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A Quasi-experimental Study on How Free College Influences Educational Equity in the United States Based on Analysis of the Excelsior Program

Zhuoyao Liu
zhuoyao.liu@student.shu.edu

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by

Zhuoyao Liu

Dissertation Committee
Robert Kelchen, Ph.D., Mentor
Rong Chen, Ph.D.
Hillary Morgan, Ph.D.

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APPROVAL FOR SUCCESSFUL DEFENSE

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DISSERTATION COMMITTEE

(please sign and date)

Dr. Robert Kelchen
Mentor **Date**

Dr. Rong Chen
Committee Member **Date**

Dr. Hillary Morgan
Committee Member **Date**

The mentor and any other committee members who wish to review revisions will sign and date this document only when revisions have been completed. Please return this form to the Office of Graduate Studies, where it will be placed in the candidate's file and submit a copy with your final dissertation.

ABSTRACT

Educational equity has long been an important issue to which the U.S. government, academia, and the public have paid great attention in past decades. The federal government and state governments have successively promulgated policies to reduce the equity gap between well-represented and underrepresented students. As such, the Promise Program (a representative of free college policy) has become a popular tool to address the educational equity issue. New York was the first state in the United States that announced a statewide Promise (called the Excelsior Program) applying the free college policy to all public higher education sectors for its state residents. Will this program actually improve educational equity? This study seeks to explore this issue by focusing on the impact of the Excelsior Program on the educational equity of public 2-year and 4-year colleges. According to higher education equity theories, I considered three types of educational outcomes (enrollment, persistence, and graduation) as measures of educational equity.

Based on the annual data for the years 2010–2019 from the Integrated Postsecondary Education Dataset, I utilized a quasi-experimental design and conducted difference-in-difference (DiD) modeling to examine how the Excelsior Program affected the overall educational outcomes and how this effect varied across public 2-year and 4-year colleges (i.e., SUNY and CUNY) in New York (compared with colleges in other 37 states that did not implement the statewide Promise before the 2019–2020 academic year). To further explore the equity implication of the Excelsior Program, I also examined the effect of the Excelsior Program on the educational outcomes of underrepresented student groups. With respect to

public 2-year colleges, the treatment state (New York) included 36 public colleges while the control group consisted of 573 public colleges. With respect to public 4-year colleges, the treatment state included 34 public colleges while the control group consisted of 424 public colleges.

Results show that for public 2-year colleges that have implemented the Excelsior Program, the undergraduate enrollment, retention, and graduation rate (total undergraduates) generally decreased. In the analysis of underrepresented groups, the enrollment of some racial minority groups, such as Hispanic (full-time first-time and total) and Native Hawaiian (full-time first-time) undergraduates decreased. The graduation of low-income undergraduates (full-time first-time) decreased. The decreased enrollment, retention, and graduation suggested that the Excelsior Program enabled high school graduates to access more alternative educational opportunities (versus public 2-year colleges), supporting the implications of the Excelsior Program for educational equity from a different view.

In public 4-year colleges that have implemented the Excelsior Program, the enrollment of full-time first-time undergraduate generally increased. In the analysis of underrepresented groups, the enrollment of low-income undergraduates (full-time first-time and total), American Indian (full-time first-time and total) and African American (full-time first-time and total) undergraduates increased. These findings strongly supported the implications of the Promise effect for educational equity in 4-year public colleges.

Keywords: educational equity, Excelsior Program, free college, enrollment, retention, graduation, underrepresented students, difference-in-difference model.

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CONTENTS

INTRODUCTION

Improving the educational equity for students in need is an issue on which academia continues to focus and which the U.S. government has long hoped to solve. This dissertation will explore whether the implementation of Excelsior Program will improve the equity outcomes in the state of New York and reduce the equity gap among the underrepresented and well-represented students. In this chapter, I will introduce the research background, purpose, questions, contributions, important definitions and the structure of the dissertation.

Why the topic matters

In 1944, the GI Bill of Rights was passed by Congress to open the door to higher education for World War II veterans. The bill benefited 16 million of the target audience (Bennett, 1996). Influenced by the Civil Rights Movement in the 1960s, affirmative action became a famous policy that reflects the American higher education's initiative in increasing educational opportunities for historically disadvantaged minorities (Hurtado, 2006). In 1965, Title IV of the Higher Education Act (HEA) contained the first specific federal obligation to make college affordable and promote equal college opportunities for students in need (Gladieux, 1995). The Education Amendments of 1972 continues to provide students with various forms of financial aid programs, including scholarships, grants, low-interest loans, etc., and has further expanded the scope and intensity of funding through the promulgation of the Middle Income Student Assistance Act in 1978.

Students pursuing higher education are adults and can generally judge whether a certain type of higher education can bring them expected benefits. The role of the government

(including the state government) is to ensure that every student who is willing to receive higher education has access to higher education. This goal is achieved mainly through the following ways: subsidizing/waiving tuition fees, setting up grants (Pell Grants), setting up student loan programs, providing some work-study opportunities (e.g., Federal Work-Study Program), and providing different kinds of scholarship for students (Nguyen, Kramer, & Evans, 2019).

As a result of these financial aid innovations, the college enrollment gap between students from the lowest- and highest-income families has been reduced significantly in the past half century (Pell Institute, 2020). However, the inequity still exists. The enrollment rate of students in the highest income quartile is 75%, while the enrollment rate of students in the lowest income quartile is 51% (Pell Institute, 2020). Federal reserve statistics released indicate that student debt in the United States reached 1.7 trillion dollars by March 2021 (Federal Reserve Board, 2021**)**. Scholars in the field are concerned that such high student debt can limit low-income students' willingness to go to college (Gándara & Li, 2020; Gurantz, 2020; Nguyen, 2019). The state government utilized the finance policy to solve the issues of student debt. However, the effect did not act in the expected way. Just as some scholars found that the financial aid policy cannot effectively help the underrepresented students (who is vulnerably to bear the debt burden) reduce their financial stress, which leads to the reduction of the students' internal motivation to continue their study (Miron & Kelaher-Young, 2012). The implementation of innovations in higher education finance policy

illustrates policy leaders' desire to narrow the opportunity gap (Blumenstyk, 2014; Gurantz, 2020; Perna & Leigh, 2017).

The emergence of free college, or Promise Programs, has far-reaching influence on improving educational equity for underrepresented students (Gándara & Li, 2020; Gurantz, 2020; Perna & Leigh, 2018). To continue expanding the access of these students to college, free college or Promise Programs have become a popular tool in the higher education financial aid system. Over 50% of young Americans between the ages of 18 and 29 support free college, despite knowing the estimated cost of conducting the program (The Institute of Politics at Harvard University, 2020). Popular among college going students because of their "free-tuition" characteristics, Promise Programs differ in program eligibility and student populations that qualify.

Since the first local Promise Program, Kalamazoo (Michigan) Promise, began in 2005, over 200 local Promise Programs have developed in the United States (Bartik, Hershbein, & Lachowska, 2021; Billings, 2018; Perna & Leigh, 2018). Evidence has shown that these programs have created significant impacts in boosting educational outcomes and increasing local prosperity (Billings, 2018; Miller-Adams, 2015; Perna & Leigh, 2018). The programs are very diverse in design, with some funding only community college and others providing a full 4 years of college tuition. Some are need-based, and some are merit-based. Some require all other forms of aid to be used first ("first dollar"), while others don't ("last dollar") (W.E. Upjohn Institute, 2019). To be specific, first-dollar models offer the financial aid before any amount of grants the students will receive while the last-dollar models offer only the amount

of money that may not be covered by Pell Grant or other public grants (ACCT, 2019; Billings, 2018; Perna & Leigh, 2018).

Scholars found that first-dollar programs like Kalamazoo Promise providing universal scholarships have a high rate of return. African American females performed outstandingly in 4-year graduation rate and exceed the state average (Miller-Adams, 2015). The study by Bartik et al. (2021) proved that despite the program working for low-income families, female and non-Whites, Promise has a more powerful positive effect on the Whites and males. Last-dollar programs, like Pittsburgh (Pennsylvania) Promise, require students to file the FAFSA and meet the GPA as well as full-time requirements (Page et al., 2019). Pittsburgh Promise witnessed a significant rise in low-income students' enrollment and persistence rate (with 14 % and 17 %, respectively) as it covers all type of institutions (Page et al., 2019). The graduation rate also climbed 6% during the 2009 to 2014 period (Miller-Adams, 2015). The major differences between first-dollar and last-dollar designs will be mentioned again in the "Important Definitions" section.

I hand collected the statewide programs information from the higher education bills of 50 states in the United States and found that legislators in 24 states filed (some have not passed yet) their statewide promise bills by spring 2021. Established in 2015, Tennessee Promise is the first statewide and state-funded Promise Program that provides free tuition for students who attend 2-year public community colleges (Poutre & Voight, 2018). It is also the first state that grabs public attention by applying the "free college" concept on the state level (Bell, 2021).

Publications discussed the early impacts of Tennessee Promise (Bell, 2021; Nguyen, 2020; Smith & Bowyer, 2016). Smith and Bowyer (2016) provided early evidence that the obvious impact Tennessee Promise made was increasing by nearly 25% full-time first-time enrollment at the community colleges and attracting more high school students go to college immediately after they graduate. Nguyen (2020) strengthened Smith and Bowyer's study by conducting a difference-in-difference (DiD) design and figured that college enrollment increased by 40% in the public 2-year institutions relative to other states.

In a just-published quantitative study, Bell (2021) echoed the previous findings in the positive effect that Tennessee Promise made in the college enrollment but also identifies that such statewide promise design might help minority students have more educational opportunities and results in their flexibility to choose what type of colleges to enroll. A quasi-experimental paper also provided early proof that statewide Promise Programs can result in different enrollment impact on different racial groups with different treatment years (Perna & Smith, 2020). The White enrollment in Tennessee's community colleges increased significantly in its first-year implementation of the free tuition Promise Programs. Tennessee's community colleges also witnessed a moderate increase in Black overall enrollment (Perna & Smith, 2020).

Influenced by the Tennessee Promise, states like Oregon, Rhode Island, and New York put forward their own statewide Promise designs. Few studies have analyzed to what extent or how effectively this design influences educational equity in areas such as the improvement of the total and minorities' enrollment, retention, and graduation. The main reason could be

the institutional data has not been available yet because the statewide Promise initiatives have just begun. In Gurantz's research, Oregon Promise increased the public 2-year colleges' enrollment by 5% for the first two treatment years (Gurantz, 2020). The program was established in 2016 and covered up to 12 credits per term for students who attend the community colleges as long as their tuition and fees are fully covered by federal/state grants (Hodara et al., 2018). Rhode Island Promise was established in the same year, with the aim of increasing the total enrollment of community colleges.

In 2017, New York became the first state to create a state-level Promise Program (called Excelsior) that covers residents' tuition not only for 2-year community colleges but also for 4-year public universities (Nguyen, 2019). According to Governor Cuomo, the Excelsior Program is targeting college completion and degree attainment. Nearly 24,000 SUNY and CUNY undergraduates obtained support from the Excelsior Program at the completion of year two (from https://www.suny.edu/suny-news/press-releases/9-19/9-10-19/index.html), which accounts 3.2% of the students statewide (from https://nycfuture.org/research/excelsior-scholarship). To address the knowledge gap of this new design in state-level Promise Programs and to contribute more knowledge about the Promise Program, I tested the effects of New York Excelsior on total educational outcomes and underrepresented students' educational outcomes and if these effects vary across the 2-year and 4-year public sectors.

Purpose and problem statement

Nguyen (2019) previously conducted a study to discuss the impact of Excelsior after the first year of implementation. The outcome of interest is college enrollment. Nguyen

conducted a DiD model to compare New York State's enrollment changes after the Excelsior Program began with the other 43 states that do not implement any statewide Promise Programs at all. The result proves that the program effect on first-year enrollment is not significant.

I aim to explore whether the statewide Promise Program in New York has an impact on educational outcomes by using 2010–2019 institution-level data from the Integrated Postsecondary Education Dataset (IPEDS), so as to confirm the equity changes in the fairness and quality of higher education after the implementation of the free college policy. Notably, if more years of data are available (which happened pretty late in the spring) and will be able to see effects beyond the initial year of implementation. In other words, the goal of this study is to evaluate changes in overall college enrollment, persistence, and graduation rates in 2- and 4-year postsecondary institutions in New York State relative to states that do not implement Promise Programs by using DiD estimation, with a focus on racial and income disparities.

Research questions

This dissertation aims to explore whether educational equity increased in the postsecondary institutions of the state that implemented the Excelsior Program (New York) when using the institutions in states that do not implement any statewide Promise Program as controls. Educational equity is indicated by two types of educational outcomes. The first type of outcome is the total enrollment, retention, and/or graduation of students. Total enrollment, retention, and/or graduation means the educational outcomes of students from all social

classes. A wide range of social classes participate in higher education constitute an important part of educational equity. The second type of outcome is the enrollment and/or graduation of underrepresented students, which is the more typical definition of equity.

Based on the aforementioned outcomes, there are two research questions in this dissertation:

(1) To what extent are there a relationship between New York State implementing the Excelsior Program and the educational outcomes (total enrollment, retention, and graduation) of undergraduate students in the public 2-year colleges, and a relationship between New York State implementing the Excelsior Program and the educational outcomes (total enrollment and retention) of undergraduate students in the public 4-year colleges?

(2) To what extent is there a relationship between New York State implementing the Excelsior Program and the educational outcomes of underrepresented undergraduate students (e.g., low-income and/or racial minority), and does this relationship vary across 2-year and public 4-year colleges?

Theoretical framework and research methodology

The theoretical framework of my paper explains the *purpose* (guided by John Bordley Rawls's theory of justice) and the *indicators* (guided by Torsten Husén's educational equity theory) to reflect the purpose and what different *components* (guided by Pierre Bourdieu's forms of capital theory) can affect the results of these indicators (See Figure 1.1). Guided by these equity theories and free college policy literature, I conducted my research through a general DiD design. The purpose of this design was to examine how free college policy

influences the overall educational outcomes in a state and how the outcomes differ in the minority and low-income students after the implementation of statewide Promise Programs. To conduct this methodological design, I set up a traditional regression (including the interaction term of post and treatment) that can estimate the difference in post-implementation outcomes for the treatment group and the control group.

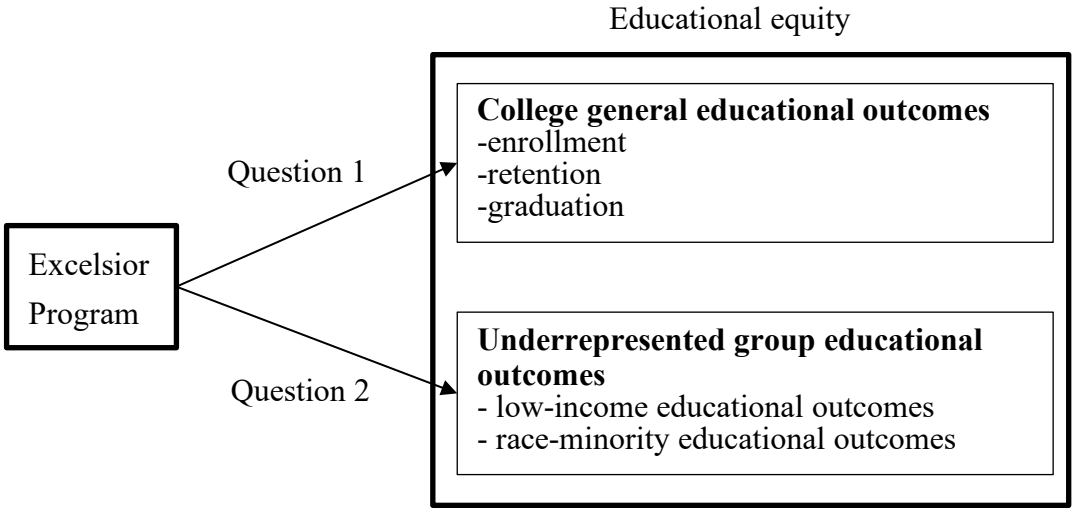

Figure 1.1 Theoretical framework

Contributions and significance

Previous studies conducted investigated how the Promise effect leads to differences in the college enrollment, persistence, and completion on the local level. This study, therefore, contributes by adding to the literature on a statewide level (some exceptions such as work on Oregon and Tennessee) and seeing to what extent free college policy has a relationship with multiple educational outcomes and in what ways. The study explores the educational equity issues through the underrepresented students' (minority students such as African American, Hispanic, and American Indian students and low-income students) perspectives.

Important definitions

The typology as well as design of college Promise Programs are generally considered in four groups of categories: program implications level (local or state), aiding type (first dollar or last dollar), eligible institutions, and students' eligibility criteria (Billings, 2018; Perna & Leigh, 2018; Willard et al., 2019). State-wide college Promise Program is a specific type of free college policy but has some different features compared with free college. Many free college programs provided free tuition and included pre-college requirements (such as community service or courses taken in high school) while the majority of state-wide college Promise Programs typically do not have these requirements and do not cover non-tuition costs such as books, transportation, and living expenses. Potential students who are eligible for free tuition in this situation should be the residents of the state and whose total family income is less than a certain amount (usually set in the low-income family line of the specific state).

There is difference existing between first dollar and last dollar. Promise Programs that define their aiding type as "first dollar" means that the program assists the students with scholarships before they apply for any other possible funding (Upjohn Institute, 2015). Kalamazoo Promise is also a great example of this case. However, as the funding sources are limited, many local programs which were motivated by the success of Kalamazoo Promise do not adapt its first-dollar model and choose the "last-dollar" model, which means they will offer only the amount of money that may not be covered by Pell Grant or other public grants (ACCT, 2019; Billings, 2018; Perna & Leigh, 2018). As for the state programs, Tennessee

and the other 24 states all choose last-dollar programs (California is the only exception), awarding eligible students after calculating all federal and state grant aid.

Equity in American higher education means that each student group in the United States enjoys equal rights to receive the opportunities of postsecondary education, the services and quality supports of public educational resources, and the opportunities for pursuing academic and career success through the higher education process (Bowen, Kurzweil, Tobin, & Pichler, 2005).

Structure of the dissertation

This study's organization is as follows. In Chapter 2, I discuss three representative theories in my theoretical framework section. The first is the theory of justice, which explains where educational equity comes from and provides critical guidance in exploring the significance of my study—implementing free college policy as well as college promise to reduce educational inequity for the underrepresented students (i.e., low-income and racial minority students) and ultimately improve social justice. The other two theories mainly explain why free tuition policy provides the potential to attract more students and address the equity issues for different student groups.

I then conduct a systematic literature review on the U.S. financial aid system, explain the policy and law contexts of the statewide Promise Programs, and emphasize the effect of Promise Programs on educational equity and what gaps exist in current research, which leads to the inspiration for my research questions. I argue that very little literature analyzes the statewide promise effect and previous studies exposed the following limitations: from a time

perspective, the latest academic year that previous studies cover is 2017; from an outcome perspective, enrollment is the only indicator the authors have selected to measure the policy's effects, and other educational outcomes like retention and completion/graduation remain to be discussed.

In Chapter 3, I provide an examination of the educational outcomes (three major indicators based on the literature): enrollment, retention, and graduation. I also estimate how free college policy influences these three outcomes for racial minority groups and low-income groups after the implementation of the statewide (Excelsior) Promise Program. In the quasi-experimental design, I conducted DiD equations as the outcomes of interests change with time. Then, I report three main limitations and the results of descriptive statistics of the focal variables in this study (i.e., outcome variables and controls). In addition, I also present the results of parallel trend tests and falsification tests to recognize the robustness of our findings.

In Chapter 4, I report and summarize the findings of DiD modeling, which aims at exploring the effect of the Excelsior Program on educational outcomes. In doing so, I respond to my research questions and find evidence for the policy effect.

In my last chapter, I discuss the research findings regarding question 1 and question 2 and some directions that future research could address.

LITERATURE REVIEW

My literature review includes the following sections. First, in the theoretical framework section, I discuss three theories that are related to the educational equity and free college movements. Guided by these theories, the following sections explain how the historical and current trends in educational equity as well as the development of financial aid systems may lead to an increasing demand for implementing the Promise Programs. The last section of this literature review represents an overview of Promise Programs, discussing the Promise effects (positive effects and the drawbacks), especially at the state level.

Theoretical grounding

Plato, who first mentioned that education is a way to reach justice, put forward the concept of equal educational opportunity in *The Republic*. While the concept has been widely discussed in the modern conception of social justice, it was not until the 1950s that American higher education began to conduct in-depth studies of educational equity. As a product of democratic politics, it received the great attention of scholars in the 1960s and 1980s—James Coleman, John Rawls, and Eliza Sallis are the most prominent ones. For example, one authoritative work is the Coleman Report that emphasized equal educational opportunities. Based on the literature, I would introduce three main equity theories that are relevant to the emergence of free college movements.

John Bordley Rawls's Theory of Justice

The main interest of my study is educational equity, and the concept of justice has guided educational equity in many ways. Rawls began to explain the views of social justice in

his book *A Theory of Justice*, which systematically demonstrated the problems of justice, leading theoretical innovations in justice in contemporary America. His idea of fair justice had the greatest influence on the concept and policy of educational equity. Rawls opposed traditional utilitarianism and believed that justice is the main virtue of the social system, just as truth is to the ideological system (Rawls, 1971). Unjust laws and systems, however effective, should be reformed and eliminated (Rawls, 1971).

Justice, Rawls (1971) argued, was a consensus that people imagine themselves in an original position whose core content was that any inequality should be in the best interests of the least benefited, provided that the fundamental rights of everyone were protected and compatible with the same rights of others. The principle of Fair Equality of Opportunity that Rawls put forward continues to have a profound influence on the formulation of education policy (Shields, 2015). The difference principle derived from it is committed to establishing a compensation mechanism for the least benefited groups to have access to the social goods in the society. This promotes educational equity against inefficient practices, which is the main application of this justice theory in the field of higher education (Dowd et al., 2020). Guided by this theory, this study also focuses on these least benefited groups (i.e., low-income and racial minority students).

Torsten Husén's Theory of Educational Equity

According to Torsten Husén, the concept of educational equity has gone through the evolution process of the conservative stage, liberal stage, and radical stage successively due to transformations in social philosophy. In the 1970s, he analyzed educational equity in three

dimensions. The first dimension is the equality of starting point; that is, everyone has the opportunity to start his or her learning career without any discrimination. The second is the equality in the intermediary stage; that is, people are treated equally in the process of education and people from different ethnic groups and social backgrounds are treated on the basis of equity. The last dimension is the equality of the final outcome (goal); that is, students have equal opportunity to achieve academic success (Husén, 1972).

Husén's equity theory makes educational equity become measurable. By discussing educational opportunities in terms of educational resources, he effectively promotes the equity practice of ensuring equal social group access to college (Marginson, 2016). The core of the free college movement is to solve the issue of the starting point—increase the chance for residents from low- or low-middle-income groups to enter the university and make their college dreams possible, so as to improve working population quality and increase the human capital of the society as a whole (Dowd et al., 2020).

Pierre Bourdieu's Forms of Capital theory

Pierre Bourdieu developed "The Forms of Capital" into economic capital theory, cultural capital theory, and social capital theory, focusing on the differentiation and interaction of them. Bourdieu believed that students with highly cultural backgrounds could generally inherit valuable cultural activity patterns from their parents while students from grassroots are more dependent on the school education (Bourdieu, 1986). Social capital is a collection of actual or potential resources that are inextricably linked to the possession of some enduring networks. They could be networks that are common, recognized, or

institutionalized. They could also be networks that are linked to the membership system of a group, and they support each member from the perspective of collective ownership of capital and provide the credentials that earn them fame (Bourdieu, 1986). Social capital exists in the form of networks of relationships.

The theory explains why policy makers should pay attention to the important influence of economic capital, cultural capital, and social capital of the network members when considering the equity of higher education. Free college is to help the residents whose power of capital is in a disadvantaged position (i.e., low-income and racial minority students), so that these student groups can have access to and gain success in higher education, building educational equity in the long run.

The financial aid system in the United States

According to the latest College Board data report, the average published tuition and fees of private, nonprofit 4-year universities in 2018–2019 was $35,830, while that of public 4-year universities was $10,230 (College Board, 2019b). If converted according to the current currency value, the tuition fees of these two types of universities 30 years ago were $17,010 and $3,360, respectively (College Board, 2019). At public 2-year institutions, the tuition is much lower while the number still doubles when compared to the figures in 1988–1989 (College Board, 2019).

Research has shown that multiple factors, from government financial aid policy to the institutional operation strategies, drive the overall price and burden of postsecondary education for the students and their families. From the perspective of higher education

institutions, improving institutional competitiveness has been their main goal in the past decade. Institutions tend to invest more money in purchasing and maintaining facilities, hiring superstar professors with high salaries, and increasing the number of administrative positions that provide better student services (Kelchen, 2018). All of these actually increased their overall operational cost.

As for the outside financial support system of higher education, state governments cut their budgets for the universities, which could shift the increasing institutional costs to the students and their families (Collier et al., 2019). As the latest statistics showed, the total amount of student loan that college students carried has ranked second among all credit product debts that U.S. consumer carried (Tatham, 2019). Students from low-income families are more likely to bear heavy debts. According to the Center on Budget and Policy Priorities report, the average debt level of a low-income student graduating from a public 4-year university increased by 17% within 4 years (Mitchell, 2014).

Low-income students are more likely to bear the risk of carrying over-burden debts than their high socioeconomic counterparts as well (Houle, 2014). To ease the existing gap the U.S. government constructed a diversified student-aid mechanism for the students, with the federal government as the main component and the state governments, universities, non-profit foundations, and other social organizations as the participants. Based on the definition of Federal Student Aid, the main types of financial aid may include grants, student loans, and work-study (Federal Student Aid, 2018).

The first type is grants. Institutions and some public organizations provide grants to help students from low socioeconomic families or award students with excellent academic achievement. Grants account for the main form of the state aid, including need-based and merit-aid programs. (1) Need-based programs: The federal government is by far the largest sponsor of need-based aid (Kelchen, 2018). According to the 2017–2018 annual survey data of National Association of State Student Grant & Aid Program (NASSGAP), states allocated over 80% of grant funding to the need-based grants (National Association of State Student Grant & Aid Program, 2019). The biggest program that the federal government sponsors is the Pell Grant. In other words, the Pell Grant is the cornerstone of the federal government's funding program for economically disadvantaged students (Rubin, 2011). Additionally, Campus-based federal financial assistance programs like the Federal Supplemental Educational Opportunity Grant and Federal Work-Study (FWS) Program have offered approximately 2 billion dollars in funding to students in need (Kelchen, 2017b). (2) Merit-aid program(s): Georgia HOPE scholarship "award[s] full tuition and fees to students who maintain a certain GPA in high school and college" (Nguyen et al., 2019, p. 835). The College Board data showed that between 1990 and 2019, the total institutional grant aid for undergraduate students increased from $27,756 million to $116,900 million (College Board, 2019a). The average grant aid per full-time student increased by 195.77% during the same time period (self-calculated by using the College Board Trends in Student Aid 2019 data).

The second type is student loans. Student loans in the United States have various forms. The federal government, state governments, universities, and private institutions all set up

student loans to provide financial support ($5,500 to $12,500 per year) for college students to receive higher education, of which the main part are the student loans provided by the federal government. There have been two main federal student loans: William D. Ford Federal Direct Loan and Federal Perkins Loan Program; the latter program ended a few years ago. The Federal Direct Loan is now the largest federal student loan (The Condition of Education, 2020). It consists of Direct Loans, Direct Unsubsidized Loans, Direct PLUS Loans, and Direct Consolidation Loans that help students from diverse backgrounds and educational levels (The Condition of Education, 2020).

The third type is work-study programs. Work-study programs are campus-based financial aid funds provided by the federal government for college students (Kelchen, 2017a). Compared to the other two types of aid, a work-study program provides job opportunities for college students in the form of compensation. The funding of the work-study program still mainly comes from the federal government (Kelchen, 2017b). Any full-time or part-time college student who has a difficult family economic condition can apply to the school for the opportunity for a work-study program (Federal Student Aid, 2017). The on-campus workplace is usually set up in universities' libraries, cafes, or administrative offices. Programs in specific districts or discipline (e.g. northern California's nursing program) will also set up cooperative work-study programs with some well-known companies by offering off-campus internships for undergraduate students (Wallace, 2016).

The federal government also established a series of tax relief policies to ensure that every college-age student has access to higher education and to encourage parents to actively

support their children's enrollment in colleges and universities. For example, the policy of lifelong learning tax relief aims to reduce the dropout rate of college students. Its main targets are senior undergraduates and postgraduates (Davies & Collins, 2005).

The financial aid system described above is not perfect and has, to some extent, failed to keep up with the price of higher education. William Bennett, the former U.S. secretary of education, expressed the belief that college tuition fees have increased by 6% to 8% a year since the 1970s due to the reduction in government financial aid, and has condemned the leaders of colleges and universities for their laissez-faire attitude towards this situation. He claimed that the rapid increase in tuition fees is an inevitable result of the reduction in federal funding for higher education (Bennett, 1986).

Bennett's view not only shocked some political leaders, the media, and the general public, but also was later refined as the *Bennett hypothesis* in higher education finance policy; that is, federal student aid may lead to an increase in tuition fees (Kelchen, 2019). Regardless of whether the Bennett hypothesis is true, the financial aid system needs to be diversified in enriching student group diversity and meeting the demands of equity. With the enrichment and deepening of relevant research, disputes have emerged again and again, the core issues of which include: Who should pay for the cost of financial aid for college students? How do we ensure that aid is facilitated effectively?

Historically, free tuition policy did appear in some institutions and states, especially in the 19th and 20th centuries in the United States. Baruch College in New York, for instance, was founded in 1847 as the Free Academy (Roff et al., 2000). California community colleges

were also free for every resident in the early 20th century (Tollefson, 2009). However, the number of students who enrolled in the colleges was very low during that time (Galizio, 2019).

Meanwhile, influenced by the land grant policy, Section 14 of the Organic Act in California demanded that ". . .admission and tuition shall be free to all residents of the State; and . . . all portions of the State shall enjoy equal privileges therein" (Assembly Bill. No. 583., 1868). Although California institutions began charging a small amount for fees later, in 1921, in-state students are free of tuitions after these policy and law readjustments (Brossman, 1977; Rauner et al., 2018).

Historical evidence of free tuition policies has been found in Florida and Arizona as well. For instance, the 1912 statement of expenses of the University of Florida clearly stated that in-state students enjoyed free tuition except at the College of Law (University of Florida, 1912). Similarly, Article XI (Text of Section 6) of the constitution of Arizona stated the free tuition concept for the state's university and all other state institutions (Ballotpedia, n.d.).

In addition to New York, California, Florida, and Arizona, Indiana once made an effort to apply the free tuition policy at the public university. Article IX section 2 of 1816 Indiana constitution said that ". . . from township schools to a state university, wherein tuition shall be gratis, and equally open to all" (Indiana Archives and Records Administration, n.d.). However, the efforts that policymakers made at that time never became a reality and the terms about free tuition disappeared in the later revision of Indiana's constitution.

Current research on the statewide Promise Programs

As mentioned, the most well-known programs that today reflect the free college movement in the United States are called *College Promise* or *tuition-free programs*. In many studies, College Promise is a place-based financial support that usually presents as a grant or universal type of scholarship (Collier & Parnther, 2021; Perna & Leigh, 2018; Ritter & Ash, 2016). However, since the Promise model can vary across different states, in this paper, the definition of college Promise Programs are programs that "seek to expand access to and ensure success in higher education, deepen the college-going culture . . . as a whole" (Miller-Adams, 2015, p. 1).

Table 2.1 provides my hand-collected information from each state's senate bills, with the first column listing the name of each state in alphabetical order, the second column showing the name of the statewide Promise Program for each state ("N" represents the state that does not implement any statewide Promise Program at all), the third column recording the implementation year of each Promise Program, and the fourth column showing the funding model that each statewide Promise Program runs.

Table 2.1: List of statewide Promise Programs.

States	Statewide college Promise Programs (public 2- or 4-year)	Started/ incoming year	Last/first dollar	Sources
Alabama	N			
Alaska	N			
Arizona	N			
Arkansas	Arkansas Future Grants	2017	Last Dollar	https://www.arkleg.state.ar.us/Bills/FTPDocument?path=%2FBills%2F2017R%2FPublic%2FHB1426.pdf
California	California College Promise	2019	First Dollar	https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB2
Colorado	N			

Connecticut	Pledge to Advance Connecticut, or PACT plan	Fall 2020	Last Dollar	https://www.nbcconnecticut.com/news/local/pact-plan-would-offer-free-tuition-to-eligible-connecticut-students/2198263/
Delaware	N			
Florida	N			
Georgia	N			
Hawaii	Hawaii Promise	2017	Last Dollar	https://www.capitol.hawaii.gov/session2018/bills/HB2501_SD2_.HTM
Idaho	Idaho Promise	N/A ((bill introduced in March 2019)	Last Dollar	https://idahonews.com/news/project-idaho/project-idaho-new-promise-for-post-secondary-education
Illinois	College Promise grants	2021	Last Dollar	http://www.ilga.gov/legislation/fulltext.asp?DocName=&SessionId=108&GA=101&DocTypeId=SB&DocNum=2324&GAID=15&LegID=122622&SpecSess=&Session=
Indiana	N			
Iowa	N			
Kansas	Kansas Promise Scholarship Act	N/A (bill introduced in Feb 2021)	Last Dollar	http://www.kslegislature.org/li/b2019_20/measures/documents/hb2515_00_0000.pdf
Kentucky	Work Ready Kentucky Scholarship Program	2019	Last Dollar	https://apps.legislature.ky.gov/recorddocuments/bill/19RS/sb98/orig_bill.pdf
Louisiana	N			
Maine	N			
Maryland	Maryland Community College Promise Scholarship Program	2019	Last Dollar	http://mgaleg.maryland.gov/2019RS/bills/sb/sb0240f.pdf
Massachusetts	N			
Michigan	N			
Minnesota	College Promise Grant Program	2022	Last Dollar	https://www.senate.mn/departments/scr/billsumm/summary_display_from_db.php?ls=91&id=6641
Mississippi	N			
Missouri	N			
Montana	Montana Promise Act	2018	Last Dollar	https://leg.mt.gov/bills/2017/billpdf/HB0185.pdf
Nebraska	N			
Nevada	Nevada Promise Scholarships	2018	Last Dollar	https://www.leg.state.nv.us/Session/79th2017/Bills/SB/SB391_EN.pdf
New Hampshire	N			
New Jersey	Community College Opportunity Grant	Jan 2019	Last Dollar	https://www.njleg.state.nj.us/2018/Bills/A4500/4326_I1.HTM
New Mexico	New Mexico Opportunity Scholarship	Fall 2020	Last Dollar	https://nmsuroundup.com/15155/campus-life/opportunity-scholarship-dies-in-second-session-of-nm-legislature/
New York	Excelsior Scholarship	2017	Last Dollar	https://legislation.nysenate.gov/pdf/bills/2019/S5821

North Carolina	N			
North Dakota	N			
Ohio	N			
Oklahoma	N			
Oregon	Oregon Promise	2016	Last Dollar	https://www.oregon.gov/highered/research/Documents/Reports/SB-81-Oregon-Promise-2018.pdf
Pennsylvania	Pennsylvania Promise Act	N/A	Last Dollar	https://www.legis.state.pa.us/cfdocs/legis/PN/Public/btCheck.cfm?txtType=HTM&sessYr=2019&sessInd=0&billBody=H&billTyp=B&billNbr=0244&pn=0283
Rhode Island	Rhode Island Promise	2017	Last Dollar	http://webserver.rilin.state.ri.us/BillText19/HouseText19/H5862.pdf
South Carolina	South Carolina Promise Scholarships	N/A	Last Dollar	https://www.scstatehouse.gov/sess123_2019-2020/bills/25.htm
South Dakota	N			
Tennessee	Tennessee Promise	2015	Last Dollar	http://www.capitol.tn.gov/Bills/108/Bill/SB2471.pdf
Texas	N			
Utah	Access Utah Promise Scholarship	2019	Last Dollar	https://ushe.edu/ushe-policies/r620-access-utah-promise-scholarship/
Vermont	Vermont Promise Scholarship Program	2020	Last Dollar	https://legislature.vermont.gov/Documents/2020/Docs/BILLS/S-0038/S-0038%20As%20Introduced.pdf
Virginia	N			
Washington	Washington Promise	2022	Last Dollar	http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/House%20Bills/1123.pdf?q=20200421111547
West Virginia	West Virginia Promise	2020	Last Dollar	https://www.wvlegislature.gov/Bill_Status/bills_text.cfm?billdoc=hb2020%20intr.htm&yr=2015&sesstype=RS&i=2020
Wisconsin	N			
Wyoming	N			

In 2017, the New York state announced the implementation of the Excelsior Program, which allows students to attend a public college tuition-free in a full-time status. The New York State Senate Bill S4091A (current bill status: in Senate Committee Higher Education Committee) aims to expand eligibility for the New York state excelsior scholarship award to certain applicants enrolled on a part-time basis or in a BOCES or other approved vocational program.

It is reasonable that the lawmakers make these adjustments to help the Excelsior Program become more beneficial to the students in need and attract more high school graduates to enroll in college. These adjustments try to address the existing educational opportunity issues by expanding the eligible student groups, lowering the credit requirements, and mitigating the default penalty compared to the original bill issued in 2017. The only study on the New York Excelsior Program does not provide evidence on how the Promise effect works in different student groups as it might be too early to see the impacts, or the first treatment year may not have worked. This study will fill the gap.

Many studies used DiD and other quasi-experimental designs to examine the enrollment changes that have happened in the district after the college Promise Programs were implemented. Scholars found a range of positive Promise effects in local-level programs (Bartik et al., 2019). Less research, however, has investigated the statewide Promise effects. The literature review table (Table 2.2) summarizes four studies of the effect of statewide Promise Programs on postsecondary enrollment. Though the table may not be expansive enough to explain all the details, it includes the most recent, relevant, and methodologically exhaustive research on analyzing the most representative statewide Promise Programs.

As a last-dollar Promise Program, New York Excelsior requires eligible students to exhaust all other forms of tuition aid before giving financial support for the rest of their tuition costs. According to Nguyen, the program is "targeting students in both the community college and 4-year sectors, . . . and carries an elaborate list of requirements beyond state residency" (Nguyen, 2019, p. 574). Nguyen selected 2010 to 2017 institutional-level data

from IPEDS and ran the DiD by choosing all types of non-profit institutions that include 2-year community colleges and 4-year public and private institutions in other states as the control group.

The DiD result shows that the Excelsior Program did not make a significant impact on the postsecondary enrollment within New York State, and the same results are also represented in the sub-group analysis and state-level analysis (Nguyen, 2019). I strengthened the robustness of Nguyen's study in this study by adding more academic years' data: the pre-Promise enrollment trends (2010–2017) of controlled and treatment groups may not change, but the post-Promise enrollment trends definitely would as Nguyen only used the first treatment year data, which leads to an incomprehensive picture of the treatment effects. Nguyen listed a table of the descriptive statistics by institutional type (4-year public, 2-year public and 4-year private). However, it is unclear what individual-level or school-level characteristics were controlled in the regression analysis. This can impact the research results in a quite different way.

When the DiD design is applied to another prominent statewide Promise Program, the enrollment results of the study are totally different. Established a year earlier than Excelsior, Oregon Promise is also a last-dollar program (Gurantz, 2020). Its statewide Promise model has two main advantages, combining a funding model with a more flexible approach: every eligible participant gets $1,000 to cover tuition, and post-graduation residency is not required (see in the Appendix). Gurantz (2020) conducted a DiD analysis by collecting data from College Board and focusing on 10th-grade public school PSAT takers to estimate the Oregon

Promise impacts on college enrollment. The comparison group included 6 states PSAT exam policies are relatively similar to Oregon's.

Nguyen's study included a sub-group analysis under minority students (Black and Hispanic). Gurantz brought in broader groups of students, including female; minority (Asian, African American, Hispanic); White; other ethnicity; no reported income students; and low-, middle-, high-income students into consideration thanks to the great differences in demographic characteristics between the two states. The results of Gurantz's study show several significant impacts that Oregon Promise made on postsecondary attendance and persistence. An enrollment shift from 4-year institutions to public 2-year institutions occurred in first-year data with the total public 2-year colleges enrollment increasing by a ratio of 4 to 5. The second year's program data witnessed a positive enrollment result for all types of postsecondary institutions (Gurantz, 2020). African American and Hispanic students were the groups that benefited most. Recent three studies on state-wide and local Promise Program support the finding of an enrollment shift from 4-year to 2-year colleges, demonstrating a significant increase in the Black female and Hispanic female students in the Promise-eligible colleges' enrollment (51% and 52%, respectively) (Bell, 2021; Gándara & Li, 2020; Nguyen, 2020).

Despite the fact that the free college movement and Promise Programs have gained wide support from state leaders, the system itself is not perfect. One of the shortcomings is that the programs did not consider that the students from lowest income quartile usually have to work and study at the same time. As can be seen in the summary Table 2.1, the majority of the

statewide Promise bills require prospective students to attend the colleges as full-time students. Also, based on the requirements of each statewide program, if Promise-eligible students cannot finish their degree within the prescribed credit hours (vary by states but most within 90 credits for a 2-year degree) they would have to pay their tuition later. Even for those who complete the task in time, they still need to bear the high cost of accommodation, transportation, textbooks, and other incidental expenses (Jones & Berger, 2018).

Both local and state-level programs may not be "universal" enough for all disadvantaged students as they include extensive eligibility requirements that are very likely to shut the door to students and families who wish to use the program (Billings, 2018). In New Haven, Connecticut, less than 35% of high school graduates meet the program's eligibility requirements; in Pittsburgh, that number was only 10% higher. Kalamazoo Promise's success in covering over 80% of high school graduates may not be able to be duplicated, as it is the only first-dollar program (Billings, 2018).

Another critical area of pushback about the effectiveness of the programs regarding assisting low-income students is that most of these students already have federal support covering most of their fees and tuition (Jones & Berger, 2018). Based on the Urban Institute's latest report, 46.5% of low-income undergraduates as well as 41.6% of low-middle-income undergraduates attend 2-year public community college. Low-income and low-middle-income students do not receive much additional benefit beyond increased enrollment, which may be against the public's general belief in "free college" policy (Baum, 2014; Urban Institute, 2019).

Researchers have indicated that without financial support from rich funders or tax policy adjustment, current funding of Promise Programs could have difficulty keeping up with the district demand (Miller-Adams, 2015; Mulhere, 2015). Leading scholars also have voiced their concerns about program longevity issues: after showing a number of positive results at the beginning stage, whether local programs like Pittsburgh Promise are able to sustainably keep their financial sources in the long run remains uncertain (Page et al., 2018).

Research gap

Publications about statewide Promise Programs are very limited due to lack of available data (i.e., large-scale program effect will appear only after additional years of the outcomes data are available). Previous studies have employed DiD design to investigate the free college policy's treatment effects on the college outcomes through different statewide Promise Programs. The post-treatment data years that previous studies collected vary, but all were from 2017 or earlier, which may not be able to reflect the programs' effects by 2019. All studies have selected enrollment as sole indicator for the equity changes, which is a main area that I sought to improve in my own research design to see whether statewide Promise Programs affect other collegiate outcomes (e.g., persistence and graduation) as well.

Table 2.2: Summary of the effect of statewide promise programs.

Study	Data sources	Program	Findings	Controls
Nguyen (2019)	IPEDS data: full-time fall Undergraduate enrollment at public 2-year/4-year colleges from 2010 to 2017	New York Excelsior, 2017	The overall treatment effect is not obvious in both 2-year and 4-year colleges	Use 43 control states; have one treatment year only
Gurantz (2020)	College Board data: the high school graduating cohorts from 2012 to 2017 with 2,212,760 participants	Oregon Promise, 2016	Treatment effect is obvious especially in the 2nd treatment year: more students move from no college to 2-year/4- year colleges	Use 47 control states; have two treatment years: effect varies by years
Nguyen (2020)	IPEDS data: full-time fall Undergraduate enrollment at public 2-year/4-year colleges from 2009 to 2017	Tennessee Promise, 2015	The average treatment effect on 2-year colleges is obvious with 40% increase in enrollment and it has medium-run positive effect on public 4-year enrollment	Use 45 control states; have three treatment years: effect varies by years
Bell (2021)	IPEDS data: first-time fall undergraduate	Tennessee Promise, 2015	Treatment effect is obvious in the public universities with more	Use neighboring states as control; effect varies by

	enrollment at all postsecondary institutions in Tennessee from 2012 to 2016	students enrolled in the Promise-eligible institutions and less enrolled in the Promise ineligible institutions.	the type of institution

Summary

Overall, the statewide Promise is a relatively new branch of research under subject of postsecondary finance. This study extends the previous research's academic year to 2019–2020 and covers the research gaps by adding more outcomes (persistence and graduation) and underrepresented students in terms of the admission/persistence/graduation ratios, which correspond one-to-one with the starting point, intermediary stage, and final outcome stage in the Husen's theory of educational equity. This dissertation shall answer the research question of whether the total enrollment/persistence/graduation increases at a faster rate in New York State's public institutions, which implemented the first 4-year Promise Program, than in the states that did not implement any statewide Promise Program.

METHODOLOGY

The paper adopts a DiD design by using the institution-level, annual data for the years 2010–2019 from the IPEDS to explore the heterogeneous treatment effects of a novel Promise design at both 2-year and 4-year public postsecondary institutions. My primary goal was to evaluate what kind of impacts that the New York Excelsior Program has made on student outcomes. The Excelsior Program aims to address the educational equity issues. As described in the government report, the top-level blueprint and design of the Excelsior scholarship is to "make college possible for hundreds of thousands of students across the state . . . helping to alleviate the crushing burden of student debt. . . . and ensures New York's students have access to a quality education and the skills they need to succeed" (New York State Government, 2017).

In Tennessee and Oregon, the implementation of statewide Promise Programs has had an impact on the enrollment rate of ethnic and low-income groups in various type of institutions, which shows the impact of the free college policy on educational equity (Bell, 2021; Gurantz, 2020; Nguyen, 2020). This dissertation shall examine the educational equity of public colleges after the Excelsior Program initiated in 2017 to see if the free college policy is effective.

Research questions and hypothesis

The Excelsior Program covers both 2-year and 4-year public colleges. This dissertation focuses on the educational outcome (i.e., enrollment) after this program was implemented in both 2-year and 4-year public colleges. Although the program may pull some students from

2-year colleges to 4-year colleges, my investigation on the implications of the Excelsior Program in 2-year college makes sense given that it is an arguable topic whether the 2-year colleges' enrollment will increase after a Promise Program came into being. On the one hand, previous Promise Programs like that in Oregon motivated high school graduates from no college to 2-year colleges (Gurantz, 2020), suggesting the incentive effect of the Promise Program for public 2-year colleges. On the other hand, I expect a different result will emerge. Specifically, with the support of the Excelsior Program, high school students may choose to enroll in the 4-year colleges. To reconcile these divergent views, it is particularly important to explore the effect of Promise Programs in public 2-year colleges.

I analyzed the enrollment and retention outcomes for both sectors. To be noted, when exploring graduation as an outcome variable, I only focused on 2-year public colleges (rather than 4-year colleges) because this Promise Program just came into being in 2017, so the first 4-year cohort has not yet graduated. In this study, I focused on the comparison of the educational outcomes between the public colleges (including 2-year and 4-year sectors) in the state (New York) that has implemented the Excelsior Program and the colleges in the states that have not implemented any statewide Promise Programs to examine the following research questions:

(1) To what extent is there a relationship between New York State implementing the Excelsior Program and the educational outcomes (total enrollment, retention, and/or graduation) of undergraduate students, and does this relationship apply to or vary across public 2-year and public 4-year colleges?

Hypothesis 1: The Excelsior Program's implementation decreases educational outcomes such as enrollment (Hypothesis 1a), retention (Hypothesis 1b), and graduation (Hypothesis 1c) of undergraduate students in public 2-year college.

Hypothesis 2: The Excelsior Program's implementation increases educational outcomes such as enrollment (Hypothesis 2a) and retention (Hypothesis 2b) of undergraduate students in public 4-year colleges.

(2) To what extent is there a relationship between New York State implementing the Excelsior Program and the educational outcomes of underrepresented undergraduate students (e.g., low-income and/or racial minority), and does this relationship apply to or vary across 2-year and public 4-year colleges?

Hypothesis 3: The Excelsior Program's implementation decreases educational outcomes (enrollment and/or graduation) of low-income (Hypothesis 3a) and racial minority (Hypothesis 3b) students in public 2-year colleges.

Hypothesis 4: The Excelsior Program's implementation increases educational outcomes such as enrollment of low-income (Hypothesis 4a) and racial minority (Hypothesis 4b) students in public 4-year colleges.

Data description

To conduct this study, I hand-gathered and coded program data from 50 states' Promise bills, including the establishment year of the program and details on the design characteristics of the program (Table 2.1 lists all of the statewide Promise Programs and the key features). The treatment group is the public colleges in New York (the policy of interest), which

implemented the Excelsior Program in 2017. My dataset covers academic years 2010–2011 to 2019–2020. Additionally, I found that 37 states did not implement the statewide Promise Program (i.e., including 26 states that have not yet implemented any statewide Promise Program and 11 states that did not implement the program before the academic year of 2019–2020). These states were considered as the control group.

I gathered IPEDS data on institutions in states that do not implement the statewide Promise to provide a comparison group and New York State (the only state that has Promise Program covering both the 2-year and 4-year public universities) as the treatment group, to study the impact of the program on educational outcome.

Outcome variables

For each institution and academic year, I collected data from the national database IPEDS. To answer the first question, I collected the data of enrollment, retention, and/or graduation of undergraduates. The enrollment measure included total enrollment and full-time first-time enrollment. Total enrollment measure is the number of overall undergraduate students enrolled at the beginning of the fall semester in both 2-year and 4-year colleges. The full-time first-time enrollment measure is the number of the full-time first-time undergraduates enrolled at the beginning of the fall semester. The retention measure included the total retention and full-time first-time retention. The total retention measure is the number of overall undergraduate students (fall cohort from the prior year) that re-enrolled at the institution. The full-time first-time retention measure is the number of full-time first-time undergraduate students (fall cohort from the prior year). The total graduation measure is the

percentage of full-time first-time and all undergraduate students at 2-year colleges who graduated within three years. For detailed information, see Table 3.1.

The underrepresented (low-income) undergraduate enrollment measure is the number of students receiving Pell Grants, which was obtained from IPEDS. Pell Grants are limited to students with financial need (i.e., low-income group); thus, prior studies have used it as an indicator of underrepresented student from low-income family (Kelchen, 2018, 2019). For the well-represented students, I refer to Kelchen's performance-based policy paper that creates a measure of "the number of undergraduates not receiving Pell Grants (as a proxy for higher income students or those for whom colleges would not receive a bonus for serving) by subtracting Pell recipients from total undergraduate enrollment during the relevant period of time" (Kelchen, 2019, p. 7).

The underrepresented (low-income) undergraduate graduation measure is the overall percentage of students receiving Pell Grants and graduated within 150% of the normal time. Additionally, I obtained the data of students who did not receive Pell Grants and graduated within 150% of the normal time.

I measured the underrepresented (racial minority) undergraduate enrollment using the number of the race minority undergraduates (e.g., American Indian, African American, Hispanic, and Native Hawaiian students) enrolled in a given year. As a comparison, I obtained the data regarding the number of enrolled White and Asian students on the undergraduate level (Ginder et al., 2017), to also examine whether non-racial minority groups' enrollment changed after the Excelsior Program was implemented. Following the

guidance of Gándara and Li's paper (2020), all these racial subgroups are separate (not combined) in my data analysis.

The underrepresented (racial minority) undergraduate graduation measure is the percentage of underrepresented minority undergraduate students (American Indian, African American, Hispanic, and Native Hawaiian students) who graduated in a given year. The percentage of graduated White and Asian students on the undergraduate level is also included (Ginder et al., 2017). For detailed information, see Table 3.2.

The number of enrollments and retention were be logged so results could be interpreted as percentage-point changes (Kelchen, 2019). The raw data of outcome variables such as graduation rate were used.

Table 3.1: Summary of outcome variables.

Outcomes	College	Undergraduates	Definition	Measure/indicator
Enrollment	2-year college	Full-time first-time	The number of the full-time first-time undergraduates enrolled at the beginning of the fall semester in the 2-year college.	IPEDS, Fall enrollment, Full-time first-time undergraduate enrollment (using 2-year college sample).
		Total	The number of all the undergraduates enrolled at the beginning of the fall semester in the 2-year college.	IPEDS, Fall enrollment, Undergraduate enrollment (using 2-year college sample).
	4-year college	Full-time first-time	The number of the full-time first-time undergraduates enrolled at the beginning of the fall semester in the 4-year college.	IPEDS, Fall enrollment, Full-time first- time undergraduate enrollment (using 4-year college sample).
		Total	The number of all the undergraduates enrolled at the beginning of the fall semester in the 4-year college.	IPEDS, Fall enrollment, Undergraduate enrollment (using 4-year college sample).
Retention	2-year college	Full-time first-time	The number of the (fall cohort from the prior year) that re-enrolled at the 2-year institution as full-time first-time in the current year.	IPEDS, Retention, Full-time (first-time) retention number (using 2-year college sample).
		Total	The number of the (fall cohort from the prior year) that re-enrolled at the 2-year institution as either full-time (first-time) or part-time in the current year.	IPEDS, Retention, Full-time retention and part-time retention (using 2-year college sample).
	4-year college	Full-time first-time	The number of the (fall cohort from the prior year) that re-enrolled at the 4-year institution as full-time first-time in the current year.	IPEDS, Retention, Full-time fall cohort (using 4-year college sample).
		Total	The number of the (fall cohort from the prior year) that re-enrolled at the 4-year institution as either full-time (first-time) or part-time in the current year.	IPEDS, Retention, Full-time retention and part-time retention (using 4-year college sample).
Graduation	2-year college	Full-time first-time	The percentage of full-time first-time students (undergraduates seeking a bachelor's degree) that graduated from 2-year colleges.	IPEDS, Frequently used graduation rate, Graduation rate, total cohort (GRTYPE=29)
		Total	The percentage of all the students (undergraduate) that graduated from 2-year colleges.	Not available

Table 3.2: Summary of focal outcome variables in underrepresented groups.

Outcomes	College	Underrepresented students	Definition	Measure/indicator
Enrollment	2-year college	Low-income full-time first-time	The number of full-time first-time undergraduates from low-income group (receiving Pell Grants that are limited to students with financial need) enrolled at the beginning of the fall semester in 2-year colleges.	IPEDS, Financial aid, Number of full-time first-time undergraduates awarded Pell Grant (using 2-year college sample).
		Low-income total	The number of undergraduates from low-income group (receiving Pell Grants that are limited to students with financial need) enrolled at the beginning of the fall semester in 2-year colleges.	IPEDS, Financial aid, Number of undergraduates awarded Pell Grant (using 2-year college sample).
		Racial minority full-time first-time	The number of full-time first-time minority undergraduates (American Indian, African American, Hispanic, and Native Hawaiian undergraduates) enrolled at the beginning of the fall semester in 2-year colleges.	IPEDS, Fall enrollment, Enrollment by race/ethnicity (using the option of levels of student and 2-year college sample).
		Racial minority total	The number of underrepresented minority undergraduates (American Indian, African American, Hispanic, and Native Hawaiian) enrolled at the beginning of the fall semester in 2-year colleges.	IPEDS, Fall enrollment, Enrollment by race/ethnicity (using 2-year college sample).
	4-year college	Low-income full-time first-time	The number of full-time first-time undergraduates from low-income group (receiving Pell Grants that are limited to students with financial need) enrolled at the beginning of the fall semester in 4-year colleges.	IPEDS, Financial aid, Number of full-time first-time undergraduates awarded Pell Grant (using 4-year college sample).
		Low-income total	The number of undergraduates from low-income group (receiving Pell Grants that are limited to students with financial need) enrolled at the beginning of the fall semester in 4-year colleges.	IPEDS, Financial aid, Number of undergraduates awarded Pell Grant (using 4-year college sample).
		Racial minority full-time first-time	The number of full-time first-time minority undergraduates (American Indian, African American, Hispanic, and Native Hawaiian) enrolled at the beginning of the fall semester in 4-year colleges.	IPEDS, Fall enrollment, Enrollment by race/ethnicity (using the option of levels of student and 4-year college sample).
		Racial minority total	The number of underrepresented minority undergraduate (American Indian, African American, Hispanic, and Native Hawaiian) enrolled at the beginning of the fall semester in 4-year colleges.	IPEDS, Fall enrollment, Enrollment by race/ethnicity (using 4-year college sample).
Graduation	2-year college	Low-income full-time first-time	The percentage of full-time first-time undergraduates from low-income group (receiving Pell Grants that are limited to students with financial need and seeking for a bachelor's degree) that graduated from 2-year colleges.	IPEDS, Frequently used graduation rate, Graduation rate, Pell Grant recipients, overall graduation rate.
		Racial minority full-time first-time	The percentage of underrepresented minority undergraduates (African American, Hispanic, and American Indian students) that graduated from 2-year colleges.	IPEDS, Frequently used graduation rate, Graduation rate - African American/Hispanic/American Indian students (GRTYPE=29)

Sample

I used Carnegie classifications to make public 2-year versus 4-year college distinctions and made sure I had public undergraduate degree-granting institutions only in IPEDS. The public 2-year colleges were identified using the categories of associate colleges and baccalaureate/associate colleges. The public 4-year colleges were identified using the categories of doctoral universities, doctoral/professional universities, master's colleges & universities, and baccalaureate colleges. I then eliminated special-focus and graduate-only colleges. My sample consisted of 609 public 2-year colleges (36 public 2-year colleges in New York and 573 public 2-year colleges in the other 37 states) and 458 public 4-year colleges (34 public 4-year colleges in New York and 424 public 4-year colleges in the other 37 states), following the state bills and omitting the states that did not implement the statewide promise before the 2019–2020 academic year. Annual data for the years 2010–2019 of these samples were be used for our data analysis.

The sample in this study meets three criteria: (a) degree-granting colleges since they are the focus of the Excelsior Program; (b) public 2-year colleges and public 4-year colleges; (c) the treatment colleges are SUNY and CUNY only because SUNY and CUNY are two state university systems, which are used to identify public 2-year and 4-year colleges (the focal sample in the treatment group of this dissertation). As the purpose of the study is to evaluate the effect of New York Excelsior on educational outcomes, the DiD model is a feasible method to estimate the causal effect. Its basic idea is to regard public policy (Excelsior Program) as a natural experiment, and the whole sample is divided into two groups: one group is affected by the Excelsior Program, that is, the treatment group; the other group is not

affected by the statewide Promise Program, that is, the comparison (control) group. Data sources can be found in Table 2.2.

Methods

DiD modeling is widely used to analyze the effect of policies, with the purpose to examine the difference in outcomes of the treatment group and the control group after the implementation of a policy (Gándara & Li, 2020). The panel dataset (IPEDS) includes years before and after Excelsior Program was adopted, providing a suitable data structure for me to conduct DiD modeling. Thus, I conducted generalized DiD regressions to answer my research questions, following the general structure of Kelchen (2018, 2019). In order for the results from DiD modeling to be plausible, I tested the parallel trends assumption (Angrist & Pischke, 2009).

I conducted an analysis on parallel trend and falsification. The identification of the Promise effect was based on when the statewide program came into being. Several issues, however, needed to be addressed when using DiD. The comparison group could be states that do not implement the statewide Promise Programs and have parallel trends with the treatment group (pre-implementation) in the educational outcomes (total enrollment and/or graduation) of undergraduate students and the educational outcomes of underrepresented undergraduate students (e.g., low-income and/or racial minority). This parallel trend assumption ensures the unbiased estimation of the causal effect. Moreover, I also followed Kelchen's (2019) paper to conduct falsification tests that compared the educational outcomes in a given year with outcomes 1 and 2 years prior to the implementation of the Excelsior Program.

By using 2016 (the last year without Excelsior) as the timing of policy intervention, I set up a traditional regression framework that can estimate the difference in post-implementation outcomes for New York State and the states that did not have the statewide college promise policy. For college i in year t, the DiD model estimate equation for my study is as follows:

$$Y_{it} = \beta_0 + \beta_1(Treat)_i + \beta_2(Post)_t + \beta_3(Treat*Post)_{it} + \boldsymbol{x}'_{it} + \epsilon_{it}$$

Y represents the outcome of interests in my study: the educational outcomes (total enrollment, retention, and/or graduation) of undergraduate students and the educational outcomes of underrepresented undergraduate students (e.g., low-income and/or racial minority) in public colleges. $Treat_i$ is a program dummy variable which is marked as 1 if the college is in New York and as 0 otherwise. $Post_t$ is a time dummy variable which is marked as 1 if it is after the implementation of Excelsior and as 0 if it is before the program. The interaction ($Treat * Post$) coefficient (β_3) reflects the extent to which educational outcomes of colleges in New York State changed after implementing the Excelsior Program in 2017. β_1 reflects institutional effects representing differences between colleges in the treatment and comparison conditions, and β_2 reflects year effects that reflect differences between the posttreatment and pretreatment year. $\boldsymbol{x}'_{ist}$ represents the time-varying covariates.

The control variables in my model include the college's in-state tuition, admission test scores (i.e., SAT/ACT), and urbanization. Previous studies found that tuition has a negative relationship with enrollment (Jepsen & Montgomery, 2009) given that a significant number of students switch from no college to attend community college when tuition decreases because they can afford the higher education (Denning, 2017). I controlled for test score (ACT/SAT concordance) in 4-year colleges, as a previous study and institutional reporting

also showed that admission test scores (i.e., ACT/SAT) are strong predictors in identifying student readiness for 4-year college as well as the likelihood to return to the college for a second year (Dorothy et al., 2004; University of California, 2020). Given that some colleges only recorded ACT scores while others only recorded SAT scores, I used ACT/SAT concordance as a means to combine ACT and SAT into one score. Specifically, I concorded the original ACT scores to SAT scores based on the published ACT/SAT concordance chart (Guide to the 2018 ACT/SAT Concordance; www.act.org). Notably, given that SAT scores changed in 2016, the study keeps SAT scores from 2010–2019 on the same 1600-point scale. For colleges reported both test scores I kept the SAT scores as the benchmark. However, ACT and SAT are usually not required for 2-year college admission; therefore, for 2-year colleges I did not add test scores as a control during the data analysis. Finally, this dissertation also considers urbanization as a control variable, given that urbanization can highly affect the college-going patterns and travel distance for students attending schools (Jepsen & Montgomery, 2009; Roderick et al., 2011). The urbanization variable in IPEDS have four main categories (rural, town, suburb, city). Hence, I transferred 4 categories of urbanization to 3 dummy variables coded as 0 or 1 (reference group is "Rural"). ϵ_{ist} represents an error term. The operationalized measure of variables above are from the national database of IPEDS.

Limitations

This dissertation has three main limitations. First, although I hypothesized that Excelsior might exert an effect on the graduation rate in public 2-year colleges, a limitation to note is that graduation rates may not be affected as much if students transfer before earning an

associate degree (Denning, 2017). Second, I used a sample of three treatment years (2017–2018, 2018–2019, 2019–2020) to examine if Excelsior had an effect on educational outcomes. To enrich the results of this study, it will be helpful to reexamine the effect of the Promise Programs when more years of data available. Future studies shall pay more attention on how the statewide program can impact the educational outcomes using sufficient time-lagged data if possible. Third, the sample sizes for Native Hawaiian and Native American are very small, with the averages being just one or two students in some cases. The results regarding Native Hawaiian and Native American should be considered cautiously because there is so much noise in the estimates.

Descriptive statistics

I conducted descriptive analyses on the characteristics of public 2-year and 4-year colleges. Table 3.3 contains the descriptive statistics of focal variables (outcomes and controls) in public 2-year colleges. Regarding college student characteristic, the average number (2010–2019) of full-time first-time undergraduate enrollment has reached 683.6 (SD = 760.2). The average number of full-time first-time undergraduate retention has reached 320.4 (SD = 391.0). Regarding the low-income group characteristic, the average number of full-time first-time undergraduates receiving a Pell Grant has reached 392.5 (SD = 445.6). The average graduation rate of full-time first-time undergraduates receiving a Pell Grant has reached 24.4% (SD = 11.7). The average enrollment rate of low-income student has reached 86.1% (SD = 1.86). Regarding the racial minority group characteristic, the average number of full-time first-time American Indian undergraduates enrolled was 8.1 (SD = 22.1). The average number of full-time first-time African American undergraduates enrolled was 115.2

(SD = 184.2). The average number of full-time first-time Hispanic undergraduates enrolled was 119.4 (SD = 270.6). The average undergraduate graduation rate of full-time first-time American Indian students was 18.4% (SD = 25.9). The average undergraduate graduation rate of full-time first-time African American students was 14.9% (SD = 14.1). The average undergraduate graduation rate of full-time first-time Hispanic students was 22.1% (SD = 18.4). The average undergraduate graduation rate of full-time first-time Native Hawaiian students was 20.0% (SD = 33.2). The average undergraduate enrollment number of total American Indian students was 25.2 (SD = 76.6); the average undergraduate enrollment number of total African American students was 355.8 (SD = 603.3); the average undergraduate enrollment number of total Hispanic students was 333.2 (SD = 784.9); and the average undergraduate enrollment number of total Native Hawaiian students was 1.8 (SD = 2.1).

Table 3.4 contains the descriptive statistics in public 4-year colleges. Regarding the student characteristics, the average number of full-time first-time enrollment has reached 1720.6 (SD = 1733.8). The average number of full-time first-time retention has reached 1698.9 (SD = 1704.1). Regarding the low-income group characteristic, the average number of full-time first-time undergraduate received Pell Grant has reached 593.4 (SD = 469.1). Total undergraduate received Pell Grant has reached 3399.0 (SD = 3164.3). The average rate of low-income student enrollment has reached 37.9% (SD = 0.2). Regarding the racial minority characteristic, the average number of full-time first-time American Indian undergraduate enrollment has reached 10.0 (SD = 24.0).

Table 3.3: Summary statistics of the public 2-year college sample (Source: IPEDS).

Characteristic	N	Mean	SD
State characteristic			
Average in-state tuition	6040	3632.1	1898.6
College student characteristic			
Full-time first-time enrollment	6050	683.6	760.2
Total undergraduate enrollment	6050	6259.0	7456.1
Full-time first-time retention	6049	320.4	391.0
Total undergraduate retention	6090	1082.2	1302.2
Total undergraduate graduation rate	6040	24.8	12.3
Low-income group characteristic			
Full-time first-time undergraduate received Pell Grant	6046	392.5	445.6
Graduation rate of full-time first-time undergraduate received Pell Grant	2426	24.4	11.7
Total undergraduate received Pell Grant	6048	2435.1	3006.5
Low-income student enrollment rate	6009	86.1	1.9
Racial minority group characteristic			
Full-time first-time American Indian undergraduate enrollment	6048	8.1	22.1
Full-time first-time African American undergraduate enrollment	6048	115.2	184.2
Full-time first-time Hispanic undergraduate enrollment	6048	119.4	270.6
Full-time first-time Native Hawaiian undergraduate enrollment	6048	1.3	3.2
Full-time first-time American Indian undergraduate graduation	5127	18.4	25.9
Full-time first-time African American undergraduate graduation	5879	14.9	14.1
Full-time first-time Hispanic undergraduate graduation	5893	22.1	18.4
Full-time first-time Native Hawaiian undergraduate graduation	2160	20.0	33.2
Total American Indian undergraduate enrollment	6050	25.2	76.6
Total African American undergraduate enrollment	6050	355.8	603.3
Total Hispanic undergraduate enrollment	6050	333.2	784.9
Total Native Hawaiian undergraduate enrollment	5490	1.8	2.1
Non-minority group characteristic			
Full-time first-time White undergraduate enrollment	6048	363.7	386.2
Full-time first-time Asian undergraduate enrollment	6048	20.7	64.0
Full-time first-time White undergraduate graduation	6039	27.7	13.4
Full-time first-time Asian undergraduate graduation	4607	26.9	27.4
Total White undergraduate enrollment	6050	1128.9	1246.6
Total Asian undergraduate enrollment	6050	73.4	226.3

Note: the data of graduation rate of full-time first-time undergraduate received Pell Grant only became available since 2016, the colleges did not provide the Native Hawaiian and Asian graduation in 2010 and for these two racial groups there are a lot of missing data existing in the 2011–2019 datasets.

Table 3.4: Summary statistics of the public 4-year college sample (Source: IPEDS).

Characteristic	N	Mean	SD
State characteristic			
Average in-state tuition	4452	6996.847	3204.462
College student characteristic			
ACT/SAT concordance	3859	24.3	4.4
Full-time first-time enrollment	4480	1720.6	1733.8
Total undergraduate enrollment	4480	10103.6	9444.6
Full-time first-time retention	4388	1698.9	1704.1
Total undergraduate retention	4580	1671.7	1739.4
Total undergraduate graduation rate	4322	49.0	17.1
Low-income group characteristic			
Full-time first-time undergraduate received Pell Grant	4338	593.4	469.1
Total undergraduate received Pell Grant	4417	3399.0	3164.3
Low-income student enrollment rate	4417	37.8	0.2
Racial minority group characteristic			
Full-time first-time American Indian undergraduate enrollment	4361	10.0	24.0
Full-time first-time African American undergraduate enrollment	4361	204.2	263.6
Full-time first-time Hispanic undergraduate enrollment	4361	212.6	392.9
Full-time first-time Native Hawaiian undergraduate enrollment	4361	2.2	4.0
Total American Indian undergraduate enrollment	4442	50.3	119.8
Total African American undergraduate enrollment	4442	927.1	1168.5
Total Hispanic undergraduate enrollment	4442	932.2	1839.7
Total Native Hawaiian undergraduate enrollment	4442	10.9	17.7
Racial minority undergraduate enrollment rate	4442	0.7	0.01
Non-minority group characteristic			
Full-time first-time White undergraduate enrollment	4361	1083.8	1181.3
Full-time first-time Asian undergraduate enrollment	4361	100.1	213.9
Total White undergraduate enrollment	4442	5067.2	5402.37
Total Asian undergraduate enrollment	4442	442.2	924.6

Note: ACT/SAT concordance means a new score which concords the original ACT scores to SAT scores based on the published ACT/SAT concordance chart https://www.act.org/content/act/en/products-and-services/the-act/scores/act-sat-concordance.html.

The average number of full-time first-time African American undergraduate enrollment has reached 204.2 (SD = 263.5). The average number of full-time first-time Hispanic undergraduate enrollment has reached 212.6 (SD = 392.9). The average number of full-time

first-time Native Hawaiian undergraduate enrollment has reached 2.2 (SD = 3.9). The average number of total American Indian undergraduate enrollment has reached 50.3 (SD = 119.8); the average number of total African American undergraduate enrollment has reached 927.2 (SD = 1168.5); the average number of total Hispanic undergraduate enrollment has reached 932.2 (SD = 1839.7); and the average number of total Native Hawaiian undergraduate enrollment has reached 10.9 (SD = 17.7). The average rate of racial minority enrollment has reached 0.7% (SD = 0.01).

Results of parallel trend test

To evaluate whether the results from a DiD model are plausible, I tested the parallel trend assumption (Angrist & Pischke, 2009). I examined this by running traditional parallel tests (calculating the difference between treatment groups' outcome and control groups' outcome before the implementation of Excelsior Program) and falsification tests that compared the educational outcomes in a given year with outcomes 1 and 2 years prior to when the Excelsior Program was implemented. Both traditional parallel tests and falsification tests were done as regressions with the controls.

Based on the sample of public 2-year colleges, the results of parallel tests (Table 3.5) showed that full-time first-time graduation rate (difference = 0.032, p = 0.967); low-income student graduation rate (difference = 1.404, p = 0.502); full-time first-time American Indian, African American, and Native Hawaiian graduation rate (difference = -2.894, p = 0.092; difference = -1.665, p = 0.069; difference = 5.433, p = 0.165); full-time first-time White undergraduate graduation rate (difference = 0.346, p = 0.684); and full-time first-time Asian undergraduate graduation rate (difference = 0.158, p = 0.935) were similar (without

significant difference) for the treatment group's colleges and the control group's colleges. However, the results showed I should be cautious about full-time first-time enrollment (difference = 0.991, p = 0.000); total undergraduate enrollment (difference = 0.490, p = 0.000); full-time first-time retention (difference = 1.003, p = 0.000); total undergraduate retention (difference = 0.680, p = 0.000); full-time first-time low-income undergraduate students (difference = 1.040, p = 0.000); total low-income undergraduate students (difference = 0.530, p = 0.033); full-time first-time American Indian, African American, Hispanic, or Native Hawaiian undergraduate enrollment (difference = 0.384, p = 0.000; difference = 1.201, p = 0.000; difference = 1.530, p = 0.000; difference = 0.650, p = 0.000); full-time first-time Hispanic undergraduate graduation rate (difference = -4.554, p = 0.000); and total American Indian, African American, Hispanic or Native Hawaiian undergraduate enrollment (difference = 0.420, p = 0.000; difference = 1.141, p = 0.000; difference = 1.475, p = 0.000; difference = 0.155, p = 0.015). The concerns regarding full-time first-time enrollment and total low-income undergraduate enrollment were not found in the results of falsification tests using a 2-year lead. The concerns regarding total undergraduate enrollment, full-time first-time undergraduate retention, total undergraduate retention, full-time first-time low-income undergraduate enrollment, full-time first-time American Indian or full-time first-time African American undergraduate enrollment, full-time first-time Hispanic undergraduate graduation, total American Indian or total Native Hawaiian undergraduate enrollment, and full-time first-time Asian undergraduate enrollment were not found in the results of falsification tests using both a 1-year lead and a 2-year lead. The parallel tests of enrollment, retention, and graduation were graphically presented in Figures 3.1, 3.2, and 3.3. As shown in Figures 3.1

and 3.2, the logged number of enrollments and retentions in the treatment group and control group developed in a parallel trend from 2010 to 2017. Figure 3.3 shows that the graduation rate in the treatment group and control group developed in a nearly parallel trend from 2010 to 2012 and 2014 to 2017.

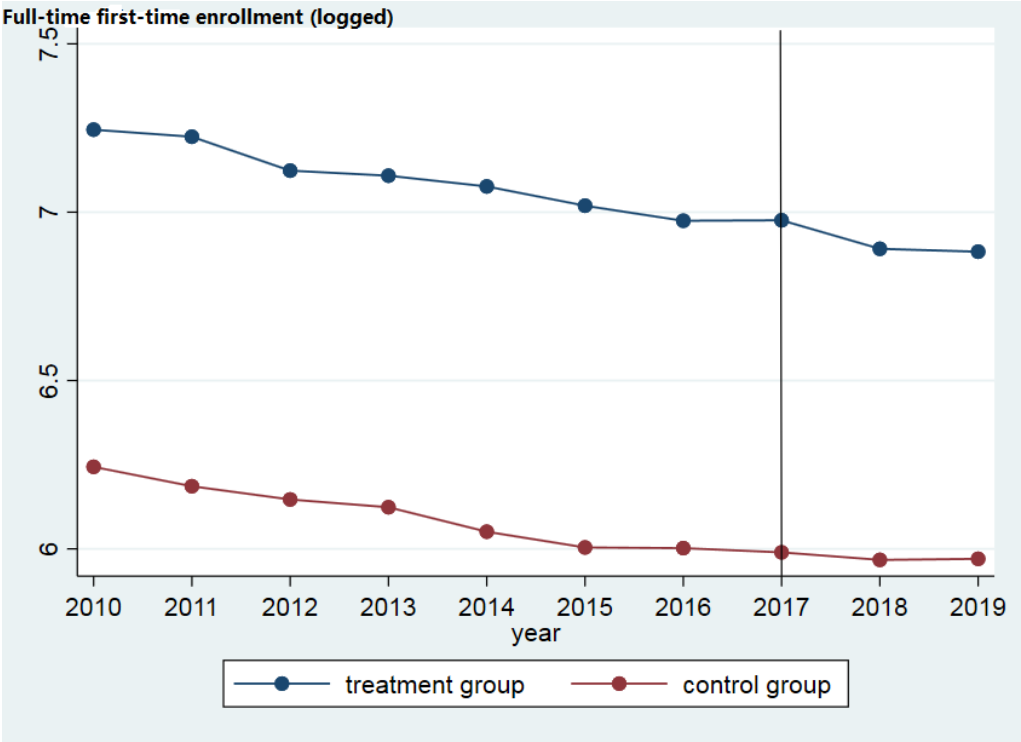

Figure 3.1: Parallel trend test of full-time first-time enrollment (logged) between treatment group and control group.

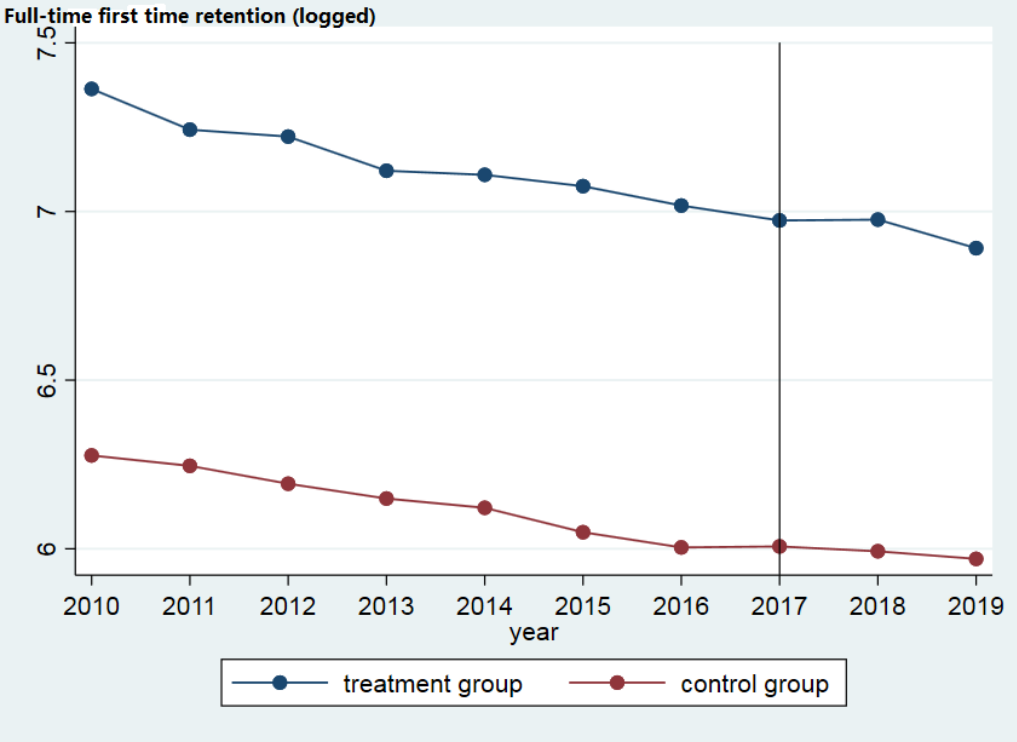

Figure 3.2: Parallel trend test of full-time first-time retention (logged) between treatment group and control group.

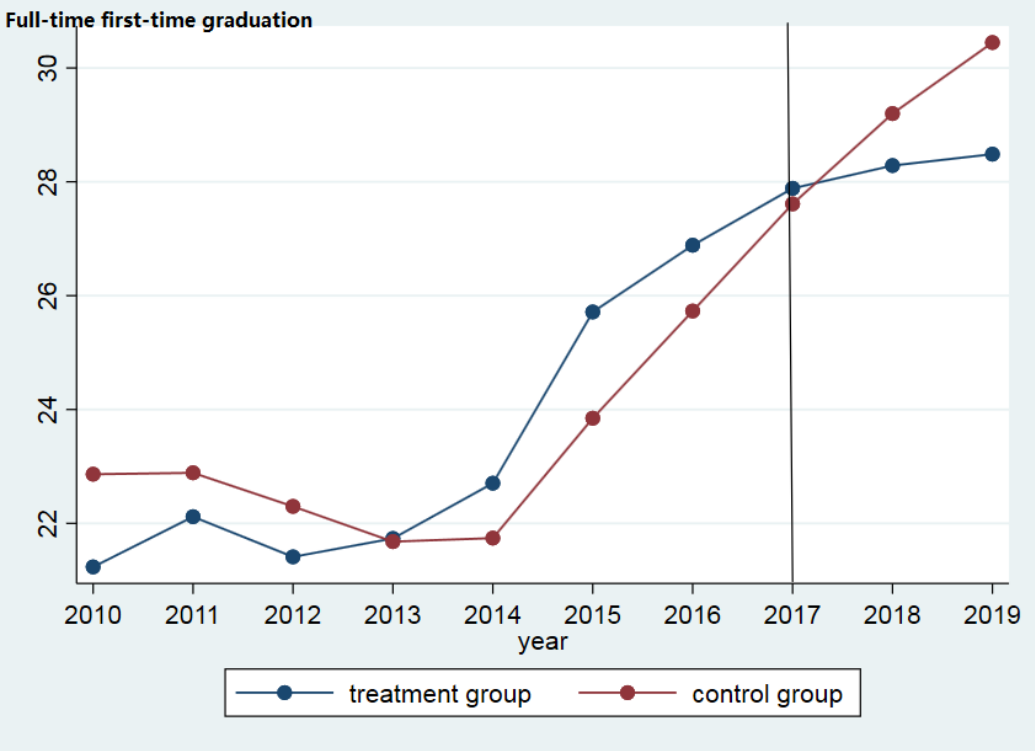

Figure 3.3: Parallel trend test of full-time first-time graduation rate between treatment group and control group.

Based on the sample of public 4-year colleges, the results of parallel tests (Table 3.6) showed that full-time first-time enrollment (difference = 0.087, p = 0.483), total undergraduate enrollment (difference = 0.092, p = 0.840), full-time first-time retention (difference = -0.061, p = 0.631), total undergraduate retention (difference = -0.022, p = 0.866), total Native Hawaiian undergraduate enrollment (difference = 0.154, p = 0.195), full-time first-time White undergraduate enrollment (difference = -0.086, p = 0.605), and total White undergraduate enrollment (difference = -0.009, p = 0.955) were similar for the treatment group's colleges and the control group's colleges. However, the results showed I should be cautious about full-time first-time low-income undergraduate enrollment (difference = 0.232, p = 0.030); total low-income undergraduate enrollment (difference = 0.223, p = 0.028); full-time first-time American Indian (difference = -0.380, p = 0.003), African American (difference = 0.319, p = 0.039), Hispanic (difference = 0.857, p = 0.000), Native Hawaiian (difference = -0.294, p = 0.005), and Asian undergraduate enrollment (difference = 1.089, p = 0.000); and total American Indian (difference = -0.307, p = 0.022), African American (difference = 0.412, p = 0.008), Hispanic (difference = 1.053, p = 0.000), and Asian undergraduate enrollment (difference = 1.327, p = 0.000). The concerns regarding full-time first-time American Indian and Hispanic undergraduate enrollment were not found in the results of falsification tests using a 2-year lead. The concerns regarding full-time first-time Native Hawaiian undergraduate enrollment, total Hispanic undergraduate enrollment, full-time first-time Asian undergraduate enrollment, and total Asian undergraduate enrollment were not found in the results of falsification tests using both a 1-year lead and 2-year lead. However, the results of falsification tests using either a 1-year lead or 2-year lead replicated

the concerns regarding full-time first-time low-income undergraduate enrollment, full-time first-time African American undergraduate enrollment, and total African American undergraduate enrollment.

These concerns may suggest that colleges began to respond to the Excelsior Program after hearing informal information (e.g., word of mouth) about the plan for the Excelsior Program but before it was formally implemented. New York Governor Andrew Cuomo announced the plan of the Excelsior Program in January of 2017 at LaGuardia Community College.[1] Before the state governor's announcement, colleges may have heard some informal information about the program and begun to prepare for or react to this program. It could also be that Cuomo announced the plan due to trends within CUNY and SUNY. Nevertheless, the results for those which do not meet the requirement of parallel trend in particular should be interpreted with caution due to the parallel trends and assumptions being placed into question. The parallel tests of enrollment and retention are graphically presented in Figure 3.4 and 3.5. As shown in Figure 3.4, the logged number of enrollments in the treatment group and control group developed in a nearly parallel trend from 2014 to 2017. Figure 3.5 shows that the logged number of retentions in the treatment group and control group developed in a nearly parallel trend from 2010 to 2017.

[1]From: www.nytimes.com/2017/04/11/nyregion/new-yorks-free-tuition-program-will-help-traditional-but-not-typical-students.html).

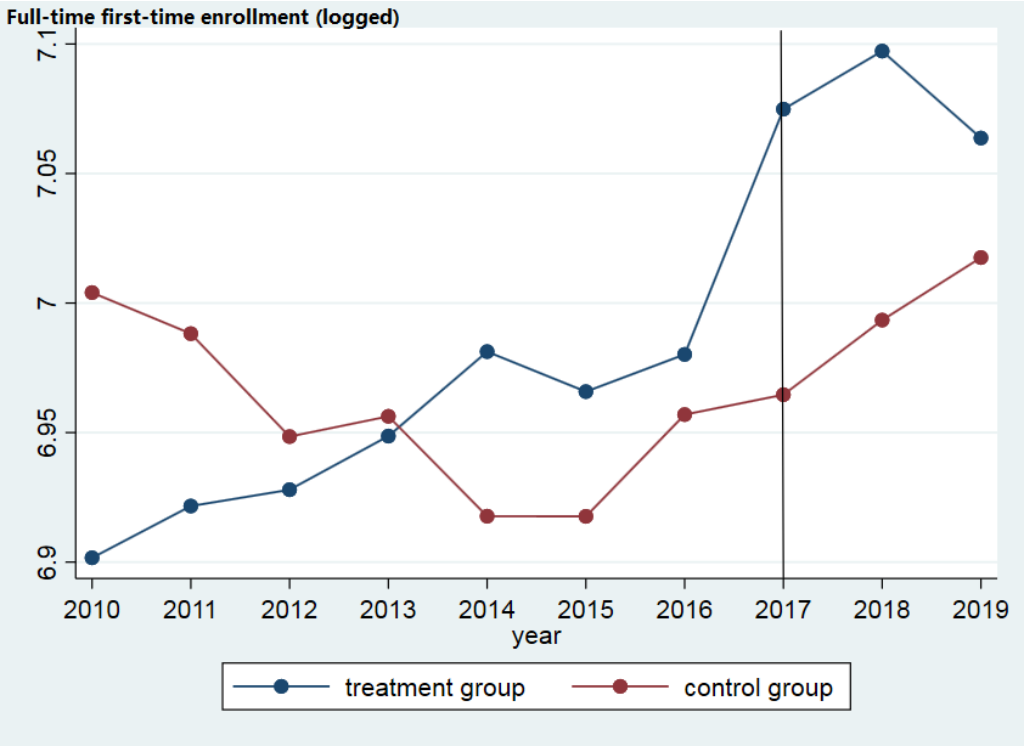

Figure 3.4: Parallel trend test of public 4-year full-time first-time enrollment (logged) between treatment group and control group.

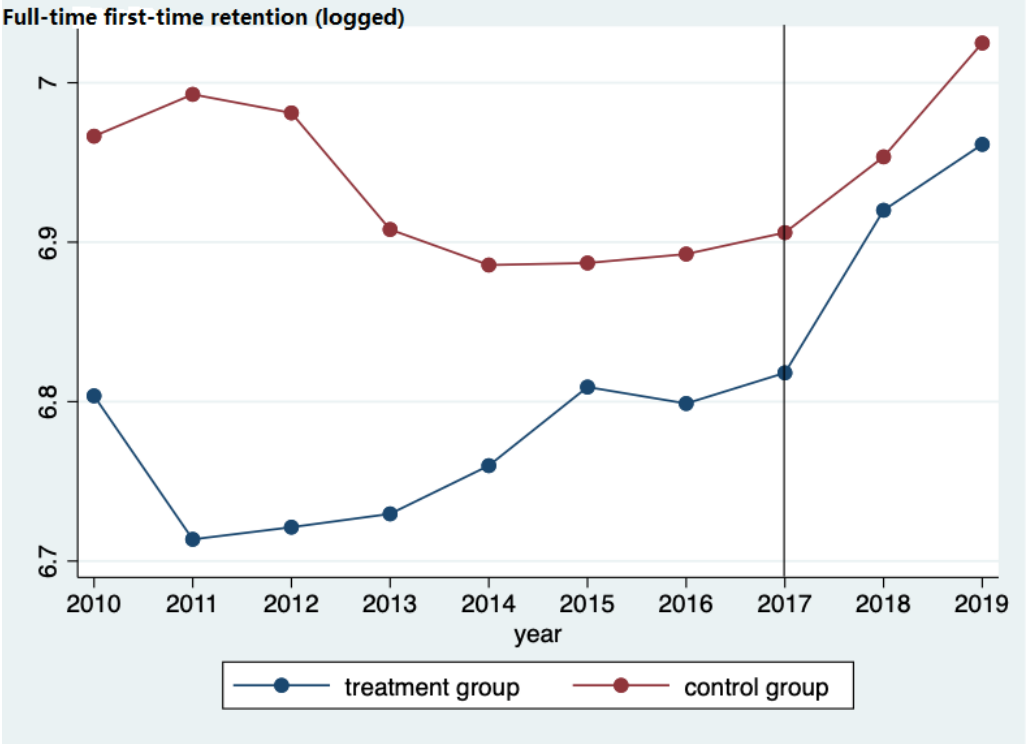

Figure 3.5: Parallel trend test of public 4-year full-time first-time retention (logged) between treatment group and control group.

Table 3.5: Parallel trend & falsification tests for public 2-year colleges.

Outcome variables	Control (Mean)	Treat (Mean)	Diff	P-Value	Falsification Tests	
					1-year lead	2-year lead
Full-time first-time enrollment	6.107	7.097	0.991	0.000***	-0.055***	-0.040
Total undergraduate enrollment	8.317	8.807	0.490	0.000***	-0.042	-0.035
Full-time first-time retention	6.147	7.150	1.003	0.000***	-0.042	-0.030
Total undergraduate retention	6.579	7.258	0.680	0.000***	-0.057	-0.051
Full-time first-time graduation rate	23.016	23.049	0.032	0.967	-0.243	0.642
Full-time first-time undergraduate received Pell Grant	5.572	6.611	1.040	0.000***	0.043	0.062
Graduation rate of full-time first-time undergraduate received Pell Grant	22.040	23.444	1.404	0.502	0.000	0.000
Total undergraduate received Pell Grant	9.775	10.305	0.530	0.033**	0.079**	0.065
Full-time first-time American Indian undergraduate enrollment	1.433	1.818	0.384	0.000***	0.053	0.015
Full-time first-time African American undergraduate enrollment	3.803	5.004	1.201	0.000***	0.119	0.130
Full-time first-time Hispanic undergraduate enrollment	3.411	4.941	1.530	0.000***	-0.266***	-0.229***
Full-time first-time Native Hawaiian undergraduate enrollment	0.608	1.258	0.650	0.000***	-0.313***	-0.251***
Full-time first-time American Indian undergraduate graduation	17.715	14.821	-2.894	0.092	-1.430	-1.338
Full-time first-time African American undergraduate graduation	13.751	12.086	-1.665	0.069	2.287**	2.747***
Full-time first-time Hispanic undergraduate graduation	20.521	15.967	-4.554	0.000***	-0.146	0.720
Full-time first-time Native Hawaiian undergraduate graduation	18.172	23.606	5.433	0.165	-7.037	-7.067
Total American Indian undergraduate enrollment	2.285	2.705	0.420	0.000***	0.107	0.108
Total African American undergraduate enrollment	4.752	5.893	1.141	0.000***	0.125**	0.140**
Total Hispanic undergraduate enrollment	4.318	5.793	1.475	0.000***	-0.194***	-0.179***
Total Native Hawaiian undergraduate enrollment	0.793	0.949	0.155	0.015**	-0.078	-0.081
Full-time first-time White undergraduate enrollment	5.459	6.183	0.724	0.000***	-0.143***	-0.141***
Full-time first-time Asian undergraduate enrollment	1.856	3.076	1.221	0.000***	0.070	0.045
Full-time first-time White undergraduate graduation	25.626	25.972	0.346	0.684	1.240	1.730
Full-time first-time Asian undergraduate graduation	24.332	24.490	0.158	0.935	2.832	3.016
Total White undergraduate enrollment	6.557	7.192	0.634	0.000***	-0.094**	-0.105**
Total Asian undergraduate enrollment	2.752	4.081	1.329	0.000***	0.154***	0.152***

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3.6: Parallel trend & falsification tests for public 4-year colleges.

Outcome variables	Control (Mean)	Treat (Mean)	Diff	P-Value	Falsification Tests	
					1-year lead	2-year lead
Full-time first-time enrollment	6.992	7.079	0.087	0.483	0.138***	0.123***
Total undergraduate enrollment	8.768	8.860	0.092	0.840	0.042	0.026
Full-time first-time retention	6.960	6.900	-0.061	0.631	0.085	0.093
Total undergraduate retention	6.943	6.921	-0.022	0.866	0.087	0.095
Full-time first-time undergraduate received Pell Grant	6.036	6.269	0.232	0.030**	0.260***	0.253***
Total undergraduate received Pell Grant	7.708	7.930	0.223	0.028**	0.275**	0.322***
Full-time first-time American Indian undergraduate enrollment	1.619	1.239	-0.380	0.003***	0.426***	0.317
Full-time first-time African American undergraduate enrollment	4.504	4.823	0.319	0.039**	0.421***	0.345***
Full-time first-time Hispanic undergraduate enrollment	4.499	5.356	0.857	0.000***	0.180**	0.166
Full-time first-time Native Hawaiian undergraduate enrollment	0.829	0.535	-0.294	0.005***	0.031	-0.002
Total American Indian undergraduate enrollment	2.916	2.609	-0.307	0.022**	0.184	0.178
Total African American undergraduate enrollment	5.968	6.380	0.412	0.008***	0.273***	0.237**
Total Hispanic undergraduate enrollment	5.820	6.873	1.053	0.000***	0.130	0.104
Total Native Hawaiian undergraduate enrollment	1.801	1.955	0.154	0.195	0.072	0.020
Full-time first-time White undergraduate enrollment	6.203	6.118	-0.086	0.605	0.111**	0.106**
Full-time first-time Asian undergraduate enrollment	3.313	4.403	1.089	0.000***	0.068	0.103
Total White undergraduate enrollment	7.723	7.714	-0.009	0.955	0.071**	0.066**
Total Asian undergraduate enrollment	4.612	5.939	1.327	0.000***	0.164	0.155

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

RESULTS

I began by examining the differences between colleges subject to the Excelsior Program and those colleges that were not subject to any Promise Program. I tested this using a DiD model in Stata.

Results of the exploration of question 1 using DiD modeling

I presented the results responding to research question one. The results of the educational outcomes (enrollment, retention, graduation) comparison among public 2-year colleges were presented in Table 4.1. The estimate of diff is interpreted as the difference between the New York colleges' (treatment group) educational outcomes after Excelsior and before Excelsior minus the difference between the control group's educational outcomes after Excelsior and before Excelsior. The estimate of treat is interpreted as the New York colleges' (treatment group) educational outcomes minus the control group's educational outcomes. The estimate of post is interpreted as the educational outcomes after Excelsior minus the educational outcomes before Excelsior. For example, the estimate of diff (-0.056) indicates that *the difference between the 2-year New York colleges' full-time first-time enrollment after Excelsior and that before Excelsior* is 0.056 excluding the time effect estimated by *difference between the control group's enrollment after Excelsior and that before Excelsior.* The estimate of treat (0.893) indicates that the New York colleges' enrollment is more than the control group's enrollment. The estimate of post (-0.132) indicates that the New York colleges' enrollment is less than the control group's enrollment.

Compared with the control group, the full-time first-time undergraduate enrollment (diff_estimate = -0.056, $p < 0.05$), total undergraduate enrollment (diff_estimate= -0.044, $p <$

0.10), full-time first-time retention (diff_estimate = -0.053, p < 0.10), total retention (diff_estimate = -0.063, p < 0.05), and total graduation rate (diff_estimate = -0.966, p<0.10) significantly decreased in the treatment group of public 2-year colleges after the implementation of the Excelsior Program. These suggested that the program generally imposed challenges on the enrollment and retention numbers in the public 2-year colleges, such that more students would not choose 2-year college education when an alternative sector of higher education was available.

Table 4.1: Impacts of Excelsior Program on educational outcomes in public 2-year colleges (addressing question 1).

	Enrollment		Retention		Graduation
VARIABLES	Full-time first-time	Total	Full-time first-time	Total	Total
post	-0.132***	-0.098***	-0.158***	-0.140***	5.680***
	(0.014)	(0.012)	(0.014)	(0.013)	(0.233)
treat	0.893***	0.351***	0.908***	0.569***	0.581
	(0.103)	(0.110)	(0.102)	(0.101)	(0.914)
_diff	-0.056**	-0.044*	-0.053*	-0.063**	-0.966*
	(0.027)	(0.024)	(0.027)	(0.027)	(0.559)
City	0.851***	1.072***	0.838***	0.959***	-6.592***
	(0.082)	(0.080)	(0.080)	(0.081)	(1.153)
Suburb	0.804***	1.032***	0.804***	0.933***	-7.212***
	(0.090)	(0.086)	(0.089)	(0.088)	(1.142)
Town	0.182**	-0.010	0.174**	0.053	3.016**
	(0.086)	(0.077)	(0.085)	(0.082)	(1.261)
log_avetu	-0.010	-0.062	-0.015	-0.074	2.905***
	(0.052)	(0.051)	(0.051)	(0.050)	(0.629)
Constant	5.749***	8.332***	5.835***	6.718***	2.008
	(0.419)	(0.408)	(0.414)	(0.405)	(5.007)
Observations	6,038	6,040	6,035	6,036	6,030
R-squared	0.243	0.348	0.247	0.287	0.186

Note: Robust standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p < 0.1

The results of the educational outcome (enrollment, retention, and graduation) comparison among public 4-year colleges are presented in Table 4.2. The full-time first-time undergraduate enrollment (diff_estimate = 0.114, p < 0.01) significantly increased in the

treatment group of public 4-year colleges (versus the control group) after the implementation of the Excelsior Program. In other words, the "diff_estimate" means that *the difference between the 4-year New York colleges' full-time first-time undergraduate enrollment after Excelsior and that before Excelsior* is 0.114 more than *the difference between the control group's enrollment after Excelsior and that before Excelsior*. The effect of Excelsior on total undergraduate enrollment (diff_estimate = -0.015, ns), full-time first-time undergraduate retention (diff_estimate = 0.077, ns), and total undergraduate retention (diff_estimate = 0.078, ns) were not significant. These findings have suggested the program generally had an incentive effect on full-time first-time enrollment in the public 4-year colleges, such that more students attend 4-year higher education and persist in their academic studies.

Table 4.2: Impacts of Excelsior Program on educational outcomes in public 4-year colleges (addressing question 1).

	Enrollment		Retention	
VARIABLES	Full-time first-time	Total	Full-time first-time	Total
post	-0.015	-0.023	0.001	-0.003
	(0.018)	(0.017)	(0.019)	(0.019)
treat	-0.111	0.011	-0.205	-0.224
	(0.135)	(0.132)	(0.150)	(0.150)
_diff	0.114***	-0.015	0.077	0.078
	(0.034)	(0.024)	(0.048)	(0.048)
City	1.840***	1.753***	1.957***	1.914***
	(0.149)	(0.158)	(0.169)	(0.156)
Suburb	1.333***	1.178***	1.451***	1.403***
	(0.171)	(0.186)	(0.189)	(0.177)
Town	1.189***	0.994***	1.279***	1.230***
	(0.155)	(0.165)	(0.175)	(0.162)
log_avetu	0.138**	0.074	0.129*	0.126*
	(0.067)	(0.070)	(0.069)	(0.068)
ACT/SAT concordance	0.740***	0.805***	0.747***	0.754***
	(0.141)	(0.136)	(0.147)	(0.145)
Constant	-0.308	1.740*	-0.415	-0.362
	(0.954)	(0.908)	(0.976)	(0.965)
Observations	3,841	3,841	3,832	3,832
R-squared	0.228	0.260	0.235	0.236

Note: *** p < 0.01, ** p < 0.05, * p < 0.1

Results of the exploration of question 2 using DiD modeling

I presented the results responding to research question two. The results of the low-income students' educational outcomes (enrollment and graduation) in public 2-year colleges after the implementation of the Excelsior Program (versus colleges that did not implement any Promise Programs) are presented in Table 4.3. Full-time first-time low-income undergraduate enrollment significantly increased (diff_estimate = 0.083, $p < 0.01$), but the graduation rate (diff_estimate = -0.110, $p < 0.01$) significantly decreased in the treatment group of public 2-year colleges (versus control public 2-year colleges) after the implementation of the Excelsior Program. The comparison results of low-income (total) undergraduates' enrollment were not significant (diff_estimate = 0.035, ns). These findings suggested that the Excelsior Program generally made 2-year college education accessible to more students from low-income families, but these benefits were limited to only full-time first-time students rather than all students (because the program itself was leaning towards the full-time first-time students). Surprisingly, the program failed to incentivize the graduation rate as it lacked some components targeted at improving enrolled students' qualifications.

The results of the racial minority students' educational outcome (full-time first-time enrollment) in public 2-year colleges after the Excelsior Program was implemented (versus colleges that did not implemented any Promise Programs) were presented in Table 4.4. The results showed that full-time first-time Hispanic and Native Hawaiian undergraduate enrollment (diff_estimate = -0.265, $p < 0.01$; diff_estimate = -0.404, $p < 0.01$) significantly decreased in the treatment group of public 2-year colleges (versus the control group of public 2-year colleges) after the implementation of the Excelsior Program. The effect of Excelsior

on full-time first-time American Indian and African American undergraduates' enrollment was not significant (diff_estimate = 0.044, ns; diff_estimate = 0.106, ns). This suggested that the full-time first-time American Indian and African American undergraduates' enrollment did not change at a significant level after the implementation of the Excelsior Program. Thus, the program could not increase the attractiveness of 2-year colleges for racial minority students. It might lead to the Hispanic and Native Hawaiian undergraduate enrollment going down.

Table 4.3: Impacts of Excelsior Promise on low-income student enrollment and graduation in public 2-year colleges (addressing question 2).

	Low-income undergraduate enrollment		Low-income undergraduate graduation
VARIABLES	Full-time first-time	Total	Full-time first-time
post	-0.255***	-0.201***	0.157***
	(0.012)	(0.014)	(0.014)
treat	0.375***	0.967***	0.201***
	(0.110)	(0.105)	(0.042)
_diff	0.083***	0.035	-0.110***
	(0.025)	(0.030)	(0.022)
City	1.047***	0.825***	-0.189***
	(0.078)	(0.079)	(0.049)
Suburb	0.919***	0.664***	-0.215***
	(0.082)	(0.087)	(0.050)
Town	-0.094	0.144*	0.154***
	(0.081)	(0.083)	(0.047)
log_avetu	-0.104**	-0.0612	0.0592**
	(0.050)	(0.049)	(0.026)
Constant	7.812***	5.668***	2.523***
	(0.399)	(0.397)	(0.213)
Observations	6,035	6,034	2,417
R-squared	0.349	0.244	0.111

Note: Low-income students are those who received Pell Grants.

*** p < 0.01, ** p < 0.05, * p < 0.1

I also presented the results of non-minority enrollment after the implementation of Excelsior Program to explore more information. In the non-minority group, full-time first-time White undergraduate enrollment (diff_estimate = -0.123, $p < 0.01$) significantly decreased in the treatment group of public 2-year colleges (versus the controlled public 2-year colleges) after the implementation of the Excelsior Program. However, the effect of Excelsior on full-time first-time Asian undergraduate enrollment was not significant (diff_estimate = 0.060, ns).

Table 4.4: Impacts of Excelsior Program on racial minority student enrollment (full-time first-time) in public 2-year colleges (addressing question 2).

	Racial minority undergraduate enrollment				Non-minority enrollment	
VARIABLES	American Indian	African American	Hispanic	Native Hawaiian	White	Asian
post	-0.135***	-0.171***	0.343***	0.0182	-0.224***	0.010
	(0.027)	(0.024)	(0.024)	(0.035)	(0.017)	(0.026)
treat	0.508***	1.105***	1.491***	0.610***	0.621***	1.084***
	(0.141)	(0.171)	(0.203)	(0.177)	(0.184)	(0.213)
_diff	0.044	0.106	-0.265***	-0.404***	-0.123***	0.060
	(0.066)	(0.075)	(0.053)	(0.088)	(0.043)	(0.058)
City	0.267**	1.223***	1.642***	0.410***	0.369***	1.472***
	(0.121)	(0.150)	(0.145)	(0.076)	(0.114)	(0.123)
Suburb	0.010	1.044***	1.422***	0.323***	0.692***	1.486***
	(0.119)	(0.162)	(0.162)	(0.090)	(0.106)	(0.145)
Town	0.210*	0.175	0.392***	0.089	0.211**	-0.022
	(0.126)	(0.154)	(0.136)	(0.075)	(0.103)	(0.101)
log_avetu	-0.375***	-0.137	-0.433***	-0.122**	0.161**	-0.012
	(0.081)	(0.084)	(0.092)	(0.055)	(0.076)	(0.093)
Constant	4.281***	4.306***	6.024***	1.341***	3.884***	1.188
	(0.675)	(0.691)	(0.742)	(0.439)	(0.622)	(0.743)
Observations	5,023	5,878	5,899	2,642	6,037	5,122
R-squared	0.056	0.165	0.252	0.085	0.089	0.310

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results of the racial minority students' educational outcome (total enrollment) in public 2-year colleges after the Excelsior Program was implemented (versus colleges that did not implement any Promise Programs) are presented in Table 4.5. The total enrollment of Hispanic undergraduates (diff_estimate = -0.190, $p < 0.01$) significantly decreased in the treatment group of public 2-year colleges (versus the control group of public 2-year colleges) after the implementation of the Excelsior Program. The total enrollment of African American undergraduates (diff_estimate = 0.112, $p < 0.1$) marginally increased in the treatment group of public 2-year colleges (versus the control group of public 2-year colleges) after the implementation of the Excelsior Program. The effect of Excelsior on total enrollment of American Indian and Native Hawaiian undergraduates was not significant (diff_estimate = 0.058, ns; diff_estimate = -0.003, ns). These results suggested that African American students (in total) enjoyed some benefits (2-year college education) associated with the implementation of the Excelsior Program while members of other racial minority groups (in total) were not incentivized to attend 2-year colleges.

In the non-minority group, the total enrollment of White undergraduate students (diff_estimate = -0.086, $p < 0.05$) significantly decreased in the treatment group of public 2-year colleges (versus the control group of public 2-year colleges) after the implementation of the Excelsior Program. The total enrollment of Asian undergraduate students significantly increased (diff_estimate = 0.146, $p < 0.05$) in the treatment group of public 2-year colleges (versus the control group of public 2-year colleges) after the implementation of the Excelsior Program.

Table 4.5: Impacts of Excelsior Program on racial minority student enrollment (total) in public 2-year colleges (addressing question 2).

	Racial minority undergraduate enrollment				Non-minority enrollment	
VARIABLES	American Indian	African American	Hispanic	Native Hawaiian	White	Asian
post	-0.148***	-0.066***	0.414***	-0.026	-0.148***	0.091***
	(0.025)	(0.024)	(0.022)	(0.025)	(0.015)	(0.024)
treat	0.533***	1.005***	1.421***	0.158*	0.519***	1.091***
	(0.147)	(0.177)	(0.209)	(0.086)	(0.171)	(0.210)
_diff	0.058	0.112*	-0.190***	-0.003	-0.086**	0.146***
	(0.081)	(0.062)	(0.037)	(0.120)	(0.034)	(0.056)
City	0.539***	1.483***	1.794***	0.423***	0.520***	1.933***
	(0.130)	(0.161)	(0.149)	(0.051)	(0.106)	(0.129)
Suburb	0.240*	1.338***	1.580***	0.400***	0.808***	1.916***
	(0.130)	(0.169)	(0.165)	(0.061)	(0.098)	(0.149)
Town	0.252*	0.111	0.353**	0.0330	0.144	-0.005
	(0.134)	(0.168)	(0.141)	(0.049)	(0.098)	(0.111)
log_avetu	-0.464***	-0.191**	-0.488***	-0.045	0.109	-0.040
	(0.089)	(0.090)	(0.095)	(0.033)	(0.070)	(0.090)
Constant	5.722***	5.587***	7.323***	0.932***	5.356***	2.154***
	(0.744)	(0.740)	(0.761)	(0.268)	(0.572)	(0.720)
Observations	5,748	6,002	5,993	3,471	6,039	5,764
R-squared	0.074	0.199	0.279	0.083	0.104	0.385

Note: *** p < 0.01, ** p < 0.05, * p < 0.1

The results of the racial minority students' educational outcome (full-time first-time graduation) in public 2-year colleges after the Excelsior Program was implemented (versus colleges that had not implemented any Promise Programs) were presented in Table 4.6. All these diff_estimates were not significant. For the non-minority group, the results were not as hypothesized as well. These suggested that the Excelsior Program did relatively little to incentivize or disincentivize the racial minority students to graduate from the public 2-year colleges.

Table 4.6: Impacts of Excelsior Program on racial minority student graduation (full-time first-time) in public 2-year colleges (addressing question 2).

	Racial minority undergraduate enrollment				Non-minority enrollment	
VARIABLES	American Indian	African American	Hispanic	Native Hawaiian	White	Asian
post	3.055***	4.168***	6.182***	4.006***	6.283***	7.431***
	(0.843)	(0.419)	(0.514)	(1.501)	(0.282)	(0.886)
treat	-2.170*	-0.487	-3.634***	5.578	0.694	1.046
	(1.256)	(0.799)	(0.989)	(4.014)	(0.996)	(1.639)
_diff	0.909	0.925	-0.876	-3.982	0.820	3.370
	(2.254)	(0.850)	(0.982)	(5.786)	(1.141)	(2.207)
City	-4.156***	-4.277***	-5.883***	-2.550	-5.600***	-6.910***
	(1.343)	(0.983)	(1.217)	(2.239)	(1.228)	(1.542)
Suburb	-4.235***	-5.530***	-6.520***	-0.05	-7.136***	-7.769***
	(1.638)	(1.011)	(1.286)	(2.490)	(1.153)	(1.596)
Town	1.933	0.650	0.518	4.105	3.622***	1.069
	(1.471)	(1.127)	(1.347)	(2.607)	(1.286)	(1.807)
log_avetu	0.443	-1.387**	0.183	1.652	3.633***	-0.186
	(0.887)	(0.552)	(0.734)	(1.349)	(0.710)	(0.929)
Constant	15.58**	26.88***	21.74***	4.921	-1.684	29.30***
	(7.158)	(4.552)	(5.928)	(10.91)	(5.664)	(7.564)
Observations	5,119	5,870	5,883	2,158	6,029	4,602
R-squared	0.015	0.057	0.058	0.010	0.169	0.038

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results of the low-income students' educational outcome (enrollment) in public 4-year colleges that implemented after Excelsior Program (versus colleges that did not implement any Promise Programs) are presented in Table 4.7. Both full-time first-time and total low-income undergraduate enrollment (diff_estimate = 0.093, $p < 0.01$; diff_estimate = 0.200, $p < 0.01$) significantly increased in the treatment group of public 4-year colleges (versus the control group of public 4-year colleges) after the implementation of the Excelsior Program. This suggested that the program encouraged more students from low-income families to have access to 4-year higher education, supporting the incentive effect of the Excelsior Program on educational equity.

The results of the effect of racial minority students' educational outcome (full-time first-time enrollment) in public 4-year colleges that implemented the Excelsior Program (versus

colleges that did not implement any Promise Programs) are presented in Table 4.8. Full-time first-time American Indian and African American undergraduate enrollment (diff_estimate = 0.221, $p < 0.10$; diff_estimate = 0.379, $p < 0.01$) significantly increased in the treatment group of public 4-year colleges (versus the control group of public 4-year colleges) after the implementation of the Excelsior Program. The effect on Hispanic undergraduate enrollment (diff_estimate = 0.064, ns) was not significant. The effect on Native Hawaiian undergraduate enrollment (diff_estimate = -0.532, $p < 0.01$) was negative (i.e., enrollment decreased).

Table 4.7: Impacts of Excelsior Program on low-income student enrollment in public 4-year colleges (addressing question 2).

	Low-income undergraduate enrollment	
VARIABLES	Full-time first-time	Total
post	-0.019	0.031*
	(0.019)	(0.018)
treat	0.080	-0.050
	(0.147)	(0.148)
_diff	0.093***	0.200***
	(0.025)	(0.039)
City	1.570***	1.565***
	(0.191)	(0.182)
Suburb	0.965***	1.016***
	(0.213)	(0.197)
Town	0.863***	0.996***
	(0.199)	(0.187)
log_avetu	-0.001	0.042
	(0.083)	(0.068)
ACT/SAT concordance	0.370***	0.214*
	(0.118)	(0.119)
Constant	4.276***	3.131***
	(0.936)	(0.904)
Observations	3,837	3,829
R-squared	0.218	0.186

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

These data suggested that the Excelsior had expanded educational access for full-time first- time racial minority group students at public 4-year colleges, but only for American Indian, African American, and Hispanic students. Native Hawaiian students did not respond favorably to the Excelsior Program.

In the non-minority group, full-time first-time White and Asian undergraduate enrollment (diff_estimate = 0.016, ns; diff_estimate = -0.027, ns) did not increase in the treatment group of public 4-year colleges (versus the control group of public 4-year colleges) after the implementation of Excelsior Program. These data suggested that enrollment effects occurred entirely among historically underrepresented students.

Table 4.8: Impacts of Excelsior Program on racial minority student enrollment (full-time first-time) in public 4-year colleges (addressing question 2).

	Racial minority undergraduate enrollment				Non-minority enrollment	
VARIABLES	American Indian	African American	Hispanic	Native Hawaiian	White	Asian
post	-0.093***	0.041	0.333***	-0.090**	-0.156***	0.055*
	(0.033)	(0.032)	(0.030)	(0.035)	(0.031)	(0.032)
treat	-0.565***	-0.183	0.726***	0.281*	-0.192	1.161***
	(0.130)	(0.200)	(0.179)	(0.155)	(0.183)	(0.237)
_diff	0.221*	0.379***	0.064	-0.532***	0.012	-0.027
	(0.115)	(0.055)	(0.059)	(0.149)	(0.045)	(0.070)
City	0.890***	1.952***	2.817***	0.822***	1.843***	2.943***
	(0.206)	(0.401)	(0.235)	(0.091)	(0.315)	(0.179)
Suburb	0.468**	1.315***	2.110***	0.456***	1.647***	2.385***
	(0.227)	(0.415)	(0.259)	(0.101)	(0.323)	(0.204)
Town	0.923***	1.046**	1.689***	0.380***	1.543***	1.268***
	(0.228)	(0.411)	(0.245)	(0.102)	(0.318)	(0.173)
log_avetu	-0.062	-0.024	-0.031	0.121**	0.331***	0.455***
	(0.070)	(0.094)	(0.089)	(0.049)	(0.124)	(0.105)
ACT/SAT concordance	0.829***	-0.591**	0.598**	0.0176	1.948***	1.491***
	(0.223)	(0.269)	(0.235)	(0.126)	(0.289)	(0.269)
Constant	-3.900***	7.117***	-1.540	-0.915	-10.62***	-12.53***
	(1.466)	(1.955)	(1.639)	(0.847)	(2.103)	(1.860)
Observations	3,336	3,833	3,817	2,391	3,835	3,693
R-squared	0.082	0.132	0.236	0.088	0.180	0.336

Note: *** p < 0.01, ** p < 0.05, * p < 0.1

The results of the racial minority students' educational outcome (total) in public 4-year colleges after the Excelsior Program was implemented (versus colleges that did not implement Promise Programs) are presented in Table 4.9. The results showed that total American Indian and African American undergraduate enrollment (diff_estimate = 0.207, $p < 0.05$; diff_estimate = 0.162, $p < 0.01$) significantly increased in the treatment group of public 4-year colleges (versus the control group of public 4-year colleges) after the implementation of the Excelsior Program. The effect of Excelsior on total enrollment of Hispanic and Native Hawaiian undergraduates was not significant (diff_estimate = -0.012, ns; diff_estimate = -0.141, ns). These findings suggested the Excelsior Program benefited the American Indian and African American groups of students in total. The Hispanic and Native Hawaiian groups of students were not incentivized by the program.

In addition, I explored the relationship between non-minority group enrollment and the implementation of the Excelsior Program. In the non-minority group, total White and Asian undergraduate enrollment (diff_estimate = -0.045, ns; diff_estimate = 0.028, ns) did not increase in the treatment group of public 4-year colleges (versus the control group of public 4-year colleges) after the implementation of the Excelsior Program.

Table 4.9: Impacts of Excelsior Program on racial minority student enrollment (total) in public 4-year colleges (addressing question 2).

VARIABLES	Racial minority undergraduate enrollment				Non-minority enrollment	
	American Indian	African American	Hispanic	Native Hawaiian	White	Asian
post	-0.195***	0.064**	0.336***	-0.116***	-0.186***	0.014
	(0.033)	(0.029)	(0.029)	(0.034)	(0.028)	(0.033)
treat	-0.500***	0.068	0.927***	0.330*	-0.053	1.243***
	(0.164)	(0.204)	(0.196)	(0.197)	(0.167)	(0.244)
_diff	0.207**	0.162***	-0.012	-0.141	-0.045	0.028
	(0.099)	(0.039)	(0.043)	(0.121)	(0.037)	(0.063)
City	1.581***	2.029***	2.717***	1.357***	1.855***	3.232***
	(0.203)	(0.402)	(0.261)	(0.184)	(0.265)	(0.224)
Suburb	0.967***	1.353***	1.964***	0.800***	1.569***	2.599***
	(0.229)	(0.418)	(0.289)	(0.203)	(0.282)	(0.255)
Town	1.408***	0.967**	1.480***	0.612***	1.433***	1.472***
	(0.227)	(0.412)	(0.269)	(0.190)	(0.270)	(0.223)
log_avetu	-0.087	-0.088	-0.065	0.090	0.274**	0.397***
	(0.086)	(0.107)	(0.098)	(0.074)	(0.107)	(0.102)
ACT/SAT concordance	1.338***	-0.557**	0.651***	0.472**	1.885***	1.704***
	(0.238)	(0.266)	(0.247)	(0.183)	(0.272)	(0.280)
Constant	-6.043***	8.961***	-0.041	-2.891**	-8.066***	-12.17***
	(1.566)	(1.939)	(1.681)	(1.266)	(1.906)	(1.872)
Observations	3,754	3,841	3,841	3,398	3,841	3,829
R-squared	0.152	0.162	0.246	0.127	0.197	0.370

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Robustness check

The results of the racial minority students' educational outcome in public 2-year colleges after the Excelsior Program was implemented (versus colleges that did not implement Promise Programs) are presented in Table 4.10. The results showed that racial minority undergraduate total enrollment and graduation rate (diff_estimate = 0.068, $p < 0.05$; diff_estimate = 7.697, $p < 0.10$) significantly increased in the treatment group of public 2-year colleges (versus the control group of public 2-year colleges) after the implementation of the Excelsior Program.

Table 4.10: Impacts of Excelsior Program on racial minority student enrollment (Full-time first-time and total) and graduation (total) in public 2-year colleges (robustness check).

VARIABLES	Racial minority undergraduate enrollment		Racial minority undergraduate graduation
	Full-time first-time	Total	Total
post	0.039*	0.177***	15.98***
	(0.020)	(0.012)	(1.279)
treat	1.060***	0.063	-4.020
	(0.179)	(0.120)	(2.697)
_diff	0.015	0.068**	7.697*
	(0.060)	(0.031)	(4.439)
City	1.414***	0.634***	-6.811**
	(0.125)	(0.087)	(3.007)
Suburb	1.121***	0.433***	-8.709***
	(0.144)	(0.093)	(3.237)
Town	0.251*	-0.038	6.713**
	(0.128)	(0.092)	(3.264)
log_avetu	-0.412***	-0.412***	-2.234
	(0.076)	(0.056)	(1.832)
Constant	7.262***	6.160***	73.61***
	(0.613)	(0.450)	(14.87)
Observations	6,028	6,038	6,040
R-squared	0.251	0.179	0.045

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results of the racial minority students' educational outcome in public 4-year colleges after the Excelsior Program was implemented (versus colleges that did not implement Promise Programs) are presented in Table 4.11. The results showed that racial minority undergraduate total and full-time first-time enrollment (diff_estimate = 0.139, $p < 0.01$; diff_estimate = 0.261, $p < 0.01$) significantly increased in the treatment group of public 4-year colleges (versus the control group of public 4-year colleges) after the implementation of the Excelsior Program.

Table 4.11: Impacts of Excelsior Program on racial minority student enrollment (full-time first-time and total) in public 4-year colleges (robustness check).

	Undergraduate enrollment	
VARIABLES	Full-time first-time	Total
post	0.174***	0.181***
	(0.026)	(0.027)
treat	0.227	0.041
	(0.189)	(0.173)
_diff	0.139***	0.261***
	(0.034)	(0.046)
City	2.264***	2.249***
	(0.338)	(0.332)
Suburb	1.473***	1.496***
	(0.358)	(0.348)
Town	1.192***	1.303***
	(0.345)	(0.338)
log_avetu	-0.141	-0.099
	(0.111)	(0.098)
ACT/SAT concordance	-0.227	-0.282
	(0.206)	(0.203)
Constant	7.912***	6.382***
	(1.553)	(1.505)
Observations	3,841	3,839
R-squared	0.236	0.216

Note: *** p < 0.01, ** p < 0.05, * p < 0.1

Summary of results

I summarized the results of the DiD models in Table 4.12. Overall, the enrollment (full-time first-time and total), retention (full-time first-time and total), and graduation rate (total) of undergraduates in public 2-year colleges decreased after the implementation of Excelsior Program. Regarding racial minority groups, the enrollment of Hispanic undergraduates (full-time first-time and total) and Native Hawaiian undergraduates (full-time first-time) decreased while the enrollment of African American undergraduates (total) increased after the implementation of Excelsior Program. Regarding the low-income group, the enrollment of total low-income undergraduates increased while graduation of full-time first-time low-income undergraduates decreased in public 2-year colleges.

The enrollment (full-time first-time) of undergraduates in public 4-year colleges increased after the implementation of the Excelsior Program. Regarding the underrepresented group, the enrollment of low-income undergraduates (full-time first-time and total), American Indian (full-time first-time and total), African American (full-time first-time and total) increased but enrollment of Native Hawaiian (full-time first-time) undergraduates decreased in public 4-year colleges after the implementation of the Excelsior Program. Notably, the enrollment of overall race minority (full-time first-time and total) increased.

Table 4.12: Summary of the results (using DiD analysis).

Outcomes	Undergraduate type		Public college	
			2-year	4-year
Enrollment	Full-time first-time		↓	↑
	Total		↓	
	Low-income full-time first-time		↑	↑
	Low-income total			↑
	Racial minority full-time first-time	American Indian		↑
		African American		↑
		Hispanic	↓	
		Native Hawaiian	↓	↓
		Race Minority		↑
	Racial minority total	American Indian		↑
		African American	↑	↑
		Hispanic	↓	
		Native Hawaiian		
		Race Minority	↑	↑
Retention	Full-time first-time		↓	
	Total		↓	
Graduation	Full-time first-time		N/A	N/A
	Total		↓	N/A
	Low-income full-time first-time		↓	N/A
	Racial minority full-time first-time	American Indian		N/A
		African American		N/A
		Hispanic		N/A
		Native Hawaiian		N/A
		Race Minority	↑	N/A

Note: "↓" indicates decrease, "↑" indicates increase. To be noted, the results regarding Native Hawaiian and Native American should be considered cautiously because there is so much noise in the estimates.

DISCUSSIONS AND FUTURE WORK

Promise Programs, a relatively new finance policy targeted at higher education, are becoming a popular tool to address educational equity issues and make higher education possible for more students, especially the historically underrepresented students. Previous studies have proved that statewide Promise Programs increased college enrollment (Bell, 2021; Gurantz, 2020; Nguyen, 2020) and had positive impacts on improving college affordability at eligible colleges (Perna, Leigh, & Carroll, 2018). These studies also provided early evidence on how Promise Programs affect the public sector and racial groups differently after the free college policy was initiated. However, most previous statewide Promise Programs only targeted public 2-year colleges, so little is known about how the Promise effect may change if the policy applies to all (including both 2-year and 4-year schools) in the public sector. To address this issue, this dissertation focuses on the Excelsior Program with the features of covering not only the public 2-year colleges but also the public 4-year colleges for undergraduate students.

In this study, I examined how the implementation of Excelsior Program, the only Promise Program that covers all sectors of public higher education institutions, shapes the educational outcomes in both public 2-year and 4-year colleges. Specifically, I explored two research questions. The first question focused on 2-year colleges' educational outcomes, such as enrollment (Hypothesis 1a) and retention (Hypothesis 1b) of full-time first-time and all undergraduate students as well as graduation (Hypothesis 1c) of full-time first-time students, as well as on 4-year colleges' educational outcomes such as enrollment (Hypothesis 2a) and retention (Hypothesis 2b) of full-time first-time and all undergraduate students. The second

question focused on the underrepresented students' educational outcomes, such as low-income (Hypothesis 3a) and racial minority (Hypothesis 3b) students' enrollment (full-time first-time and total) and graduation (full-time first-time) in public 2-year colleges and low-income (Hypothesis 4a) and racial minority (Hypothesis 4b) students' enrollment (full-time first-time and total) in public 4-year colleges.

Discussions on findings regarding question 1

First, I found that there are statistically significant differences in full-time first-time and all undergraduate enrollments between the 2-year public colleges in the state (New York) that has implemented the Excelsior Program and those in colleges in the states that have not implemented any statewide Promise Programs. Based on the IPEDS data of 2010–2017, Nguyen (2019) found that the full-time fall undergraduate enrollment in 2-year public colleges did not significantly change after the implementation of the Excelsior Program based on just the first year of data. I believe these non-significant findings may be due to the limited post-treatment data (2017). Indeed, Promise Programs usually need several years to prove their effects (Nguyen, 2019). As such, I drew on the data of 2010 to 2019 to identify how the policy effect occurs 3 years after implementation. The results showed that the enrollment of both full-time first-time undergraduates and total undergraduates decreased significantly after the implementation of Excelsior. To be noted, there may be two different typologies of the enrollment implications of the Promise Program. One is that the Promise Program would increase the enrollment by getting new 2-year students to attend. The other one is that the Promise Program would decrease enrollment by shifting students to the 4-year sector. My results support the latter. Although the program may attract new students to attend colleges,

most of them may not choose public 2-year education given the diverse choice (e.g., 4-year education) provided by the program. These findings provided a different perspective on the implications of the Excelsior Program for educational equity, such that it enabled more students to access diverse educational opportunities.

Second, I found that there are statistically significant differences in full-time first-time and all undergraduate retention between the 2-year public colleges in the state (New York) that has implemented the Excelsior Program and the colleges in the states that have not implemented any statewide Promise Programs. Specifically, the retention number decreased in public 2-year colleges in New York because of two reasons: (a) the retention number decreased with the decrease of the enrollment number, and (b) the requirements of full-time status by the Excelsior created obstacles for some students to persist in the process, and thus they withdrew from the schools.

Third, there are few statistical differences in full-time first-time graduation between the 2-year public colleges in the state (New York) that has implemented the Excelsior Program and the colleges in the states that have not implemented any statewide Promise Programs. To be noted, my sample only contains the data of 3 years after the implementation; thus, we should be cautious in inferring the impact of the Excelsior Program on graduation outcomes because some students need more than 2 years to graduate from public 2-year colleges. The Excelsior Program focused on attracting new students to enroll but did not provide resources to facilitate and guarantee their graduation. This is unlike Tennessee Promise, which provides adequate mentoring services for each student to ensure they succeed (Carruthers & Fox, 2016). To be noted, a number of students may take more than 3 years to graduate, indicating

that this issue needs to be reexamined including data from more years after the Excelsior Program was initiated. With the improvement of Excelsior, I expect that the results regarding graduation rate may change according to previous research (Gershenfeld et al., 2019; Miller-Adams, 2015).

Fourth, there are significant differences in full-time first-time enrollment between the 4-year public colleges in the state (New York) that has implemented the Excelsior Program and the colleges in the states that have not implemented any statewide Promise Programs. Previous studies have shown that Promise Programs are beneficial for the enrollment of full-time first-time students in public 4-year colleges (Bell, 2021; Gurantz, 2020; Nguyen, 2020). My finding is consistent with the major conclusions of previous studies, supporting the positive consequences of the Excelsior Program for 4-year college education. The Excelsior Program makes public 4-year educational opportunity accessible for more full-time first-time students and thus boost the enrollment of full-time first-time undergraduates in 4-year colleges. This finding proves that the "free 4-year college" policy is very attractive, which makes sense as previously high school graduates might not have the chance to attend 4-year colleges due to the financial limitations (Denning, 2017). However, there are few statistically significant differences in all undergraduate enrollment between the 4-year public colleges in the state (New York) that has implemented the Excelsior and the colleges in the states that have not implemented any statewide Promise Programs. This relationship needs to be further explored in the future.

To be noted, there are no statistically significant difference in full-time first-time retention as well as all undergraduate retention between the 4-year public colleges in the state

(New York) that has implemented the Excelsior and the colleges in the states that have not implemented any statewide Promise Programs.

Discussions on findings regarding question 2

First, I found that through the Excelsior Program, the full-time first-time undergraduate students from low-income families have more opportunity to attend public 2-year colleges. The Excelsior Program provided free-tuition opportunities for students from low-income families, assuaging their concern about the financial burden associated with higher education. This finding supports the incentive implications of the Excelsior Program for the full-time first-time low-income underrepresented group. However, a different result emerges about which I shall be cautious: the graduation rate of students from low-income families in 2-year public colleges in New York State was decreasing. More full-time first-time students from low-income families failed to graduate after the implementation of the Excelsior Program. This finding suggests that we should be cautious about the implications of the Excelsior Program for the low-income group. Although the program expanded access to higher education for the low-income group, it did not benefit their graduation rate.

Second, consistent with Hypothesis 3b, the enrollment of (full-time first-time and total) students from low-income families in the public 4-year colleges in the state (New York) that has implemented the Excelsior Program was higher than that of the colleges in the states that have not implemented any statewide Promise Programs. This finding suggests that the Excelsior Program has improved educational equity in public 4-year colleges, particularly by boosting the enrollment of students from low-income families by offering free-of-charge 4-year higher education. Financial factors are among the crucial determinants of low-income

families' education opportunities (Gándara & Li, 2020; Gurantz, 2020; Nguyen, 2019). Excelsior addressed this concern of low-income families by clearly signaling free educational opportunity to them, which can reduce their concerns about their financial inability to attend college.

There are significant differences in racial minority groups' enrollment between the 2-year public colleges in the state (New York) that has implemented the Excelsior Program and the 2-year colleges in the states that have not implemented any statewide Promise Programs. However, the subgroups of racial minorities respond differently to the Excelsior Programs. Specifically, the enrollment of full-time first-time Hispanic and Native Hawaiian students and total Hispanic students in New York State decreased after the implementation of the Excelsior Program. The enrollment of total African American students, nevertheless, increased after the program's implementation. Interestingly, although my finding regarding African American students is consistent with previous research findings that proved the positive effect of Promise Programs on enrollment for racial minority groups (Bartik, Hershbein, & Lachowska, 2021; Gándara & Li, 2020; Gurantz, 2020; Perna & Leigh, 2018), my study's findings regarding Hispanic and Native Hawaiian students are different from prior arguments. The decreasing trend indicated that 2-year community colleges' attractiveness and competitiveness went down in absorbing some minority students (such as Hispanic and Native Hawaiian) when the Excelsior Program gave them more alternative opportunities for free college education.

Finally, I identified an increase in the enrollment of students from racial minority groups in the 4-year public colleges in the state (New York) compared with those in the states that

have not implemented any statewide Promise Programs. Specifically, most subgroups of racial minorities, including American Indian and African American experienced great benefits from the Excelsior Program, such that they were able to enroll in the public 4-year higher education as full-time first-time students with the support of the program. Of note, the enrollment of total American Indian and African American students also increased after the implementation of Excelsior Program. As such, I expect that through covering all public sectors in the policy, the Excelsior Program plays a crucial role in reducing the equity gap between racial minority groups and other groups in public 4-year institutions (i.e., SUNY and CUNY). Overall, my findings supported the implications of Excelsior for educational equity in racial minority groups.

Overall, the Excelsior Program improved educational equity such as by increasing low-income and racial minority students' enrollment and persistence in public 4-year colleges and increasing the low-income total and the African American students' enrollment in public 2-year colleges. Although full-time first-time enrollment in public 2-year colleges decreased, it suggested that the Excelsior Program enabled high school graduates to access more alternative educational opportunities (pulled them from 2-year colleges to 4-year colleges to enjoy high-quality education). This also supported the implications of the Excelsior Program for educational equity.

Future work

Although I found some interesting results regarding the implications of Excelsior Program for educational equity, there still exist some points that future research could address and advance. First, the role of information equity in shaping the implications of the Excelsior

Program could be explored. In the United States, young Americans in the low-income quartile do not have equal access to gaining information about college access compared to their counterparts in the high-income quartile (Brown, Wohn, & Ellison, 2016). Low-income high school students are limited in receiving information, as their families do not have the opportunity to access this type of information (Bourdieu, 1986). Therefore, future studies on the free college policy should reconsider that equality of information may determine whether Excelsior has the intended positive effect on educational equity. As for the state governors, it is important not only to have the Promise Program policies in place but also to make detailed information about free college easier for low-income families to understand and clearer for the students in need.

Another interesting research direction would be to a conduct comparative study of Excelsior Program and other Promise Programs, as the comparisons of Promise Programs is one of the mainstreams in the field (Dowd et al., 2020). Many financial aid policies have been implemented, and only by comparison can we identify whether the tool is easy to use and what is the best tool to use. The comparison of these programs is relevant because the focus of these programs is still on the improvement of educational equity. They seek to find the most appropriate policy tool to promote equity in higher education and can find the policy balance between state government and federal government to improve policy tools with the times. Further, future studies could also explore what kind of roles the state government and federal government play in the financial aid policy for college students, and how they might work together to make finance policy more effective. With the further development of

finance policy (Promise Programs), what will be the change in education outcomes in 2-year and 4-year colleges?

This dissertation did not explore the implications of Excelsior for graduation in public 4-year colleges given that the program was implemented in 2017 and graduation data will not be available until 2022. I recommend that future research address this issue in several years after the students who were enrolled in the fall of 2017 have begun to graduate (e.g., in 2021). Exploration of this issue is important because I did not find evidence of the incentive effect of Excelsior Program on the graduation rate in public 2-year colleges, resulting in a question about the effectiveness of Excelsior Program (with regard to graduation rate). This puzzle can be clarified when graduation rate after the implementation of Excelsior in public 4-year colleges is explored.

Though the Excelsior Program has played a certain role in improving the equity of higher education, there is still little evidence on how to further support students from racial minority backgrounds and low-income families in improving their qualifications, which is another important aspect to identify their educational quality and educational equity level. Although this study showed that Excelsior will affect the chance to receive higher education opportunities for students from different socioeconomic classes and racial groups, future work should pay attention to increasing support for the intermediary stage of low-income and minority students, as it is the liberal stage of educational equity (Husen, 1972), by focusing on the quality and type of higher education they receive.

It is necessary for future research to explore the way to introduce accurate and targeted policies for the historically underrepresented students so their chances will be equal to those

of their well-represented counterparts (i.e., Whites) to gain the opportunities as well as succeed in higher education. Last but not least, prior studies mainly focus on how the Promise Programs lead to educational equity of students, while overlooking the equity of colleges with regard to receiving financial support. Although Dowd et al. (2020) believed that outcome equity was important, they posited that the extent to which each sector in higher education received adequate funding is also an important issue in educational equity. A notable case would be some for-profit colleges closing their poor-performing programs after the gainful employment policy came out (Kelchen & Liu, 2021). To further advance our understanding of the education equity implications of the Excelsior Program, it is of particular importance for future work to shed light on the equity issues between colleges. Future work could also look at the Excelsior Program's effects on institutional selectivity and explore why some minority groups might be more responsive than others to Excelsior.

REFERENCES

ACCT. (2019). *First-Dollar vs. Last-Dollar Promise Models*. https://www.acct.org/page/first-dollar-vs-last-dollar-promise-models

Angrist, J. D., & Pischke, J.-S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton, NJ: Princeton University Press.

Assembly Bill. No. 583. (1868). *An Act to Create and Organize the University of California.* https://bancroft.berkeley.edu/CalHistory/charter.html

Bartik, T. J., Hershbein, B., & Lachowska, M. (2021). The effects of the Kalamazoo Promise Scholarship on college enrollment and completion. *Journal of Human Resources, 56*(1), 269-310.

Baum, S. (2014). *Who really wins with free tuition for community college students?* Urban Institute. https://www.urban.org/urban-wire/who-really-wins-free-tuition-community-college-students

Becker, W. E., & Darrell, R. L. (2012). *The Economics of American Higher Education* [Monograph]. London: Springer Press, 2012:91-120.

Bennett, M. J. (1996). *When Dreams Came True: The GI Bill and the Making of Modern America.*

Bennett, W. (1986). *Text of Secretary Bennett's Speech on College Costs and US Student Aid*. The Chronicle of Higher Education.

Bifulco, R., Rubenstein, R., & Sohn, H. (2017). Using Synthetic Controls to Evaluate the Effect of Unique Interventions: The Case of Say Yes to Education. *Evaluation Review*, *41*(6), 593–619. https://doi.org/10.1177/0193841X17742233

Bifulco, R., Rubenstein, R., & Sohn, H. (2019). Evaluating the Effects of Universal Place-Based Scholarships on Student Outcomes: The Buffalo "Say Yes to Education" Program. *Journal of Policy Analysis and Management*, *38*(4), 918–943. https://doi.org/10.1002/pam.22139

Billings, M. (2018a). *Free college for all: The impact of Promise Programs on college access and success* [Doctoral dissertation]. https://deepblue.lib.umich.edu/bitstream/handle/2027.42/144101/msbill_1.pdf?sequence=1

Billings, M. (2018b). *Understanding the design of college Promise Programs, and where to go from here.* Brookings. https://www.brookings.edu/blog/brown-center-chalkboard/2018/09/18/understanding-the-design-of-college-promise-programs-and-where-to-go-from-here/

Blumenstyk, G. (2014). *American higher education in crisis?: What everyone needs to know.* Oxford; New York: Oxford University Press, 2014.

Bourdieu, P. (1986). The forms of capital in J. Richardson (ed.) *Handbook of Theory and Research for the Sociology of Education* (New York, Greenwood), 241-258.

Bourdieu, P., & Passeron, J. (1979). *The Inheritors, French Students and their Relation to Culture*. Richard Nice (trans.). Chicago, IL: University of Chicago Press.

Bourdieu, P., & Passeron, J. (1990). *Reproduction in Education, Society and Culture* (Theory, Culture and Society Series) 2e. London: Sage.

Bowen, W. G., Kurzweil, M. A., Tobin, E. M., & Pichler, S. C. (2005). *Equity and excellence in American higher education*. Charlottesville: University of Virginia Press, 2005.

Bozick, R., Gonzalez, G., & Engberg, J. (2015). Using a merit-based scholarship program to increase rates of college enrollment in an urban school district: The case of the Pittsburgh Promise. *Journal of Student Financial Aid, 45*(2).

Brossman, S. W. (1977). *The California Dream: Tuition-Free Higher Education at the Crossroads.*

Brown, M. G., Wohn, D. Y., & Ellison, N. (2016). Without a map: College access and the online practices of youth from low-income communities. *Computers & Education*, *92–93*, 104–116. https://doi.org/10.1016/j.compedu.2015.10.001

Cahalan, M., Perna, L. W., Yamashita, M., Wright-Kim, J., & Jiang, N. (2019). *Indicators of Higher Education Equity in the United States: 2019 Historical Trend Report.* Pell Institute for the Study of Opportunity in Higher Education. https://eric.ed.gov/?id=ED595444

Callaway, B., & Sant'Anna, P. H. (2019). *Difference-indifferences with multiple time periods*. http://conference.iza.org/conference_files/EVAL_2019/28549.pdf

Carruthers, C. K., & Fox, W. F. (2016). Aid for all: College coaching, financial aid, and post-secondary persistence in Tennessee. *Economics of Education Review, 51*, 97–112.

Chase, M. M., Dowd, A. C., Pazich, L. B., & Bensimon, E. M. (2014). Transfer equity for "minoritized" students: A critical policy analysis of seven states. *Educational Policy, 28*(5), 669–717.

Chen, R. (2008). Financial aid and student dropout in higher education: A heterogeneous research approach. In M. B. Paulsen (Ed.), *Higher education: Handbook of theory and research* (pp. 209–239). Springer.

Chiyaka, E. T., Sithole, A., Manyanga, F., McCarthy, P., & Bucklein, B. K. (2016). Institutional Characteristics and Student Retention: What Integrated Postsecondary Education Data Reveals about Online Learning. *Online Journal of Distance Learning Administration, 19*(2).

Cohen, A. M., & Kisker, C. B. (2010). *The Shaping of American Higher Education: Emergence and Growth of the Contemporary System* [Monograph]. San Francisco: John Wiley & Sons Press.

Coleman, J. S. (2019). *Equality and Achievement In Education*. Routledge.

College Board. (2019a). *Trends in College Pricing.* https://trends.collegeboard.org/college-pricing

College Board. (2019b). *Trends in Student Aid.* https://research.collegeboard.org/trends/student-aid/resource-library

Collier, D. A., Mishra, S., Houston, D. A., Hensley, B. O., & Hartlep, N. D. (2019). Americans 'support' the idea of tuition-free college: An exploration of sentiment and political identity signals otherwise. *Journal of Further and Higher Education*, *43*(3), 347–362. https://doi.org/10.1080/0309877X.2017.1361516

Collier, D. A., & Parnther, C. (2021). Conversing with Kalamazoo Promise Scholars: An Inquiry Into the Beliefs, Motivations, and Experiences of Tuition-Free College Students. *Journal of College Student Retention: Research, Theory & Practice*, *22*(4).

Daniela, G. The Effect of Student Aid on the Duration of Study. (2011). *Economics of Education Review*, *30*(1), 177-190.

Denning, J. T. (2017). College on the cheap: Consequences of community college tuition reductions. *American Economic Journal: Economic Policy, 9*(2), 155–188.

Dowd, A. C., Rosinger, K. O., & Fernandez Castro, M. (2020). Trends and Perspectives on Finance Equity and the Promise of Community Colleges. *Higher Education: Handbook of Theory and Research: Volume 35*, 1–72.

Federal Student Aid. (2017, August 23). *Work-Study Jobs*. /types/work-study

Federal Student Aid. (2018, September 18). *Types of Aid*. Federal Student Aid. https://studentaid.ed.gov/sa/types

Fuller, M. B. (2014). A History of Financial Aid to Students. *Journal of Student Financial Aid*, *44*(1).

Furquim, F., Corral, D., & Hillman, N. (2019). A primer for interpreting and designing difference-in-differences studies in higher education research. In L. W. Perna (Ed.), *Higher education: Handbook of theory and research:* Volume 35 (pp. 1–58). Springer.

Galizio, L. (2019, April 18). *The Origin of California's Community Colleges*. https://www.ccleague.org/blog/origin-californias-community-colleges

Gándara, D., & Li, A. (2020). Promise for Whom? "Free-College" Programs and Enrollments by Race and Gender Classifications at Public, 2-Year Colleges. *Educational Evaluation and Policy Analysis*, *42*(4).

Gándara, D., & Rutherford, A. (2018). Mitigating unintended impacts? The effects of premiums for underserved populations in performance-funding policies for higher education. *Research in Higher Education*, *59*, 681–703.

Gershenfeld, S., Zhan, M., & Hood, D. W. (2019). The impact of a promise: A loan replacement grant, low-income students, and college graduation. *The Review of Higher Education*, *42*(3), 1073-1100.

Ginder, S. A., Kelly-Reid, J. E., Mann, F. B. (2017). *Graduation rates for selected cohorts, 2008-13; outcome measures for cohort year 2008; student financial aid, academic year 2015-16; and admissions in postsecondary institutions, fall 2016.* Washington, DC: National Center for Education Statistics Report 2017-150rev.

Gladieux, L. (1995). *Archived - Federal Student Aid Policy: A History and an Assessment*. U.S. Department of Education. https://www2.ed.gov/offices/OPE/PPI/FinPostSecEd/gladieux.html

Goodman-Bacon, A. (2018). *Difference-in-differences with variation in treatment timing* (No. w25018). National Bureau of Economic Research.

Gonzalez, G. C., Bozick, R., Tharp-Taylor, S., & Phillips, A. (2011). *Fulfilling the Pittsburgh Promise: Early progress of Pittsburgh's postsecondary scholarship program* [Monograph]. RAND Corporation.

Gurantz, O. (2020). What Does Free Community College Buy? Early Impacts from the Oregon Promise. *Journal of Policy Analysis and Management*, *39*(1), 11-35. https://doi.org/10.1002/pam.22157

Houle, J. N. (2014). Disparities in Debt: Parents' Socioeconomic Resources and Young Adult Student Loan Debt. *Sociology of Education*, *87*(1), 53–69. https://doi.org/10.1177/0038040713512213

Hurtado, S. (2006). Linking Diversity with the Educational and Civic Missions of Higher Education. *The Review of Higher Education*, *30*(2), 185–196. https://doi.org/10.1353/rhe.2006.0070

Husen, T. (1972). *Social Background and Educational Career: Research Perspectives on Equality of Educational Opportunity*. https://eric.ed.gov/?id=ED080397

Indiana Archives and Records Administration. (n.d.). *Full text of the 1816 Constitution*. https://www.in.gov/iara/2778.htm

Iriti, J., Bickel, W., & Kaufman, J. (2012). *Realizing "the promise": Scholar retention and persistence in post-secondary education.* Pittsburgh Promise.

Jaquette, O., & Parra, E. E. (2014). Using IPEDS for panel analyses: Core concepts, data challenges, and empirical applications. In M. B. Paulsen (Ed.), *Higher education: Handbook of theory and research* (pp. 467–533). Springer.

Jepsen, C. & Montgomery, M. (2009). "Miles to go before I learn: The effect of travel distance on the mature person's choice of a community college." *Journal of Urban Economics*, *65*(1), 64–73.

Johnstone, D. B. (2004). The Economics and Politics of Cost Sharing in Higher Education: Comparative Perspectives. *Economics of Education Review*, *23*(4), 403-410.

Jones, T., & Berger, K. (2018). *A promise fulfilled.* The Education Trust. https://edtrust.org/resource/apromise-fulfilled/

Kane, T. J. (1999). *The Price of Admission: Rethinking How Americans Pay for College.* Washington, DC: Brookings Institution Press.

Keppel, F. (1987). Higher Education Acts Contrasted, 1965-1986: Has Federal Policy Come of Age? *Harvard Educational Review*, *57*(1), 49-67.

Kelchen, R. (2017a). *A Review of College Promise Programs: Evidence from the Midwest.* Minneapolis, MN: Midwestern Higher Education Compact.

Kelchen, R. (2017b). Campus-Based Financial Aid Programs: Trends and Alternative Allocation Strategies. *Educational Policy*, *31*(4), 448–480. http://dx.doi.org.ezproxy.shu.edu/10.1177/0895904815604213

Kelchen, R. (2018a). Do Performance-Based Funding Policies Affect Underrepresented Student Enrollment? *The Journal of Higher Education*, *89*(5), 702-727.

Kelchen, R. (2018b). *Higher Education Accountability.* Baltimore, MD: Johns Hopkins University Press.

Kelchen, R. (2019). Exploring the Relationship between Performance-Based Funding Design and Underrepresented Student Enrollment at Community Colleges. *Community College Review*, *47*(4), 382-405.

Kelchen, R., Goldrick-Rab, S., & Hosch, B. (2017). The Costs of College Attendance: Examining Variation and Consistency in Institutional Living Cost Allowances. *The Journal of Higher Education*, *88*(6), 947-971.

Kelchen, R., & Liu, Z. (2021). Did Gainful Employment Regulations Result in College and Program Closures? *Education Finance and Policy.*

Kelchen, R., Rosinger, K. O., & Ortagus, J. C. (2019). How to Create and Use State-Level Policy Data Sets in Education Research. *AERA Open*, *5*(3), 1-14. doi:10.1177/2332858419873619.

Kramer, D. A., II, Ortagus, J. C., & Lacy, T. A. (2018). Tuition-setting authority and broad-based merit aid: The effect of policy intersection on pricing strategies. *Research in Higher Education*, *59*(4), 489–518.

LeGower, M., & Walsh, R. (2017). Promise scholarship programs as place-making policy: Evidence from school enrollment and housing prices. *Journal of Urban Economics*, *101*, 74–89. https://doi.org/10.1016/j.jue.2017.06.001

Mangan, K. (2019). *Presidential hopefuls are pushing free college back into the spotlight. But what does "free" mean, anyway?* The Chronicle of Higher Education. https://www.chronicle.com/article/Presidential-Hopefuls-Are/245918

Marginson, S. (2016). *Higher Education and the Common Good*. Melbourne Univ. Publishing.

McDonough, P. M., & Calderone, S. (2006). The Meaning of Money: Perceptual Differences Between College Counselors and Low-Income Families About College Costs and Financial Aid. *American Behavioral Scientist*, *49*(12), 1703–1718. https://doi.org/10.1177/0002764206289140

Miller-Adams, M. (2015). *Promise nation: Transforming communities through place-based scholarships.* W. E. Upjohn Institute for Employment Research. http://research.upjohn.org/up_press/235/

Miron, G., Jones, J., & Kelaher-Young, A. (2012). The Impact of the Kalamazoo Promise on student attitudes, goals, and aspirations. *American Secondary Education*, *40*(2), 5–28.

Mitchell, M. (2014, May 7). *Higher Ed Cuts, Tuition Hikes Worsen Low-Income Students' Struggles*. Center on Budget and Policy Priorities. https://www.cbpp.org/blog/higher-ed-cuts-tuition-hikes-worsen-low-income-students-struggles

Mulhere, K. (2015). Promise Programs thrive despite unanswered questions about long-term effects and sustainability. *Inside Higher Ed*. https://www.insidehighered.com/news/2015/04/07/promise-programs-thrive-despite-unanswered-questions-about-long-term-effects-and

National Association of State Student Grant & Aid Program. (2019). *NASSGAP Annual Survey*. https://www.nassgapsurvey.com/survey/state_data_check.asp

New York State Government. (2017). *The Excelsior Scholarship, Making College Possible.* https://www.ny.gov/sites/ny.gov/files/atoms/files/ExcelsiorScholarship_Toolkit.pdf

Nguyen, H. (2019). Free tuition and college enrollment: Evidence from New York's Excelsior Program. *Education Economics*, *27*(6), 573-587. https://doi.org/10.1080/09645292.2019.1652727

Nguyen, T. D., Kramer, J. W., & Evans, B. J. (2019). The Effects of Grant Aid on Student Persistence and Degree Attainment: A Systematic Review and Meta-Analysis of the Causal Evidence. *Review of Educational Research*, *89*(6), 831–874. https://doi.org/10.3102/0034654319877156

Nielsen, H. S., Sørensen, T., & Taber, C. (2010). Estimating the Effect of Student Aid on College Enrollment: Evidence from a Government Grant Policy Reform. *American Economic Journal Economic Policy*, *2*(2), 185-215.

OECD. (2015). *Indicator B5 How Much do Tertiary Students Pay and What Public Support do they Receive?* OECD ILibrary. https://read.oecd-ilibrary.org/education/education-at-a-glance-2015/indicator-b5-how-much-do-tertiary-students-pay-and-what-public-support-do-they-receive_eag-2015-21-en

OHCHR. (2019). *International Covenant on Economic, Social and Cultural Rights*. https://www.ohchr.org/en/professionalinterest/pages/cescr.aspx

Ost, B., Pan, W., & Webber, D. (2018). The impact of mass layoffs on the educational investments of working college students. IZA Discussion Papers, 51, 1-12.

Page, L. C., Iriti, J. E., Lowry, D. J., & Anthony, A. M. (2019). The promise of place-based investment in postsecondary access and success: Investigating the impact of the Pittsburgh Promise. *Education Finance and Policy*, *14*(4), 572-600. https://doi.org/10.1162/edfp_a_00257

Pell Institute. (2020). Indicators of Higher Education Equity in the United States—Reports and Data, 2020. Retrieved November 21, 2020, from http://pellinstitute.org/downloads/publications-Indicators_of_Higher_Education_Equity_in_the_US_2020_Historical_Trend_Report.pdf

Perna, L. W., & Leigh, E. W. (2017). *College Promise Programs: Designing Programs to Achieve the Promise*. American Council on Education.

https://www.higheredtoday.org/2017/02/13/college-promise-programs-designing-programs-achieve-promise/

Perna, L. W., & Leigh, E. W. (2018). Understanding the promise: A typology of state and local college Promise Programs. *Educational Researcher*, *47*(3), 155–180.

Perna, L. W., Leigh, E. W., & Carroll, S. (2018). "Free College:" A New and Improved State Approach to Increasing Educational Attainment? *American Behavioral Scientist*, *61*(14) 1740–1756.

Perna, L. W., & Smith, E. J. (2020). Improving research-based knowledge of college Promise Programs. *American Educational Research Association.*

Perry, D. A., Brown, M. T., & Sawrey, B. A. (2004). Rethinking the Use of Undergraduate Admissions Tests: The Case of the University of California. In Rebecca Zwick (Ed.), *Rethinking the SAT: The future of standardized testing in university admissions.* (pp. 103-124). London and New York: Routledge Falmer.

Rauner, M., Perna, L. W., & Kanter, M. J. (2018). *California College Promise: Program Characteristics and Perceptions from the Field*. WestEd. https://eric.ed.gov/?id=ED592498

Rawls, J. (1971). *A Theory of Justice.* Cambridge: Harvard University Press.

Ritter, G. W., & Ash, J. (2016). The promise of a college scholarship transforms a district. *Phi Delta Kappan*, *97*(5), 13–19. https://doi.org/10.1177/0031721716629652

Roderick, M., Coca, V., & Nagaoka, J. (2011). Potholes on the road to college: High school effects in shaping urban students' participation in college application, 4-year college enrollment, and college match. *Sociology of Education*, *84*(3), 178–211.

Roff, S. S., Cucchiara, A. M., & Dunlap, B. J. (2000). *From the Free Academy to CUNY: Illustrating Public Higher Education in New York City, 1847-1997*. Fordham Univ Press.

Rubin, R. B. (2011). The Pell and the Poor: A Regression-Discontinuity Analysis of On-Time College Enrollment. *Research in Higher Education*, *52*(7), 675–692. http://dx.doi.org.ezproxy.shu.edu/10.1007/s11162-011-9215-6

Shields, L. (2015). From Rawlsian autonomy to sufficient opportunity in education. *Politics, Philosophy & Economics*, *14*(1), 53–66. https://doi.org/10.1177/1470594X13505413

Smith, J. F., & Bowyer, K. (2016). Tennessee promise: implementation and outcomes at two diverse colleges. *Planning for Higher Education*, *45*(1), 180+. https://link.gale.com/apps/doc/A484628919/AONE?u=setonhallu&sid=AONE&xid=84ae4493

St. Clair, T., & Cook, T. D. (2015). Difference-in-differences methods in public finance. *National Tax Journal*, *68*(2), 319–338.

Teranishi, R. T., & Kim, V. (2017). The Changing Demographic Landscape of the Nation: Perspectives on College Opportunities for Asian Americans and Pacific Islanders. *Educational Forum*, *81*(2), 204–216.

The Condition of Education. (2019). *Loans for Undergraduate Students*. https://nces.ed.gov/programs/coe/indicator_cub.asp

The Institute of Politics at Harvard University. (2020). *Spring 2019 Harvard IOP Youth Poll Results*. https://iop.harvard.edu/about/newsletter-press-release/spring-2019-harvard-iop-youth-poll-results

Thelin, J. R. (2013). Success and Excess: The Contours and Character of American Higher Education Since 1960. *Society*, *50*(2), 106-114.

The Regional Educational Laboratory West. (2016). *The College Promise in California: A Collection of Program Profiles*. 92.

Tollefson, T. A. (2009). Community College Governance, Funding, and Accountability: A Century of Issues and Trends. *Community College Journal of Research and Practice*, *33*(3–4), 386–402. https://doi.org/10.1080/10668920802580481

University of California. (2020). *Relationship of the SAT/ACT to College Performance at the University of California.* https://www.ucop.edu/institutional-research-academic-planning/_files/sat-act-study-report.pdf

University of Florida. (1912). *University Record of the University of Florida: Undergraduate catalog*.

U.S. Federal Reserve Board. (2021). Federal Reserve statistical release. Retrieved from the Federal Reserve web site: https://www.federalreserve.gov/Releases/g19/current/

Wallace, J. (2016). Nursing Student Work-Study Internship Program: An Academic Partnership. *Journal of Nursing Education*, *55*(6), 357–359. https://doi.org/10.3928/01484834-20160516-11

Webster, A., & Showers, V. (2011). Measuring predictors of student retention rates. *American Journal of Economics and Business Administration*, *3*(2), 301–311.

Willard, J., Vasquez, A., & Lepe, M. (2019). *Designing for Success: The Early Implementation of College Promise Programs*. MDRC. https://eric.ed.gov/?id=ED594448

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data* (2nd ed.). MIT Press.