(0.093)	-0.123**	(0.046)
*Interaction HS adm. Dependency * HS vocational track*								
Public* Vocational HS track			-0.002	(0.123)	-0.000	(0.123)		

Private* Vocational HS track				11.989**	(0.567)	-12.744**	(0.565)		
Male		-0.054	(0.038)	0.073	(0.048)	-0.070	(0.048)	0.055	(0.038)
Region. Ref. cat. 13									
	1	-0.026	(0.107)	-0.154	(0.134)	0.155	(0.134)	0.026	(0.107)
	2	-0.494**	(0.116)	0.374**	(0.137)	-0.376**	(0.137)	0.493**	(0.116)
	3	-0.082	(0.090)	0.314**	(0.106)	-0.316**	(0.106)	0.082	(0.090)
	4	0.442**	(0.096)	-0.480**	(0.117)	0.480**	(0.117)	-0.442**	(0.096)
	5	0.489**	(0.074)	-0.583**	(0.090)	0.583**	(0.090)	-0.489**	(0.074)
	6	0.282**	(0.079)	-0.320**	(0.097)	0.320**	(0.097)	-0.282**	(0.079)
	7	0.299**	(0.087)	-0.320**	(0.117)	0.322**	(0.117)	-0.299**	(0.087)
	8	0.808**	(0.069)	-0.831**	(0.088)	0.821**	(0.088)	-0.809**	(0.069)
	9	0.822**	(0.085)	-0.759**	(0.112)	0.759**	(0.111)	-0.822**	(0.085)
	10	0.225**	(0.081)	-0.157	(0.102)	0.151	(0.102)	-0.226**	(0.081)
	11	-0.465**	(0.156)	0.741**	(0.163)	-0.740**	(0.163)	0.465**	(0.156)
	12	-0.332*	(0.144)	0.175	(0.164)	-0.176	(0.164)	0.331*	(0.144)
	14	0.612**	(0.105)	-0.658**	(0.142)	0.659**	(0.142)	-0.612**	(0.105)
	15	0.661**	(0.198)	-0.614*	(0.276)	0.615*	(0.276)	-0.661**	(0.198)
Constant		0.077	(0.087)	-1.175**	(0.114)	1.176**	(0.114)	-0.077	(0.087)
Observations		14,947		14,947		14,947		14,947	

Notes: Robust standard errors in parentheses. **p<0.01, * p<0.05.

Table A.3.1. Prediction Accuracy. Logistic Regression Approach

	Deciles 1-4	Deciles 7-10	Deciles 1-6	Deciles 5-10
True positive (sensitivity): % Students in deciles correctly classified	69.14	74.55	75.51	70.14
True negative (specificity): % Students not in deciles correctly classified	70.12	75.54	74.49	69.15
% Students in the predicted deciles correctly assigned	76.46	46.80	91.11	61.81
% Students not in the predicted deciles correctly assigned	61.81	91.14	46.77	76.48
Cut-off	0.64	0.18	0.82	0.36

Table A.3.2. Multinomial Logistic Regression Predicting Income Decile Categories. CASEN 2015

		Ref. cat. Decile 5-6			
		Decile 1-4	(SE)	Decile 7-10	(SE)
Max. parents' educational level. Ref. cat. High school complete					
No education		0.721	(0.386)	-0.720	(0.654)
Elementary/Middle incomplete		0.680**	(0.091)	-0.650**	(0.168)
Elementary/Middle complete		0.466**	(0.077)	-0.298*	(0.122)
High school incomplete		0.273**	(0.067)	-0.333**	(0.102)
Higher education incomplete		-0.358**	(0.105)	0.467**	(0.116)
Higher education complete		-0.890**	(0.071)	1.039**	(0.070)
Graduate education		-1.050*	(0.518)	2.574**	(0.348)
Average high school copay. Ref. cat. No copay					
Low level		-0.090	(0.070)	0.015	(0.095)
Medium low level		-0.198	(0.103)	0.089	(0.128)
Medium high level		-0.458**	(0.102)	0.235*	(0.116)
High level		-0.822**	(0.135)	0.451**	(0.129)
Full		12.964**	(1.032)	15.640**	(1.025)
Vulnerability high school index for free lunch		0.001	(0.001)	-0.007**	(0.001)
HS administration dependency. Ref. cat. Subsidized					
Public		0.030	(0.062)	0.017	(0.088)
Private		-13.744**	(1.008)	-14.280**	(1.011)
Vocational HS track (vs. academic track)		0.064	(0.052)	-0.175*	(0.073)
Male		-0.034	(0.044)	0.050	(0.055)
Region. Ref. cat. 13					
	1	-0.123	(0.123)	-0.228	(0.152)
	2	-0.473**	(0.136)	0.077	(0.153)
	3	0.022	(0.107)	0.255*	(0.122)

	4	0.317**	(0.111)	-0.286*	(0.135)
	5	0.306**	(0.085)	-0.422**	(0.104)
	6	0.200*	(0.092)	-0.182	(0.111)
	7	0.226*	(0.101)	-0.171	(0.136)
	8	0.646**	(0.081)	-0.387**	(0.104)
	9	0.711**	(0.100)	-0.262*	(0.134)
	10	0.204*	(0.096)	-0.031	(0.122)
	11	-0.125	(0.207)	0.662**	(0.207)
	12	-0.334*	(0.167)	0.015	(0.179)
	14	0.482**	(0.123)	-0.319	(0.168)
	15	0.569*	(0.238)	-0.214	(0.340)
Constant		0.835**	(0.107)	0.150	(0.126)
Observations		14,947		14,947	

Notes: Robust standard errors in parentheses. **p<0.01, * p<0.05.

Table A.3.3. Prediction Accuracy. Multinomial Regression Approach

	Predicted deciles			
	Pr. Deciles 1-4	Pr. Deciles 5-6	Pr. Deciles 7-10	Total
Deciles 1-4	8,020	276	470	8,766
row %	91.49	3.15	5.36	100
column %	69.51	37.91	17.18	58.43
Deciles 5-6	2,183	203	491	2,877
row %	75.88	7.06	17.07	100
column %	18.92	27.88	17.95	19.18
Deciles 7-10	1,335	249	1,775	3,359
row %	39.74	7.41	52.84	100
column %	11.57	34.2	64.88	22.39
Total	11,538	728	2,736	15,002
row %	76.91	4.85	18.24	100
column %	100	100	100	100

Classification

Once I have run the predictions of all the models described above in the high school graduate sample, I did a final classification of students' eligibility status using the information provided by each model. A visual representation of the classification strategy is presented in Table A.3.5. Finally, a student was classified as eligible (belonging to the first four family income deciles) if 1) she was classified as eligible in the multinomial model; 2) she was also

classified as eligible in the 1-4 logit model, and; 3) she was classified as not belonging to the las four family income deciles in the 7-10 logit model (or classified as "0" in this model).

Conversely, an ineligible student must be classified as 1) ineligible in the multinomial logistic model (belonging to deciles 7-10); 2) ineligible in the 7-10 logistic regression model (or classified as "1" in this model); 3) and must not be predicted as eligible in the 1-4 logistic regression model. Cases predicted in deciles 5 - 6 in the multinomial regression model, or cases that were ambiguous (e.g., predicted as 1 in 1-6 logit model and as 1 in 7-10 logit model) were dropped from the analysis. This approach, predicted eligibility 1, resulted in 731,821 eligible (59%) and ineligible cases (41%).

Table A.3.4. Visual Representation of the Classification Strategy

	Logistic regression approach				Multinomial logistic regression approach		
	1-4	7-10	1-6	5-10	1-4 cat.	5-6 cat.	7-10 cat.
Eligible	☑	☒			☑		
Ineligible	☒	☑					☑
Ambiguous	☒	☒	☑	☑		☑	

I tested the accuracy of this prediction by classifying high school students in the 2015 CASEN sample as eligible and ineligible following the logistic and multinomial logistic regression approach. As shown in Table A.3.6, this approach classified correctly 93% of truly eligible students and 75% of truly ineligible students.

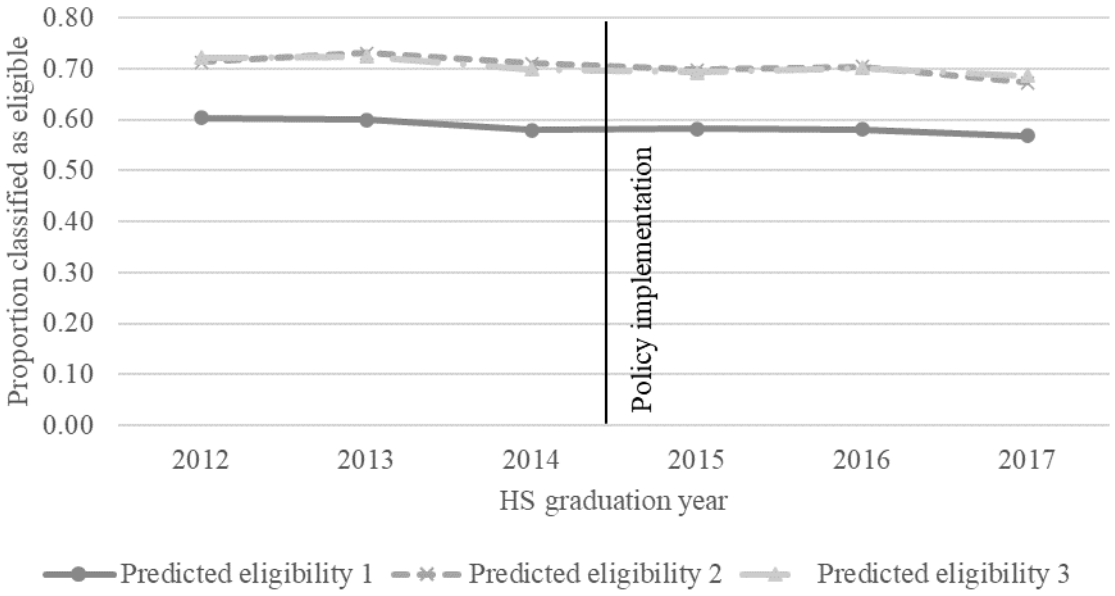
Table A.3.5. Prediction Accuracy Using the Logistic and Multinomial Logistic Approach. 2015 CASEN

	Ineligible	Eligible	Total
Deciles 1-4	433	6,034	6,467
row %	6.7	93.3	100
column %	16.16	76.49	61.19
Deciles 5-6	483	1,259	1,742
row %	27.73	72.27	100
column %	18.03	15.96	16.48
Deciles 7-10	1,763	596	2,359
row %	74.74	25.26	100
column %	65.81	7.55	22.32
Total	2,679	7,889	10,568
row %	25.35	74.65	100
column %	100	100	100

Notes: Eligible students are those in deciles 1 to 4, ineligible students are those in deciles 7 to 10. Deciles for the analytical sample were assigned according to financial aid information submitted to MINEDUC.

Based on predicted eligibility 1, I created two other eligibility variables adding prior information related to the income classification of the students while in high school (priority students) or according to the financial aid received once in college. As shown in Figure A.3.1, the proportion of high school graduates classified as eligible following the three different criteria is stable over time. In addition, predicted eligibility 1 tends to classify a lower proportion of students as eligible than predicted eligibility 2 and 3, which tend to be very similar.

Figure A.3.1. Proportion of High School (HS) Graduates Classified as Eligible by HS Graduation Year



Notes: Predicted eligibility 1 corresponds to cases classified as eligible/ineligible using the logistic and multinomial logistic regression models. Predicted eligibility 2 corresponds to a correction of predicted eligibility 1 by priority student status. Predicted eligibility 3 corresponds to a correction of predicted eligibility 1 by priority student status and financial aid assigned.

Appendix B

Results using Predicted Eligibility1

Table B.3.1. Descriptive Statistics of Main Outcome Variables

	Non-Eligible			Eligible			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Diff.
Access							
Apply for financial aid	0.635	0.672	0.037**	0.627	0.714	0.086**	0.050**
Register for PSU test	0.983	0.986	0.003**	0.86	0.882	0.022**	0.020**
1st univ. choice accr-y	5.603	5.666	0.063**	5.143	5.222	0.079**	0.016
Enroll in H. Ed.	0.731	0.68	-0.016**	0.443	0.473	0.030**	0.081**
Enroll vocational HEIs	0.118	0.101	-0.016**	0.258	0.259	0.001	0.017**
Enroll univ.	0.613	0.578	-0.035**	0.184	0.214	0.029**	0.064**
Persist							
Persist 2nd year in H. Ed.	0.690	0.644	-0.047**	0.376	0.409	0.033**	0.079**
Persist program	0.566	0.537	-0.030**	0.326	0.357	0.031**	0.061**
Persist vocational HEI	0.096	0.084	-0.012**	0.201	0.206	0.005**	0.017**
Persist univ.	0.574	0.544	-0.030**	0.159	0.185	0.026**	0.056**
N	146,634	156,596		215,195	213,396		

Notes: Eligibility status based on PE1. Diff. column contains the values for the difference in the Post-Pre differences for Not-Eligible and Eligible high school graduates. **p<0.01

Table B.3.2. Descriptive Statistics of Control Variables

	Non-Eligible			Eligible			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Diff.
High school (HS) graduate's characteristics							
Female	0.506	0.508	0.002	0.550	0.544	-0.006	-0.007
Vocational HS track	0.082	0.078	-0.004	0.616	0.601	-0.015**	-0.010**
HS GPA percentile	5.192	5.031	-0.161**	5.205	4.961	-0.245**	-0.083**
Parents' Education							
Less than HS	0.001	0.001	-0.000	0.604	0.558	-0.035**	-0.035**
HS	0.032	0.033	0.001	0.384	0.419	0.035**	0.034**
College	0.967	0.966	-0.001	0.012	0.012	0.001	0.001
HS characteristics:							
HS administrative dependency:							
Public	0.111	0.117	0.006	0.622	0.616	-0.006**	-0.012**
Subsidized	0.556	0.558	0.002	0.378	0.384	0.006	0.004
Private	0.333	0.325	-0.008**	0.000	0.000	0.000	0.008**
Rural HS	0.007	0.007	-0.001	0.056	0.052	-0.004**	-0.004**
HS in PACE	0.001	0.022	0.021**	0.019	0.279	0.260**	0.240**
JUANEB HS vulnerability index	33.015	33.911	0.896**	77.220	80.129	2.909**	2.014**
N	146,634	156,596		215,195	213,396		

Notes: Eligibility status based on PE. Diff. column contains the values for the difference in the Post-Pre differences for Not-Eligible and Eligible high school graduates. **p<0.01

Table B.3.3. Access to Higher Education

	Apply for financial aid	Register for PSU test	1st univ. preference accr-y	Enroll in higher ed.	Enroll vocational HEIs	Enroll univ.	Enroll vocational HEI in Free-Tuition	Enroll univ. in Free-Tuitipn	Enroll vocational HEI with 6/7 accr-y	Enroll univ HEI with 6/7 accr-y
Eligible*After2014	-0.018	-0.034**	-0.0431	0.001	-0.013	0.014	-0.01	0.029**	-0.005	0.003
	(0.006)	(0.005)	(0.0192)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.029**	0.013	0.125**	0.006	0.017**	-0.011	0.026**	-0.005	0.023**	-0.025**
	(0.005)	(0.004)	(0.0210)	(0.005)	(0.004)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible	0.009	0.056**	0.190**	0.044**	0.028**	0.016	0.004	0.03	0.005	0.045**
	(0.011)	(0.006)	(0.0270)	(0.008)	(0.006)	(0.009)	(0.005)	(0.009)	(0.004)	(0.007)
After2014	0.040**	0.001	0.121**	-0.002	-0.016**	0.013	-0.008**	0.003	-0.010**	0.01
	(0.004)	(0.001)	(0.0111)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
After2015	-0.014**	-0.004**	0.110**	-0.007	-0.002	-0.005	-0.001	-0.011	-0.000	0.022**
	(0.004)	(0.001)	(0.0121)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	731,821	731,821	314,124	731,821	731,821	731,821	731,821	731,821	731,821	731,821

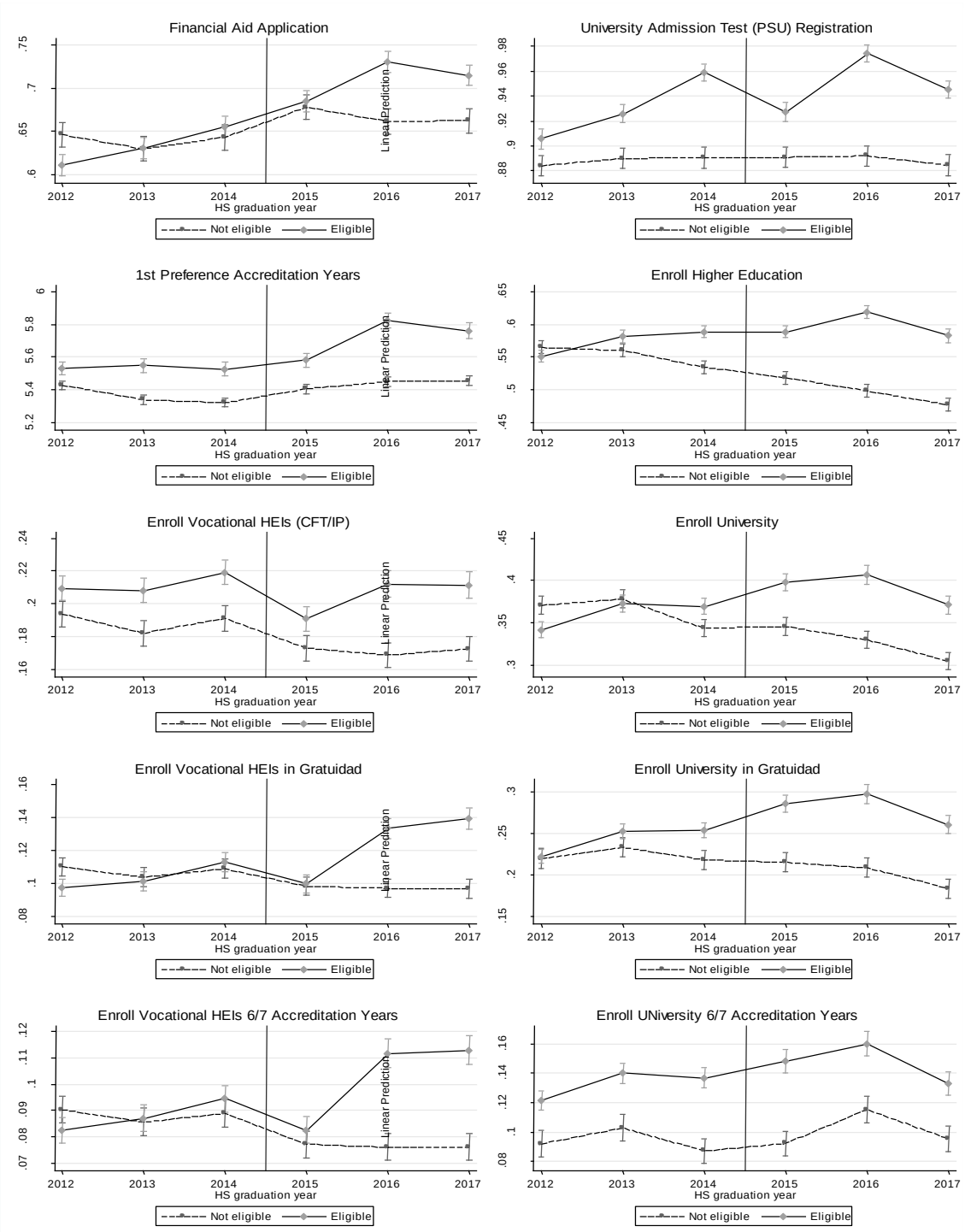
Notes: **p<0.01, *p<0.05. P-values' significance adjusted for multiple comparisons using Bonferroni correction. Accr-y means accreditation years. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level.

Table B.3.4. Persistence by Type of Institutions, Free-Tuition Policy Participation, and Institutional Accreditation Years (accr-y)

	Persist 2nd year	Persist program	Persist vocational HEI	Persist univ.	Persist vocational HEI in Free Tuition	Persist univ. in Free Tuition	Persist vocational HEI with 6/7 accr-y	Persist univ. with 6/7 accr-y
Eligible*After2014	0.004	0.003	-0.009	0.012	-0.006	0.027**	-0.002	0.003
	(0.005)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.002	-0.000	0.017**	-0.016**	0.024**	-0.008	0.021**	-0.028**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
Eligible	0.044**	0.039**	0.027**	0.021	0.005	0.031**	0.005	0.044**
	(0.008)	(0.008)	(0.006)	(0.009)	(0.004)	(0.009)	(0.004)	(0.006)
After2014	0.001	-0.006	-0.012**	0.015**	-0.007**	0.004	-0.008**	0.01
	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
After2015	-0.001	-0.007	-0.001	-0.001	0.000	-0.006	0.000	0.023**
	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
N	731,821	731,821	731,821	731,821	731,821	731,821	731,821	731,821

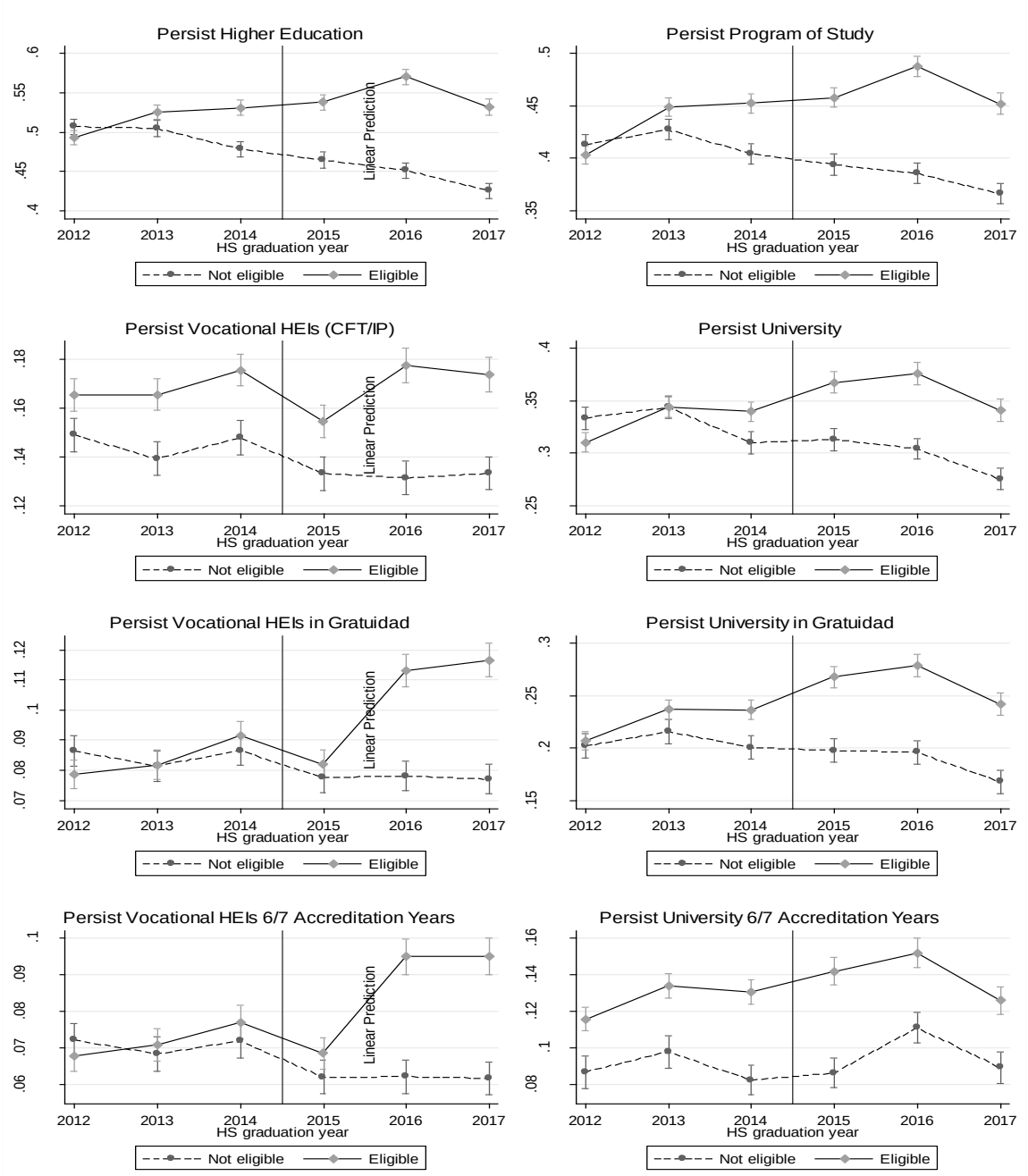
Notes: Persistence conditional on enrollment. **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Figure B.3.1. Marginal Effects of Eligibility to Receive Free Tuition on Access Outcomes



Notes: Estimates and its 95% confident interval presented are the marginal effects of the interaction between eligibility and fixed-effect high school graduation year based on linear probability models. All models control by student sociodemographic characteristics and high school characteristics. Standard errors clustered at the high school level. The vertical line represents the free tuition policy implementation.

Figure B.3.2. Marginal Effects of Eligibility to Receive Free Tuition on Persistence Outcomes



Notes: Estimates and its 95% confident interval presented are the marginal effects of the interaction between eligibility and fixed-effect high school graduation year based on linear regression models. All models control by student sociodemographic characteristics and high school characteristics. Standard errors clustered at the high school level. The vertical line represents the free tuition policy implementation.

Table B.3.5. Robustness Checks for Access Outcomes

	Apply for financial aid	Register for PSU test	1st univ. preference accreditation years	Enroll in higher ed.	Enroll vocational HEI	Enroll univ.	Enroll vocational HEI in Free Tuition	Enroll univ. in Free Tuition	Enroll vocational HEI with 6/7 accr-y	Enroll univ. HEI with 6/7 accr-y
Main Results										
Eligible*After2014	-0.018	-0.034**	-0.0431	0.001	-0.013	0.014	-0.01	0.029**	-0.005	0.003
	(0.006)	(0.005)	(0.0192)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.029**	0.013	0.125**	0.006	0.017**	-0.011	0.026**	-0.005	0.023**	-0.025**
	(0.005)	(0.004)	(0.0210)	(0.005)	(0.004)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
N	731,821	731,821	314,124	731,821	731,821	731,821	731,821	731,821	731,821	731,821
Robustness 1: HS Graduation Years 2013-2017										
Eligible*After2014	0.003	-0.023**	0.029	0.02	-0.007	0.028**	-0.009	0.041**	-0.002	0.009
	(0.007)	(0.005)	(0.022)	(0.006)	(0.005)	(0.006)	(0.004)	(0.006)	(0.004)	(0.004)
Eligible*After2015	0.057**	0.027**	0.222**	0.030**	0.025**	0.005	0.028**	0.009	0.027**	-0.019**
	(0.006)	(0.005)	(0.023)	(0.006)	(0.005)	(0.005)	(0.004)	(0.006)	(0.003)	(0.004)
N	608,560	608,560	266,723	608,560	608,560	608,560	608,560	608,560	608,560	608,560

Notes: **p<0.01, *p<0.05. P-values' significance adjusted for multiple comparisons using Bonferroni correction. Accr-y means accreditation years. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level. Robustness 2 including parents' educational missing cases was not performed because there were no missing cases.

Table B.3.6. Robustness Checks for Persistence Outcomes

	Persist 2nd year	Persist program	Persist vocational HEI	Persist univ.	Persist vocational HEI in Free Tuition	Persist univ. in Free Tuition	Persist vocational HEI with 6/7 accr-y	Persist univ. with 6/7 accr-y
Main Results								
Eligible*After2014	0.004	0.003	-0.009	0.012	-0.006	0.027**	-0.002	0.003
	(0.005)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.002	-0.000	0.017**	-0.016**	0.024**	-0.008	0.021**	-0.028**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
N	731,821	731,821	731,821	731,821	731,821	731,821	731,821	731,821
Robustness 1: HS Graduation Years 2013-2017								
Eligible*After2014	0.023**	0.022**	-0.003	0.023**	-0.005	0.038**	0.000	0.008
	(0.006)	(0.006)	(0.004)	(0.006)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.025**	0.023**	0.025**	-0.003	0.026**	0.004	0.024**	-0.023**
	(0.006)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
N	608,560	608,560	608,560	608,560	608,560	608,560	608,560	608,560

Notes: Persistence conditional on enrollment. **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level. Robustness 2 including parents' educational missing cases was not performed because there were no missing cases.

Appendix C

Results using Predicted Eligibility 3 (PE3)

Table C.3.1. Descriptive Statistics of Main Outcome Variables

	Non-Eligible			Eligible			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Diff.
Access							
Apply for financial aid	0.600	0.623	0.023**	0.653	0.732	0.080**	0.056**
Register for PSU test	0.984	0.986	0.001	0.879	0.898	0.019**	0.018**
1st univ. choice accr-y	5.655	5.697	0.042**	5.174	5.246	0.072**	0.030
Enroll in H. Ed.	0.738	0.656	-0.082**	0.477	0.493	0.016**	0.098**
Enroll vocational HEIs	0.108	0.095	-0.013**	0.248	0.248	-0.0002	0.013**
Enroll univ.	0.630	0.560	-0.069**	0.229	0.245	0.016**	0.086**
Persist							
Persist 2nd year in H. Ed.	0.700	0.622	-0.078**	0.409	0.430	0.021**	0.099**
Persist program	0.574	0.515	-0.060**	0.350	0.373	0.023**	0.083**
Persist vocational HEI	0.088	0.079	-0.009**	0.192	0.197	0.005**	0.014**
Persist univ.	0.592	0.528	-0.065**	0.199	0.214	0.015**	0.080**
N	123,611	130,167		290,962	284,687		

Notes: Eligibility status based on PE3. Diff. column contains the values for the difference in the Post-Pre differences for Not-Eligible and Eligible high school graduates. **p<0.01

Table C.3.2. Descriptive Statistics for Control Variables

	Non-Eligible			Eligible			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Diff.
High school (HS) graduate's characteristics							
Female	0.500	0.508	0.008	0.541	0.535	-0.006	-0.014**
Vocational HS track	0.079	0.076	-0.004	0.553	0.547	-0.006**	-0.002
HS GPA decile	5.101	5.076	-0.026	5.255	4.999	-0.257**	0.231**
Parents' Education							
Less than HS	0.015	0.015	0.00	0.445	0.427	-0.017**	-0.017**
HS	0.073	0.078	0.005	0.405	0.438	0.033**	0.028**
College	0.912	0.907	-0.005	0.151	0.135	-0.016	-0.011**
HS characteristics							
HS administrative dependency:							
Public	0.114	0.118	0.004	0.535	0.538	0.003	-0.001
Subsidized	0.515	0.511	-0.004	0.457	0.456	0.000	0.004
Private	0.371	0.370	0.000	0.008	0.005	-0.003	-0.003
Rural HS	0.008	0.007	-0.001	0.046	0.044	-0.002	-0.001
HS in PACE	0.002	0.023	0.022**	0.016	0.237	0.221**	0.200**
JUANEB HS vulnerability index	31.126	31.971	0.845**	72.980	76.133	3.152**	2.307**
N	123,611	284,687		130,167	290,962		

Notes: Eligibility status based on PE3. Diff. column contains the values for the difference in the Post-Pre differences for Not-Eligible and Eligible high school graduates. **p<0.01

Table C.3.3. Descriptive Statistics for Control Variables

	Apply for financial aid	Register for PSU test	1st univ. preference accr-y	Enroll in higher ed.	Enroll vocational HEIs	Enroll univ.	Enroll vocational HEI in Free Tuition	Enroll univ. in Free Tuition	Enroll vocational HEI with 6/7 accr-y	Enroll univ HEI with 6/7 accr-y
Eligible*After2014	-0.007	-0.032**	-0.007	0.014	-0.031**	0.045**	-0.023**	0.080**	-0.019**	0.021**
	(0.006)	(0.004)	(0.016)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.037**	0.015**	0.078**	0.023**	0.047**	-0.024**	0.058**	-0.017**	0.051**	-0.025**
	(0.005)	(0.003)	(0.017)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
Eligible	0.080**	0.015**	-0.062**	0.009	0.022**	-0.013**	0.009**	0.005	0.006	-0.010**
	(0.004)	(0.002)	(0.010)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
After2014	0.029**	0.002	0.097**	-0.018**	-0.001	-0.017**	0.004	-0.046**	0.002	-0.009
	(0.005)	(0.001)	(0.011)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
After2015	-0.025**	-0.008**	0.119**	-0.020**	-0.025**	0.006	-0.025**	-0.002	-0.022**	0.024**
	(0.004)	(0.001)	(0.012)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	829,427	829,427	341,890	829,427	829,427	829,427	829,427	829,427	829,427	829,427

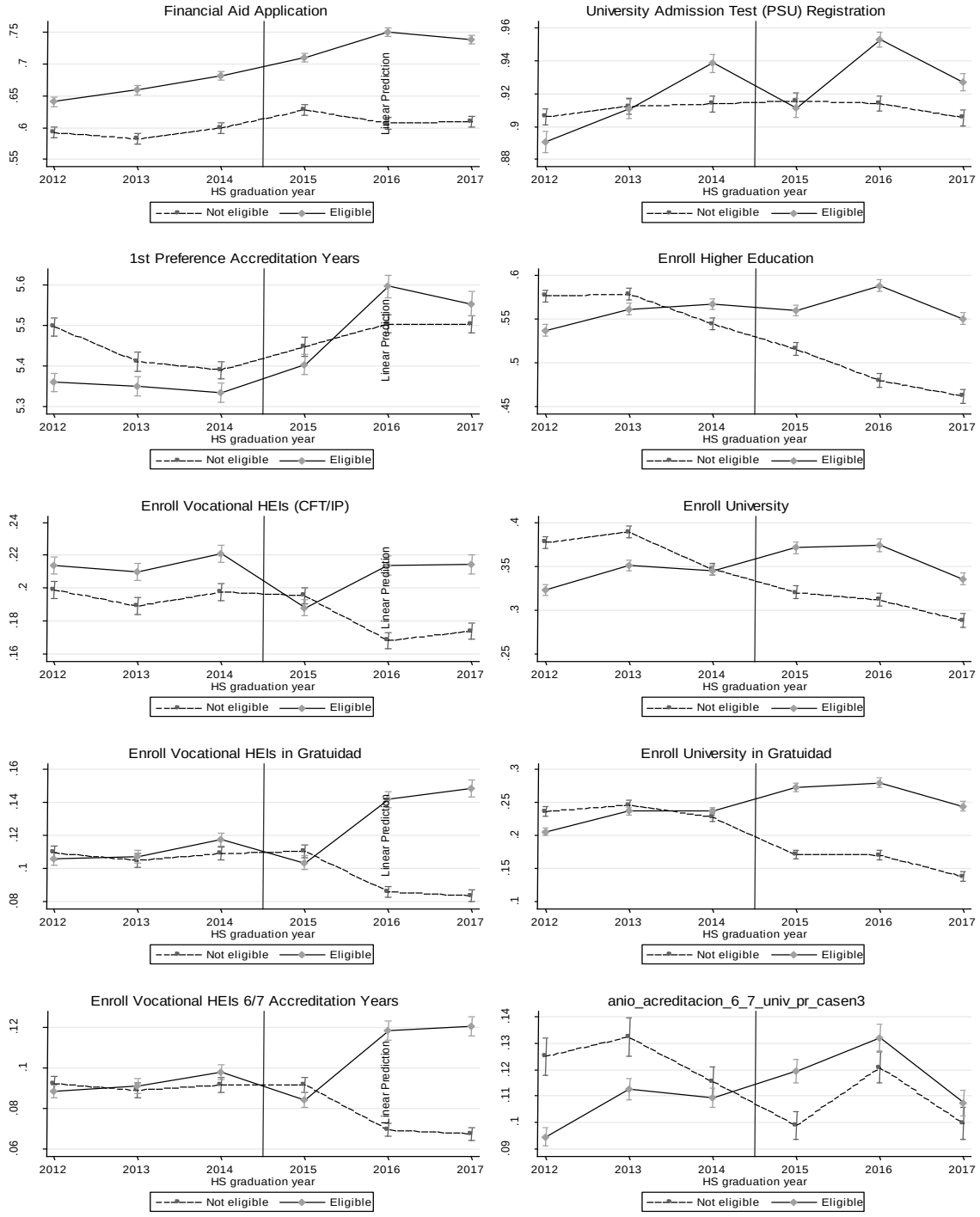
Notes: **p<0.01, *p<0.05. P-values' significance adjusted for multiple comparisons using Bonferroni correction. Accr-y means accreditation years. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level.

Table C.3.4. Persistence by Type of Institutions, Free Tuition Policy Participation, and Institutional Accreditation Years (accr-y)

	Persist 2nd year	Persist program	Persist vocational HEI	Persist univ.	Persist vocational HEI in Free Tuition	Persist univ. in Free Tuition	Persist vocational HEI with 6/7 accr-y	Persist univ. with 6/7 accr-y
Eligible*After2014	0.015	0.012	-0.026**	0.041**	-0.018**	0.076**	-0.015**	0.020**
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.021**	0.015**	0.047**	-0.029**	0.056**	-0.019**	0.050**	-0.027**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
Eligible	0.002	0.005	0.016**	-0.014**	0.006	0.003	0.003	-0.010**
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
After2014	-0.013	-0.017**	0.001	-0.014	0.004	-0.042**	0.002	-0.009
	(0.004)	(0.005)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
After2015	-0.015**	-0.017**	-0.023**	0.009	-0.023**	0.001	-0.021**	0.024**
	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	829,427	829,427	829,427	829,427	829,427	829,427	829,427	829,427

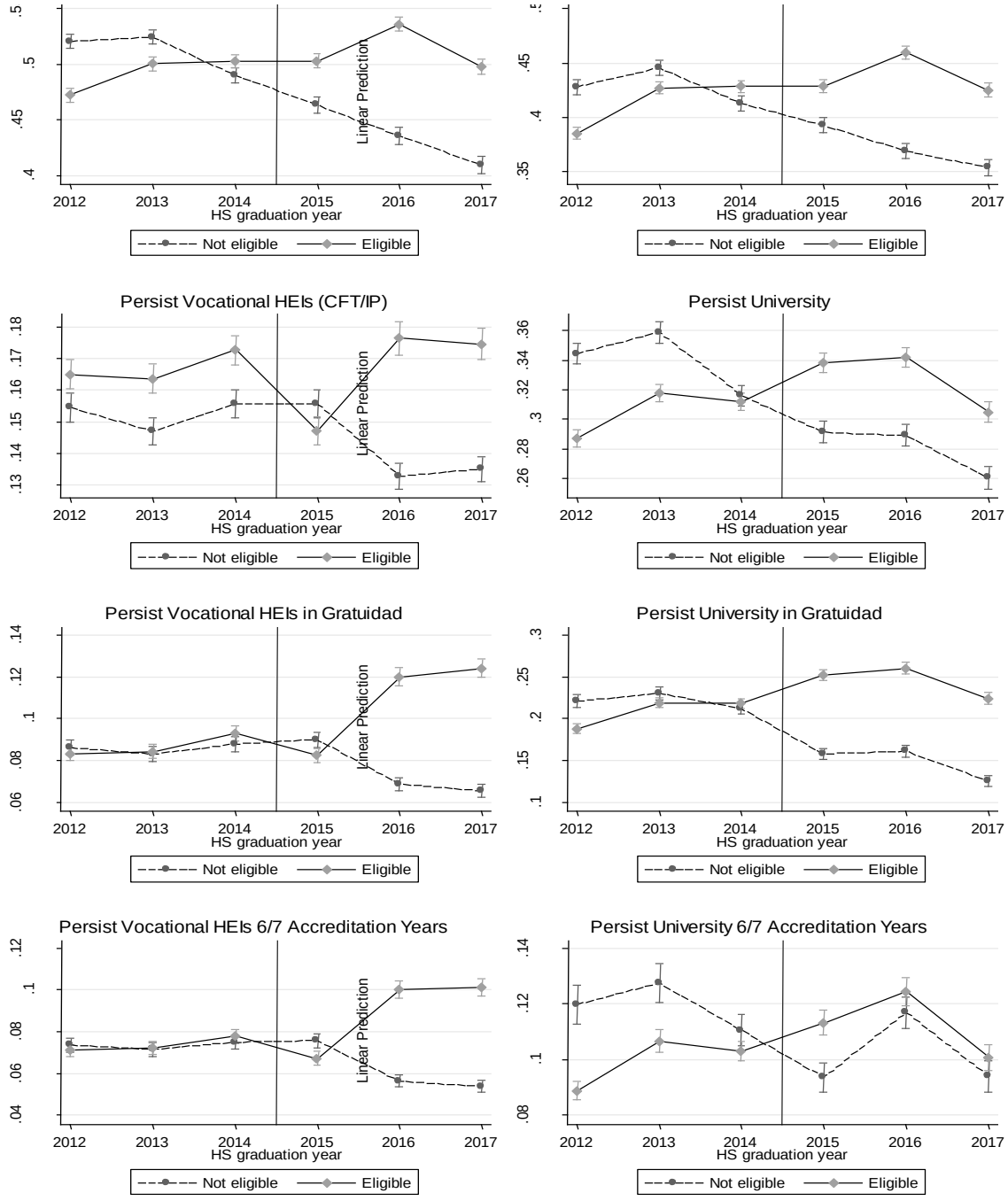
Notes: Persistence conditional on enrollment. **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Figure C.3.1. Marginal Effects of Eligibility to Receive Free Tuition on Access Outcomes



Notes: Estimates and its 95% confident interval presented are the marginal effects of the interaction between eligibility and fixed-effect high school graduation year based on linear probability models. All models control by student sociodemographic characteristics and high school characteristics. Standard errors clustered at the high school level. The vertical line represents the free tuition policy implementation.

Figure C.3.2. Marginal Effects of Eligibility to Receive Free Tuition on Persistence Outcomes



Notes: Estimates and its 95% confident interval presented are the marginal effects of the interaction between eligibility and fixed-effect high school graduation year based on linear regression models. All models control by student sociodemographic characteristics and high school characteristics. Standard errors clustered at the high school level. The vertical line represents the Gratuidad policy implementation.

Table C.3.5. Robustness Checks for Access Outcomes

	Apply for financial aid	Register for PSU test	1st univ. preference accreditation years	Enroll in higher ed.	Enroll vocational HEI	Enroll univ.	Enroll vocational HEI in Free Tuition	Enroll univ. in Free Tuition	Enroll vocational HEI with 6/7 accr-y	Enroll univ. HEI with 6/7 accr-y
Main Results										
Eligible*After2014	-0.007	-0.032**	-0.00705	0.014	-0.031**	0.045**	-0.023**	0.080**	-0.019**	0.021**
	(0.006)	(0.004)	(0.0161)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.037**	0.015**	0.0782**	0.023**	0.047**	-0.024**	0.058**	-0.017**	0.051**	-0.025**
	(0.005)	(0.003)	(0.0171)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
N	829,427	829,427	341,890	829,427	829,427	829,427	829,427	829,427	829,427	829,427
Robustness 1: HS Graduation Years 2013-2017										
Eligible*After2014	0.011	-0.022**	0.042	0.028**	-0.027**	0.055**	-0.024**	0.091**	-0.018**	0.026**
	(0.006)	(0.004)	(0.018)	(0.006)	(0.004)	(0.005)	(0.004)	(0.006)	(0.003)	(0.004)
Eligible*After2015	0.060**	0.027**	0.143**	0.039**	0.052**	-0.013	0.056**	-0.005	0.052**	-0.019**
	(0.006)	(0.004)	(0.020)	(0.006)	(0.004)	(0.006)	(0.004)	(0.005)	(0.003)	(0.004)
N	691,140	691,140	290,552	691,140	691,140	691,140	691,140	691,140	691,140	691,140
Robustness 2: Including missing cases in parents' education										
Eligible*After2014	-0.006	-0.030**	-0.007	0.014	-0.031**	0.045**	-0.022**	0.080**	-0.019**	0.020**
	(0.006)	(0.004)	(0.016)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.036**	0.013**	0.078**	0.022**	0.046**	-0.025**	0.057**	-0.018**	0.051**	-0.026**
	(0.005)	(0.003)	(0.017)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
N	859,699	859,699	343,751	859,699	859,699	859,699	859,699	859,699	859,699	859,699

Notes: **p<0.01, *p<0.05. P-values' significance adjusted for multiple comparisons using Bonferroni correction. Accr-y means accreditation years. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level.

Table C.3.6. Robustness Checks for Persistence Outcomes

	Persist 2nd year	Persist program	Persist vocational HEI	Persist univ.	Persist vocational HEI in Free Tuition	Persist univ. in Free Tuition	Persist vocational HEI with 6/7 accr-y	Persist univ. with 6/7 accr-y
Main Results								
Eligible*After2014	0.015	0.012	-0.026**	0.041**	-0.018**	0.076**	-0.015**	0.020**
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.021**	0.015**	0.047**	-0.029**	0.056**	-0.019**	0.050**	-0.027**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
N	829,427	829,427	829,427	829,427	829,427	829,427	829,427	829,427
Robustness 1: HS Graduation Years 2013-2017								
Eligible*After2014	0.028**	0.028**	-0.022**	0.050**	-0.019**	0.085**	-0.014**	0.024**
	(0.006)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.036**	0.034**	0.053**	-0.020**	0.054**	-0.009	0.050**	-0.022**
	(0.006)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
N	691,140	691,140	691,140	691,140	691,140	691,140	691,140	691,140
Robustness 2: Including missing cases in parents' education								
Eligible*After2014	0.015**	0.012	-0.027**	0.041**	-0.018**	0.075**	-0.015**	0.020**
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.020**	0.014	0.047**	-0.029**	0.055**	-0.020**	0.049**	-0.027**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
N	859,699	859,699	859,699	859,699	859,699	859,699	859,699	859,699

Notes: Persistence conditional on enrollment. **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Appendix D

Previous Trends

Table D.3.1. Linear Regression Models of Eligibility to Receive Free Tuition and Persistence Outcomes

	Apply for financial aid	Register for PSU test	1st univ. preference accreditation years	Enroll in higher ed.	Enroll vocational HEI	Enroll univ.	Enroll vocational HEI in Free Tuition	Enroll univ. in Free Tuition	Enroll vocational HEI with 6/7 accr-y	Enroll univ. HEI with 6/7 accr-y
HS graduation year (Ref. cat 2014)										
2012	0.007	-0.005**	0.113**	0.031**	0.002	0.029**	0.001	0.004	0.001	0.006
	(0.004)	(0.001)	(0.011)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
	0.080	0.000	0.000	0.000	0.424	0.000	0.528	0.274	0.408	0.090
2013	-0.013**	-0.000	0.022	0.027**	-0.010**	0.037**	-0.005	0.017**	-0.003	0.016**
	(0.004)	(0.001)	(0.010)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.722	0.028	0.000	0.000	0.000	0.019	0.000	0.113	0.000
2015	0.037**	0.000	0.083**	-0.016**	-0.017**	0.001	-0.011**	-0.007	-0.011**	0.006
	(0.004)	(0.001)	(0.009)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.886	0.000	0.000	0.000	0.879	0.000	0.064	0.000	0.044
2016	0.018**	0.001	0.126**	-0.038**	-0.023**	-0.015**	-0.014**	-0.013	-0.015**	0.029**
	(0.004)	(0.001)	(0.011)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.510	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
2017	0.024**	-0.006**	0.132**	-0.060**	-0.019**	-0.041**	-0.014**	-0.038**	-0.014**	0.008
	(0.004)	(0.001)	(0.012)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018
Eligible	0.102**	0.038**	0.003	0.027**	0.024**	0.003	0.010**	0.020**	0.010**	0.006
	(0.004)	(0.003)	(0.013)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.003)
	0.000	0.000	0.830	0.000	0.000	0.426	0.000	0.000	0.000	0.060
Interaction: HS grad. year * Eligible										
2012*Eligible	-0.051**	-0.043**	-0.091**	-0.060**	-0.009	-0.051**	-0.014**	-0.034**	-0.012**	-0.020**

	(0.005)	(0.004)	(0.014)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000
2013*Eligible	-0.010	-0.027**	-0.008	-0.030**	-0.001	-0.028**	-0.006	-0.016**	-0.004	-0.013**
	(0.005)	(0.003)	(0.013)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.003)
	0.033	0.000	0.523	0.000	0.699	0.000	0.016	0.000	0.122	0.000
2015*Eligible	-0.007	-0.026**	-0.020	0.016**	-0.013**	0.029**	-0.001	0.042**	-0.000	0.004
	(0.005)	(0.003)	(0.013)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.003)
	0.140	0.000	0.138	0.000	0.000	0.000	0.588	0.000	0.967	0.265
2016*Eligible	0.049**	0.013**	0.130**	0.062**	0.013**	0.049**	0.035**	0.055**	0.032**	-0.007
	(0.005)	(0.003)	(0.018)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053
2017*Eligible	0.031**	-0.007	0.079**	0.051**	0.012	0.039**	0.042**	0.048**	0.034**	-0.010
	(0.005)	(0.003)	(0.019)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
	0.000	0.031	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.007
Observations	860,448	860,448	361,276	860,448	860,448	860,448	860,448	860,448	860,448	860,448
test 2012-2012*eligible. F-value	47.32**	91.41**	81.82**	151.52**	4.64	107.74**	13.4	23.68**	11.02	12.95
test 2013-2013*eligible. F-value	0.21	54.58**	2.12	63.73**	2.61	73.09**	0.18	18.91**	0.05	18.10**

Notes: **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. All models control by student sociodemographic characteristics and high school characteristics. Standard errors clustered at the high school level.

Table D.3.2. Linear Regression Models of Eligibility to Receive Free Tuition and Persistence Outcomes

	Persist 2nd year	Persist vocational HEI	Persist univ.	Persist program	Persist vocational HEI in Free Tuition	Persist univ. in Free Tuition	Persist vocational HEI with 6/7 accr-y	Persist univ. with 6/7 accr-y
HS graduation year (Ref. cat 2014)								
2012	0.029***	0.011	0.001	0.025**	-0.000	0.003	-0.000	0.006
	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
	0.000	0.009	0.780	0.000	0.848	0.365	0.975	0.114
2013	0.028**	0.024**	-0.009**	0.036**	-0.004	0.016**	-0.003	0.016**
	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.000	0.000	0.000	0.012	0.000	0.055	0.000
2015	-0.015**	-0.011	-0.013**	0.001	-0.008**	-0.007	-0.010**	0.004
	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.003	0.000	0.772	0.000	0.061	0.000	0.130
2016	-0.029**	-0.021**	-0.017**	-0.008	-0.011**	-0.008	-0.012**	0.030**
	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.000	0.000	0.029	0.000	0.033	0.000	0.000
2017	-0.056**	-0.041**	-0.015**	-0.038**	-0.012**	-0.037**	-0.012**	0.007
	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050
Eligible	0.019**	0.018**	0.020**	-0.002	0.007	0.016**	0.007	0.003
	(0.004)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.000	0.000	0.617	0.002	0.000	0.003	0.246
Interaction: HS grad. year * Eligible								
2012*Eligible	-0.059**	-0.053**	-0.009**	-0.048**	-0.010**	-0.031**	-0.007**	-0.019**
	(0.004)	(0.005)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000
2013*Eligible	-0.029**	-0.023**	-0.001	-0.027**	-0.004	-0.014**	-0.002	-0.012**
	(0.004)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
	0.000	0.000	0.855	0.000	0.069	0.000	0.354	0.000
2015*Eligible	0.022**	0.018**	-0.009	0.029**	0.000	0.041**	0.001	0.005
	(0.004)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)

	0.000	0.000	0.002	0.000	0.903	0.000	0.512	0.095
2016*Eligible	0.065**	0.055**	0.019**	0.043**	0.034**	0.050**	0.031**	-0.009
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
2017*Eligible	0.058**	0.044**	0.016**	0.039**	0.040**	0.046**	0.033**	-0.009
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020
Observations	860,448	860,448	860,448	860,448	860,448	860,448	860,448	860,448
test 2012-2012*eligible. F-value	141.64**	4.3	86.96**	58.46**	6.85	19.79**	4.28	11.54
test 2013-2013*eligible. F-value	60.99**	3.13	67.05**	38.14**	0	17.31**	0.11	18.15**

Notes: **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. All models control by student sociodemographic characteristics and high school characteristics. Standard errors clustered at the high school level.

Appendix E

Main Results without Bonferroni Correction

Table E.3.1. Access to Higher Education

	Apply for financial aid	Register for PSU test	1st univ. choice accr-y	Enroll in higher ed.	Enroll vocational HEIs	Enroll univ.	Enroll vocational HEI in Free Tuition	Enroll univ. in Free Tuition	Enroll vocational HEI with 6/7 accr-y	Enroll univ. HEI with 6/7 accr-y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Eligible*After2014	-0.020**	-0.029**	-0.036*	0.002	-0.016**	0.018**	-0.009*	0.033**	-0.005	-0.001
	(0.006)	(0.004)	(0.016)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.022**	0.009**	0.084**	0.008	0.020**	-0.013**	0.029**	-0.009	0.025**	-0.023**
	(0.005)	(0.003)	-0.017	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible	0.099**	0.029**	-0.008	0.020**	0.024**	-0.004	0.010**	0.016**	0.010**	0.003
	(0.004)	(0.003)	-0.012	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
After2014	0.042**	0.000	0.120**	-0.002	-0.014**	0.012**	-0.009**	0.000	-0.010**	0.012**
	(0.004)	(0.001)	-0.011	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
After2015	-0.014**	-0.004**	0.113**	-0.008*	-0.004	-0.004	-0.003	-0.009*	-0.002	0.023**
	(0.004)	(0.001)	-0.012	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	860,448	860,448	361,276	860,448	860,448	860,448	860,448	860,448	860,448	860,448

Notes: Coefficients presented from linear probability models, except for the outcome 1st university choice accreditation years which coefficients are from a linear model. **p<0.01, *p<0.05. Accr-y means accreditation years. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level. Enrollment estimates represent immediate enrollment.

Table E.3.2. Persistence by Type of Institution, Free Tuition Policy Participation, and Institutional Accreditation Years (accr-y)

	Persist 2nd year in H.Ed.	Persist program	Persist vocational HEI	Persist univ.	Persist vocational HEI in Free Tuition	Persist univ. in Free Tuition	Persist vocational HEI with 6/7 accr-y	Persist univ. with 6/7 accr-y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Eligible*After2014	0.006	0.004	-0.011**	0.017**	-0.005	0.031**	-0.002	-0.000
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.006	0.003	0.021**	-0.016**	0.029**	-0.01*	0.026**	-0.025**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
Eligible	0.013**	0.013**	0.020**	-0.008*	0.008**	0.013**	0.007**	0.001
	(0.004)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)
After2014	0.001	-0.006	-0.011**	0.013**	-0.007**	0.002	-0.008**	0.012**
	(0.004)	(0.005)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
After2015	-0.003	-0.008	-0.003	-0.000	-0.003	-0.005	-0.003	0.024**
	(0.004)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	860,448	860,448	860,448	860,448	860,448	860,448	860,448	860,448

Notes: Persistence conditional on enrollment. **p<0.01, *p<0.05. P-values adjusted for multiple comparisons using Bonferroni correction. See results without Bonferroni correction in Appendix D. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Table E.3.3. Robustness Check for Access Outcomes

	Apply for financial aid	Register for PSU test	1st univ. preference accreditation years	Enroll in higher ed.	Enroll vocational HEI	Enroll univ.	Enroll vocational HEI in Free Tuition	Enroll univ. in Free Tuition	Enroll vocational HEI with 6/7 accr-y	Enroll univ. HEI with 6/7 accr-y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Main Results										
Eligible*After2014	-0.020**	-0.029**	-0.036*	0.002	-0.016**	0.018**	-0.009*	0.033**	-0.005	-0.001
	(0.006)	(0.004)	(0.016)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.022**	0.009**	0.084**	0.008	0.020**	-0.013**	0.029**	-0.009	0.025**	-0.023**
	(0.005)	(0.003)	-0.017	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
N	860,448	860,448	361,276	860,448	860,448	860,448	860,448	860,448	860,448	860,448
Robustness 1: HS Graduation Years 2013-2017										
Eligible*After2014	0.004	-0.019**	0.020	0.018**	-0.012**	0.030**	-0.009*	0.043**	-0.003	0.003
	(0.006)	(0.004)	(0.018)	(0.006)	(0.004)	(0.005)	(0.003)	(0.006)	(0.003)	(0.004)
Eligible*After2015	0.053**	0.022**	0.158**	0.026**	0.025**	0.001	0.029**	0.003	0.028**	-0.020**
	(0.006)	(0.004)	(0.020)	(0.006)	(0.004)	(0.005)	(0.003)	(0.006)	(0.003)	(0.005)
N	717,800	717,800	307,849	717,800	717,800	717,800	717,800	717,800	717,800	717,800
Robustness 2: Including missing cases in parents' education										
Eligible*After2014	-0.020**	-0.029**	-0.036*	0.002	-0.015**	0.018**	-0.008**	0.032**	-0.005	-0.001
	(0.006)	(0.004)	(0.016)	(0.005)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.021**	0.008*	0.084**	0.007	0.020**	-0.013**	0.029**	-0.009*	0.025**	-0.023**
	(0.005)	(0.003)	(0.017)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.002)	(0.004)
N	890,130	890,130	362,625	890,130	890,130	890,130	890,130	890,130	890,130	890,130

Notes: **p<0.01, *p<0.05. Accr-y means accreditation years. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level.

Table E.3.4. Robustness Check for Persistence Outcomes

	Persist 2nd year	Persist program	Persist vocational HEI	Persist univ.	Persist vocational HEI in Free Tuition	Persist univ. in Free Tuition	Persist vocational HEI with 6/7 accr-y	Persist univ. with 6/7 accr-y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Main Results								
Eligible*After2014	0.006	0.004	-0.011**	0.017**	-0.005	0.031**	-0.002	-0.000
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.006	0.003	0.021**	-0.016**	0.029**	-0.01*	0.026**	-0.025**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)
N	860,448	860,448	860,448	860,448	860,448	860,448	860,448	860,448
Robustness 1: HS Graduation Years 2013-2017								
Eligible*After2014	0.021**	0.021**	-0.007*	0.027**	-0.005	0.041**	-0.001	0.002
	(0.006)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
Eligible*After2015	0.023**	0.023**	0.027**	-0.005	0.029**	-0.001	0.028**	-0.024**
	(0.006)	(0.006)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)
N	717,800	717,800	717,800	717,800	717,800	717,800	717,800	717,800
Robustness 2: Including missing cases in parents' education								
Eligible*After2014	0.005	0.004	-0.012**	0.016**	-0.005*	0.031**	-0.002	-0.000
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)	(0.002)	(0.004)
Eligible*After2015	0.005	0.003	0.021**	-0.016**	0.029**	-0.011**	0.025**	-0.025**
	(0.005)	(0.005)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
N	890,130	890,130	890,130	890,130	890,130	890,130	890,130	890,130

Notes: Persistence conditional on enrollment. **p<0.01, *p<0.05. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Table E.3.5. Heterogeneity Effects on Access Outcomes

	All	Female	Male	TP	HC
Apply financial aid					
Eligible*After2014	-0.020**	-0.022**	-0.018*	-0.021	-0.017**
	(0.006)	(0.007)	(0.008)	(0.017)	(0.006)
Eligible*After2015	0.022**	0.011	0.034**	0.033*	0.012*
	(0.005)	(0.006)	(0.007)	(0.014)	(0.005)
N	860,448	454,562	405,886	343,362	517,086
Register PSU test					
Eligible*After2014	-0.029**	-0.022**	-0.038**	-0.030**	-0.002
	(0.004)	(0.004)	(0.006)	(0.011)	(0.002)
Eligible*After2015	0.009**	0.005	0.013**	0.029**	0.004*
	(0.003)	(0.003)	(0.005)	(0.010)	(0.002)
N	860,448	454,562	405,886	343,362	517,086
N. accreditation years 1st univ. preference					
Eligible*After2014	-0.036*	-0.030	-0.040	-0.050	-0.022
	(0.016)	(0.021)	(0.022)	(0.069)	(0.017)
Eligible*After2015	0.084**	0.083**	0.099**	0.126	0.088**
	-0.017	(0.021)	(0.023)	(0.086)	(0.019)
N	361,276	198,322	162,954	50,278	310,998
Enrollment in Higher Education					
Eligible*After2014	0.002	-0.001	0.007	-0.003	0.005
	(0.005)	(0.007)	(0.007)	(0.017)	(0.006)
Eligible*After2015	0.008	0.001	0.015*	0.017	0.001
	(0.005)	(0.006)	(0.006)	(0.015)	(0.005)
N	860,448	454,562	405,886	343,362	517,086
Enrollment in Vocational HEI					
Eligible*After2014	-0.016**	-0.018**	-0.014**	-0.006	-0.012**
	(0.004)	(0.005)	(0.005)	(0.015)	(0.004)
Eligible*After2015	0.020**	0.012**	0.030**	0.026	0.018**
	(0.003)	(0.004)	(0.005)	(0.015)	(0.004)
N	860,448	454,562	405,886	343,362	517,086
Enrollment in University					
Eligible*After2014	0.018**	0.016*	0.020**	0.003	0.017**
	(0.005)	(0.007)	(0.006)	(0.014)	(0.006)
Eligible*After2015	-0.013**	-0.011	-0.015**	-0.008	-0.017**
	(0.004)	(0.006)	(0.006)	(0.012)	(0.005)
N	860,448	454,562	405,886	343,362	517,086

Notes: **p<0.01, *p<0.05. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. The model for 1st university preference accreditation years controls also by the number of applications. Standard errors clustered at the high school level.

Table E.3.6. Heterogeneity Effects on Persistence Outcome

	All	Female	Male	TP	HC
Persistence in Higher Education					
Eligible*After2014	0.006	0.003	0.008	-0.001	0.006
	(0.005)	(0.007)	(0.007)	(0.016)	(0.006)
Eligible*After2015	0.006	-0.002	0.014*	0.019	0.001
	(0.005)	(0.006)	(0.006)	(0.015)	(0.005)
N	860,448	454,562	405,886	343,362	517,086
Persistence in Program of Study					
Eligible*After2014	0.004	-0.000	0.009	0.002	0.007
	(0.005)	(0.007)	(0.007)	(0.016)	(0.006)
Eligible*After2015	0.003	-0.002	0.008	0.042	-0.006
	(0.005)	(0.006)	(0.007)	(0.015)	(0.006)
N	860,448	454,562	405,886	343,362	517,086
Persistence in Vocational HEI					
Eligible*After2014	-0.011**	-0.012**	-0.011*	-0.004	-0.009*
	(0.003)	(0.004)	(0.005)	(0.014)	(0.004)
Eligible*After2015	0.021**	0.012**	0.032**	0.039**	0.019**
	(0.003)	(0.004)	(0.005)	(0.014)	(0.004)
N	860,448	454,562	405,886	343,362	517,086
Persistence in University					
Eligible*After2014	0.017**	0.015*	0.018**	0.006	0.016**
	(0.005)	(0.007)	(0.006)	(0.012)	(0.006)
Eligible*After2015	-0.016**	-0.013*	-0.019**	-0.007	-0.019**
	(0.004)	(0.006)	(0.006)	(0.011)	(0.005)
N	860,448	454,562	405,886	343,362	517,086

Notes: **p<0.01, *p<0.05. All models control by student sociodemographic characteristics, high school characteristics, and a differential time trend between eligible and ineligible students. Standard errors clustered at the high school level.

Chapter 4

Study 3: Are Free Tuition Policy Incentives Enough to Diversify the Student Population? An Exploration of Higher Education Institution's Response to the Chilean Free Tuition Policy

Free tuition policies have been implemented around the world to improve equity in access and success in higher education (Salmi & D'Addio, 2020). Consequently, researchers have focused on exploring its effects on student outcomes, such as enrollment, persistence, and graduation (Martin, 2021; Nguyen, 2019; Page et al., 2019; Post, 2011). Little attention has been paid, however, to the effects of free tuition policies on higher education institutions (HEIs). Depending on the policy design, free tuition policies can affect HEIs by changing student preferences to eligible institutions, and/or by restricting institutions' behavior. Therefore, although the focus of free tuition policies may be on students, they may also affect institutions. Additionally, the HEI's response can affect the effectiveness of the policy in achieving its intended goals. Thus, understanding the response of HEIs to these policies is important, especially when they are implemented at a large scale, include only one higher education sector, and/or restrict institutional behavior.

Free tuition policies implemented around the world indicate that institutions' participation depends on the policy design. Some policies include only public institutions (e.g., the case of Ecuador or the Philippines), or only vocational institutions (e.g., the state of Oregon in the U.S.), while others make participation optional for private institutions (e.g., the case of Chile). From an institutional perspective, free tuition policies may be attractive because they reduce the direct

dependency of HEIs on the student's ability to pay their tuition, and/or the goals of these policies are aligned with their mission (e.g., educating marginalized populations). Thus, HEIs may have incentives to participate in these initiatives even when their participation is attached to rules that restrict their behavior.

Empirical research that examines student responses to free tuition policies is prevalent, but research examining institutional outcomes and behavior after HEIs take up a free tuition policy is scarce. As free tuition policies become more popular, understanding how one of the main actors reacts (i.e., HEIs) to the policy is crucial to evaluate policy effectiveness. This is especially important considering that free tuition policies usually restrict what institutions are included in or eligible to participate. I contribute to this literature by exploring changes in institutional outcomes after the implementation of a free tuition policy in Chile in 2016. Based on Resource Dependence Theory and microeconomic concepts (i.e., supply and demand theory), I develop a conceptual framework and derive hypotheses of possible institutions' responses to the free tuition policy. Using administrative data from Chile and a fixed effects estimation strategy, I explore whether the policy changes the socioeconomic diversification of the student body, as well as admissions and finance outcomes. The Chilean case is interesting because it demonstrates the tensions of implementing a free tuition policy in a highly privatized system, and the need of the government to restrict HEI's autonomy in a context where they are highly dependent on tuition revenues. Thus, to achieve its goal of decreasing inequities in access and success in higher education, the Chilean free tuition policy needed to include not only state institutions, but also private HEIs. At the same time, due to the limited fiscal resources, the government must set rules that restrict institutions' behavior by limiting enrollment growth and regulating tuition.

This paper is organized as follows. The next section summarizes the literature on the relationship between financial policy change and college adjustments. I then introduce the theoretical framework that guides the empirical work. I draw from the organizational behavior and economic literature to identify the possible organizational responses to the Chilean free tuition policy and pose a set of research questions to answer. I then describe the method used to answer each research questions and provide empirical results. The paper ends with a Discussion and Conclusion section.

Literature Review

Much of the literature on free tuition policy effects is focused on student outcomes (Bucarey, 2018; Gurantz, 2020; Martin, 2021; Nguyen, 2019; Page et al., 2019) and has disregarded its effects on HEIs. Because a free tuition policy can be considered a change in finance policy, I examine the literature that explores how colleges adjust to changes in financial policies.

Overall, researchers studying the effect of financial policies on institutional behavior in the U.S. have found that institutions respond to such changes by reducing student financial aid allocations and/ or by diversifying their revenue streams. For instance, Miller and Park (2022), studied tuition freeze and cap policies and found that colleges lower their institutional financial aid when they are constrained to maintain their tuition at specific levels. Contrary to the policy aim of making college affordable, they conclude that tuition freeze and cap policies have unintended distributional effects because low-income students who require institutional financial aid receive less of such aid. Delaney and Kerney (2016), studying tuition guarantee laws, found that institutions that were restricted to increasing an entering cohort's tuition during their undergraduate program increase these students' required fees and increase out-of-state tuition at

higher rates than institutions not restricted by these laws. Bound et al. (2020), and Jaquette and Curs (2015), studying the effects of decreasing state appropriations on institutions' behavior found that colleges leverage decreases in appropriations by enrolling more out-of-state or international students, who pay higher tuition than their in-state or domestic counterparts.

Researchers studying changes in tuition policies have found null to positive but small effects on diversifying the student body. Gandara and Li (2020), studying free tuition programs in the U.S., found that such programs have a positive but small effect on racially diversifying the student population of eligible colleges in the vocational sector. Researchers studying the effect of no-loan institutional programs also found no effect or a small positive effect on socioeconomically diversifying their student population (Hillman, 2013; Linsenmeier et al., 2006).

In contrast, researchers studying policies that deregulate tuition have found no effect or a positive effect on diversifying the student population. Murphy et al. (2019) studied the case of England, which moved from a free tuition to high tuition, high aid model. They found that charging fees did not increase the gap in enrollment rates between high- and low-income students. In addition, they found that allowing institutions to charge tuition increases the institutional quality as it increases the resources available per student at the institutional level. Andrews and Stange (2019), studying a price deregulation policy enacted in Texas, found that the policy socioeconomically diversified the student population of high-earning programs. They also found that those programs were able to diversify their student population by increasing their sticker price, introducing greater price discrimination, and increasing program resources.

In sum, the literature on financial policy highlights that policy changes affect HEIs behavior and outcomes. Specifically, those changes often affect institutional revenue patterns,

student financial aid allocations, and the composition of the student body. Although useful, most of this literature does not delve into the theoretical underpinnings of these responses. Thus, next I develop a theoretical framework that addresses this issue.

Theoretical Framework

To explain why HEIs may react to a free tuition policy, I use Resource Dependence Theory (Pfeffer & Salancik, 1978), from the organizational behavior field. I complement this framework with microeconomic concepts of supply and demand to derive hypotheses of specific institutional behaviors that might be induces by the policy.

Resource Dependence Theory

Resource Dependence Theory (RDT) posits that organizations are immersed in and affected by their environment (Pfeffer & Salancik, 1978). Thus, the implementation of a free tuition policy represents a change in the environment that induces HEIs to adapt to their new environment. RDT posits that the survival of the organization in this new environment depends on its ability to secure resources that align with its needs (Pfeffer & Salancik, 1978). In order to secure resources or to adapt to changes in the environment, organizations can implement different strategies to increase or maintain their autonomy and achieve their goals. To understand organizational behavior, RDT posits that it is important to understand the power dynamics among the organizations that share an environment, as it is power and not efficiency that guides an organization's decisions. Power, in this sense, is a "function of specific needs and resources that can vary from one exchange partner to another" (Scott & Davis, 2007, p. 234). In this scenario, "organizations should choose the least constraining approach to coordinate relations

with other organizations and to reduce the dependence that their exchanges create" (Scott & Davis, 2007, p. 234).

Following Scott and Davis (2007), I derive that how HEIs react to the implementation of a free tuition policy is all about power, which is proxied by resource capture and use. Are the resource-based incentives offered by the policy enough to induce HEIs to enroll students who will benefit from the policy? On the one hand, the free tuition policy reduces the direct dependency of the HEI on the students' ability to pay their tuition. On the other hand, if the policy restricts HEI's behavior by, for example, restricting enrollments or fixing the tuition paid by the government to a lower level than the actual tuition, institutions may actually lose resources. In this case, institutions may have incentives to not participate in the policy or not admit students targeted by the policy.

A second takeaway derived from this theory is that the reactions of a HEI to a free tuition policy depend on the power dynamics *among* institutions. Considering that prestige in the higher education context is a source of power, I hypothesize that the strategic adjustment implemented by each institution when a free tuition policy in enacted depends on its current prestige and/or the risk of seeing its prestige eroded. Thus, RDT is a useful framework to understand the effect of a free tuition policy on organizational behavior.

Although RDT provides a framework to understand why HEIs may be more or less responsive to policy goals, it is less clear about the specific changes that institutions can implement under this type of policy. Therefore, I complement this theory with the microeconomic concepts of supply and demand, especially as they relate to postsecondary education.

Higher Education Supply and Demand Theory

From an economic perspective, the supply curve of higher education is determined by the price of the service and factors related to the price of the resources needed to produce the service, the technology used, and subsidies received by the institutions (Toutkoushian & Paulsen, 2016). The law of supply holds that, ceteris paribus, an increase in price results in an increase in the quantity offered, a movement along the supply curve. In contrast, changes in non-price factors result in changes in the location of the supply curve. For example, an increase in subsidies would tend to move the supply curve to the right as institutions can offer higher enrollments at the same price. Similarly, price changes also determine a change in the quantity demanded and changes in non-price factors result in shifts in the demand curve. However, for demand, price and quantity are inversely related (Toutkoushian & Paulsen, 2016).

In a perfectly-competitive market, the market sets the price and the quantity traded for a given service or product by bringing together demand and supply. Applying this theory to higher education, tuition should be determined by the intersection between the number of students who are willing and can afford to go to college, and the number of vacancies the institutions are willing to provide. This point of intersection is called equilibrium. This equilibrium changes when the demand and/or supply curve changes due to non-price factors (Toutkoushian & Paulsen, 2016).

However, HEIs do not produce the same interchangeable service. Each institution produces a service slightly different and therefore, HEIs do not operate in a perfectly competitive market, but rather in a monopolistically-competitive market. Thus, HEIs often compete with each other using other strategies than lowering the price (Toutkoushian & Paulsen, 2016). Toutkoushian and Paulsen (2016) proposed that HEI's behavior depends on the market where

they compete. Some institutions seek to maximize prestige, whereas others seek to maximize revenues. By maximizing either prestige or revenues, institutions can achieve their mission of producing and disseminating knowledge.[17]

Prestige maximizing institutions seek to enroll high-ability students as this is a common source of prestige in the academy (Toutkoushian & Paulsen, 2016). To increase the demand for those students, institutions may improve the quality of the services they offer and/or reduce the price for high-ability students. Subsidies from the government, donors, or other non-student sources, are one method institutions have to reduce the price without reducing quality. Toutkoushian and Paulsen (2016) represent this model as circular, where attracting subsidies allows institutions to lower prices and/or improve quality, which increases demand at a given capacity, which then leads to increased selectivity, which raises prestige and reputation, and increases subsidies, starting the cycle over again. For those institutions that attempt to maximize revenues, they will attempt to enroll the maximum number of students given the tuition and quality desired.

Possible Institutional Reactions to the Chilean Free Tuition Policy

The main aim of the Chilean free tuition policy was to promote the inclusion of academically prepared low-income prospective students in high-quality HEIs (Queupil & Durán del Fierro, 2018). Thus, one of the main goals of this policy was to shift low-income students' college preferences toward high-quality institutions, defined as HEIs with an accreditation result of four years or more (where the range is from 0—accreditation denied--to 7 years of

[17] Prestige and revenue are not the only aspects that HEIs seek to maximize to achieve their intended goals. The economic literature has described discretionary budgets or the quality of the student experience as other aspects that HEIs seek to maximize (Toutkoushian & Paulsen, 2016).

institutional accreditation).[18] In doing so, the policy was implicitly promoting diversifying the socioeconomic characteristics of the student body in institutions participating in the policy, especially in the university sector where there were high concentrations of students from high-income families. At the same time, the program established some rules for participating institutions that changed how they relate to their environment.

For institutions participating in the free tuition policy, a set of rules was established regarding the institution's ability to select their students, finances, and capacity. First, universities were required to admit students using the Single University Admission System (*Sistema Único de Admisión*, SUA), where each institution had to establish the weight for each factor in the admissions process (composed of a standardized test, high school ranking, and high school GPA), the first-year enrollment capacity, and the actual tuition for each of their programs of study. Second, the policy established a regulated tuition for each program of study,[19] an average of the tuition charged by similar programs in institutions with similar levels of accreditation. The state calculated the amount to pay to each institution by multiplying the regulated tuition by the number of free-tuition students enrolled in each program of study. If there was a difference between the amount an institution would receive if it charged the actual tuition and the amount received using the regulated tuition, the state would increase the amount by a maximum of 20%. This regulated tuition applied only to beneficiary students, and institutions could still charge a tuition that is not regulated (the actual tuition) to students who were not part of the free tuition

[18] In Chile, institutional accreditation is a quality certification where institutions undergo through a process to confirm the quality of their internal processes and outcomes. The result of the certification is a number of years (from 0, accreditation denied, to 7 years) awarded depending on the level of compliance of the accreditation standards set by the National Accreditation Commission (Comisión Nacional de Acreditación, CNA). This process although voluntary in the years examined in this study, was needed in order to access student financial aid.
[19] In Chile, students apply to a program of study in an institution.

policy.[20] Third, institutions using the free tuition policy could increase their enrollment capacity by a maximum of 2.7% of the prior year's enrollment.[21]

Through this set of rules, the free-tuition policy created a new organizational environment, affecting the institution's finances, ability to select students, and enrollment capacity. Acknowledging that predicting higher education institutions' behaviors in a new environment is a complex task and is beyond the goals of this paper, I will use supply and demand theory as a guide to derive some possible reactions of HEIs to the free tuition policy implemented in Chile.

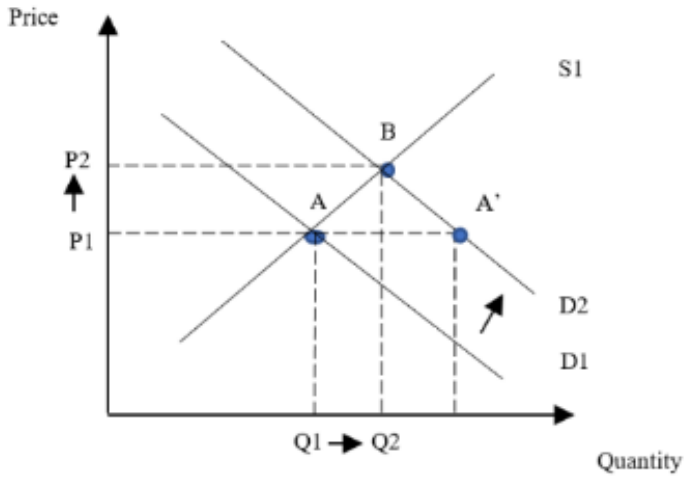
Figure 4.1 represents the effect of the free tuition policy on the demand for higher education and market equilibrium. Although it is framed as a subsidy to institutions, the Chilean free tuition policy used a formula to calculate the amount to transfer to institutions based on the number of eligible students enrolled and the tuition they should have paid in absence of the policy. In this sense, the policy can be understood as a subsidy to eligible students, which would (ceteris paribus), tend to shift the demand curve to the right (D2) generating higher demand at the same price (A'). Although, for theoretical purposes, I simplified the effect of the policy on the demand and supply of higher education by focusing on the price factor, I acknowledge that the policy can affect other non-price factors. For instance, two aspects of the policy merits further discussion as they affect the supply and demand curves. First, as the policy targets low- to middle-income students, whose demand for higher education tend to be more elastic than their more affluent peers (Brent, 2021; Heller, 1997; Kane, 1995; Kim, 2010), the effect of the policy should increase the demand of eligible student at higher levels than the average. Second, free

[20] Since 2019, a regulated tuition applied to students in the 7th to 8th deciles.
[21] Institutions are allowed to increase more than the 2.7% if they are approved by the Ministry of Education.

tuition is only available in participating HEIs. So, eligible student's preferences, a non-price factor, should change towards HEIs in the policy shifting the demand curve to the right only for participating institutions.

On the other hand, in the long run, a change in student's preferences, can also change the supply curve to the right by inducing other HEIs to participate in the policy. However, in the short run, the supply is fixed, as shown in Figure 2, and the change in demand should establish a

Figure 4.1. Effect of Subsidy on the Higher Education Demand and the Market Equilibrium



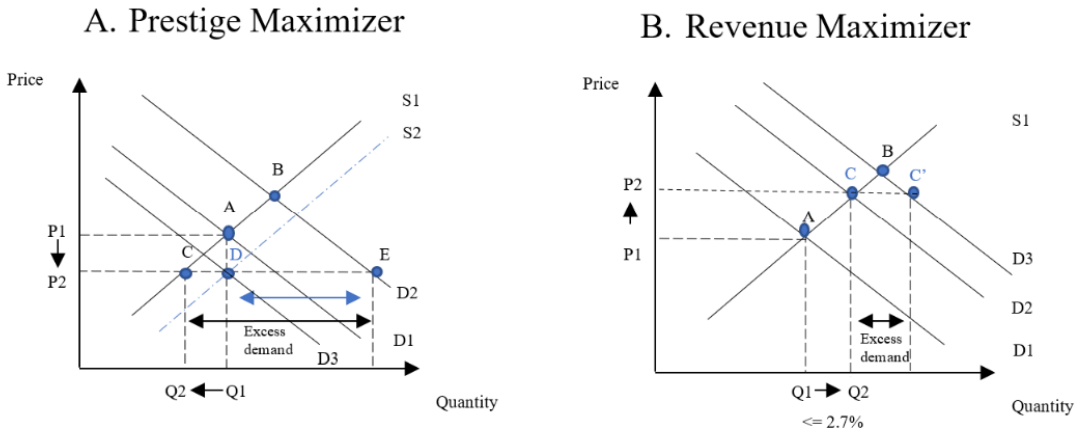
new equilibrium (point B) at a higher price (P2) and an increase in enrollment capacity (Q2).

However, the Chilean free tuition policy established rules that prevented institutions from increasing capacity, and it also regulated tuition. Thus, I hypothesize that an institution's reaction depends on whether the institution is or is not a prestige maximizer. For prestige maximizing institutions (Figure 4.2.A), which are highly selective institutions that tend to have tuition levels higher than the regulated tuition, the free-tuition program may lead to an increase in demand but a decrease in tuition revenue because the government pays only the regulated tuition for each free-tuition student enrolled. In this case, microeconomic theory predicts that, ceteris paribus,

institutions will decrease capacity in order to adjust to the new price (point C). However, the change in the demand curve to the right (D2) will increase the excess of demand (represented by points E-C), which will result in an increase in selectivity (more applicants per vacancy). If this is the case, the increase in selectivity will tend to result in decreasing the share of low- to middle-income students admitted as they are the least like to be academically prepared to gain admission to selective institutions under the SUA system.

For revenue maximizers (Figure 4.2.B), higher education institutions with relatively low selectivity and tuition rates similar to the regulated tuitions, an increase in enrollment demand is constrained by the rule to be no more than 2.7% of the previous year's enrollment. Therefore, they could increase capacity and tuition by no more than the 2.7% rule (point C). If the 2.7% increase in capacity is enough to absorb the increase in demand (D2), then the demand and supply reach a new equilibrium at point C and these institutions will increase their proportion of low- to middle-income students. However, if the increase in demand is higher than 2.7% (D3), revenue maximizer institutions will have an excess of demand (represented by C' – C) and will tend to be more selective. Similar to the prestige maximizer institution's case, an increase in selectivity will tend to result in decreasing the share of low- to middle-income students.

Figure 4.2. Reactions of Supply and Demand in Higher Education by Type of Higher Education Institution



Another possible behavior for prestige maximizing institutions is that they decide to maintain their capacity at Q1. In this case, the supply curve will have to move to the right (S2 in Figure 4.2.A) in order to offer the same capacity at a lower price (point D; regulated tuition tends to be lower than the actual tuition in prestige maximizer institutions). This change in the supply curve can be interpreted as a decrease in quality as institutions decrease their tuition revenues per student. This decrease in quality, a non-price factor, may induce a decrease in demand (represented by D3 in Figure 3.A) which will be manifested in a decrease in applicants and therefore, in selectivity, resulting in a loss of prestige. Thus, prestige-seeking institutions have incentives to act to restitute their equilibrium (point A) where they have excess demand and not decrease their quality. A possible mechanism to achieve point A is to seek other sources of subsidies. In the environment created by the free tuition policy, where capacity is restricted, other possible sources of non-governmental subsidies are high-income students who can pay

higher tuition,[22] donors, or providing other services. In this scenario, the socioeconomic diversity of the student body should increase or maintain.

A third reaction for prestige maximizing institutions is to try to maintain demand (D1) by preventing free-tuition beneficiaries from applying and being admitted by changing the weighting of the PSU during the admissions process. As PSU is correlated with the student's socioeconomic background (Koljatic et al., 2013), increasing the weight of this test in the overall admission score will tend to reduce the likelihood of low-income students being admitted. In this case, the goal of socioeconomically diversifying the student body will tend to fail.

In sum, by applying the theoretical framework to the case of Chile, I derive that achieving the policy goal of inclusion depends on the HEI's ability to secure resources. Depending on the institution's goals of maximizing prestige or revenues, possible reactions can be to increase enrollments and/or selectivity, diversify revenue streams, or increase barriers so free tuition prospective applicants do not gain admission to eligible HEIs.

Research Questions

Using the theoretical framework described above and its application to the free tuition policy implemented in Chile, I derive the following research questions:

1. Does the free tuition policy change the socioeconomic diversity of the student body in the institutions participating in the policy?
2. After the free tuition policy implementation, do participating institutions:
    a. Change their admission outcomes (number of applicants they receive; enrollment capacity; SUA enrollment; PSU test weight in the admission process)?

[22] The free-tuition program only regulates the tuition that the government pays for each free-tuition student enrolled but institutions can still charge a higher tuition to students that are not free-tuition beneficiaries.

b. Change their financial outcomes (actual tuition and fees, donor, services, non-degree courses' revenues, and/or expenditures)?

3. Do any observed differences in diversity, admission, or finance outcomes vary between revenue and prestige maximizing institutions?

Methods

The main aim of this study is to explore the free tuition policy effects on institutional behavior. Therefore, I set the unit of observation at the institution level. I restrict the analysis to the university sector as it is the sector with more institutions included in the policy for a longer period of time. In addition, universities must use the SUA system for the admission process, which keeps track of the enrollment capacity, the number of applicants, and the weight assigned to the university admission test, high school GPA, and high school ranking for each program of study, allowing the construction of a database to use to conduct the statistical analysis.

Sample and Data

As of 2019, 33 universities participated in the free tuition policy. Thirty of them entered the policy in 2016, the first year of implementation, and are the focus of this study. I excluded three universities from the eligible institutions group because they do not have pre-implementation data[23] or have incomplete pre- and post-policy implementation data.[24]

To examine institutional outcomes over time, I accessed longitudinal datasets from the Ministry of Education (MINEDUC) and the Department for Educational Evaluation,

[23] In 2017, the State established two new universities (Universidad de O'Higgins and Universidad de Aysén) which automatically entered the free tuition policy.

[24] One university (Universidad Academia de Humanismo Cristiano) entered the policy in 2018, which was the first year it participated in the SUA system. Therefore, it has incomplete pre-implementation data for the enrollment outcomes. For the finance outcomes, the only post-implementation year with data available was 2018.

Measurement, and Registry (*Departamento de Evaluación, Medición y Registro Educacional*, DEMRE). The MINEDUC datasets provide data at the program of study level for each institution, including enrollment capacity, tuition and fees, weights for the different components of the SUA system (i.e., high school GPA, high school GPA ranking, and the university standardized tests), first year and total enrollments, and institutional revenue and expenditure data. The DEMRE datasets provide student-level observations about college applications and enrollments derived from the SUA system. The data covers the period from 2012 to 2019, which permits me to have four pre-implementation years (2012, 2013, 2014, and 2015) and four post-implementation years (2016, 2017, 2018, and 2019). An exception is the revenue and expenditure data, which is only available between 2013 and 2018.

Using the data described above, I constructed several outcomes (see Table 1). The outcomes are divided into the following categories, which align with my research questions: diversity, admission, and financial outcomes. For the diversity outcomes, I used the student high school dependency (i.e., public, subsidized, and private) and the student high school track (i.e., vocational or academic) as proxies to identify low- to middle-income students, who are the target of the policy. I used the high school of origin as a proxy for socioeconomic level because, in Chile, segregation in schools along socioeconomic lines is very high (Bellei et al., 2010). Using high school dependency and track measures, I operationalize diversity in two ways to examine the representation of the targeted students and the socioeconomic heterogeneity of the student body: (1) I measure the representation of low- to middle-income students on campus by the proportion of an HEIs students enrolled from public and subsidized high schools and the proportion of students from a vocational track. (2) I measure the socioeconomic heterogeneity of the student body using the Simpson diversity index (SDI) of the high school dependency and

track. SDI measures the probability that two students selected at random would belong to the same group of interest and therefore, is a measure of diversity of the student body.

For the admission outcomes, I aggregate data from the SUA system at the institutional level. The SUA system collects student-level data about their college applications, and program-level data about enrollments and weights assigned to each component of the application process. The outcomes of interest are the total number of applications received by the institution, the institutional enrollment capacity, the actual enrollment through the SUA system,[25] and the average weight assigned to the PSU test.

The finance outcomes include revenues derived from undergraduate tuition, donations, services, non-degree courses, and undergraduate expenditures. Revenues and expenditures are declared by each university to the MINEDUC and comprise the actual total revenues and expenditures in a calendar year. In Table 4.1, I describe each of these outcomes and the dataset used to generate them. Table 4.2 presents the descriptive statistics for each variable.

Table 4.1. Outcomes Description and Source

Outcome	Description	Dataset
Diversity (2012-2019)		
Proportion of students from public/subsidized high schools	Proportion of students from public and subsidized high schools enrolled in the program of study first year through the SUA system.	DEMRE
Proportion of students from vocational high schools	Proportion of students from a vocational track in high school enrolled in the program of study first year through the SUA system.	DEMRE

[25] The enrollment through the SUA system and the total first-year enrollment can differ because universities have different admission channels besides the SUA system. In the analysis, I focus on the enrollment through the SUA system because it is the way to access the free tuition benefits.

Simpson diversity index of high school dependency	Probability that any two students selected at random would belong to the same high school dependency (range 0-1, where 0 represents no diversity). It was calculated considering the three high school dependency (i.e., public, subsidized, and private; see Franklin, 2012 for more information).	DEMRE
Simpson diversity index of high school track	Probability that any two students selected at random would belong to the same high school track (range 0-1, where 0 represents no diversity). It was calculated considering the two high school tracks (i.e., academic and vocational; see Franklin, 2012 for more information).	DEMRE
Admission (2012-2019)		
Number of applications	Sum of applications received by all the undergraduate programs of study participating in the SUA system.	DEMRE
Average PSU test weight	Average weight of the PSU test in the admission system of all undergraduate programs of study participating in the SUA system.	MINEDUC
Enrollment capacity	Sum of enrollment capacity of all undergraduate programs of study participating in the SUA system.	MINEDUC
First-year SUA enrollment	Sum of first-year enrollment of all undergraduate programs of study participating in the SUA system.	DEMRE
Financial (2013-2018)		
Undergraduate tuition and fees revenues per student	Revenues from tuition and fees declared by the university in the calendar year. Includes revenues due to the free tuition policy. Adjusted by inflation. (Total tuition and fees revenue * proportion of undergraduate enrollment) / Total undergraduate enrollment.	MINEDUC
Donations revenues per student	Revenues from donations declared by the university in the calendar year. Adjusted by inflation. Total donation revenues / Total undergraduate enrollment.	MINEDUC
Services revenues per student	Revenues from services provided by the university in a calendar year. Adjusted by inflation. Total revenues due to services / Total undergraduate enrollment.	MINEDUC
Non-degree program revenues per student	Revenues from non-degree programs declared by the university in a calendar year. Adjusted by inflation. Total revenues due to non-degree programs / Total undergraduate enrollment.	MINEDUC
Undergraduate Expenditures per student	Expenditures due to salaries and administration declared by the university in a calendar year. Adjusted by inflation.	MINEDUC

(Salaries + administration expenditures) * proportion of undergraduate enrollment / Total undergraduate enrollment.

Table 4.2. Descriptive Statistics of Outcome Variables

Variable		Mean	Std. dev.	Min	Max	Observations		
Diversity Outcomes (2012-2019)								
Proportion of Students from public/subsidized HS	overall	0.87	0.14	0.34	1.00	N	=	224
	between		0.14	0.34	0.99	n	=	28
	within		0.03	0.69	1.00	T	=	8
Proportion of Students form vocational HS	overall	0.15	0.08	0.02	0.45	N	=	224
	between		0.08	0.02	0.38	n	=	28
	within		0.02	0.11	0.22	T	=	8
SDI: HS dependency	overall	0.54	0.05	0.38	0.66	N	=	224
	between		0.05	0.43	0.66	n	=	28
	within		0.02	0.49	0.67	T	=	8
SDI: HS track	overall	0.25	0.10	0.03	0.50	N	=	224
	between		0.10	0.04	0.47	n	=	28
	within		0.02	0.18	0.33	T	=	8
Admission Outcomes (2012-2019)								
Number of applications	overall	17294.22	10881.35	1912.00	51798.00	N	=	224
	between		10812.39	2877.38	47875.38	n	=	28
	within		2272.84	11385.97	26195.84	T	=	8
Enrollment Capacity	overall	2562.75	1328.51	590.00	7552.00	N	=	224
	between		1269.86	944.50	5671.50	n	=	28
	within		450.55	1124.63	4443.25	T	=	8
First-year SUA enrollment	overall	2207.196	1283.31	369.00	5744.00	N	=	224
	between		1290.96	485.50	5307.00	n	=	28
	within		180.63	1728.32	2810.57	T	=	8
PSU test weight	overall	69.49	9.28	50.00	89.85	N	=	224
	between		8.18	57.26	83.31	n	=	28
	within		4.62	60.01	89.90	T	=	8
Financial Outcomes (2013-2018)								
Ug. Tuition and fees revenues per student	overall	103.05	22.14	33.68	168.19	N	=	180
	between		20.58	65.59	156.15	n	=	30
	within		8.86	67.62	130.15	T	=	6
Donations revenues per student	overall	2.10	6.66	0.00	62.59	N	=	180
	between		6.01	0.00	33.20	n	=	30
	within		3.04	-6.11	31.49	T	=	6
Services revenues per student	overall	27.82	73.82	0.00	416.55	N	=	180
	between		74.56	0.00	364.94	n	=	30
	within		7.14	-4.32	79.43	T	=	6
	overall	6.29	11.52	0.00	55.86	N	=	180

Non-degree program revenues per student	between		11.54	0.00	51.45	n	=	30
	within		1.81	-0.002	16.02	T	=	6
Ug. Expenditures	overall	166.82	95.88	72.52	598.37	N	=	180
	between		95.51	82.75	549.96	n	=	30
	within		18.07	113.47	218.95	T	=	6

Notes: Financial outcomes are in Chilean Unidad de Fomento (UF) which is a non-circulating currency which exchanges rate between the UF and the Chilean peso is constantly adjusted for inflation. In August 2022, 1 UF=U$38.02. SDI means Simpson diversity index. HS means high school. SUA is the acronym for the Single University Admission System (*Sistema Único de Admisión*). PSU is the acronym in Spanish for the university standardized test (*Prueba de Selección Universitaria*). Ug. Stands for undergraduate. Source: Own elaboration based on MINEDUC and DEMRE data.

Prestige and Revenue Maximizer University Classification

In the theoretical framework, I hypothesize that universities will react differently if they are prestige or revenue maximizing institutions, identifying prestige maximizers as highly selective institutions and revenue maximizers as non-selective institutions. As most of the outcomes (i.e., diversity and admission outcomes) are based on the SUA system, all the universities included in the analysis are somewhat selective. Thus, I operationalize prestige maximizing institutions as those highly selective institutions, and revenue maximizing institutions as the less selective institutions. However, I acknowledge that there are no purely revenue maximizers in the sample.

I used two proxies to classify universities according to their selectivity level. First, I used the number of accreditation years granted in the accreditation process until 2015, the year before the free tuition policy implementation. Researchers have found that the number of accreditation years granted is positively associated with student selectivity, as measured by the average PSU test scores of the students admitted to the institution (Fleet et al., 2014). Thus, and considering that universities must have at least four years of accreditation to participate in the free tuition policy, I classified as low selective universities those with less than five years of accreditation, medium selective universities as those with five years of accreditation, and highly selective universities as those with six or seven years of accreditation.

Second, I calculated the average of the language and math PSU tests of the admitted students in 2015. As I hypothesized that universities at the extreme of the distribution would be the most likely to behave as prestige or revenue maximizers, I categorized this variable into three categories based on their distribution: low selective universities are those in the bottom 25% of the distribution, medium selective universities are those in the middle (25% to 75%) of the distribution, and highly selective are those in the top 25% of the distribution.

Analytic Approach

Exploring the effect of the free tuition policy on university outcomes posits a methodological challenge. Although the policy is focused on specific institutions, it may also influence student behavior at the system level. Because the policy keeps capacity relatively constant, an increase in low-income students that enroll in eligible institutions should result in a displacement of high-income students to non-eligible institutions. This sorting issue that affects the potential "treatment" and "control" groups makes it difficult to use a causal inference approach such as difference-in-difference. Therefore, I used fixed effects regression models to explore the free tuition policy effects on university outcomes. Fixed effects models use panel data to estimate the effect of an intervention on a dependent variable. By only using within-institution variation, fixed effects regressions control for all institutional stable characteristics without the need for a control group (Allison, 2009). The methodological approach is formally described in Equation 2:

$$Y_{it} = \alpha_i + \beta_1 T_t + \beta_2 After2016_t + \beta_3 (T * After2016)_t + + \varepsilon_{it} \quad (2)$$

where Y_{it} is the outcome (diversity of the student body, admission, and financial outcomes), which vary over time (t) and by institution (i), T_t is a continuous variable representing the year when the observation was measured and centered on the year of the policy implementation

(2016=0), "After2016" is a dummy variable identifying whether the observation was observed before (=0) or after (=1) the policy implementation and "T*After2016" is an interaction of time and the dummy variable that identifies the pre- and post-intervention periods; α controls for institutional fixed effects and the β are parameters to be estimated: β_1 represents the change in the outcome due to a unit increase in time and it can be interpreted as the pre-intervention trend, β_2 is the average change in the outcome when the intervention was implemented, and β_3 represents the change in the trend after the policy implementation; ε_{it} is an error term measured at the institutional level. For all models estimated, the standard errors are clustered at the university level to account for the structure of the data (i.e., repeated measures by institution). The number of applications, enrollment capacity, first-year enrollment, and financial outcomes were transformed into a logarithm scale to normalize their distributions.

Because I estimated several models using the same datasets and produced numerous parameter estimates, I adjusted the *p*-values using a Bonferroni correction accounting for the increased likelihood of Type-I errors. Because the Bonferroni correction can be very conservative, I also explored differences among accreditation and selectivity levels by including a triple interaction effect (Time*After2016*Accreditation Level or Time*After2016*Selectivity Level) in the fixed effect regression models. I then conduct join tests of the three-way interactions to evaluate whether the time trend after the policy implementation varies by accreditation and/or selectivity level. Results using the triple interaction approach are presented in Appendix A.4.

Analysis at the Program of Study Level

In Chile, the admission and enrollment processes are done at the program level. Therefore, I explored whether there is a change in the diversity outcomes at the program of study

level. To assess the change after the policy implementation, I only considered programs with data available in 2015, the year before the free tuition policy implementation. By excluding programs created after policy implementation, I avoid any changes in the program offerings of universities induced by the policy implementation, which, in turn, could influence the diversity outcomes. I also categorized each program according to their selectivity (language and math PSU test average of the admitted students in 2015) following the same approach described above for categorizing the universities. In total, 1,145 programs of study were included in the sample. I used fixed effect regression models at the program of study/university level and clustered the standard errors at the same level in all the models.

Limitations

Although this study uses unique data and strong statistical methods to explore the possible effects of a free tuition policy on institutional outcomes, it nonetheless has limitations. First, in Chile, the application process is done at the program/institution level and enrollment capacity, weights for the factors in the admission process, and tuition are set at this level. However, some data, such as revenue and expenditure data, is only available at the institutional level. Therefore, I analyzed changes in the outcomes at the institutional level. Aggregating the data at the institutional level can result in a loss of within institutional variation and may mask effects at the program level. I tried to mitigate this issue by incorporating a program/institution level analysis of the diversity outcomes, but more research using the available application and admission data is needed at this level to further explore within institution changes.

A second limitation is related to not having a control group to compare the outcomes of treated institutions. The free tuition policy allows private institutions to voluntarily opt-in the policy, while it is mandatory for state institutions. Thus, there is self-selection of institutions that

opted to be part of the policy, introducing an endogeneity problem. Although I tried to mitigate this issue by using a fixed effect regression approach, which controls for all stable unobserved characteristics, it does not control for unobserved characteristics that change over time. Therefore, I consider my results exploratory and further research is needed to continue to understand how HEIs react to free tuition policies.

A third limitation is related to only considering selective universities in the sample and therefore, not having only revenue maximizing institutions, as hypothesized in the theoretical framework. Due to the research design, the analysis in this paper needed pre- and post-implementation data on key outcomes that were only available for selective institutions. Thus, open-access institutions were not considered in the analysis. Future research can focus on different outcomes that are available for selective and non-selective institutions to overcome this limitation.

A fourth limitation is related to the dataset available to track the effects of the policy on institutions. Although the data available represent an important first step to begin analyzing possible policy effects on institutions, informational interviews pointed out other kinds of issues that were not captured by the available data. For instance, vice-presidents of finance pointed out that the effect of the policy on tuition revenues depends on the level of institutional financial aid that institutions invest before the policy implementation because after the policy, they do not have to spend revenues to provide student financial aid. Therefore, the institution's response to the policy could be related to the level of institutional financial aid. Another issue raised in the interviews was that the effect of the policy varies according to the level of centralization in the decision-making process inside an institution. Interview respondents mentioned that centralized institutions can redistribute the free tuition revenues according to each program's needs, but

decentralized institutions had problems redistributing the revenues, especially when institutions receive a compensation due to a high difference between the regulated and actual tuition (the free tuition policy contemplates a maximum of 20% increase in the amount to transfer to institution if the regulated tuition is lower than the actual tuition). In the dataset available, there was no information about the institution's financial aid nor the level of centralization to explore whether those characteristics are related to how institutions react to the policy.

Results

Effects on Socioeconomic Diversity of the Student Body

The first research question asks whether the participating universities have socioeconomically diversified their student body after the free tuition policy implementation. Table 4.3 presents the fixed effect regression estimates of the free tuition policy on the socioeconomic diversity outcomes of the first-year student body. The estimates of interest are After2016 and After2016*Time, which measure the change in the outcome and in the outcome time trend (respectively) after policy implementation. Section A of Table 4.3 provides the estimates for all universities participating in the free tuition policy. Overall, these estimates indicate that the implementation of the free tuition policy did not change the stable socioeconomic diversity trend observed prior to policy implementation in participating universities. However, there is a one-time effect on increasing the proportion of low-income students, estimated to be approximately 0.02 points (0.018 for students from public or subsidized high schools; 0.021 for students from vocational high schools, see Models 1 and 2, respectively in section A). This one-time effect is also observed in the heterogeneity of the student body as measured by the SDI of the high school track, and estimated to be about 0.03 points (see Model

4, section A). This slight increase in the high school track SDI means that the policy has a small effect on changing the composition of the student population in participating universities. However, this change is not confirmed by the high school dependency SDI.

Sections B and C of Table 4.3 disaggregate the estimates by accreditation and selectivity level, respectively. No change after the policy implementation on diversifying the student body trends is found in any of these classifications.[26] The one-time effect after policy implementation in increasing low- to middle-income student proportion is found only in universities with low accreditation or selectivity levels (see Model 1, section B.1 and section C.1) and in universities with medium accreditation or selectivity levels (see Model 2, section B.2. and C.2).

Table 4.3. Fixed Effect Regression Estimates of the Free tuition Policy on Diversity Outcomes

	Proportion of students from:		Simpson Diversity Index:	
	Public/ subsidized HS	Vocational HS	HS Dependency	HS Track
	(1)	(2)	(3)	(4)
A. All Universities (obs. 224; n universities 28)				
Time	0.000	-0.005	-0.001	-0.005
	(0.002)	(0.002)	(0.001)	(0.002)
After 2016	0.018***	0.021***	-0.004	0.027***
	(0.005)	(0.004)	(0.003)	(0.004)
After2016 * Time	-0.004	0.003	0.005	0.004
	(0.002)	(0.002)	(0.003)	(0.002)
Constant	0.861***	0.136***	0.534***	0.227***
	(0.002)	(0.004)	(0.003)	(0.004)
B. Accreditation Level				
B.1. Low Accreditation Level (<5 years; obs. 80; n universities 10)				
Time	-0.005**	-0.009	0.000	-0.009
	(0.001)	(0.004)	(0.003)	(0.003)
After 2016	0.019***	0.029	-0.004	0.031
	(0.003)	(0.008)	(0.007)	(0.008)

[26] Overall, results using the triple interaction approach confirmed that the policy implementation did not change the socioeconomic diversity trend of the student body in universities with different accreditation or selectivity levels. Only the triple interaction including the proportion of students from public/subsidized high schools by selectivity level was statistically significant. See results in Appendix B, Table B.1., Models 1 to 4.

After2016 * Time	-0.002	0.007	0.010	0.007
	(0.004)	(0.004)	(0.006)	(0.003)
Constant	0.932***	0.177***	0.504***	0.284***
	(0.003)	(0.007)	(0.007)	(0.006)
B.2. Medium Accreditation Level (5 years; obs.88; n universities 11))				
Time	0.005	-0.005	-0.001	-0.005
	(0.003)	(0.002)	(0.002)	(0.003)
After 2016	0.023	0.024***	-0.005	0.033***
	(0.011)	(0.003)	(0.005)	(0.005)
After2016 * Time	-0.005	0.002	0.000	0.003
	(0.002)	(0.002)	(0.003)	(0.002)
Constant	0.862***	0.131***	0.546***	0.221***
	(0.004)	(0.003)	(0.005)	(0.004)
B. 3. High Accreditation Level (6-7 years; obs. 56; n universities 7)				
Time	0.001	-0.000	-0.001	-0.000
	(0.002)	(0.003)	(0.003)	(0.005)
After 2016	0.009	0.007	-0.004	0.012
	(0.005)	(0.005)	(0.006)	(0.008)
After2016 * Time	-0.006	0.000	0.004	0.001
	(0.004)	(0.005)	(0.003)	(0.007)
Constant	0.759***	0.087***	0.559***	0.154***
	(0.005)	(0.008)	(0.006)	(0.012)
C. Selectivity				
C.1. Low Selectivity (Bottom 25%; obs. 72; n universities 9)				
Time	-0.004**	-0.006	-0.000	-0.005
	(0.001)	(0.004)	(0.003)	(0.002)
After 2016	0.014***	0.026	0.004	0.026
	(0.003)	(0.009)	(0.007)	(0.008)
After2016 * Time	0.001	0.006	0.005	0.005
	(0.001)	(0.004)	(0.004)	(0.003)
Constant	0.939***	0.191***	0.515***	0.303***
	(0.002)	(0.008)	(0.007)	(0.005)
C.2. Medium Selectivity (Middle 50%; obs. 72, n universities 9)				
Time	0.003	-0.007	-0.001	-0.008
	(0.004)	(0.003)	(0.002)	(0.004)
After 2016	0.028	0.029***	-0.012	0.040***
	(0.013)	(0.003)	(0.006)	(0.003)
After2016 * Time	-0.009	0.005	0.010	0.005
	(0.004)	(0.002)	(0.007)	(0.002)
Constant	0.884***	0.129***	0.515***	0.219***
	(0.005)	(0.003)	(0.006)	(0.003)
C.3. High Selectivity (Top 25%; obs. 80; n universities 10)				
Time	0.001	-0.002	-0.000	-0.004
	(0.003)	(0.003)	(0.002)	(0.004)
After 2016	0.013	0.010	-0.004	0.016

	(0.005)	(0.005)	(0.003)	(0.007)
After2016 * Time	-0.004	0.000	0.000	0.001
	(0.004)	(0.003)	(0.003)	(0.005)
Constant	0.771***	0.094***	0.569***	0.165***
	(0.004)	(0.006)	(0.005)	(0.009)

Notes: Standard errors in parentheses and clustered at the university level. ***p<0.01, **p<0.05. P-values' significance was adjusted for multiple comparisons using Bonferroni correction. For results without Bonferroni correction see Appendix B. HS means high school. Source: Diversity outcomes come from DEMRE datasets.

In sum, the overall results suggest that the implementation of the free tuition policy did not diversify the student population of participating universities. There is only a small, one-time effect on increasing the proportion of low and middle-income students, especially in those universities identified by the theoretical framework as revenue maximizers (low to medium selectivity/accreditation levels). However, this increase is not enough to change the socioeconomic composition in participating institutions, as shown by the lack of significant effects on the diversity indexes by accreditation or selectivity level. Next, I explore whether there is any change in the admission and financial outcomes, as suggested by the theoretical framework.

Effects on Admission Outcomes

Table 4.4 presents the fixed effect estimates for the admission outcomes. Overall, the implementation of the free tuition policy had a one-time effect on increasing the applications received by the universities in the policy, by about 23 percentage points, and this increase tends to remain stable over time (see Model 1, section A). Disaggregating by accreditation level, the results in section B indicate that only universities with low accreditation levels tend to decline their total application growth after policy implementation ($\beta = -0.057$). However, this decrease is not observed in universities with low selectivity and is not confirmed by the triple interaction approach (see Appendix A, Table A.4.1, Models 5 to 8), suggesting that the one-time increase in applications does not decline for prestige or revenue maximizing institutions. Thus, I conclude

that the demand for enrolling in participating universities increased for both type of institutions after policy implementation.

Next, I examine whether participating universities are absorbing the increase in demand by changing their enrollment capacity and their first-year SUA enrollment (see Model 2 and 3, respectively, in Table 4.4). Overall, after the policy implementation, participating universities grow their enrollment capacity by about five percentage points per year (see Model 2, section A). No differences are found by accreditation or selectivity levels (see sections B and C of Model 2, respectively. See Appendix A, Table A.4.1., Model 6 for the triple interaction approach).

Despite the increase in enrollment capacity, participating universities did not change their SUA enrollment trends after the policy implementation (see Model 3, section A). However, there is evidence that enrollment trends vary by accreditation and selectivity levels (join test for triple interaction is significant for both models, $p < 0.05$, see Table A.4.1., Models 6 and 7 in Appendix A). By accreditation level, universities with low accreditation tend to decline their enrollment trend observed before policy implementation, and enrollments tend to stabilize after the policy implementation (see Model 3, section B). Similar results are observed in universities with low and medium selectivity, although they are measured more imprecisely and not statistically significant (see Model 3, section C). Results based on the triple interaction approach confirm the decline in enrollment growth after the policy implementation in universities with low accreditation or selectivity levels. These results also demonstrate an increase in enrollments in universities with high accreditation or selectivity after the policy implementation.

In sum, these results suggest that universities increased their enrollment capacity after policy implementation. However, only prestige maximizing universities increased their

enrollments, whereas revenue maximizing institutions saw their enrollment growth trend decline after policy implementation, leading to a stabilization in enrollments.

I also examined whether participating universities changed the weight assigned to the PSU test in the SUA system after the free tuition policy implementation. Overall, results in Model 4, section A, indicate that universities tended to maintain the weight assigned to the test after the implementation of the policy interrupting the declining trend in the PSU weight observed before the implementation. This stabilizing trend in the PSU weight is observed more in universities with medium to high accreditation and selectivity levels than in their low accreditation or selectivity peers. However, this difference is not confirmed by the triple interaction approach (see Tables A.4.1. and A.4.2., Model 8 in Appendix A).

Table 4.4. Fixed Effect Regression Estimates of the Free Tuition Policy on Admission Outcomes

	Ln (Total Applications)	Ln (Enrollment Capacity)	Ln (SUA Enrollment)	PSU Test Weight
	(1)	(2)	(3)	(4)
A. All Universities (obs.=224; n universities=28)				
Time	0.008	-0.002	0.047***	-2.890***
	(0.010)	(0.016)	(0.009)	(0.379)
After 2016	0.229***	0.108	-0.005	2.798***
	(0.026)	(0.069)	(0.017)	(0.748)
After2016 * Time	-0.036	0.050**	-0.033	2.333***
	(0.012)	(0.018)	(0.012)	(0.471)
Constant	9.472***	7.628***	7.582***	64.894***
	(0.019)	(0.048)	(0.017)	(0.811)
B. Accreditation Level				
B.1. Low Accreditation Level (<5 years; obs.=80, n universities=10)				
Time	0.034	-0.003	0.082**	-2.024***
	(0.020)	(0.042)	(0.016)	(0.315)
After 2016	0.197**	0.226	-0.043	2.657**
	(0.043)	(0.190)	(0.031)	(0.896)
After2016 * Time	-0.057**	0.047	-0.088**	1.074
	(0.020)	(0.044)	(0.019)	(0.778)

Constant	8.924***	7.271***	7.135***	71.139***
	(0.035)	(0.132)	(0.030)	(0.941)
B.2. Medium Accreditation Level (5 years; obs.=88; n universities=11)				
Time	-0.008	-0.008	0.033	-3.534***
	(0.008)	(0.015)	(0.013)	(0.790)
After 2016	0.284***	0.040	0.046	3.053
	(0.044)	(0.028)	(0.021)	(1.547)
After2016 * Time	-0.032	0.065**	-0.005	3.007***
	(0.020)	(0.022)	(0.014)	(0.779)
Constant	9.569***	7.604***	7.583***	60.822***
	(0.020)	(0.032)	(0.019)	(1.609)
B.3. High Accreditation Level (6-7 years; obs.=56, n universities=7)				
Time	-0.006	0.009	0.022	-3.114***
	(0.021)	(0.017)	(0.009)	(0.708)
After 2016	0.187***	0.047	-0.029	2.597
	(0.039)	(0.049)	(0.029)	(1.524)
After2016 * Time	-0.010	0.032	0.003	3.071**
	(0.025)	(0.021)	(0.008)	(0.775)
Constant	10.103***	8.178***	8.218***	62.373***
	(0.044)	(0.045)	(0.019)	(1.629)
C. Selectivity Level				
C.1. Low Selectivity (Bottom 25%; obs.=72; n universities=9)				
Time	0.042	-0.008	0.080	-2.818**
	(0.020)	(0.047)	(0.019)	(0.986)
After 2016	0.203	0.243	-0.045	3.612
	(0.046)	(0.211)	(0.035)	(1.891)
After2016 * Time	-0.051	0.066	-0.07	1.804
	(0.022)	(0.048)	(0.023)	(1.298)
Constant	8.947***	7.275***	7.118***	68.084***
	(0.040)	(0.146)	(0.035)	(2.191)
C.2. Medium Selectivity (Middle 50%; obs.=72, n universities=9)				
Time	-0.009	0.007	0.045	-2.972***
	(0.005)	(0.010)	(0.015)	(0.418)
After 2016	0.289**	0.046	0.053	1.471
	(0.053)	(0.029)	(0.023)	(0.734)
After2016 * Time	-0.043	0.027	-0.035	2.725***
	(0.021)	(0.014)	(0.023)	(0.368)
Constant	9.431***	7.526***	7.526***	62.307***
	(0.024)	(0.024)	(0.029)	(0.572)
C.3. High Selectivity (Top 25%; obs.=80; n universities=10)				
Time	-0.008	-0.005	0.021	-2.880***
	(0.017)	(0.018)	(0.009)	(0.570)
After 2016	0.197***	0.043	-0.020	3.259**
	(0.034)	(0.040)	(0.023)	(1.125)

After2016 * Time	-0.015	0.057	0.004	2.456***
	(0.023)	(0.025)	(0.008)	(0.644)
Constant	9.982***	8.039***	8.050***	64.352***
	(0.032)	(0.042)	(0.018)	(1.248)

Notes: Standard errors in parentheses and clustered at the university level. ***p<0.01, **p<0.05. P-values' significance was adjusted for multiple comparisons using Bonferroni correction. For results without Bonferroni correction see Appendix B. PSU is the Spanish acronym for the university standardized test (*Prueba de Selección Universitaria*). SUA is the acronym for the Single University Admission System (*Sistema Único de Admisión*). Source: Admission outcomes come from DEMRE datasets, except for PSU weight and enrollment capacity that come from MINEDUC dataset.

Effects on Financial Outcomes

Table 4.5 presents the fixed effect estimates for the financial outcomes. Overall, the free tuition policy has no effect on undergraduate tuition, donation, services, or non-degree program revenues of the participating universities. The policy implementation lowered the positive trend in undergraduate expenditures observed before the policy, by about five percentage points (see Model 5, section A). No variation was found by accreditation or selectivity level (see sections B and C in Table 4.5, and Table A.4.3. and A.4.4. in Appendix A for the triple interaction approach).

Table 4.5. Fixed Effect Estimates of the Free Tuition Policy on Finance Outcomes

	Ln (Ug. Tuition Rev.)	Ln (Donation Rev.)	Ln (Services Rev.)	Ln (Certificate Rev.)	Ln (Ug. Exp.)
	(1)	(2)	(3)	(4)	(5)
A. All Universities	(obs.=180; n univ.=30)	(obs.=153; n univ.=28)	(obs.=165; n univ.=29)	(obs.=160; n univ.=29)	(obs.=180; n univ.=30)
Time	0.001	-0.169	-0.045	-0.022	0.081***
	(0.010)	(0.103)	(0.055)	(0.083)	(0.009)
After 2016	0.009	0.505	0.099	0.061	-0.027
	(0.025)	(0.297)	(0.073)	(0.078)	(0.016)
After2016 * Time	0.005	0.092	0.012	-0.042	-0.048***
	(0.020)	(0.143)	(0.084)	(0.108)	(0.014)
Constant	4.604***	-1.098***	1.762***	1.165***	5.093***
	(0.021)	(0.230)	(0.088)	(0.119)	(0.017)
B. Accreditation Level					
B.1. Low Accreditation Level (<5 years)	(obs.=66; n univ.=11)	(obs.=44; n univ.=9)	(obs.=64; n univ.=11)	(obs.=53; n univ.=11)	(obs.=66; n univ.=11)
Time	-0.001	-0.206	-0.075	-0.133	0.094***
	(0.019)	(0.239)	(0.112)	(0.162)	(0.016)

After 2016	-0.024	1.384	0.142	0.221	-0.021
	(0.040)	(0.838)	(0.127)	(0.180)	(0.029)
After2016 * Time	-0.024	0.172	0.106	0.008	-0.066
	(0.042)	(0.191)	(0.165)	(0.213)	(0.031)
Constant	4.465***	-2.612***	1.123***	0.424*	4.900***
	(0.045)	(0.607)	(0.177)	(0.226)	(0.034)
B. 2. Medium Accreditation Level (5 years)	(obs.=72; n univ.=12)	(obs.=72; n univ.=12)	(obs.=59; n univ.=11)	(obs.=65; n univ.=11)	(obs.=72; n univ.=12)
Time	0.012	-0.122	-0.131	-0.125	0.080***
	(0.017)	(0.168)	(0.086)	(0.083)	(0.017)
After 2016	-0.016	0.325	0.187*	0.108	-0.049
	(0.030)	(0.240)	(0.093)	(0.106)	(0.019)
After2016 * Time	0.019	-0.030	0.132	0.094	-0.041
	(0.034)	(0.281)	(0.099)	(0.146)	(0.020)
Constant	4.679***	-0.969***	1.176***	1.061***	5.017***
	(0.023)	(0.286)	(0.120)	(0.157)	(0.025)
B. 3. High Accreditation Level (6-7 years)	(obs.=42; n univ.=7)	(obs.=37; n univ.=7)	(obs.=42; n univ.=7)	(obs.=42; n univ.=7)	(obs.=42; n univ.=7)
Time	-0.017	-0.221	0.119	0.223	0.061***
	(0.016)	(0.114)	(0.043)	(0.180)	(0.011)
After 2016	0.105	-0.158	-0.079	-0.145	0.003
	(0.068)	(0.534)	(0.180)	(0.058)	(0.041)
After2016 * Time	0.025	0.241	-0.3	-0.260	-0.034
	(0.010)	(0.111)	(0.132)	(0.219)	(0.013)
Constant	4.695***	0.418	3.550***	2.188***	5.527***
	(0.042)	(0.354)	(0.110)	(0.223)	(0.028)
C. Selectivity Level					
C.1. Low Selectivity (Bottom 25%)	(obs.=54; n univ.=9)	(obs.=37; n univ.=7)	(obs.=52; n univ.=9)	(obs.=42; n univ.=9)	(obs.=54; n univ.=9)
Time	-0.019	-0.413	-0.104	-0.148	0.100***
	(0.022)	(0.229)	(0.106)	(0.179)	(0.022)
After 2016	0.045	1.363	0.080	0.211	-0.035
	(0.028)	(0.549)	(0.096)	(0.238)	(0.038)
After2016 * Time	0.030	0.312	0.041	-0.036	-0.071
	(0.032)	(0.104)	(0.184)	(0.220)	(0.039)
Constant	4.422***	-2.639***	1.295***	0.723**	4.895***
	(0.033)	(0.417)	(0.160)	(0.259)	(0.046)
C.2. Medium Selectivity (Middle 50%)	(obs.=54; n univ.=9)	(obs.=54; n univ.=9)	(obs.=46; n univ.=8)	(obs.=52; n univ.=9)	(obs.=54; n univ.=9)
Time	0.006	-0.196	0.035	-0.112	0.077**
	(0.014)	(0.194)	(0.086)	(0.103)	(0.018)
After 2016	-0.070	0.659	0.010	0.163	-0.041
	(0.048)	(0.595)	(0.108)	(0.111)	(0.019)
After2016 * Time	-0.004	0.172	0.029	0.165	-0.05
	(0.058)	(0.289)	(0.107)	(0.160)	(0.027)
Constant	4.651***	-1.352**	1.561***	0.795***	5.053***

	(0.042)	(0.444)	(0.121)	(0.171)	(0.025)
C.3. High Selectivity (Top 25%)	(obs.=60; n univ.=10)	(obs.=50; n univ.=10)	(obs.=55; n univ.=10)	(obs.=54; n univ.=9)	(obs.=60; n univ.=10)
Time	0.010	-0.096	-0.067	0.116	0.065***
	(0.021)	(0.109)	(0.111)	(0.167)	(0.010)
After 2016	0.056	0.021	0.172	-0.113	0.006
	(0.053)	(0.408)	(0.190)	(0.080)	(0.028)
After2016 * Time	-0.000	0.002	-0.056	-0.197	-0.026
	(0.020)	(0.280)	(0.176)	(0.216)	(0.008)
Constant	4.702***	0.380	2.801***	1.741***	5.373***
	(0.042)	(0.287)	(0.206)	(0.220)	(0.018)

Notes: All outcomes are per undergraduate student. Standard errors in parentheses and clustered at the university level. ***p<0.01, **p<0.05. P-values' significance was adjusted for multiple comparisons using Bonferroni correction. For results without Bonferroni correction see Appendix B. Ug. Stands for undergraduate. Rev. stands for revenues. Exp. Stands for expenditures. Source: Finance outcomes come from MINEDUC dataset.

Diversity Outcomes by Program of Study

So far, the analysis has been conducted at the institutional level. However, the application and admission processes in Chile take place at the program of study level. The lack of effect on the diversity outcomes discussed at the institution level may be due to some programs diversifying their student body and others decreasing their diversity within an institution, resulting in offsetting effects. Therefore, I further explore the diversity outcomes but now do so at the program/institution level.

Table 4.6 presents the fixed effect estimates of the free tuition policy on diversity outcomes at the program/institution level. Overall, results indicate that after policy implementation there is a slight one-time increase in the socioeconomic representation of low- and middle-income students of approximately 0.02 points (see After2016 estimates in Models 1 and 2, section A). There is also a positive one-time effect on increasing the high school track diversity index (see Model 4, section A). The only outcome that changed its time trend after the policy implementation is the proportion of students from vocational high schools. Prior the policy implementation, the proportion of students from vocational high schools was declining in

participating universities. After the implementation, this tendency is reversed reaching a stable trend (i.e., -0.006*Time + 0.005*After2016*Time = -0.001; see Model 2, section A).

Table 4.6. Fixed Effect Estimates of the Free Tuition Policy on Diversity Outcomes. Program/Institution Level

	Proportion of Students from:		Simpson Diversity Index:	
	Public/ subsidized HS	Vocational HS	HS Dependency	HS Track
	(1)	(2)	(3)	(4)
A. All Universities (obs.= 8,214; n program of studies=1,145)				
Time	-0.001	-0.006***	0.000	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
After 2016	0.016***	0.019***	-0.004	0.022***
	(0.003)	(0.003)	(0.003)	(0.004)
After2016 * Time	-0.002	0.005**	0.003	0.003
	(0.001)	(0.001)	(0.002)	(0.002)
Constant	0.849***	0.138***	0.524***	0.215***
	(0.002)	(0.003)	(0.003)	(0.003)
B. Accreditation Level				
B.1. Low Accreditation Level (<5 years; obs.=2,246; n program of studies=324)				
Time	-0.005**	-0.008**	-0.000	-0.008***
	(0.001)	(0.003)	(0.003)	(0.003)
After 2016	0.019***	0.025***	-0.006	0.026***
	(0.005)	(0.007)	(0.008)	(0.009)
After2016 * Time	-0.004	0.008	0.01	0.01
	(0.002)	(0.003)	(0.004)	(0.003)
Constant	0.914***	0.189***	0.495***	0.281***
	(0.004)	(0.006)	(0.006)	(0.007)
B.2. Medium Accreditation Level (5 years; obs.=2,957; n program of studies=421)				
Time	0.002	-0.007***	-0.000	-0.006
	(0.001)	(0.002)	(0.002)	(0.002)
After 2016	0.018***	0.024***	-0.000	0.030***
	(0.004)	(0.005)	(0.005)	(0.006)
After2016 * Time	-0.001	0.005	0.001	0.003
	(0.002)	(0.002)	(0.002)	(0.003)
Constant	0.859***	0.138***	0.521***	0.214***
	(0.004)	(0.004)	(0.004)	(0.005)
B.3. High Accreditation Level (6-7 years; obs.=3,011; n program of studies=400)				
Time	-0.002	-0.002	0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)
After 2016	0.011	0.008	-0.006	0.01

	(0.004)	(0.004)	(0.005)	(0.006)
After2016 * Time	-0.002	0.001	0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.003)
Constant	0.791***	0.099***	0.549***	0.166***
	(0.004)	(0.003)	(0.004)	(0.005)
C. Program Selectivity Level				
C.1. Low Selectivity (Bottom 25%; obs.=1,897; n program of studies=284)				
Time	-0.004	-0.009	0.002	-0.006
	(0.002)	(0.003)	(0.003)	(0.003)
After 2016	0.018	0.027**	-0.008	0.029**
	(0.006)	(0.008)	(0.008)	(0.009)
After2016 * Time	0.002	0.008	0.003	0.008
	(0.002)	(0.004)	(0.004)	(0.004)
Constant	0.917***	0.232***	0.507***	0.323***
	(0.005)	(0.007)	(0.006)	(0.008)
C.2. Medium Selectivity (Middle 50%; obs.=4,087; n=570)				
Time	-0.002	-0.008***	-0.001	-0.007**
	(0.001)	(0.001)	(0.002)	(0.002)
After 2016	0.013***	0.022***	0.000	0.025***
	(0.003)	(0.004)	(0.005)	(0.006)
After2016 * Time	-0.000	0.005	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.003)
Constant	0.888***	0.141***	0.512***	0.232***
	(0.003)	(0.004)	(0.004)	(0.005)
C.3. High Selectivity (Top 25%; obs.=2,230; n program of studies=291)				
Time	0.002	0.000	0.001	-0.000
	(0.002)	(0.001)	(0.002)	(0.002)
After 2016	0.019***	0.004	-0.007	0.008
	(0.005)	(0.003)	(0.005)	(0.005)
After2016 * Time	-0.009**	-0.000	0.003	0.000
	-0.003	(0.001)	(0.002)	(0.002)
Constant	0.719***	0.050***	0.560***	0.091***
	(0.004)	(0.002)	(0.004)	(0.004)

Notes: Standard errors in parentheses and clustered at the program of study/institution level. ***p<0.01, **p<0.05. P-values' significance was adjusted for multiple comparisons using Bonferroni correction. For results without Bonferroni correction see Table B.4.4. in Appendix B. Only programs of study with data on 2015 are considered in the analysis. Selectivity level is calculated at the program of study level. HS means high school. Source: Diversity outcomes come from DEMRE datasets.

Sections B and C in Table 4.6 present results by accreditation and program selectivity levels, respectively. The one-time effect in the socioeconomic representation of low- and middle-income students observed in the overall sample after the policy implementation is also observed by accreditation and selectivity level, especially for the outcome of the proportion of students

from public and subsidized high schools (see Models 1, sections B and C). For the proportion of students from vocational high school and the SDI high school track outcomes, there is a one-time increase in universities with low and medium accreditation or selectivity levels (see Models 2 and 4, sections B and C).

Results related to the change in the time trend in the socioeconomic diversity of the student body after policy implementation indicate that highly selective programs tend to decrease the proportion of low- to middle-income students after policy implementation (see Model 1, section C.3). This change in trends is confirmed by the triple interaction approach (see Table A.4.6. in Appendix A).

Discussion

Much research on free tuition policy effects has been focused on student outcomes. However, free tuition policies also affect HEIs, especially when they are implemented at a large scale, include only specific sectors, and/or restrict institutional behavior. Little is known about how HEIs respond and adapt to this type of policy. Therefore, I explored whether a free tuition policy implemented in Chile in 2016 affects key institutional outcomes. Based on the Chilean policy's aim (i.e., to induce low- to middle-income students to enroll in the universities in the policy), I first hypothesized that the free tuition policy, if effective, should increase the socioeconomic diversity of eligible universities. Then, by developing a theoretical framework based on Resource Dependence Theory and concepts from microeconomics, I identified key outcomes related to the admissions process (number of applications, enrollment capacity, first-year SUA enrollments, PSU test weight in the SUA system) and the institution's finance (tuition and fees, donation, services, non-degree program revenues, and undergraduate expenditures) that could be affected by the policy. I also developed hypotheses about how these outcomes might be

related to a change (or not) in the socioeconomic diversity of the student body, depending on whether institutions are prestige (highly selective) or revenue maximizers (less selective).

Overall, I found that the free tuition policy did not diversify the student socioeconomic composition of the participating universities. Although there was a slight increase in the proportion of low- to middle-income students, especially in revenue maximizing universities, this increase was not enough to increase the overall socioeconomic heterogeneity of the student population. These results are in line with research studying the effects of tuition programs (i.e., free tuition programs in the vocational sector or no-loan institutional programs) on diversifying the student population in the U.S. context (Gándara & Li, 2020; Hillman, 2013; Linsenmeier et al., 2006).

Results at the program/institution level confirmed that the free tuition policy did not increase the socioeconomic diversity of the student population. The results did, however, indicate that highly selective programs tend to decrease the proportion of low- to middle-income students after the policy implementation. These programs may be becoming more selective, crowding out low- to middle-income students who tend to be the less prepared to gain access to these programs. Future research can focus on program-level outcomes to further explore the effects of the policy on specific areas of study within institutions.

Examining the admission and finance outcomes, I found partial support for the hypotheses stated in the theoretical framework as few differences between were evident for prestige and revenue maximizing HEIs. Regarding the admission outcomes, I found that participating universities increased the total number of applications received after the policy implementation. Thus, as hypothesized in the theoretical framework, the student demand for

universities participating in the policy increased after policy implementation for prestige and revenue maximizing institutions.

Prestige and maximizing institutions also increased their enrollment capacity after policy implementation. However, only prestige maximizing universities increased their SUA enrollments after policy implementation. In contrast, revenue maximizers tended to have lower enrollment growth, leading to more stable enrollment trends after policy implementation. These results are opposite of the relationship hypothesized, where I predicted that revenue maximizing institutions would increase their enrollments, whereas prestige maximizers would decrease or maintain their enrollments. These opposite-as-expected behaviors may be a short-term response to facing the uncertainties of the changes in the environment. Further research, including more years in the sample, is needed to continue testing the hypotheses and better understand this university behavior.

Another result that merits further discussion is the mismatch between the increase in the university's enrollment capacity and the lack of increase in actual enrollments. Institutions may be increasing their enrollment capacity in programs that do not have demand and are maintaining enrollment capacity constant in programs with high demand. It is possible that high-demand programs are more expensive and take more time to implement, such as those in the Health Sciences. Therefore, it is more difficult for HEIs to increase enrollment capacity in those high-demand programs in a short time. More research is needed at the program level to understand why an increase in enrollment capacity does not translate into an increase in enrollments.

Furthermore, I found partial support for the hypothesis that prestige maximizing universities would increase their PSU test weights in the SUA system in order to prevent low-

income students from gaining admission to these selective universities.[27] Overall, participating universities tended to maintain the weight they assign to the PSU test after the policy implementation interrupting the declining trend observed before policy implementation. Thus, although participating universities are not actively preventing low-income students from gaining admission, they are also not helping them. Thus, maintaining the PSU test weight constant may also help to explain the status quo on the socioeconomic diversification of the student body as PSU test is one of the main barriers that prevent low-income students from gaining access to selective universities.

Regarding the financial outcomes, I did not find any changes in the tuition and fees, donations, services, and non-degree courses revenues post-policy implementation, but I found that participating universities tended to decrease their undergraduate expenditures after the policy implementation. No differences were found between prestige or revenue maximizers on any of these financial outcomes.

The lack of changes in tuition revenues disagrees with some grey literature in Chile that describes a decrease in revenues in the first years of policy implementation due to the difference between the real and regulated tuition imposed by the policy (Contralorìa General de la República, 2020; Salas Opazo et al., 2021; Sanhueza de la Cruz & San Martín Kohan, 2019). This disagreement may be related to those reports being only descriptive and/or that they base their analysis on the difference between the amount received due to the free tuition policy and the amount that they would have received if they would have charged the published tuition. Thus, those analyses hypothesize that, in the absence of the policy, institutions would have received the full amount of the published tuition per each student. However, informational

[27] PSU test results and the student socioeconomic level are positively associated (Koljatic et al., 2013).

interviews with presidents and financial vice-presidents of institutions participating in the free tuition policy highlighted two important factors not considered in those analysis that affect the institution's actual tuition revenues. First, most institutions grant financial aid to low-income students, which are the beneficiaries of the policy. Second, there are always some students that do not pay or are late in the tuition payment. Therefore, HEIs do not receive the full amount of the published tuition per each student. Thus, although the policy imposes a regulated tuition, institutions do not necessarily incur in a deficit because the tuition revenues, which considers institutional financial aid and payment defaults in the absence of the policy, were always lower than the amount hypothesized by multiplying the number of students by the published tuition. In fact, interviewees mentioned that some institutions did not change or even have a small increase in their tuition revenues as now that they are participating in the free tuition policy, they do not have to absorb the loss in revenues due to tuition payment default.

Furthermore, contrary to the hypothesis that the free tuition policy would decrease tuition revenues, I did not find any changes in this outcome. Thus, participating universities did not need to diversify their revenue streams as hypothesized in the theoretical framework or as observed in institutions affected by regulated tuition policies or a decrease in state appropriations in the U.S. context (Bound et al., 2020; Delaney & Kearney, 2016; Jaquette & Curs, 2015; Miller & Park, 2022). Additionally, as there is a lack of effect on tuition revenues, there are no incentives to decrease enrollments in prestige maximizing institutions, as hypothesized. Overall, the lack of changes in the financial outcomes could be related to the lack of effect of the policy on diversifying the student body as the institutions do not have incentives to implement changes in favor of low-income students.

The decrease in undergraduate expenditures could be a conservative response to the policy, where institutions tend to prepare themselves to overcome possible negative changes in revenues due to the policy implementation. In a different context, Miller and Park (2022) found a similar conservative institutional response to tuition regulation policies. They found that colleges affected by those policies tend to decrease their institutional financial aid twice as much as the decrease in their sticker prices affected by the tuition regulations.

In sum, considering the lack of change in enrollments jointly with the increase in demand observed in the application outcome, I derive that the lack of change in the diversity outcomes is related to universities in the policy not absorbing the growth in the demand and becoming more selective over time, as hypothesized in the theoretical framework. Moreover, the lack of change in the revenue outcomes and the stabilization of the PSU test weight in the admission system contribute to maintaining stable the socioeconomic diversity of the student population. For prestige maximizing institutions, the increase in enrollments jointly with the decrease in expenditures and the lack of change in revenues could result in a decrease in quality. In the long run, these universities have incentives to adjust their expenditures or enrollments to maintain their quality and prevent a loss in prestige. Future research, including more years in the sample, could test this hypothesis.

Conclusion

This study found no evidence that the free tuition policy implemented in Chile in 2016 changed the socioeconomic diversity of the student population in participating universities. Although the policy did increase the applications to these universities, it seems that not all universities respond by increasing enrollments. Contrary to the expectations, only highly selective universities increased their enrollments after the policy implementation. In part, this

reaction could be due to the rule that keeps enrollment growth up to 2.7% of the prior year's enrollment. However, it is also possible that universities are being conservative in their response to the policy due to the uncertainties that this policy raised during its first years of implementation. During the first three years, free tuition was implemented through the Ministry of Education budget and must get approval every year, adding budgeting uncertainty. Moreover, during this period, a higher education reform was discussed in Congress, a reform that also considers changes to higher education finance in general. Thus, policymakers, when designing and implementing this kind of policy, should maintain a dialogue with HEIs to decrease the uncertainties so HEIs can make informed decisions.

Additionally, I did not find any changes in institutional revenues due to the policy implementation, but I did find a decrease in the undergraduate expenditure rate after the free tuition policy took place. This response may also be related to the uncertainty derived from the policy implementation as institutions were afraid of incurring a budget deficit due to the imposition of regulated tuition because there was no clarity about how this allocation would be calculated. As observed in the results, participating universities did not change their tuition revenues after policy implementation. Therefore, it is possible that, shortly after the policy implementation, institutions return to their prior levels of undergraduate expenditures. Future research can focus on expanding this analysis to include more years after policy implementation and observe whether institutions return to prior expenditure levels.

According to the theoretical framework, the main question was whether the policy has sufficient incentives for HEIs to diversify their student body. Collectively, the findings suggest that institutions do not have sufficient incentives to absorb the increase in demand that could result in diversifying the student population. Because the free tuition policy restricts enrollment

growth, even when institutions would like to absorb increases in demand, by design they are restricted from doing so. Additionally, the policy also states that the universities should adopt the SUA system which is based on a standardized test (PSU test). I found that universities, after the policy implementation, maintain constant the weight assigned to the PSU test in the SUA system, interrupting the pre-implementation trend that was constantly decreasing the PSU test weight. It seems that this rule decreases the incentives of HEIs to change their admission policies in favor of targeted beneficiaries of the policy, students who tend to be the least academically prepared and least likely to gain admission through the SUA system process. Also, the uncertainties that HEIs had to face in the first years of implementation may have contributed to institutions adopting a more conservative approach about admission decisions and even decrease their expenditures. These institution's responses could be contributing to the lack of effect on the socioeconomic diversification of the student body because HEIs may be hesitant to implement changes that attract low-income students to apply, gain access to, and enroll in these institutions. From a theoretical perspective, these findings could help to redesign my theoretical framework by considering how uncertainty in the environment affects HEI's decision-making processes, and how these decisions can alter the effectiveness of the policy.

Finally, the lack of sufficient incentives for HEIs to adopt the policy goal of enrolling more low-income students can result in the unintended consequence of participating universities becoming more selective over time. If this is the case, an increase in selectivity will result in crowding out low-income students, who tend to be the less likely to gain admission to selective institutions. More research is needed to keep investigating how HEIs continue to react to the free tuition policy and whether those responses would end by increasing their selectivity undermining the main goal of the Chilean free tuition policy.

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Appendix A

Triple Interaction Approach

Table A.4.1. Fixed Effect Estimates Using Triple Interaction Approach for Diversity and Admission Outcomes. Accreditation Level

	Diversity Outcomes				Admission Outcomes			
	Prop. Of students from:		Simpson Diversity Index:					
	Public/ subsidized HS	Vocational HS	HS Dependency	HS Track	Ln (Total App.)	Ln (Enr. Cap.)	Ln (SUA Enr.)	PSU Test Weight
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time	-0.005***	-0.009**	0.000	-0.009***	0.034	-0.003	0.082***	-2.024***
	(0.001)	(0.004)	(0.003)	(0.003)	(0.019)	(0.040)	(0.016)	(0.305)
After2016	0.019***	0.029***	-0.004	0.031***	0.197***	0.226	-0.043	2.657***
	(0.003)	(0.007)	(0.007)	(0.007)	(0.042)	(0.184)	(0.030)	(0.867)
After2016* Time	-0.002	0.007**	0.010	0.007**	-0.057***	0.047	-0.088***	1.074
	(0.004)	(0.003)	(0.006)	(0.003)	(0.020)	(0.042)	(0.018)	(0.752)
Interaction: Accreditation Level*Time (Ref. Cat. Low Accreditation Level)								
Medium Accreditation Level* Time	0.011***	0.004	-0.001	0.004	-0.041*	-0.005	-0.049**	-1.510*
	(0.003)	(0.004)	(0.003)	(0.004)	(0.021)	(0.043)	(0.020)	(0.828)
High Accreditation Level* Time	0.006***	0.009*	-0.001	0.008	-0.040	0.012	-0.060***	-1.090
	(0.002)	(0.005)	(0.004)	(0.006)	(0.027)	(0.043)	(0.018)	(0.730)
Interaction: Accreditation Level*After2016(Ref. Cat. Low Accreditation Level)								
After2016*Medium Accreditation Level	0.004	-0.005	-0.001	0.002	0.087	-0.187	0.089**	0.396
	(0.011)	(0.008)	(0.008)	(0.009)	(0.060)	(0.186)	(0.036)	(1.739)
After2016*High Accreditation Level	-0.010*	-0.022**	-0.001	-0.020*	-0.009	-0.180	0.015	-0.060
	(0.005)	(0.009)	(0.009)	(0.011)	(0.056)	(0.189)	(0.041)	(1.669)

Interaction: Accreditation Level * After2016*Time (Ref. Cat. Low Accreditation Level)								
After2016*Medium Accreditation Level *Time	-0.003	-0.005	-0.010	-0.005	0.025	0.018	0.083***	1.933*
	(0.005)	(0.004)	(0.007)	(0.003)	(0.028)	(0.047)	(0.023)	(1.069)
After2016*High Accreditation Level *Time	-0.004	-0.007	-0.005	-0.007	0.047	-0.015	0.091***	1.997*
	(0.006)	(0.006)	(0.007)	(0.007)	(0.030)	(0.047)	(0.020)	(1.045)
Constant	0.861***	0.136***	0.534***	0.227***	9.472***	7.628***	7.582***	64.894***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.018)	(0.048)	(0.013)	(0.794)
Observations	224	224	224	224	224	224	224	224
n universities	28	28	28	28	28	28	28	28
Join test triple interaction	0.30 (2) p=0.74	1.03 (2) p=0.37	1.35 (2) p=0.28	0.99 (2) p=0.39	1.21 (2) p=0.31	0.65 (2) p=0.53	10.41 (2) p=0.00	2.30 (2) p=0.12

Notes: Standard errors in parentheses and clustered at the university level. ***p<0.01, **p<0.05. Diversity and Admission outcomes come from DEMRE datasets, except for PSU weight and enrollment capacity that come from MINEDUC dataset.

Table A.4.2. Fixed Effect Estimates Using Triple Interaction Approach for Diversity and Admission Outcomes. Selectivity Level

	Diversity Outcomes				Admission Outcomes			
	Prop. Of students from:		Simpson Diversity Index:					
	Public/ subsidized HS	Vocational HS	HS Dependency	HS Track	Ln (Total App.)	Ln (Enr. Cap.)	Ln (SUA Enr.)	PSU Test Weight
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time	-0.004***	-0.006	-0.000	-0.005**	0.042**	-0.008	0.080***	-2.818***
	(0.001)	(0.004)	(0.003)	(0.002)	(0.019)	(0.045)	(0.018)	(0.946)
After2016	0.014***	0.026***	0.004	0.026***	0.203***	0.243	-0.045	3.612*
	(0.003)	(0.008)	(0.007)	(0.007)	(0.045)	(0.203)	(0.034)	(1.814)
After2016* Time	0.001	0.006	0.005	0.005	-0.051**	0.066	-0.070***	1.804
	(0.001)	(0.004)	(0.004)	(0.003)	(0.021)	(0.046)	(0.022)	(1.245)
Interaction: Selectivity Level*Time (Ref. Cat. Low Selectivity Level)								
Medium Selectivity Level* Time	0.008**	-0.001	-0.001	-0.003	-0.050**	0.015	-0.035	-0.154
	(0.004)	(0.005)	(0.004)	(0.004)	(0.019)	(0.046)	(0.023)	(1.027)
High Selectivity Level* Time	0.006**	0.004	0.000	0.001	-0.050*	0.003	-0.059***	-0.061
	(0.003)	(0.005)	(0.004)	(0.005)	(0.025)	(0.048)	(0.020)	(1.095)
Interaction: Selectivity Level*After2016(Ref. Cat. Low Selectivity Level)								
After2016*Medium Selectivity Level	0.014	0.004	-0.015*	0.015*	0.085	-0.197	0.098**	-2.141
	(0.013)	(0.009)	(0.009)	(0.008)	(0.067)	(0.205)	(0.040)	(1.946)
After2016*High Selectivity Level	-0.001	-0.015	-0.008	-0.010	-0.007	-0.200	0.025	-0.353
	(0.006)	(0.010)	(0.007)	(0.010)	(0.055)	(0.206)	(0.040)	(2.115)
Interaction: Selectivity Level * After2016*Time (Ref. Cat. Low Selectivity Level)								
After2016*Medium Selectivity Level *Time	-0.011***	-0.001	0.005	-0.000	0.009	-0.040	0.034	0.921
	(0.004)	(0.004)	(0.007)	(0.004)	(0.029)	(0.048)	(0.031)	(1.294)

After2016*High Selectivity Level *Time	-0.005	-0.005	-0.004	-0.004	0.036	-0.009	0.074***	0.652
	(0.004)	(0.005)	(0.005)	(0.006)	(0.030)	(0.052)	(0.023)	(1.392)
Constant	0.861***	0.136***	0.534***	0.227***	9.472***	7.628***	7.582***	64.894***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.018)	(0.048)	(0.015)	(0.820)
Observations	224	224	224	224	224	224	224	224
n universities	28	28	28	28	28	28	28	28
Join test triple interaction F(df)	4.45 (2) p=0.02	0.75 (2) p=0.48	1.10 (2) p=0.35	0.31 (2) 0.73	0.76 (2) p=0.48	0.84 (2) p=0.44	5.91(2) p=0.01	0.29 (2) p=0.75

Notes: Standard errors in parentheses and clustered at the university level. ***p<0.01, **p<0.05. Diversity and Admission outcomes come from DEMRE datasets, except for PSU weight and enrollment capacity that come from MINEDUC dataset.

Table A.4.3. Fixed Effect Estimates Using Triple Interaction Approach for Finance Outcomes. Accreditation Level

	Ln (Ug. Tuition Rev.)	Ln (Donation Rev.)	Ln (Services Rev.)	Ln (Certificate Rev.)	Ln (Ug. Expenditures)
Time	-0.001	-0.206	-0.075	-0.133	0.094***
	(0.019)	(0.228)	(0.109)	(0.157)	(0.015)
After2016	-0.024	1.384*	0.142	0.221	-0.021
	(0.039)	(0.800)	(0.124)	(0.174)	(0.028)
After2016* Time	-0.024	0.172	0.106	0.008	-0.066**
	(0.040)	(0.183)	(0.160)	(0.207)	(0.030)
Interaction: Accreditation Level*Time (Ref. Cat. Low Accreditation Level)					
Medium Accreditation Level* Time	0.013	0.084	-0.056	0.008	-0.014
	(0.025)	(0.282)	(0.137)	(0.177)	(0.022)
High Accreditation Level* Time	-0.016	-0.015	0.194	0.355	-0.033*
	(0.024)	(0.252)	(0.116)	(0.230)	(0.018)
Interaction: Accreditation Level*After2016(Ref. Cat. Low Accreditation Level)					
After2016*Medium Accreditation Level	0.008	-1.059	0.046	-0.113	-0.028
	(0.049)	(0.835)	(0.153)	(0.202)	(0.033)
After2016*High Accreditation Level	0.129*	-1.541	-0.221	-0.366*	0.024
	(0.075)	(0.942)	(0.209)	(0.183)	(0.047)
Interaction: Accreditation Level * After2016*Time (Ref. Cat. Low Accreditation Level)					
After2016*Medium Accreditation Level *Time	0.042	-0.202	0.027	0.086	0.026
	(0.052)	(0.331)	(0.187)	(0.251)	(0.036)
After2016*High Accreditation Level *Time	0.048	0.069	-0.406*	-0.268	0.032
	(0.041)	(0.210)	(0.202)	(0.291)	(0.033)
Constant	4.604***	-1.106***	1.760***	1.146***	5.093***
	(0.021)	(0.227)	(0.083)	(0.110)	(0.017)
Observations	180	153	165	160	180
n universities	30	28	29	29	30
Join test triple interaction F(df)	0.69 (2) p=0.51	0.44 (2) p=0.65	4.13 (2) p=0.03	1.02 (2) p=0.37	0.49 (2) p=0.62

Notes: All outcomes are per undergraduate student. Standard errors in parentheses and clustered at the university level.
***p<0.01, **p<0.05. Finance outcomes come from MINEDUC dataset.

Table A.4.4. Fixed Effect Estimates Using Triple Interaction Approach for Finance Outcomes. Selectivity Level

	Ln (Tuition Rev.)	Ln (Donation Rev.)	Ln (Services Rev.)	Ln (Certificate Rev.)	Ln (Ug. Expenditures)
Time	-0.019	-0.413*	-0.104	-0.148	0.100***
	(0.021)	(0.214)	(0.102)	(0.171)	(0.021)
After2016	0.045	1.363**	0.080	0.211	-0.035
	(0.027)	(0.513)	(0.092)	(0.227)	(0.036)
After2016* Time	0.030	0.312***	0.041	-0.036	-0.071*
	(0.031)	(0.097)	(0.177)	(0.210)	(0.037)
Interaction: Selectivity Level*Time (Ref. Cat. Low Selectivity Level)					
Medium Selectivity Level* Time	0.025	0.218	0.139	0.036	-0.023
	(0.025)	(0.285)	(0.131)	(0.198)	(0.027)
High Selectivity Level* Time	0.029	0.317	0.037	0.264	-0.035
	(0.029)	(0.239)	(0.148)	(0.235)	(0.023)
Interaction: Selectivity Level*After2016(Ref. Cat. Low Selectivity Level)					
After2016*Medium Selectivity Level	-0.115**	-0.704	-0.071	-0.048	-0.006
	(0.054)	(0.770)	(0.138)	(0.251)	(0.040)
After2016*High Selectivity Level	0.011	-1.342**	0.092	-0.324	0.041
	(0.058)	(0.647)	(0.206)	(0.240)	(0.045)
Interaction: Selectivity Level * After2016*Time (Ref. Cat. Low Selectivity Level)					
After2016*Medium Selectivity Level *Time	-0.033	-0.140	-0.012	0.201	0.022
	(0.063)	(0.296)	(0.204)	(0.261)	(0.045)
After2016*High Selectivity Level *Time	-0.030	-0.309	-0.097	-0.161	0.045
	(0.036)	(0.288)	(0.246)	(0.296)	(0.038)
Constant	4.596***	-1.076***	1.916***	1.120***	5.117***
	(0.022)	(0.217)	(0.095)	(0.119)	(0.017)
Observations	168	141	153	148	168
n universities	28	26	27	27	28
Join test triple interaction F(df)	0.36 (2) p=0.70	0.64 (2) p=0.54	0.11(2) p=0.90	1.02 (2) p=0.37	1.03 (2) p=0.37

Notes: All outcomes are per undergraduate student. Standard errors in parentheses and clustered at the university level.
***p<0.01, **p<0.05. Finance outcomes come from MINEDUC dataset.

Table A.4.5. Fixed Effect Estimates Using Triple Interaction Approach for Diversity Outcomes at the Program of Study Level. Accreditation Level

	Diversity Outcomes			
	Prop. Of students from:		Simpson Diversity Index:	
	Public/ subsidized HS	Vocational HS	HS Dependency	HS Track
	(1)	(2)	(3)	(4)
Time	-0.005***	-0.008***	-0.000	-0.008***
	(0.001)	(0.003)	(0.003)	(0.003)
After2016	0.019***	0.025***	-0.006	0.026***
	(0.005)	(0.007)	(0.008)	(0.009)
After2016* Time	-0.004*	0.008**	0.010***	0.010***
	(0.002)	(0.003)	(0.004)	(0.003)
Interaction: Accreditation Level*Time (Ref. Cat. Low Accreditation Level)				
Medium Accreditation Level* Time	0.007***	0.001	-0.000	0.001
	(0.002)	(0.003)	(0.003)	(0.004)
High Accreditation Level* Time	0.003*	0.006**	0.001	0.006*
	(0.002)	(0.003)	(0.003)	(0.003)
Interaction: Accreditation Level*After2016(Ref. Cat. Low Accreditation Level)				
After2016*Medium Accreditation Level	-0.001	-0.001	0.005	0.004
	(0.006)	(0.008)	(0.010)	(0.010)
After2016*High Accreditation Level	-0.008	-0.017**	-0.000	-0.016
	(0.006)	(0.008)	(0.009)	(0.010)
Interaction: Accreditation Level * After2016*Time (Ref. Cat. Low Accreditation Level)				
After2016*Medium Accreditation Level *Time	0.003	-0.003	-0.009**	-0.006
	(0.003)	(0.004)	(0.004)	(0.004)
After2016*High Accreditation Level *Time	0.002	-0.007*	-0.009**	-0.010**
	(0.003)	(0.004)	(0.004)	(0.004)
Constant	0.849***	0.138***	0.524***	0.215***
	(0.002)	(0.003)	(0.003)	(0.003)
Observations	8,214	8,214	8,214	8,214
n program of studies	1,145	1,145	1,145	1,145
Join test triple interaction F(df)	0.51 (2) p=0.60	1.97 (2) p=0.14	2.72 (2) p=0.07	2.78 (2) p=0.06

Notes: Standard errors in parentheses and clustered at the program of study/university level. ***p<0.01, **p<0.05. Only programs of study with data on 2015 are considered in the analysis. Selectivity level is calculated at the program of study level. Diversity outcomes come from DEMRE datasets.

Table A.4.6. Fixed Effect Estimates Using Triple Interaction Approach for Diversity Outcomes at the Program of Study Level. Selectivity Level

	Diversity Outcomes			
	Prop. Of Students from:		Simpson Diversity Index:	
	Public/ subsidized HS	Vocational HS	HS Dependency	HS Track
	(1)	(2)	(3)	(4)
Time	-0.004**	-0.009***	0.002	-0.006**
	(0.002)	(0.003)	(0.003)	(0.003)
After2016	0.018***	0.027***	-0.008	0.029***
	(0.006)	(0.008)	(0.008)	(0.009)
After2016* Time	0.002	0.008**	0.003	0.008*
	(0.002)	(0.004)	(0.004)	(0.004)
Interaction: Selectivity Level*Time (Ref. Cat. Low Selectivity Level)				
Medium Selectivity Level* Time	0.003	0.001	-0.002	-0.000
	(0.002)	(0.003)	(0.003)	(0.004)
High Selectivity Level* Time	0.006***	0.009***	-0.001	0.006*
	(0.002)	(0.003)	(0.003)	(0.003)
Interaction: Selectivity Level*After2016(Ref. Cat. Low Selectivity Level)				
After2016*Medium Selectivity Level	-0.005	-0.005	0.008	-0.004
	(0.007)	(0.009)	(0.010)	(0.011)
After2016*High Selectivity Level	0.001	-0.023***	0.000	-0.021**
	(0.008)	(0.009)	(0.009)	(0.010)
Interaction: Selectivity Level * After2016*Time (Ref. Cat. Low Selectivity Level)				
After2016*Medium Selectivity Level *Time	-0.002	-0.003	-0.000	-0.005
	(0.003)	(0.005)	(0.005)	(0.005)
After2016*High Selectivity Level *Time	-0.011***	-0.008*	-0.000	-0.007
	(0.004)	(0.004)	(0.005)	(0.005)
Constant	0.849***	0.138***	0.524***	0.215***
	(0.002)	(0.002)	(0.003)	(0.003)
Observations	8,214	8,214	8,214	8,214
n program of studies	1,145	1,145	1,145	1,145
Join test triple interaction F(df)	5.68 (2) 0.00	4.07 (2) p=0.02	0.00 (2) p=0.99	1.21 (2) p=0.30

Notes: Standard errors in parentheses and clustered at the program of study/university level. ***p<0.01, **p<0.05. Only programs of study with data on 2015 are considered in the analysis. Selectivity level is calculated at the program of study level. Diversity outcomes come from DEMRE datasets.

Appendix B

Main Results without Bonferroni Correction

Table B.4.1. Fixed Effect Regression Estimates of the Free Tuition Policy on Diversity Outcomes

	Prop. Of students from:		Simpson Diversity Index:	
	Public/ subsidized HS	Vocational HS	HS Dependency	HS Track
	(1)	(2)	(3)	(4)
A. All Universities (obs.= 224; n universities=28)				
Time	0.000	-0.005**	-0.001	-0.005**
	(0.002)	(0.002)	(0.001)	(0.002)
After 2016	0.018***	0.021***	-0.004	0.027***
	(0.005)	(0.004)	(0.003)	(0.004)
After2016 * Time	-0.004	0.003	0.005	0.004
	(0.002)	(0.002)	(0.003)	(0.002)
Constant	0.861***	0.136***	0.534***	0.227***
	(0.002)	(0.004)	(0.003)	(0.004)
B. Accreditation Level				
B.1. Low Accreditation Level (<5 years; obs.=80; n universities=10)				
Time	-0.005***	-0.009**	0.000	-0.009**
	(0.001)	(0.004)	(0.003)	(0.003)
After 2016	0.019***	0.029***	-0.004	0.031***
	(0.003)	(0.008)	(0.007)	(0.008)
After2016 * Time	-0.002	0.007	0.010	0.007**
	(0.004)	(0.004)	(0.006)	(0.003)
Constant	0.932***	0.177***	0.504***	0.284***
	(0.003)	(0.007)	(0.007)	(0.006)
B.2. Medium Accreditation Level (5 years; obs.=88; n universities=11)				
Time	0.005	-0.005	-0.001	-0.005
	(0.003)	(0.002)	(0.002)	(0.003)
After 2016	0.023	0.024***	-0.005	0.033***
	(0.011)	(0.003)	(0.005)	(0.005)
After2016 * Time	-0.005	0.002	0.000	0.003
	(0.002)	(0.002)	(0.003)	(0.002)
Constant	0.862***	0.131***	0.546***	0.221***
	(0.004)	(0.003)	(0.005)	(0.004)
B. 3. High Accreditation Level (6-7 years; obs.=56; n universities=7)				
Time	0.001	-0.000	-0.001	-0.000
	(0.002)	(0.003)	(0.003)	(0.005)
After 2016	0.009	0.007	-0.004	0.012
	(0.005)	(0.005)	(0.006)	(0.008)
After2016 * Time	-0.006	0.000	0.004	0.001

	(0.004)	(0.005)	(0.003)	(0.007)
Constant	0.759***	0.087***	0.559***	0.154***
	(0.005)	(0.008)	(0.006)	(0.012)
C. Selectivity				
C.1. Low Selectivity (Bottom 25%; obs.=72; n universities=9)				
Time	-0.004***	-0.006	-0.000	-0.005
	(0.001)	(0.004)	(0.003)	(0.002)
After 2016	0.014***	0.026**	0.004	0.026**
	(0.003)	(0.009)	(0.007)	(0.008)
After2016 * Time	0.001	0.006	0.005	0.005
	(0.001)	(0.004)	(0.004)	(0.003)
Constant	0.939***	0.191***	0.515***	0.303***
	(0.002)	(0.008)	(0.007)	(0.005)
C.2. Medium Selectivity (Middle 50%; obs.=72; n universities=9)				
Time	0.003	-0.007	-0.001	-0.008
	(0.004)	(0.003)	(0.002)	(0.004)
After 2016	0.028*	0.029***	-0.012	0.040***
	(0.013)	(0.003)	(0.006)	(0.003)
After2016 * Time	-0.009**	0.005**	0.010	0.005**
	(0.004)	(0.002)	(0.007)	(0.002)
Constant	0.884***	0.129***	0.515***	0.219***
	(0.005)	(0.003)	(0.006)	(0.003)
C.3. High Selectivity (Top 25%; obs.=80; n universities=10)				
Time	0.001	-0.002	-0.000	-0.004
	(0.003)	(0.003)	(0.002)	(0.004)
After 2016	0.013**	0.010	-0.004	0.016*
	(0.005)	(0.005)	(0.003)	(0.007)
After2016 * Time	-0.004	0.000	0.000	0.001
	(0.004)	(0.003)	(0.003)	(0.005)
Constant	0.771***	0.094***	0.569***	0.165***
	(0.004)	(0.006)	(0.005)	(0.009)

Notes: Standard errors in parentheses and clustered at the university level. ***p<0.01, **p<0.05Diversity outcomes come from DEMRE datasets.

Table B.4.2. Fixed Effect Regression Estimates of the Free Tuition Policy on Admission Outcomes

	Ln (Total Applications)	Ln (Enrollment Capacity)	Ln (SUA Enrollment)	Psu Weight
	(1)	(2)	(3)	(4)
A. All Universities (obs.=224; n universities=28)				
Time	0.008	-0.002	0.047***	-2.890***
	(0.010)	(0.016)	(0.009)	(0.379)
After 2016	0.229***	0.108	-0.005	2.798***
	(0.026)	(0.069)	(0.017)	(0.748)
After2016 * Time	-0.036***	0.050***	-0.033**	2.333***
	(0.012)	(0.018)	(0.012)	(0.471)
Constant	9.472***	7.628***	7.582***	64.894***
	(0.019)	(0.048)	(0.017)	(0.811)
B. Accreditation Level				
B.1. Low Accreditation Level (<5 years; obs.=80, n universities=10)				
Time	0.034	-0.003	0.082***	-2.024***
	(0.020)	(0.042)	(0.016)	(0.315)
After 2016	0.197***	0.226	-0.043	2.657**
	(0.043)	(0.190)	(0.031)	(0.896)
After2016 * Time	-0.057**	0.047	-0.088***	1.074
	(0.020)	(0.044)	(0.019)	(0.778)
Constant	8.924***	7.271***	7.135***	71.139***
	(0.035)	(0.132)	(0.030)	(0.941)
B.2. Medium Accreditation Level (5 years; obs.=88; n universities=11)				
Time	-0.008	-0.008	0.033**	-3.534***
	(0.008)	(0.015)	(0.013)	(0.790)
After 2016	0.284***	0.040	0.046*	3.053
	(0.044)	(0.028)	(0.021)	(1.547)
After2016 * Time	-0.032	0.065**	-0.005	3.007***
	(0.020)	(0.022)	(0.014)	(0.779)
Constant	9.569***	7.604***	7.583***	60.822***
	(0.020)	(0.032)	(0.019)	(1.609)
B.3. High Accreditation Level (6-7 years; obs.=56, n universities=7)				
Time	-0.006	0.009	0.022	-3.114***
	(0.021)	(0.017)	(0.009)	(0.708)
After 2016	0.187***	0.047	-0.029	2.597
	(0.039)	(0.049)	(0.029)	(1.524)
After2016 * Time	-0.010	0.032	0.003	3.071***
	(0.025)	(0.021)	(0.008)	(0.775)
Constant	10.103***	8.178***	8.218***	62.373***
	(0.044)	(0.045)	(0.019)	(1.629)
C. Selectivity Level				

C.1. Low Selectivity (Bottom 25%; obs.=72; n universities=9)				
Time	0.042	-0.008	0.080***	-2.818**
	(0.020)	(0.047)	(0.019)	(0.986)
After 2016	0.203***	0.243	-0.045	3.612
	(0.046)	(0.211)	(0.035)	(1.891)
After2016 * Time	-0.051**	0.066	-0.070**	1.804
	(0.022)	(0.048)	(0.023)	(1.298)
Constant	8.947***	7.275***	7.118***	68.084***
	(0.040)	(0.146)	(0.035)	(2.191)
C.2. Medium Selectivity (Middle 50%; obs.=72, n universities=9)				
Time	-0.009	0.007	0.045**	-2.972***
	(0.005)	(0.010)	(0.015)	(0.418)
After 2016	0.289***	0.046	0.053	1.471
	(0.053)	(0.029)	(0.023)	(0.734)
After2016 * Time	-0.043	0.027	-0.035	2.725***
	(0.021)	(0.014)	(0.023)	(0.368)
Constant	9.431***	7.526***	7.526***	62.307***
	(0.024)	(0.024)	(0.029)	(0.572)
C.3. High Selectivity (Top 25%; obs.=80; n universities=10)				
Time	-0.008	-0.005	0.021**	-2.880***
	(0.017)	(0.018)	(0.009)	(0.570)
After 2016	0.197***	0.043	-0.020	3.259**
	(0.034)	(0.040)	(0.023)	(1.125)
After2016 * Time	-0.015	0.057	0.004	2.456***
	(0.023)	(0.025)	(0.008)	(0.644)
Constant	9.982***	8.039***	8.050***	64.352***
	(0.032)	(0.042)	(0.018)	(1.248)

Notes: Standard errors in parentheses and clustered at the university level. ***p<0.01, **p<0.05. Admission outcomes come from DEMRE datasets, except for PSU weight and enrollment capacity that come from MINEDUC dataset.

Table B.4.3. Fixed Effect Estimates of the Free Tuition Policy on Finance Outcomes

	Ln (Tuition Rev.)	Ln (Donation Rev.)	Ln (Services Rev.)	Ln (Certificate Rev.)	Ln (Ug. Expenditures)
	(1)	(2)	(3)	(4)	(5)
A. All Universities	(obs.=180; n univ.=30)	(obs.=153; n univ.=28)	(obs.=165; n univ.=29)	(obs.=160; n univ.=29)	(obs.=180; n univ.=30)
Time	0.001	-0.169	-0.045	-0.022	0.081***
	(0.010)	(0.103)	(0.055)	(0.083)	(0.009)
After 2016	0.009	0.505	0.099	0.061	-0.027
	(0.025)	(0.297)	(0.073)	(0.078)	(0.016)
After2016 * Time	0.005	0.092	0.012	-0.042	-0.048***
	(0.020)	(0.143)	(0.084)	(0.108)	(0.014)
Constant	4.604***	-1.098***	1.762***	1.165***	5.093***
	(0.021)	(0.230)	(0.088)	(0.119)	(0.017)
B. Accreditation Level					
B.1. Low Accreditation Level (<5 years)	(obs.=66; n univ.=11)	(obs.=44; n univ.=9)	(obs.=64; n univ.=11)	(obs.=53; n univ.=11)	(obs.=66; n univ.=11)
Time	-0.001	-0.206	-0.075	-0.133	0.094***
	(0.019)	(0.239)	(0.112)	(0.162)	(0.016)
After 2016	-0.024	1.384	0.142	0.221	-0.021
	(0.040)	(0.838)	(0.127)	(0.180)	(0.029)
After2016 * Time	-0.024	0.172	0.106	0.008	-0.066
	(0.042)	(0.191)	(0.165)	(0.213)	(0.031)
Constant	4.465***	-2.612***	1.123***	0.424*	4.900***
	(0.045)	(0.607)	(0.177)	(0.226)	(0.034)
B. 2. Medium Accreditation Level (5 years)	(obs.=72; n univ.=12)	(obs.=72; n univ.=12)	(obs.=59; n univ.=11)	(obs.=65; n univ.=11)	(obs.=72; n univ.=12)
Time	0.012	-0.122	-0.131	-0.125	0.080***
	(0.017)	(0.168)	(0.086)	(0.083)	(0.017)
After 2016	-0.016	0.325	0.187*	0.108	-0.049**
	(0.030)	(0.240)	(0.093)	(0.106)	(0.019)
After2016 * Time	0.019	-0.030	0.132	0.094	-0.041
	(0.034)	(0.281)	(0.099)	(0.146)	(0.020)
Constant	4.679***	-0.969***	1.176***	1.061***	5.017***
	(0.023)	(0.286)	(0.120)	(0.157)	(0.025)
B. 3. High Accreditation Level (6-7 years)	(obs.=42; n univ.=7)	(obs.=37; n univ.=7)	(obs.=42; n univ.=7)	(obs.=42; n univ.=7)	(obs.=42; n univ.=7)
Time	-0.017	-0.221*	0.119**	0.223	0.061***
	(0.016)	(0.114)	(0.043)	(0.180)	(0.011)
After 2016	0.105	-0.158	-0.079	-0.145**	0.003
	(0.068)	(0.534)	(0.180)	(0.058)	(0.041)

After2016 * Time	0.025**	0.241	-0.300	-0.260	-0.034**
	(0.010)	(0.111)	(0.132)	(0.219)	(0.013)
Constant	4.695***	0.418	3.550***	2.188***	5.527***
	(0.042)	(0.354)	(0.110)	(0.223)	(0.028)
C. Selectivity Level					
C.1. Low Selectivity (Bottom 25%)	(obs.=54; n univ.=9)	(obs.=37; n univ.=7)	(obs.=52; n univ.=9)	(obs.=42; n univ.=9)	(obs.=54; n univ.=9)
Time	-0.019	-0.413	-0.104	-0.148	0.100***
	(0.022)	(0.229)	(0.106)	(0.179)	(0.022)
After 2016	0.045	1.363**	0.080	0.211	-0.035
	(0.028)	(0.549)	(0.096)	(0.238)	(0.038)
After2016 * Time	0.030	0.312**	0.041	-0.036	-0.071
	(0.032)	(0.104)	(0.184)	(0.220)	(0.039)
Constant	4.422***	-2.639***	1.295***	0.723**	4.895***
	(0.033)	(0.417)	(0.160)	(0.259)	(0.046)
C.2. Medium Selectivity (Middle 50%)	(obs.=54; n univ.=9)	(obs.=54; n univ.=9)	(obs.=46; n univ.=8)	(obs.=52; n univ.=9)	(obs.=54; n univ.=9)
Time	0.006	-0.196	0.035	-0.112	0.077***
	(0.014)	(0.194)	(0.086)	(0.103)	(0.018)
After 2016	-0.070	0.659	0.010	0.163	-0.041
	(0.048)	(0.595)	(0.108)	(0.111)	(0.019)
After2016 * Time	-0.004	0.172	0.029	0.165	-0.050
	(0.058)	(0.289)	(0.107)	(0.160)	(0.027)
Constant	4.651***	-1.352**	1.561***	0.795***	5.053***
	(0.042)	(0.444)	(0.121)	(0.171)	(0.025)
C.3. High Selectivity (Top 25%)	(obs.=60; n univ.=10)	(obs.=50; n univ.=10)	(obs.=55; n univ.=10)	(obs.=54; n univ.=9)	(obs.=60; n univ.=10)
Time	0.010	-0.096	-0.067	0.116	0.065***
	(0.021)	(0.109)	(0.111)	(0.167)	(0.010)
After 2016	0.056	0.021	0.172	-0.113	0.006
	(0.053)	(0.408)	(0.190)	(0.080)	(0.028)
After2016 * Time	-0.000	0.002	-0.056	-0.197	-0.026**
	(0.020)	(0.280)	(0.176)	(0.216)	(0.008)
Constant	4.702***	0.380	2.801***	1.741***	5.373***
	(0.042)	(0.287)	(0.206)	(0.220)	(0.018)

Notes: All outcomes are per undergraduate student. Standard errors in parentheses and clustered at the university level. ***p<0.01, **p<0.05. Finance outcomes come from MINEDUC dataset.

Table B.4.4. Fixed Effect Regression Estimates of the Free Tuition Policy on Diversity Outcomes. Program of Study Level

	Prop. Of students from:		Simpson Diversity Index:	
	Public/ subsidized HS	Vocational HS	HS Dependency	HS Track
	(1)	(2)	(3)	(4)
A. All Universities (obs.= 8,214; n program of studies=1,145)				
Time	-0.001	-0.006***	0.000	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
After 2016	0.016***	0.019***	-0.004	0.022***
	(0.003)	(0.003)	(0.003)	(0.004)
After2016 * Time	-0.002	0.005***	0.003**	0.003**
	(0.001)	(0.001)	(0.002)	(0.002)
Constant	0.849***	0.138***	0.524***	0.215***
	(0.002)	(0.003)	(0.003)	(0.003)
B. Accreditation Level				
B.1. Low Accreditation Level (<5 years; obs.=2,246; n program of studies=324)				
Time	-0.005***	-0.008***	-0.000	-0.008***
	(0.001)	(0.003)	(0.003)	(0.003)
After 2016	0.019***	0.025***	-0.006	0.026***
	(0.005)	(0.007)	(0.008)	(0.009)
After2016 * Time	-0.004	0.008**	0.010***	0.010***
	(0.002)	(0.003)	(0.004)	(0.003)
Constant	0.914***	0.189***	0.495***	0.281***
	(0.004)	(0.006)	(0.006)	(0.007)
B.2. Medium Accreditation Level (5 years; obs.=2,957; n program of studies=421)				
Time	0.002	-0.007***	-0.000	-0.006***
	(0.001)	(0.002)	(0.002)	(0.002)
After 2016	0.018***	0.024***	-0.000	0.030***
	(0.004)	(0.005)	(0.005)	(0.006)
After2016 * Time	-0.001	0.005**	0.001	0.003
	(0.002)	(0.002)	(0.002)	(0.003)
Constant	0.859***	0.138***	0.521***	0.214***
	(0.004)	(0.004)	(0.004)	(0.005)
B.3. High Accreditation Level (6-7 years; obs.=3,011; n program of studies=400)				
Time	-0.002	-0.002	0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)
After 2016	0.011**	0.008**	-0.006	0.01
	(0.004)	(0.004)	(0.005)	(0.006)
After2016 * Time	-0.002	0.001	0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.003)
Constant	0.791***	0.099***	0.549***	0.166***
	(0.004)	(0.003)	(0.004)	(0.005)

C. Program Selectivity Level

C.1. Low Selectivity (Bottom 25%; obs.=1,897; n program of studies=284)				
Time	-0.004**	-0.009***	0.002	-0.006**
	(0.002)	(0.003)	(0.003)	(0.003)
After 2016	0.018***	0.027***	-0.008	0.029***
	(0.006)	(0.008)	(0.008)	(0.009)
After2016 * Time	0.002	0.008**	0.003	0.008
	(0.002)	(0.004)	(0.004)	(0.004)
Constant	0.917***	0.232***	0.507***	0.323***
	(0.005)	(0.007)	(0.006)	(0.008)
C.2. Medium Selectivity (Middle 50%; obs.=4,087; n=570)				
Time	-0.002	-0.008***	-0.001	-0.007***
	(0.001)	(0.001)	(0.002)	(0.002)
After 2016	0.013***	0.022***	0.000	0.025***
	(0.003)	(0.004)	(0.005)	(0.006)
After2016 * Time	-0.000	0.005***	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.003)
Constant	0.888***	0.141***	0.512***	0.232***
	(0.003)	(0.004)	(0.004)	(0.005)
C.3. High Selectivity (Top 25%; obs.=2,230; n program of studies=291)				
Time	0.002	0.000	0.001	-0.000
	(0.002)	(0.001)	(0.002)	(0.002)
After 2016	0.019***	0.004	-0.007	0.008
	(0.005)	(0.003)	(0.005)	(0.005)
After2016 * Time	-0.009***	-0.000	0.003	0.000
	(0.003)	(0.001)	(0.002)	(0.002)
Constant	0.719***	0.050***	0.560***	0.091***
	(0.004)	(0.002)	(0.004)	(0.004)

Notes: Standard errors in parentheses and clustered at the program of study/university level. ***p<0.01, **p<0.05. Only programs of study with data on 2015 are considered in the analysis. Selectivity level is calculated at the program of study level. Diversity outcomes come from DEMRE datasets.

Chapter 5
Conclusions

In this three-study dissertation, I investigated a free tuition policy implemented in Chile in 2016 to shed light on the arch of free tuition policymaking. In my first study, I described how free tuition became a policy in Chile, focusing on the role of advocacy coalitions and their beliefs and strategies to influence the policy design. In my second study, I provided empirical evidence of the policy effects on student access and persistence in higher education. In my third study, I explored whether the free tuition policy affects key institutional outcomes. By highlighting critical aspects of a free tuition policy formulation and its effects on students and institutions, I contribute to the discussion of free tuition policies, a discussion that is relevant in different countries around the world.

Collectively, these three studies highlight that free tuition policies, although simple to understand for students and their families, are complex to design and implement. Free tuition policies tend to draw the attention of different actors (e.g., political parties, HEIs, student organizations, policymakers) who try to introduce their ideas into the policy design. Moreover, policymakers may face a dilemma between how to balance the number of beneficiaries to have a real impact on equity goals and how to assure the educational quality of the institutions included in the policy, especially when considered in a context of limited resources and autonomous HEIs. As a result of these multiple interests and goals, the final policy design tends to include a mix of ideas from groups with different beliefs about free tuition and technical decisions that try to

balance the scope of the policy in financial and beneficiaries' terms, and the educational quality of the HEIs included in the policy.

In the case of Chile, the complexities in the free tuition policy design and implementation are exemplified by two aspects. On the one hand, the policy design was the result of a mix of political decisions introduced in the policy design by the two main advocacy coalitions (i.e., including private HEIs in the policy and beginning its implementation in the university sector followed, a year later, by the vocational sector). On the other hand, the design was also the result of technical decisions that restrict the institution's participation to assure quality (i.e., accreditation result restriction) and its behavior to assure that they do not increase enrollments or tuition, making free tuition non-viable. Thus, the final policy was the result of technical and political decisions introduced by policy actors that formed advocacy coalitions and used their resources to influence the policy design. Understanding the complexities in the policy design is important because, as shown in the second and third studies, the design and implementation decisions can affect the policy effectiveness by creating intended and unintended consequences.

As observed in the second study, the design and implementation decisions had intended and unintended consequences on student preferences. First, the intended consequences were that the free tuition policy changed students' application and enrollment preferences to universities of higher quality. Second, an unintended consequence was that the policy diverted students from the vocational to the university sector when only universities were included in the policy. Thus, policymakers, practitioners, and researchers should have these effects in mind when designing, implementing, and studying free tuition policies, because what institutions are included in the policy and the timing of inclusion can affect student higher education choices and trajectories and may affect their success. Additionally, researchers should have in mind that free tuition

policies can affect other student access outcomes besides enrollments, as indicated by the college choice framework and by the findings of this study.

Another possible consequence of the policy design may be the little effect of the Chilean free tuition policy on eligible student higher education enrollments and on changing the socioeconomic diversity of the participating institutions. These results raise the question about the effectiveness of the policy in decreasing enrollment gaps between low- and high-income populations. The Chilean policy, although broad in beneficiaries, only covers the tuition and fee costs of attending higher education but it does not cover other types of costs, such as living or books and supplies expenses. It is possible that only covering the tuition and fees is not enough to induce low-income students to attend higher education. Thus, policymakers should consider expanding the free tuition benefit to include other types of costs or complement the tuition benefit with, for instance, work-study programs, if the goal is to increase low-income student enrollments.

Additionally, another aspect of the policy design that could be affecting eligible student enrollments, especially in the universities with the highest quality, is the need to gain admission through the university admission system which uses a standardized test as an admission criterion. As achievements in standardized tests tend to be correlated with socioeconomic status, this test can be acting as a major barrier for eligible students to gain admission to the university sector. Thus, policymakers should pay attention to admission rules in the policy design as they can interfere with the effectiveness of the policy. Practitioners in HEIs should also revise their admission policies questioning which aspects of those policies are acting as additional barriers to eligible students.

From an institutional perspective, the rules that restrict institutional behavior may also have unintended consequences on the policy effectiveness. As observed in the third study, these rules seem to have created an uncertain environment triggering a conservative response from HEIs manifested in a decrease in undergraduate expenditures and the interruption of the pre-implementation trend that was constantly decreasing the standardized university admission test weight, an admission policy that benefited low-income student admission to selective institutions. Thus, the Chilean case exemplifies that, although setting restrictions on HEIs may seem reasonable from an efficient use of resources point of view, these restrictions may affect the effectiveness of the policy by decreasing the incentives to HEIs to admit eligible students. HEIs may respond in unexpected ways creating additional barriers to the beneficiary of the policy or at least, not helping to dismantle barriers that prevent eligible students from applying or enrolling.

This dissertation also highlights that free tuition policies can be powerful tools that affect the whole higher education system (i.e., eligible and ineligible students and HEIs) creating unintended consequences that affect the policy's effectiveness. I found that the Chilean free tuition policy has spillover effects on ineligible students. These types of policies are usually widely discussed in the media creating awareness of different aspects of the higher education system, such as the availability of financial aid or the quality of HEIs. Thus, these policies can induce non-eligible students to apply for financial aid and/or apply to eligible institutions increasing the demand for those institutions. These results jointly with the enrollment capacity regulation suggest an unintended consequence: the increase in demand for eligible institutions and the institution’s inability to increase their enrollments can result in increasing eligible institutions' selectivity and crowding out eligible students, who tend to be the least prepared to

gain admission in these selective institutions. Thus, when designing and evaluating these policies, policymakers and researchers should have in mind that free tuition policies may affect the whole community and not only the eligible population.

Hopefully, as researchers continue to provide more evidence about the effect of different free tuition policy designs on student and institution outcomes, policymakers, practitioners, and advocacy groups will be able to make more informed decisions about the elements in the policy and implementation designs that interfere with the intended goals. In a local context, I hope this work helps Chilean policymakers to reformulate the free tuition policy to achieve the goal of decreasing inequities in access and success in higher education.

This dissertation also makes conceptual contributions to the free tuition policy literature by using a unique combination of theoretical frameworks to understand different stages of its policy cycle. First, I introduce the advocacy coalition framework as a lens to understand the policy formulation, which focuses on the interactions among policy actors instead of individual actors. Second, I used a college choice framework to examine the effect of the policy on a series of student access outcomes, which acknowledge that a free tuition policy may affect outcomes different than enrollments. Third, I highlight the role of HEIs as main actors in the policy formulation and implementation processes. I also conceptualize the reaction of HEIs to a free tuition policy as a matter of resources available to induce them to adopt the policy goals. To my knowledge, this is the first study to highlight HEIs as policy actors involved in the policy design and to explore HEIs' response to a free tuition policy.

Finally, I hope that this dissertation helps to improve the understanding of free tuition policy formulation and its effects on students and institutions. As is often the case, a study of this magnitude raises many new questions, some of which could be answered with additional

research. For example, more research is needed on the political dynamics behind the policy formulation in other contexts, and how those affect policy design. In turn, more research is needed to evaluate the effect of different free tuition policy designs on student and institution outcomes to identify what works and what designs tend to induce unintended consequences. By generating more empirical research on which to make higher education decisions, research can help policymakers and practitioners to design and implement policies that are effective in improving equity and inclusion goals in higher education.