Free College For All:

The Impact Of Promise Programs On College Access And Success

by

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PREFACE

This dissertation is comprised of three chapters that focus on promise programs. Promise programs offer college scholarships to students who either live and/or attend school in a specific geographic area - usually a county, city, town, or school district. Promise programs usually serve as an economic development opportunity for the local community by attempting to attract middle class families and new businesses to the area, creating a stock of college-educated labor, and strengthening the quality of the local K-12 school system. My first chapter focuses on explaining the diffusion and reinvention of promise programs as they spread from locale to locale, discussing the heterogeneity in promise program designs, and summarizing what is currently known about the effect of promise programs on educational outcomes. My second and third chapters collectively estimate the effect of nine promise programs in Michigan on college access, choice, persistence, and degree completion. The following paragraphs discuss how I discovered promise programs and the motivation and purpose behind writing each chapter.

I was first introduced to promise programs in Fall 2010 when I started applying to PhD programs in higher education. After I narrowed down my list of interested programs, I decide to read articles by professors that I would like to work with at each university. I happened to select, "The effects of the Kalamazoo Promise on college choice" by Rodney Andrews, Stephen DesJardins, and Vimal Ranchhod (2010). I was fascinated by the idea of the Kalamazoo Promise - free college for all residents[1] - and the research design - what was this approach called

[1] Free college is defined as tuition-free college as students receive scholarships to cover their tuition and fees. Students may have to pay for room, board, textbooks, and other educational expenses from other sources.

difference-in-differences? I also thought that using ACT score-sending behavior as a proxy for college choice was clever.

After I finished reading the article, I felt disappointed because it seemed that this topic that I found so interesting and engaging was clearly exhausted. What *more* could researchers *really do* on the Kalamazoo Promise?[2] Therefore, I forgot about the Kalamazoo Promise for several years and explored other topics that were of interest. It was not until the fourth year of my PhD when I was searching for ideas for my dissertation that promise programs - actually promise zones - emerged again.

At the time, I was reading about the free community college movement as the Tennessee Promise was making headlines, and President Obama had just announced his free community college proposal in January 2015. While I was researching free community college, I stumbled across the Detroit Scholarship Fund, which provides free tuition at five local community colleges for high school graduates of Detroit. In the middle of the night, I excitedly sent an email to my advisor, Susan Dynarski, and asked whether doing an evaluation of the Detroit Scholarship Fund could be a promising avenue for a dissertation topic. Sue gave me the green light, and I began investigating the Detroit Scholarship Fund and learned more about the eligibility criteria for the scholarship. I quickly discovered that the Detroit Scholarship Fund was part of a larger group of 10 communities called promise zones which offer a tuition-free pathway to at least an associate's degree to all eligible high school graduates in their school district. It was at this point, I was hooked on the promise zones, and I knew I had a viable and engaging dissertation topic.

After reading the literature on promise programs, I realized that most researchers mention that promise programs differ in design, but no one had done a systematic review of these

[2] This was one of the first research papers of many written on the Kalamazoo Promise. Clearly, I was a bit green to academic research and had not learned that one study does not exhaust a research topic!

differences in design or visually displayed this heterogeneity in design. At most, researchers (Hemenway, 2017; Miller-Adams, 2015; Perna & Leigh, 2017) classified the promise programs based on several of their design characteristics, but the variation within these groups were lost as researchers focused instead on the variation between groups. Therefore, programs that were similar on two or three characteristics were placed in the same group even though the overall effect of the program on students may be different.

My first chapter addresses this gap and specifically focuses on the variation within *and* between promise program designs. I use this framework to summarize the current literature and to explain the magnitude and direction of the estimates for the different promise program designs. I also expand upon the research of Michelle Miller-Adams (2015) to discuss why promise programs spread to different areas and why the design changed as it spread.

In my second chapter, I return to the Kalamazoo Promise, which peaked my interest prior to enrolling in a PhD program. While the Kalamazoo Promise is the most studied promise program, prior research (Bartik, Eberts, & Huang, 2010; Bartik, Hershbein, & Lachowska, 2015; Bartik & Lachowska, 2013) has several limitations in their identification strategy which may have biased the estimates on educational attainment. In addition, some researchers were only able to examine the first class of students who were eligible for the Kalamazoo Promise and had to use proxies for college enrollment because it was not available yet (Andrews, DesJardins, & Ranchhod, 2010). I address these limitations by employing a set of comparison school districts outside of Kalamazoo, using an instrument to predict scholarship eligibility, and incorporating the first eight classes of students who were eligible for the Kalamazoo Promise. I was also motivated to estimate the effects of the Kalamazoo Promise on college enrollment, choice, and persistence because the Michigan promise zones were inspired by the Kalamazoo Promise, and I

wanted to compare and contrast these estimates with the estimates that I received for the promise zones especially given the large differences in design.

My third chapter focuses on the Michigan promise zones. As many of the older promise programs (Kalamazoo, New Haven, Pittsburgh) allowed students to attend four-year institutions, promise zones are different as they offer, with a couple of exceptions, scholarships for students to attend community colleges. For this type of promise program, undermatching[3] could be a concern because the scholarship could be diverting students (especially low-income and students of color) who would have attended a four-year institution to a community college because the community college is now "free." It is important to thoroughly investigate any unattended consequences such as these because they tend to disproportionately affect students who are the most vulnerable in the school district. It also provides an opportunity for communities that want to adopt community college promise programs the ability to modify the program to either eliminate or reduce these unattended consequences.

Collectively, these chapters help to inform researchers, practitioners, and policymakers about promise programs and their impacts on students. It is my hope that these chapters can be used by communities with promise programs or communities that want to start promise programs to design (or modify) their promise programs to meet their intended goals and to reach the students that most need these scholarships. Through researching and learning more about how promise programs affect students, we can design more effective policies to reduce educational inequality and make college accessible for all.

[3] Undermatching is the phenomenon when students enroll in colleges and universities with lower institutional selectivity than their academic credentials warrant.

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ABSTRACT

This dissertation focuses on a type of college scholarship called promise programs. These promise programs offer free or discounted tuition and fees to all eligible students within specific geographic locations. Given that students and families underestimate the amount of available financial aid and overestimate the price of tuition (De La Rosa, 2006; De La Rosa & Tierney, 2006; Grodsky & Jones, 2007), the cost (real or perceived) of postsecondary education may act as a significant barrier for college enrollment. By awarding students with free or discounted college early in the college decision making process, students may feel that college is now attainable for them because their financial concerns are either reduced or eliminated. Thus, these three chapters collectively focus on evaluating the impact of promise programs on college enrollment, choice, persistence, and degree attainment.

The first chapter discusses the policy diffusion and reinvention of promise programs across the United States. I examine 140 promise programs in the United States located in single high schools, school districts, college service areas, towns, cities, or states. This chapter describes the diffusion of promise programs across polities identifying three mechanisms for diffusion and provides examples of promise programs that were adopted due to these mechanisms. The chapter also discusses the variation in promise scholarship design and visually displays this variation on two characteristics: student eligibility and benefits offered. I explain why promise programs may have changed their design as they diffused to other areas and summarize the current promise program literature.

The second chapter focuses on the Kalamazoo Promise, the oldest and most well-known of the nation's promise programs. Funded by anonymous donors in 2005, the Kalamazoo

Promise pays up to 100% of tuition and fees to any public college or university in Michigan. I use an instrumental variable difference-in-differences research design to evaluate the effect of the Kalamazoo Promise on postsecondary attainment and choice. Unlike previous work in this area, I am able to compare changes in outcomes for students in Kalamazoo with those in a set of similar districts across the state. I use an administrative, longitudinal dataset of the universe of elementary and secondary students in Michigan in this analysis. I find that the offer of the scholarship increases college attendance by nine to eleven percentage points and degree completion by about five percentage points. Effects are smallest for economically disadvantaged, Black, or Latino students on their degree attainment.

The third chapter describes eight promise zone communities that were selected by the state of Michigan in 2009. These promise zones offer free tuition and fees to at least an associate degree for all eligible high school graduates within the promise zone. Unlike the Kalamazoo Promise, however, the scholarship designs of these promise programs are not as generous as they offer substantially smaller scholarship awards, fewer years to use the scholarship, and restrict postsecondary choice to local community colleges and universities. I use an instrumental variable difference-in-differences design to estimate the effect of eligibility for promise zones on college enrollment, college choice, and persistence. I find positive, but imprecisely estimated impacts on whether students enroll in college and persist to the second year of college. I offer suggestions for the promise zones to leverage community resources and create simple and salient messages targeted towards students.

CHAPTER 1:
Policy Diffusion And Reinvention Of Promise Programs

I. Introduction

In the last decade, promise programs have been adopted to address issues of education inequity and to reverse the decline of struggling, urban communities in the United States. These programs typically offer college scholarships to local residents to cover the cost of tuition and fees at postsecondary institutions in close proximity to the promise community. The hope is that students use the scholarships to earn postsecondary degrees and return back to the community to live and work - creating a stock of college-educated labor and attracting new businesses to the area. Therefore, the promise program serves as an economic development opportunity for the local community by reversing the urban decline through offering college scholarships to its residents (Miller-Adams, 2015).

Given this focus on the community, promise programs use residency, instead of academic merit or financial need, to determine students' eligibility for the college scholarship. Residency is often defined as the place where a student lives or the place where the student attends school (Miller-Adams, 2015). Some promise programs require students to both attend school *and* live within a particular geographic boundary for a set number of years or for specific consecutive grades.

Promise programs are typically described as either "place-based" college scholarships or "free college" programs. Often the distinction between the two is based on the size of the

geographic area that the promise program covers. If the promise program is locally-focused (i.e. within a specific county, city, or school district), it is often called a “place-based” college scholarship. If the promise program is state-wide, it is often called a “free college” program (Perna & Leigh, 2017).

Promise programs have been made popular by the announcement of the Kalamazoo Promise in November 2005. The Kalamazoo Promise offers students in the Kalamazoo Public Schools (in Michigan) the opportunity to attend college tuition-free at any in-state public college or university if they meet the residency requirements and graduate from one of the four local high schools. The scholarships are prorated based on students’ length of attendance in the school district. Students who attend the school district for four years receive 65% of the scholarship, and students who attend the school district for all thirteen years (K-12) receive 100% of the scholarship (Miller-Adams, 2009).

While the Kalamazoo Promise is an exciting opportunity for local students in Kalamazoo, it is not the first promise program of its kind nor are promise programs that unique. Historically, there have been other “place-based” scholarships and “free college” programs. In her book on the Kalamazoo Promise, Michelle Miller-Adams (2009) discussed a forerunner to the Kalamazoo Promise - a place-based college scholarship in Philomath, Oregon. In 1959, this program was created by a local, wealthy family who were concerned about the economic future of the town in light of the declining timber industry. The place-based scholarship covered up to 100% of tuition at Oregon State University for any local high school graduate.

Promise programs also have more recent antecedents such as broad-based merit aid programs which were popular in the 1990’s and early 2000’s (Doyle, 2006; Heller, 2011) and the District of Columbia Tuition Assistance Grant (DCTAG) which started in 1999 (Kane, 2007).

These programs offer tuition scholarships to eligible students to attend college, and are "place-based" as they require students to live either in a particular state for the broad-based merit aid programs or in the District of Columbia for DCTAG. In addition, broad-based merit aid programs have economic development goals as they were created to retain academically talented students in-state for college with the hope that they would be more likely to remain in the state to live and work after they graduated from college (Zhang & Ness, 2010).

When the Kalamazoo Promise was announced in November 2005, it caught the nation's attention as it was frequently reported on by the media via newspapers, public radio, and television (Miller-Adams, 2009). ABC featured a popular segment on the Kalamazoo Promise where they interviewed families who had moved from Arizona and Hawaii to be able to take advantage of the scholarship, and they featured a visit by Katie Couric to one of the local high schools. This three minute segment sparked 60 phone calls and emails within three days (Miller-Adams, 2009). Due to this focused attention by the media, the Kalamazoo Promise was broadcast to a wide range of audiences. This led to a rapid growth in the number of promise programs created in the United States. Between the years of 2006-2016, approximately 125 promise programs have been adopted, and as of 2016, 31 states have at least one promise program.[4]

In the last twelve years, the designs of promise programs have varied considerably from the Kalamazoo Promise. These variations in design affect the students who are eligible and the benefits that they receive to go to college. In some cases, the differences in design among the promise programs far outweigh their similarities. Therefore, it is not surprising that researchers have found mixed results when they estimated the effect of promise programs on educational

[4] Author's calculations based on the list of promise programs that I collected, which is described in the overview of the promise program section.

outcomes. However, as a field, we are still striving to summarize and contextualize these disparate findings to understand how promise programs may influence educational attainment and to help new and current promise programs learn from their more successful peers.

Thus, the purpose of this chapter is to provide readers with an overview of what we know about promise programs and to discuss the policy diffusion and reinvention of promise programs. Since promise programs are rapidly spreading from locale to locale, I explain the three policy diffusion mechanisms that are responsible for the spread of this type of scholarship and provide examples of promise programs that may have spread due to each mechanism. Drawing from the policy reinvention literature, I examine why promise programs may have changed from the original design of the Kalamazoo Promise and provide documented reasons of why promise programs changed their design.

I also address a gap in the literature by systematically reviewing the differences in promise program designs and discussing the variation in design between *and* within different groups of promise programs. At most, researchers (Hemenway, 2017; Miller-Adams, 2015; Perna & Leigh, 2017) have grouped promise programs based on several of their design characteristics, but they tend to focus on variation between promise program groups while ignoring variation within promise program groups. Therefore, programs that are similar on two or three characteristics were placed in the same group even though the overall effect of the program on students may be different.

To visually display the heterogeneity in promise program designs, I graph 140 promise programs based on two characteristics (student eligibility and the benefits offered) to highlight the variation between *and* within promise program groups. I chose these two characteristics because they directly influence whether the promise programs affect the educational outcomes of

their students. I then use this framework to summarize the findings from the experimental and quasi-experimental literature and to explain why the effect of promise programs on educational outcomes is mixed.

II. Overview of Promise Programs

There is not a standard definition of promise programs in the literature or one that is accepted in the research community (Perna, 2017). Therefore for the purpose of this dissertation, I define a promise program if it meets the following four characteristics: (1) provides a scholarship for college attendance, (2) bases the eligibility for the scholarship on residency by either attending school in a specific district and/or living within particular geographic boundaries for a set amount of time (usually measured in years or grades attended), (3) intents to increase the postsecondary educational attainment of its students, and (4) was created in partnership by a local entity (county, city, school district, K-12 school) or state government. In addition, promise programs tend to share the following goals: to create a college-going culture within the K-12 schools and to promote economic development for the local community (Miller-Adams, 2015).

While promise programs emphasize residency for scholarship eligibility, newer promise programs have added other criteria such as academic merit, financial need, minimum level of school attendance, community service, completion of college-preparatory courses, and evidence of good behavior (i.e. no expulsions or suspensions on their school record). About half of promise programs (47%) have merit criteria requiring students to meet a minimum grade point average, standardized test score, and/or place into college-level courses to be eligible for the scholarship. One out of five programs have need-based criteria (31 programs or 22%) and less than one out of five programs require students to meet a minimum level of attendance in high school (23 programs or 17%).

As newer promise programs have added merit and need criteria, the characteristics that distinguish promise programs from prior financial aid programs (such as broad-based merit aid programs or state-wide need-based programs) have blurred. Miller-Adams (2015) argued that the distinguishing feature of promise programs is its focus on economic development for the local community by increasing the quality of the school district, creating a stock of college-educated labor, and attracting new businesses and middle-class families to the area. However, using college scholarships to achieve economic development is not new or unique. In fact, broad-based merit aid programs have economic development goals as they use college scholarships to retain academically talented students in the state so that they will enter the state's workforce after their college graduation (Zhang & Ness, 2010).

Promise programs occur in a range of places from single high schools to school districts to states. Most promise programs are locally-focused, and represent high schools, school districts, college service areas, towns, cities, and counties. The other type of promise program encompasses the whole state, and they are often labeled as "free college" programs (Perna & Leigh, 2017). Tennessee started the first state-wide promise program in 2014 by offering free community college to eligible students.[5] As of April 2017, there are five states (Kentucky, Minnesota, New York, Oregon, and Tennessee) with state-wide promise programs. Kentucky and Minnesota target the promise scholarships towards students who enroll in specific programs that meet the needs of the state's workforce.

Promise programs also differ on which postsecondary institutions that students can use the scholarship. The majority of local promise programs restrict students to using the scholarship at the nearest community college. Some local and state-wide promise programs are more

[5] The Tennessee Promise is a promise program that offers two free years of community college to any eligible Tennessee resident (Tennessee Promise About, n.d.).

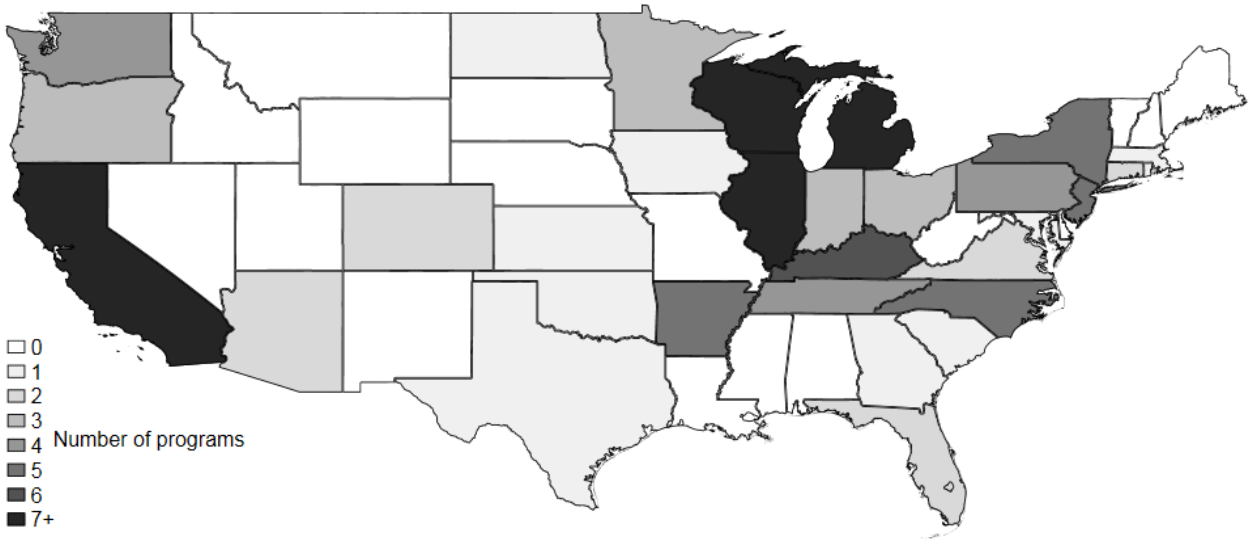
generous and allow students to use the promise scholarship at any two-year or four-year public college or university in the state.

Since I am interested in exploring the policy diffusion and reinvention of the Kalamazoo Promise scholarship design, I identified college scholarships that met my definition of a promise program and started in 2000 and after to confirm that the Kalamazoo Promise was an inflection point for the rise of promise programs and to examine programs whose scholarship design could have been influenced by the Kalamazoo Promise. Based on my criteria, there are 140 promise programs that are included in my analysis.

To construct my list of promise programs, I first collected promise programs from two main sources (Perna & Leigh, n.d. and W.E. Upjohn Institute for Employment Research, 2016). I supplemented the lists with information from the Regional Educational Laboratory West (2016) and a list of promise programs from Miller-Adams (2015). When the sources conflicted, I verified the information to the best of my ability using articles, websites, and press releases. I removed any program that did not fit my stated definition of a promise program or started before 2000. The programs that did not meet my definition of a promise program were guaranteed admission programs, college savings plans, dual-enrollment programs, or state- sponsored broad-based merit aid or need-based programs. I also did not include programs that were initiated by postsecondary institutions for their state residents and offered college scholarships to attend their school if the student gained admission and met specific merit and/or need criteria (such as the Husky Promise for Washington residents at the University of Washington or the Illinois Promise for Illinois residents at the University of Illinois-Urbana Champaign). See Appendix A for the list of promise programs that I included in my analysis.

Figure 1.1 displays a heat map for the number of promise programs in my analysis. The different shades of gray represent the number of promise programs within the state. The darker the gray, the larger the number of promise programs in the state. California, with 28 programs, has the most promise programs followed by Michigan, with 23 programs. Illinois and Wisconsin are tied for third, with nine promise programs each. There are 11 states with only one promise program and 19 states (38%) without any promise programs to date.

Figure 1.1 The heat map of promise programs in the United States



The heat map is also a visual representation of the spread of promise programs across the United States. Since Michigan is the state with the most popular promise program (Kalamazoo Promise), there is a concentration of these types of programs in the Midwest - particularly in states that are in close proximity to Michigan. This may be a result of emulation or competition and the policy diffusion section discusses these policy diffusion mechanisms in more depth. Meanwhile, the rise of promise programs in California has been relatively slower than Michigan with 22 out of 28 programs starting after 2010. Therefore, we may see an increase in the number of promise programs in neighboring states to California in the next couple of years.

III. Policy Diffusion and Promise Programs

The policy innovation and diffusion literature focuses on two interrelated processes: adoption and diffusion (Sponsler, 2010). Policy adoption research focuses on understanding the process by which a polity enacts an innovative policy (Karch, 2007; Walker, 1969) whereas policy diffusion research focuses on understanding the spread of policy ideas across polities (Gray, 1973; Volden, 2006). Given that diffusion is often thought of as an invisible process (Boushey, 2010), the majority of researchers point to evidence that an innovative policy has diffused if there is a pattern of multiple policy adoptions across polities.

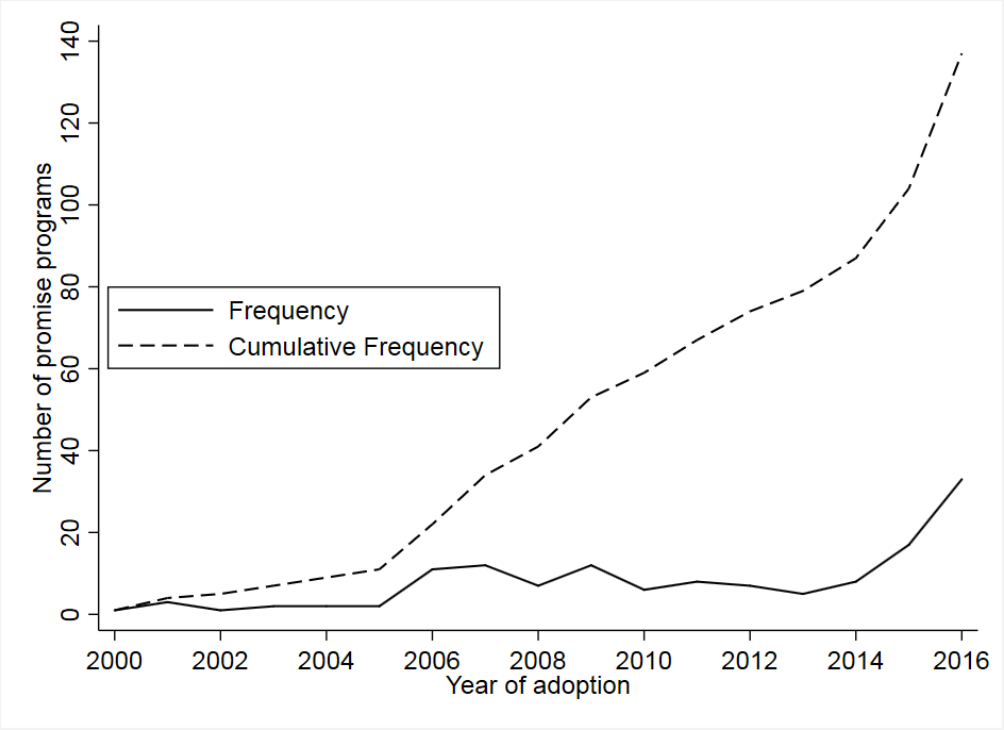
Policy diffusion researchers often graph the number of policy adoptions over several decades to present a visual display of the policy diffusion curve (Walker, 1969). Typically, policy diffusion represents an "S"-curve, with a small number of adoptions occurring in the beginning stage of dissemination, followed by an increased number of adoptions in the middle stage, when the majority of polities are aware of the innovation, and ending with a small number of adoptions in the later stage, as most polities that are susceptible to adopting the innovation have already adopted it (Rogers, 2003).

Figure 1.2 displays the number of promise program adoptions from 2000-2016.[6] The frequency line is the number of promise programs adopted each year, and the cumulative frequency line is the total number of promise programs that have been adopted by the end of that year. The graph shows that 2005 was an inflection point for promise programs, as the number of adoptions increased rapidly after that year. Most likely, this is due to the fact that the Kalamazoo Promise was announced in November 2005 and received a significant amount of national media attention that allowed other communities to become aware of the concept of the promise

[6] I graph 137 promise programs over the 17 years. I dropped three promise programs from the sample of 140 because one had an unknown year of adoption and two were adopted in 2017. I did not graph programs in 2017 as the year has not ended yet during my data collection.

program. Since the shape of the cumulative frequency line resembles an exponential curve and not an "S"-curve, the promise program movement can be interpreted to most likely be in the middle stage of policy diffusion. Thus, I would anticipate that more promise programs will be adopted in the next several years until adoptions eventually slow down and reach a leveling-off phase as the promise program movement reaches the last stage of policy diffusion.

Figure 1.2 The adoption of promise programs from 2000-2016



In general, policy diffusion research typically strives to identify and understand the mechanisms that drive the spread of policy ideas to new polities (Gray, 1973; Volden, 2006). The three main mechanisms for policy diffusion include policy learning, competition, and conformity (Berry & Berry, 2007; Walker, 1969). These mechanisms can provide insights into why promise programs have spread rapidly across the United States since the announcement of the Kalamazoo Promise. In the following subsections, I briefly explain each mechanism and then

discuss whether it is a reasonable explanation for the diffusion of policy programs drawing from examples of promise programs that have been adopted across the nation.

Policy Learning

Policy learning refers to how policymakers learn from the positive and negative experiences of policymakers in other polities (Meseguer, 2005; Walker, 1969). There are two main types of policy learning: emulation and imitation (Sponsler, 2010). Emulation refers to the actions of policymakers who seek decision making shortcuts when they are faced with policy problems. Instead of creating new policies through policy invention, policymakers monitor the policymaking activity of nearby cities, counties, and states, and borrow policy innovations that have either proven effective at or are promising for addressing the policy problem (Berry, 1994; Berry & Berry, 2007; Walker, 1969). Thus, late-adopting polities try to capture the policy successes of early-adopting polities (Karch, 2007; Volden, 2006).

The second type of policy learning is imitation. Imitation refers to the actions of policymakers who adopt policy solutions of polities that share similar policy-relevant characteristics. These policy-relevant characteristics can be the economic, political, demographic, governance, and/or educational conditions of the city, county, or state (Karch, 2007; Volden, 2006). Therefore, policymakers copy the policy actions of these similar entities in order to look like them or to imitate them. Thus, the main difference between these two types of policy learning is that emulation focuses on searching for and finding successful policies to learn from, and imitation focuses on searching for and finding similar polities to learn from (Shipan & Volden, 2008).

In the early stages of promise program diffusion, polities that adopt promise programs are primarily motivated by imitation since the results of the Kalamazoo Promise are not yet known.

Therefore, cities, counties, and school districts that were similar to either the Kalamazoo Public Schools or the city of Kalamazoo may be more likely to adopt promise programs (Miller-Adams, 2009). El Dorado, Arkansas, was one such city that adopted a promise scholarship for local school children in January 2007 (Ash & Ritter, 2015), approximately one year and two months after the Kalamazoo Promise was announced. Similar to the city of Kalamazoo, El Dorado was suffering from a population decline and the loss of jobs due to the closing of two manufacturing plants in the area (Landrum, 2008). Also, the demographics of the El Dorado school district resembled those of the Kalamazoo Public Schools as the school district served a low-performing and disadvantaged population of students (Ash & Ritter, 2015).

A local businessman read about the Kalamazoo Promise in the *Wall Street Journal* (Miller-Adams, 2009) and convinced the Murphy Oil Corporation, an oil company located in El Dorado, to donate $50 million to create the El Dorado Promise (Landrum, 2008; Miller-Adams, 2009). The El Dorado Promise used the same scholarship design as the Kalamazoo Promise, offering a first-dollar scholarship with the same student eligibility criteria.[7] To be eligible for the scholarship, students needed to continuously enroll in the El Dorado School District for a minimum of four years, live within the school district boundaries, and graduate from the El Dorado high school.[8] The scholarship was prorated based on the length of enrollment in the school district. Students who spent only four years in the school district received 65% of the scholarship, and students who attended kindergarten through 12th grade in the school district received 100% of the scholarship (Ash & Ritter, 2015; Landrum, 2008). The prorated

[7] For a discussion of first-dollar designs, see pages 26-27.
[8] In February 2013, students were no longer required to live within the El Dorado School District boundaries. This allowed students who were enrolled in the El Dorado School District through the school choice program to be eligible for the promise scholarship (Harten, 2013).

percentages based on the grade of entry are also the same criteria that the Kalamazoo Promise uses - providing another example of policy learning.

As the results of the Kalamazoo Promise became known, policy learning shifts focus from imitation to emulation as the successes of the Kalamazoo Promise were disseminated through informal and formal networks. Miller-Adams (2009) discussed how some outcomes for the Kalamazoo Promise were misrepresented in the media and that these misrepresentations were widely cited by others to promote and advocate for promise programs in their own communities. Primarily, the misrepresentations focused on increases in the high school graduation rate, housing prices, and employment opportunities. However, there is no evidence that the Kalamazoo Promise directly affected high school graduation rates (Miller-Adams, 2009), housing prices (Miller, 2011), or employment opportunities (Miller-Adams, 2009).

Competition

Competition explains the fact that polities choose to adopt policies in order to achieve an advantage over or to avoid being disadvantaged by their peers with whom they often are vying for the same economic resources and human capital (Berry, 1994; Berry & Berry, 1990, 2007; Walker, 1969). For example, states may adopt policies to create state lotteries in order to prevent their citizens from crossing state lines to gamble in neighboring lottery states (Berry & Berry, 1990), or states may choose to reduce their welfare services to avoid creating large in-migrations of poorer individuals from neighboring states (Berry & Baybeck, 2005).

The role of competition may explain the unequal distribution of promise programs across states. Four states (California, Michigan, Illinois, and Wisconsin) contain half of the promise programs in the United States. The high concentrations of promise programs within states and within the Midwest region may reflect communities competing against each other to offer

services and benefits that attract middle-class families, new businesses, human capital, and other desirable resources to their area. In 2009, the State of Michigan allowed communities that either met or exceeded the average state poverty level for families with children under the age of eighteen to apply for promise zone status (Michigan Department of Treasury, 2009). The number of promise zones was capped at 10 (Michigan Department of Treasury, 2009) and promise zone status allowed communities to use part of the state education tax to help fund the promise scholarships (How Promise Zones Work, n.d.; Michigan Promise Zone Authority Act, 2009). Nineteen urban school districts that did not already have a promise-type program in their community met this standard. Nine of the nineteen applied, and eight received promise zone status (Billings, 2018b).[9]

Conformity

Conformity, the final mechanism, refers to the pressure that polities feel to conform to either regional, state, or federal standards and adopt innovative policies that have already been widely adopted by other polities. By adopting these widely disseminated policies, polities are seen as either complying with federal or state mandates and/or implementing best practices (Berry & Berry, 2007; Walker, 1969). This pressure can be viewed as "coercive" when federal or state mandates give polities little choice, but to comply, or this pressure can be viewed as "normative" if leaders within polities are socialized into shared norms through professional training and interactions in professional associations (Berry & Berry, 2007).

In January 2015, President Obama announced the America's College Promise proposal to make the first two years of community college free. Inspired by the efforts in Tennessee and the city of Chicago (The White House, Office of the Press Secretary, 2015), the federal proposal

[9] The remaining six applicants were from school districts that are classified as suburban, town, or rural (Billings, 2018b).

brought additional attention to the free community college movement and created a normative pressure for states to consider their own promise scholarships for their residents. Since the announcement, Oregon, Kentucky, and Minnesota have adopted free community college policies (National Conference of State Legislatures, 2016). New York has expanded beyond free community college and also created promise scholarships to cover up to 100% of tuition for bachelor's degrees at State University of New York system schools (Levine, 2017). In 2016, 10 other states considered legislation to provide free community college for their residents (National Conference of State Legislatures, 2016).

IV. Policy Reinvention and Promise Program Designs

Promise programs are spreading across the nation. As new communities adopt this innovation, the original design of the promise program taken from the Kalamazoo Promise is evolving. In the policy diffusion and innovation literature, this process is known as policy reinvention, and it is defined as the "degree to which an innovation is changed or modified by a user in the process of its adoption and implementation" (Rogers, 1983, p.16-17). Essentially, policy reinvention scholars are interested in measuring and categorizing how later adopters of the innovation depart from the original "mainstream" version of the innovation (Eveland, Rogers, & Klepper, 1977). They also seek to understand why innovations are reinvented as they spread from polity to polity (Hays, 1996a, 1996b).

Policy reinvention tends to happen either during the initial diffusion or through the process of amendment, as it is unlikely for polities to adopt a single, uniform version of the policy (Glick & Hays, 1991). Instead, late adopters learn from early adopters and can use this knowledge and experience to design a more effective version of the policy. In addition, early adopters can learn from their own experience and modify the previously adopted policy to

address any concerns that have arisen during the implementation stage (Glick & Hays, 1991). This process is called social learning and describes how polities learn from previous versions to adopt or modify the innovation (Rogers, 1978; Mooney & Lee, 1995).

Through a process of social learning, Say Yes to Education was able to improve upon their promise program model which was first established in Syracuse, NY to create a promise program in Buffalo, NY in 2012, and Guilford County, NC in 2015. Specifically, Say Yes changed their implementation and fundraising strategies to learn from their experience in Syracuse (and in Buffalo for Guilford County). From Syracuse, they learned to stress the shared governance model and require written commitments from all key stakeholders to build a sense of local ownership, clarify each stakeholder's role in the program, and agree to the overarching strategy to increase postsecondary completion. They also learned to create a data sharing policy and robust data systems so that Say Yes staff was able to monitor student progress and quickly identify students who needed mentoring, tutoring, counseling, or other services to keep them on track to attend college. From Buffalo, Say Yes learned to require 40% advance commitment to the scholarship endowment fund before the program was launched (Frahm, 2016).

The Peoria Promise (in Illinois) also modified their promise scholarship as a result of social learning. The program learned that they were paying an extraordinary amount of money for classes that students stopped attending, but did not withdraw from so they were failing the courses. They decided to move to a tuition reimbursement model to reduce this practice. Under the new model, students were reimbursed at the end of each semester if they passed the course with a C or higher. The director of the program explained how the new model would hold students more "accountable" as they now would have an incentive to pass their courses (Mulhere, 2015).

Research on social learning suggests that policy innovations become more comprehensive in scope as they diffuse to other places (Boehmke & Witmer, 2004; Glick & Hays, 1991; Hays, 1996a; Hays, 1996b; Mooney & Lee, 1995).[10] However, there is no theoretical reason to assume that policies expand in scope, even though multiple research studies empirically confirm this result. Kim and Jennings (2012) argue that later adopting states may decide to adopt *either* comprehensive or restrictive versions of the policy depending on which states they are learning from. In addition, there is no reason to assume that success in one place will immediately translate to success in another place. In fact, there may be differences in the political, economic, social, and institutional characteristics among the states that make emulation difficult or impossible (Kim & Jennings, 2012).

Due to these differences in characteristics among polities, policies may change as they diffuse because the polity needs to adapt the innovation to its particular needs or circumstances. As an explanation for policy reinvention for three state policies with different patterns of diffusion, Hays (1996a) focused on examining the political characteristics of the state (i.e. legislative professionalism[11] and political ideology) and the societal context. He found that less professional states adopt more comprehensive laws, as these states had the opportunity to learn from early-adopting states and to expand upon their policies.

States with greater need tended to adopt weaker versions of the policy. This contradicted what Hays (1996a) originally theorized, but he argued that policymakers behave in a rational manner because they were concerned about adopting new policies or programs when successful

[10] Comprehensiveness is defined as the "breadth and coverage of the language of the law in its effort to remedy the social problem" (Hays, 1996a, p.635-6).

[11] Legislative professionalism is defined as "the capacity of the legislature to perform its role in the policy-making process with an expertise, seriousness, and effort comparable to that of other actors in that process. This involves the extent to which the legislature can command the full attention of its members, providing them with adequate resources to do their jobs in a manner comparable to other full-time political actors, and setting up organizations and procedures that facilitate law-making" (Mooney, 1994, p.70-1).

policy implementation was not guaranteed. If their concerns proved unfounded after implementation, policymakers may strengthen the policy through future amendments.

Promise programs may have moved away from the residence-only promise scholarship of the Kalamazoo Promise due to "meritocratic" dispositions of board members, donors, and/or program staff on which types of students should benefit from the promise scholarships (E. Smith, personal communication, December 29, 2017). In New Haven, the executive director of the New Haven Promise explained, "If the scholarship is too easy to attain, it simply becomes an entitlement and becomes fraught with all the characteristics of such. We require sweat equity in the form of community service as well as good attendance and grades, all ingredients necessary to be successful in college and in life" (New Haven Promise: Annual Scholar Celebration, 2015, p. 2). Similarly in Pittsburgh, the executive director of the Pittsburgh Promise discussed that they require a minimum GPA, "to keep encouraging our kids to drive a little harder, aim a little higher, so they know their performance matters" (Zlatos, 2008, p. 1). Both of these explanations reiterate a "meritocratic" disposition where only students who work hard and are academically successful should benefit from promise programs. Universal promise scholarships, on the other hand, are labeled as "entitlements" to people with this disposition because the scholarships are awarded to students who did nothing (in their eyes) to earn the benefits.

Beyond policy learning and specific values of donors, board members, and program staff, communities may have modified the original design of the first-dollar, residence-only promise scholarship to fit their needs and their circumstances. As most communities could not leverage a group of anonymous donors to fund the scholarships (as was the case for the Kalamazoo Promise), they needed to change the original design to fit their budget. This resulted in a switch from a first-dollar design to a last-dollar design; from focusing on providing scholarships up to a

bachelor's degree to only providing scholarships up to an associate's degree; from narrowing the promise-eligible institutions from any in-state public college or university to several local colleges and universities - or some cases, single promise-eligible postsecondary institutions. In Muskegon, the promise zone modified the original universal design to add a minimum high school GPA of 3.5. This requirement reduced the amount of eligible students, and consequently, the total amount of money that they needed to fundraise (C. Wilbur, personal communication, November 17, 2015).

Miller-Adams (2015) has argued that promise programs have become so wide-spread because it was easy for communities to adapt and modify the design to fit their student population, community needs, and budget. The Michigan promise zones specifically used the flexibility in the state legislation (that created the promise zones) to shape the promise scholarships towards each community and their needs (C. Wilbur, personal communication, November 10, 2015). In addition, Say Yes to Education discussed the importance of responding to the local context when designing the promise scholarship. From their guidebook on implementing the Say Yes program, they stated, "Because every community is unique, the Say Yes approach does not look exactly the same in Buffalo as it does in Syracuse or Guilford County. In each case, the local community has had to exhibit flexibility and to make adjustments as it encountered unexpected challenges" (Frahm, 2017, p. 6).

V. Variation in Promise Program Designs

Given the differences in promise program designs, several researchers have attempted to classify promise programs based on their characteristics (Hemenway, 2017; Miller-Adams, 2015; Perna & Leigh, 2017). Miller-Adams (2015) is the first researcher to classify promise programs. She used two characteristics, student eligibility and eligible postsecondary institutions, to create

four mutually exclusive groups. For student eligibility, she focused on whether the programs are "universal" or "targeted" towards specific students based on academic merit, financial need, or both. For eligible postsecondary institutions, she used the location and number of postsecondary schools to categorize the programs. "Restrictive" programs allowed students to enroll only in local or regional institutions whereas "expansive" programs allowed students to enroll in institutions across either the state or the nation.

Perna and Leigh (2017) and Hemenway (2017) expanded beyond the two-by-two matrix classification system of Miller-Adams and used cluster analysis to group promise programs depending on their characteristics. Perna and Leigh started with more programs than Hemenway (289 versus 185) because Perna and Leigh included programs that were created, but have yet to award scholarships. They also included state-sponsored programs that are usually classified as broad-based merit aid or need-based aid by other education researchers.

Perna and Leigh (2017) created six categories of promise programs for three different models based on a combination of six characteristics: student eligibility, number and type of eligible postsecondary institutions, award structure (first dollar vs. last dollar and whether the award covers 100% of tuition), early awareness, definition of place (i.e. state, city, county, college service district, school district, etc.), and the region where the promise program resides. Hemenway (2017) created three groups of promise programs based on yes/no answers to 12 questions. He used characteristics similar to those used by Perna and Leigh, but sometimes used multiple yes/no questions to define these characteristics. For example, Hemenway used three yes/no questions to define student eligibility while Perna and Leigh used only one question.

The main difference between their classification systems is that Hemenway found that the type of promise program sponsorship (i.e. the state, postsecondary institution, or community)

was critical in the classification of programs, and he labeled them solely by their sponsorship. On the other hand, Perna and Leigh reported that multiple characteristics were important in their cluster analysis and used five characteristics (the type of promise program, the value of benefits, level of postsecondary institution, student eligibility criteria, and early awareness status) to classify and name their promise program groups.

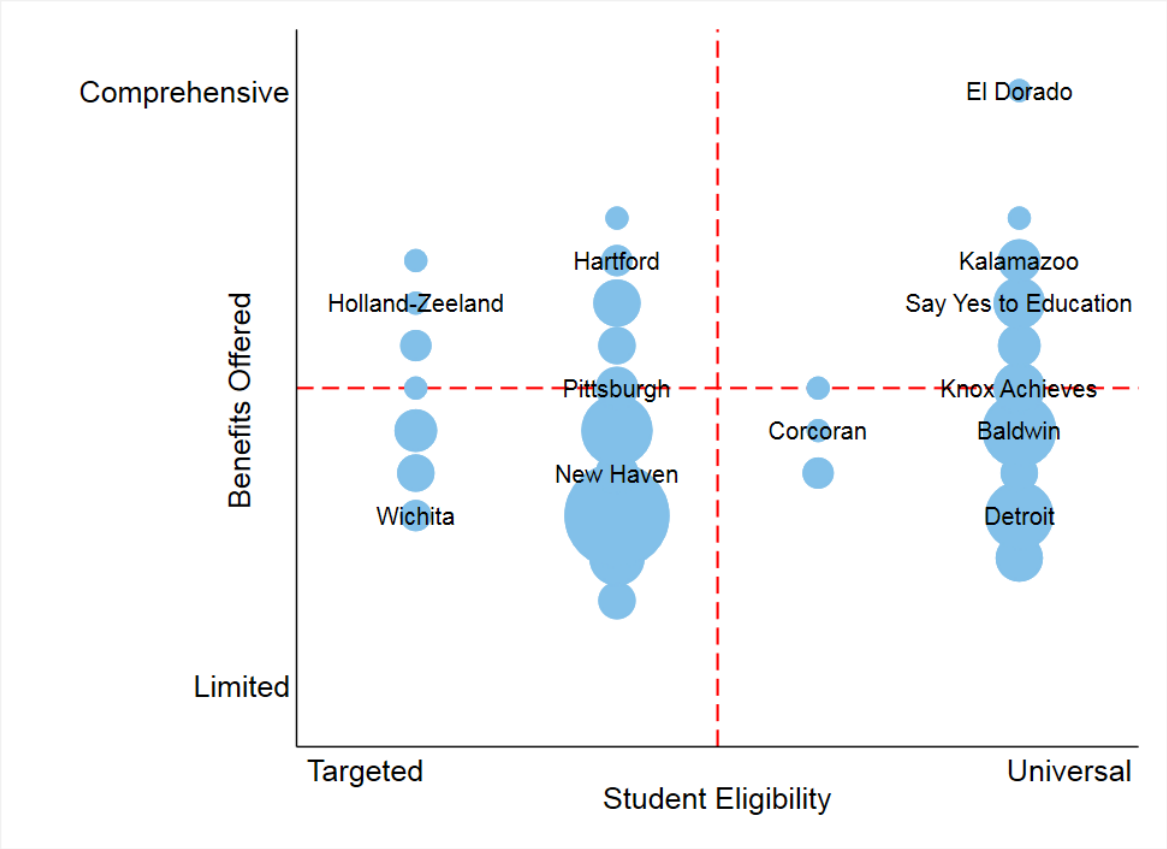
These researchers (Hemenway, 2017; Miller-Adams, 2015; Perna & Leigh, 2017) focused on the variation between promise programs designs by classifying the promise programs based on several of their characteristics. However, the variation within the groups is lost because programs that were similar on two or three characteristics were placed in the same group even though the overall effect of the program on students may be different. I address this gap in the literature to visually display the variation within *and* between promise program designs.

To visually display the variation in designs, I create two latent constructs based on student eligibility criteria and the benefits offered to eligible students. I selected these two characteristics because they directly affect student outcomes as they determine which students are eligible and the financial support that promise students receive while in college. I assigned the 140 promise programs values on the two latent constructs. On an x-y coordinate plane, I plotted each program based on its values for student eligibility and benefits offered to visualize the heterogeneity among promise programs. Ultimately, I use this visualization of promise program designs as a framework to summarize the current literature and to explain the mixed results of the effect of different promise programs on educational outcomes.

Figure 1.3 displays the plot of promise programs on the x-y coordinate plane, with student eligibility along the x-axis and benefits offered along the y-axis. The values on the x-axis represent whether the scholarship is “universal” - only requiring students to reside in specific

places - or “targeted” towards specific types of students within those places. The values on the y-axis represent whether the benefits offered to eligible students are “comprehensive” or “limited.” The most “comprehensive” benefits cover the cost of attendance at any four-year or two-year postsecondary institution in the United States, whereas the most “limited” benefits cover only a portion of the tuition at the local community college. I explain how I calculated both the student eligibility and the benefits offered indexes in subsections A and B.

Figure 1.3 Heterogeneity of design among promise programs



The size of the blue circles on the graph represents the number of programs for each x-y coordinate pair. The larger the circle, the greater the number of promise programs located at the x-y coordinate pair. I also identify some of the promise programs by name, trying to select the more well-known promise programs (when possible) to provide additional context for the location of different promise programs on the x-y coordinate plane.

A. Promise Program Designs: Who is Eligible?

I calculated the student eligibility index based on two criteria: (1) the type of eligibility criteria for the scholarship and (2) whether there is a cap on the number of students who can receive the scholarship each year. Positive values represented programs that strive to be "universal" by using criteria that select the largest number of students within the promise area whereas negative values represented programs that "target" students within the promise area by using additional criteria to reduce the number of eligible students. If the promise program only required residency, the program received a value of one. If the promise program required additional criteria, such as academic merit, financial need, school attendance, community service, evidence of good behavior, etc., the program received a value of negative one.

I also included whether there is an enrollment cap on the number of students who can accept the scholarship since this may influence students' decision-making on whether they expect to receive financial support from the program to attend college. If the eligibility criteria were easily met by many students in the promise area *and* only a small proportion of students could have accepted the scholarship, students may have felt that the promise of a college scholarship rung hollow as the competition for the award may lower their expectations of receiving the scholarship. For example, the Corcoran Promise requires only that students attend and graduate from the local high school to be eligible for free tuition in their first year at West Hills College. However, the number of promise recipients was capped at 12 out of 192 students for the graduating class of 2016 (Corcoran High School Self Study Report, 2017), at least in the pilot year. If we assume that all 12^{th} graders are eligible for the Corcoran Promise, only 6% can receive the scholarship. This low probability of receipt may be a weak inducement to change students' expectations that they can afford to attend college. Therefore, promise programs like

the Corcoran Promise received a value of zero if they have an enrollment cap, and promise programs without an enrollment cap received a value of positive one.

The two values were added together to create the student eligibility index. Since some programs had a value of zero, I avoided plotting programs directly on the y-axis by adding negative one to programs with student eligibility indexes of less than or equal to zero. Therefore, there were four discrete values ranging from negative two to positive two. Programs with a value of negative two were the most targeted as they have enrollment caps and require additional eligibility criteria beyond residency. There were 14 programs within this category and many of the students were selected through a competitive admissions process. Programs with a value of negative one had no enrollment caps, but they required additional eligibility criteria. This was the most popular category of promise programs with 68 programs in this group (or 49% of promise programs). This category contained the well-known merit-based promise programs, i.e. the Pittsburgh Promise and the New Haven Promise.

The smallest category of promise programs with a value of positive one used residency only criteria, but capped the number of students that can receive the scholarship. There were only four programs within this group, and students were usually selected either by a lottery or on a first-come, first-serve basis. The enrollment cap for these promise programs ranged from 4 to 800 recipients, and one promise program, the Rockford Promise, changed the maximum enrollment number for each cohort depending on funding.

The last category of promise programs with a value of positive two was the most universal category, as these programs use residency-only criteria and have no enrollment caps. This was the second largest student eligibility category with 54 programs or 39% of promise

programs. Within this group were the most well-known and oldest programs, such as the El Dorado Promise and the Kalamazoo Promise.

B. Promise Program Designs: What are the Benefits?

There was a large amount of variation in the generosity and flexibility for the terms of the promise scholarships. In the front end, promise programs usually restrict students to specific types of institutions (either community colleges or four-year universities) and by consequence, the level of their degree (i.e. associate degree or bachelor's degree). They also determined if students can use the scholarship to pay for living expenses such as room, board, and transportation or just educational expenses such as tuition, fees, computers, and books. Some promise programs indexed their maximum scholarship amounts to the combined total of the tuition and fees or to the overall cost of attendance (includes room, board, books, and transportation in addition to tuition and fees). Therefore as prices increased, the scholarship awards automatically adjusted to cover the costs. Other promise programs just offered students awards up to a maximum amount that were not affected by changes to the educational expenses of the postsecondary institution.

These programmatic decisions are important because they directly affect the overall cost of college and may influence a student's decision to enroll or stay in college. Miller-Adams's (2015) two-by-two classification matrix of promise programs focused on the number and location of eligible postsecondary institutions to determine whether the promise program was "restrictive" or "expansive." To expand beyond examining just the number and location of eligible postsecondary institutions, I incorporated four criteria to determine whether the scholarship benefits were "comprehensive" or "limited" in scope. The four criteria I used were the type, number, and location of eligible postsecondary institutions; whether the scholarship was

either a first-dollar or last-dollar design; what expenses the scholarship could pay for; and whether the maximum scholarship amount was indexed to tuition. I assigned each of the four criteria positive values representing "comprehensiveness" and negative values representing "limitedness." I added the four criteria together to create the benefits offered index, which ranged from positive seven to negative five. Promise programs with more "comprehensive" benefits allowed students to use the promise scholarship at multiple institutions, couple the scholarship with federal and state grant aid to receive more money, and apply the scholarship dollars to the cost of attendance. Promise programs with "limited" benefits allowed students to use the scholarship to pay for a portion of tuition at the local community college if the students were not eligible for federal or state grant aid.

For eligible postsecondary schools, I assigned values based on the type, number, and location of postsecondary schools in which students could choose to enroll. Promise programs that allowed students to enroll in local community colleges received a value of negative two, local four-year universities received a value of negative one, any in-state community colleges received a value of positive one, any in-state four-year universities received a value of positive two, and any postsecondary institutions nationwide received a value of positive three. Approximately 60% of promise programs (83 programs) restricted students to the local community colleges and 7% (10 programs) allowed students to enroll in any postsecondary institution across the nation.

The choice between first-dollar or last-dollar scholarship designs is important because it directly affects whether students who are eligible for financial aid receive money from the promise program. Promise programs with first-dollar designs apply scholarship dollars to the tuition bill *first*, before federal and state grant aid. This design allows low-income students to

receive more money than they would otherwise have received as they are able to couple their promise scholarship dollars with federal and/or state grant aid to cover the cost of attendance. These programs received a value of positive one.

Promise programs with last-dollar designs tend to subsidize middle- or high-income students that are not eligible for federal and/or state grant aid, because scholarship dollars are applied *last,* after this grant aid is exhausted. If the grant aid covered 100% of tuition and fees, promise students typically received no money from the promise program unless they can use the promise scholarship for other expenses such as books, transportation, computers, room, and board. This was not typical and only 37 promise programs with a last-dollar design allowed for this provision. These last-dollar promise programs received a value of negative one. Approximately three quarters of promise programs (107 programs) had a last-dollar design.[12] Typically, promise programs choose a last-dollar design because they require fewer financial resources to sustain, as federal and state grant aid help to fund the majority of the promise students.

Another essential aspect of the benefits offered was the type of expenses the scholarship can be used to pay for. Promise scholarships that covered just tuition received a value of negative two, and promise programs that covered tuition and fees received a value of negative one. Over half of promise scholarships (56% or 78 programs) covered tuition and fees and 14 programs just paid for tuition.

There were 40 promise programs (29%) that allowed all students to use the scholarships to pay for expenses beyond tuition and fees. Promise programs that covered other educational expenses, such as books or computers, received a value of positive one, and promise programs

[12] There are eight promise programs whose timing for applying scholarship dollars to the tuition bill is not clear. They are coded as zero.

that covered room and board receive a value of positive two.[13] There were 27 programs that covered other educational expenses and 13 programs that covered room and board.

I also examined whether the maximum promise scholarship was a flat amount or was indexed to tuition. Promise programs that offered a flat amount received a value of negative one, and promise programs that indexed their scholarship amounts to tuition received a value of positive one. The majority of promise programs (95 programs or 68%) indexed their maximum award amounts to tuition (or to tuition, room, and board in the case of Give Something Back Foundation). For those promise programs that offered a flat amount, the awards range from $250 to $25,000 per year, with an average award of $4,239.[14] There were three promise programs that combined this approach and offered either an amount indexed to tuition for low-income students or a flat amount for non-low income students.

There is considerable range in the values for the benefits offered index in 3 out of the 4 student eligibility categories (targeted with enrollment caps, targeted, and universal) for promise program designs. This suggests that they may be differences in the effects of these programs on educational outcomes even though the promise programs may have similar student eligibility criteria. In the next section, I group promise programs by student eligibility categories to summarize the extant literature, focusing on experimental or quasi-experimental research studies that evaluated the effect of promise programs on K-12 and postsecondary education outcomes. I then discuss why there are mixed results for promise programs, using Figure 1.3 as a guiding framework.

[13] There were six promise programs that offered book stipends, fee waivers, or additional funds for specific groups of students within the promise area, typically Pell recipients, and were coded as zero. In the case of two promise programs, it was unknown what the scholarship was allowed to pay for, and they were also coded as zero.
[14] I used original awards for promise programs that changed award amounts over time. When applicable, I used the maximum amount offered to students for four-year college enrollment if promise programs offered different scholarship amounts to students depending on the level of the postsecondary institution that they enrolled in.

VI. Summary of Promise Program Literature: Mixed Results?

This section summarizes the extant literature that evaluates the effect of promise programs on educational outcomes for each student eligibility category. I grouped the promise programs based on student eligibility criteria because it determined how many students were eligible for the promise scholarship which I hypothesize is related to whether the promise program affected the college access or the college choice margins. If the majority of students were eligible for the promise scholarship because the eligibility criteria were easy to meet ("universal"), this suggests that there may be larger effects of the promise scholarship on the college access margin. If the majority of students were not eligible because the eligibility criteria were based on specific goals such as academic merit or financial need ("targeted"), this suggests there may be larger effects of the promise scholarship on either the college choice or the college access margins depending on the targeted population of students.

Ideally, I would use all four student eligibility categories, but there were no research studies on the 18 promise programs with enrollment caps. Therefore, I examined only the promise programs without enrollment caps (122 programs) and summarized the findings based on whether the programs were classified as "targeted" or "universal." There are 68 promise programs that are classified as targeted (49%) and 54 promise programs that are classified as universal (39%).

To frame my analysis, I suggest that the benefits offered index for each promise scholarship is correlated with the research findings. I hypothesize that promise programs with benefits offered indexes above zero are more likely to have a positive effect on the educational outcomes, as the benefits offered are flexible and generous enough to induce more students to change their behavior and enroll in college. On the other hand, promise programs with benefits

offered indexes at or below zero have no effect on educational outcomes because the benefits offered are too limited to motivate students to enroll in college. I also use this framing to contextualize why some promise programs have large, positive increases in postsecondary outcomes, whereas other promise programs have smaller, modest increases in postsecondary outcomes. Essentially, the more generous and flexible the benefits offered to students (i.e. the larger the program's value on the benefits offered index), the greater the impact the promise program should have on the educational outcomes of its students.

In the following subsections, I describe and summarize the quasi-experimental and experimental research on targeted and universal promise programs. I then discuss the estimates of the effect of the promise programs on education outcomes in relation to their values on the benefits offered index to provide context as to why certain promise programs are more effective than others in increasing the educational attainment of their students. To avoid being repetitive, I do not thoroughly critique the methodology of these studies nor do I discuss their limitations as I focus on those issues in the literature review sections of chapters two and three.

To find the relevant literature, I searched for articles in Google Scholar, ERIC, and Educational Abstracts using the following combination of key words: "promise," "scholarship", "place-based," "free college," "financial aid," "higher education," and "postsecondary." I searched the names of well-known promise programs such as the Kalamazoo Promise, El Dorado Promise, New Haven Promise, and Pittsburgh Promise as these programs were often mentioned as examples when researchers, policymakers, and administrators described the definition of a promise program. I also searched by names of researchers/organizations that are well known for their work on promise programs (i.e. W. E. Upjohn Institute for Employment Research,

PennAhead, Michelle Miller-Adams, Timothy Bartik, Gabriella Gonzalez, Robert Bozick) among others.

After reviewing the abstracts or in some cases the full text of the articles that I collected, I narrowed the list by using the following criteria: (1) research that used only experimental or quasi-experimental methodology, as I am interested in the estimates of promise program effects, and (2) articles that focused on K-12 and/or postsecondary outcomes. Given that promise programs are fairly new, I did not want to limit the literature to only published material, so I included working papers in my review of the literature.[15] Thus, I reviewed 16 articles which represented two targeted promise programs (New Haven Promise and Pittsburgh Promise) and five universal promise programs (Kalamazoo Promise, El Dorado Promise, Knox Achieves, Say Yes to Education - Syracuse, and Say Yes to Education - Buffalo). Two out of the five universal promise programs (El Dorado Promise and Say Yes to Education) have evaluations of only K-12 educational outcomes and one out of the five universal promise programs (Knox Achieves) has an evaluation of only the postsecondary outcomes.

A. Targeted Promise Programs

Pittsburgh Promise and New Haven Promise target students based on academic merit and attendance behavior in high school. Students must have at least a 90% attendance record, continuously enroll in the district from 9th grade and graduate from one of the district's high schools, and earn at least a 2.5 grade point average[16] for Pittsburgh (Bozick, Gonzalez, & Engberg, 2015; Gonzalez, Bozick, Tharp-Taylor, & Phillips, 2011) or 3.0 grade point average for New Haven (Daugherty & Gonzalez, 2016; Gonzalez, Bozick, Daugherty, Scherer, Singh,

[15] I found several dissertations on promise programs, but they used qualitative methods for their analysis primarily employing focus groups or one-on-one interviews with promise recipients. Since they did not use quasi-experimental or experimental methods, I did not include them.

[16] The first two cohorts (2008 and 2009) had a lower GPA requirement of 2.0 and 2.25, respectively (Gonzalez, Bozick, Tharp-Taylor, and Phillips, 2011).

Suarez, & Ryan, 2014). New Haven Promise also has two additional eligibility criteria: no expulsions on the student's school record and the completion of 40 hours of community service in high school (Daugherty & Gonzalez, 2016; Gonzalez et al., 2014).

Both programs offer last-dollar college scholarships to any in-state public or private postsecondary institution. The maximum scholarship amount depends on the student's cohort year, whether the college or university is public or private, and the number of years of continuous enrollment within the district. The maximum scholarship amounts for both programs changed depending on the year that the student graduated from high school (Gonzalez et al., 2011, 2014).

New Haven chose to roll out the benefits over three cohorts, starting with a maximum scholarship amount of $2,500 per year and adding $2,500 to each cohort after the first class. The Class of 2014 was the first cohort to receive 100% benefit of the scholarship, or $10,000 per year (Daugherty & Gonzalez, 2016; Gonzalez, 2014). The Pittsburgh Promise offered a maximum scholarship amount of $5,000 per year for the first four cohorts (Classes of 2008-2011) and then increased the amount to $10,000 per year for the 5th through 9th cohorts (Classes of 2012-2016; Bozick et al., 2015; Gonzalez et al., 2011). Due to budget concerns, the Pittsburgh Promise had to decrease the maximum scholarship amount to $7,500 per year for students in the tenth cohort and later (Classes of 2017 and beyond; Polke, 2015).

The benefits offered index was zero for the Pittsburgh Promise and negative two for the New Haven Promise. For three out of the four criteria, the programs had the same values, as they were both last-dollar scholarships with maximum fixed scholarship amounts that can be used at in-state colleges and universities. The programs had different values on the benefits offered index because Pittsburgh students could use the scholarship to pay for tuition, fees, books, room,

and board (Gonzalez et al., 2011) whereas New Haven students could use the scholarship only for tuition (Gonzalez et al., 2014).

Estimates for K-12 Outcomes

There are several studies on the initial cohorts for the Pittsburgh and New Haven Promises. Among them, two groups of researchers estimated the effect of the Pittsburgh Promise on school enrollments (Gonzalez et al., 2011) and the effect of the New Haven Promise on standardized test scores and high school dropout rates (Gonzalez et al., 2014). Both research studies compared the outcome in the pre-promise years to the outcome in the post-promise years for students within the public school district. The analysis for Pittsburgh Promise, however, did not include a comparison group of students. Consequently, the researchers were not able to isolate the effect of the promise program on school enrollment. Instead, they described the trend in enrollments before and after the promise program started.

Gonzalez et al. (2011) graphed the trends in overall enrollment, persistence, and entrance of new students from 5^{th} grade to 12^{th} grade within the Pittsburgh Public Schools. There were no changes in overall enrollment or persistence of students between the pre- and post-promise years. In the post-years, however, there were more new students in 10^{th} and 11^{th} grade and fewer new students in 9^{th} grade. This result was puzzling because it contradicted what one would expect given the eligibility criteria for the scholarship. More students should enter in 9^{th} grade as they were still eligible for the scholarship, and fewer students should enter in 10^{th} and 11^{th} grade because those students were ineligible for the scholarship. The researchers did not have a clear explanation for this unexpected finding, but perhaps a comparison group of students in other school districts could shed light on this result if there were similar trends across the state.

Gonzalez et al. (2014) examined achievement gaps and high school dropout rates for the New Haven Promise. For achievement gaps, Gonzalez et al. compared the district-level math and reading test scores of students from 3rd grade through 8th grade on the Connecticut Mastery Test and the district-level math and reading test scores of 10th graders on the Connecticut Academic Performance Test for pre- and post-promise cohorts. Since New Haven Public Schools was unlike most of the school districts in the state, Gonzalez et al. created a synthetic control group from a set of school districts across the state, weighing the demographic, socioeconomic, and academic characteristics of the district in order to match the student body in the New Haven Public Schools.

While researchers observed increases in math and reading achievement scores for the New Haven Public School students, there was also an overall increase in achievement scores in the set of comparison school districts during the same time period. Therefore, Gonzalez et al. found no significant changes in math or reading achievement for elementary, middle, or high school students in New Haven in relation to the comparison school districts. They also examined the dropout rate of 9th to 12th graders in New Haven Public Schools to the set of comparison school districts. Similar to the trends in achievement, there were no differences in the dropout rate in the pre-promise years compared to the post-promise years.

Estimates for Postsecondary Outcomes

The Pittsburgh and New Haven Promises had no effect on increasing the overall college enrollment of students. For the Pittsburgh Promise, there are three studies that examined college enrollment (Bozick et al., 2015; Gonzalez et al., 2011; Page & Iriti, 2015). Bozick et al. (2015) and Gonzalez et al. (2011) used a difference-in-differences approach to estimate the effect of the Pittsburgh Promise on college enrollment for the first three classes of the promise. They

compared students who were eligible for the promise to those who were ineligible for the promise within the Pittsburgh Public Schools for pre- and post-cohort students. Slightly less than half of the students (49%) were eligible for the promise in the first three years. While the researchers found no effect of the Pittsburgh Promise on the college access margin (Bozick et al., 2015; Gonzalez et al., 2011), there was evidence that the promise affected the college choice margin by increasing the attendance at four-year colleges and universities within the state (Bozick et al., 2015).

Gonzalez et al. (2011) also examined the effect of the Pittsburgh Promise on the persistence of students in college. They defined persistence as enrollment in a postsecondary institution for two consecutive years after high school graduation. While ineligible students within the Pittsburgh Public Schools had a decrease in their college persistence over time, students who were eligible for the promise maintained the same relative persistence rate in the pre-promise years as they did in the post-promise years. This suggests that the Pittsburgh Promise may have helped to buffer students from this downward persistence trend that other students in the district experienced.

Page and Iriti (2015) examined changes in college access and choice margins attributable to the Pittsburgh Promise. They theorized that the generous benefits of the Pittsburgh Promise gave students more college choice options and should have reduced the rate of undermatching because students can now afford to attend more expensive and selective schools. They define undermatching as enrolling in colleges and universities with lower institutional selectivity than the students' academic credentials warranted. A student undermatched if he attended a postsecondary institution that has a median SAT score that is more than 15 percentile points below the student's SAT score.

Since the Pittsburgh Promise has a minimum GPA requirement, Page and Iriti (2015) exploited this cut off to compare students who were just over the grade point average eligibility threshold to students who were just below this threshold on the college access and choice margins. The students right below the threshold served as a comparison to what could have happened if the treated students had not been eligible for the Pittsburgh Promise. Since the required grade point average changed incrementally from 2.0 to 2.5 over several classes of promise students, Page and Iriti conducted separate regression discontinuity analyses for the four phases of eligibility requirements.

Overall, Page and Iriti (2015) confirmed the results from Gonzalez et al. (2011) and Bozick et al. (2015), who found that the Pittsburgh Promise increased the enrollment of students at four-year universities and increased students' persistence to their second year of college. However, the results for the effect of the Pittsburgh Promise on college undermatch were more ambiguous and mixed. For 3 out of the 4 eligibility phases, there was no evidence that the Pittsburgh Promise impacted undermatching. Only eligible students from the last phase were marginally less likely to undermatch by two percentage points.

Page and Iriti (2015) also estimated the effect of the Pittsburgh Promise on undermatching by students' socioeconomic status. Low-income students may react more strongly to the offer of the promise scholarship and enroll in more expensive and selective institutions because their concern about paying for college is either reduced or eliminated. However, the empirical results did not confirm their hypothesis as there was no evidence that the Pittsburgh Promise changed the rate of undermatching for low-income students. The researchers explained that the minimum grade point average to be eligible for the Pittsburgh Promise was relatively low for selective institutions (range of 2.0 to 2.5 depending on the eligibility phase).

While students may have performed well on the SAT exam which was used to determine whether they undermatched to their enrolled institution, their high school grade point averages might have been too low for selective colleges to offer them admission.

There were two research studies that examined the effect of the New Haven Promise on college enrollment (Daugherty & Gonzalez, 2016; Gonzalez et al., 2014). Gonzalez et al. (2014) used a difference-in-differences approach to compare eligible and ineligible high school graduates from the New Haven Public Schools in pre- and post-promise cohorts. They found that eligibility status made no difference in postsecondary enrollment rates for the post-promise cohorts and concluded that the New Haven Promise did not affect overall college enrollment - at least for the initial two classes of promise students.

Daugherty and Gonzalez (2016) used a regression discontinuity design to estimate the effect of the New Haven Promise on college enrollment. Since students were required to earn a 3.0 high school grade point average to be eligible for the promise scholarship, Daugherty and Gonzalez compared students right above this grade point average threshold who were eligible for the scholarship to students right below this grade point average threshold who were not eligible for the scholarship. The assumption was that students were randomly distributed around the 3.0 grade point average cut-point and whether they fell above or below the cut-point was systematically unrelated to characteristics that were correlated with their enrollment in college.

Daugherty and Gonzalez (2016) found an increase in college access between seven to eight percentage points and an increase in any public college or university enrollment between eight to fourteen percentage points. However, their estimates varied widely depending on the model specifications. They coupled the regression discontinuity analysis with a difference-in-differences approach to determine whether they could find the same overall trends in college

enrollments. Like Gonzalez et al. (2014), they compared eligible and ineligible students within the New Haven Public Schools in pre- and post-promise years. While Daugherty and Gonzalez had one more year of promise-eligible students, they found the same result - there was no effect of the New Haven Promise on college enrollment. Given the mixed results from the regression discontinuity analysis and the no-effect finding from the difference-in-differences analysis, they concluded that there was a lack of evidence to suggest that the New Haven Promise increased college enrollment.

Summary

Table 1.1 displays the summary of the estimates for the impact of Pittsburgh Promise and New Haven Promise on K-12 and postsecondary educational outcomes along with their values on the benefits offered index. There was no evidence that the Pittsburgh Promise affected K-12 enrollment or persistence (Gonzalez et al., 2011), and no evidence that the New Haven Promise affected academic achievement or high school dropout rates (Gonzalez et al., 2014). The only change in K-12 outcomes in the post promise years was the decrease in new students enrolling in the Pittsburgh Public Schools in 9th grade and an increase in new students enrolling in 10th and 11th grades (Gonzalez et al., 2011). Given that this finding contradicted eligibility for the Pittsburgh Promise, it is likely that this pattern is not directly related to the scholarship.

Table 1.1 Summary of targeted promise programs on educational outcomes with their benefits offered index value

	Benefits Offered Index	K-12 Outcomes	Postsec Outcomes
Pittsburgh Promise	0	n.s. enrollment n.s. persistence	n.s. access + choice
New Haven Promise	-2	n.s. acad achievement n.s. hs drop out	n.s. access

Notes. n.s. stands for not (statistically) significant. hs stands for high school.

There also was no evidence that the Pittsburgh and New Haven Promises increased college access (Bozick et al., 2015; Daugherty & Gonzalez, 2016; Gonzalez et al., 2011, 2014). Although, there was some evidence that the Pittsburgh Promise may have impacted college choice as there was an increase in the percent of eligible students attending in-state four-year universities in the post-period (Bozick et al., 2015). Also, eligible students were more likely than ineligible students to persist to their second year of college so the scholarship may have helped in retaining students once they were in college (Gonzalez et al., 2011). Overall, these findings were consistent with the impacts that I hypothesized - modest to no evidence of an effect, given that the benefits offered index was zero for the Pittsburgh Promise and negative two for the New Haven Promise.

B. Universal Promise Programs

The universal promise programs base their student eligibility criteria solely on place. Students need to attend school in a specific school district, live in a particular geographic area, or meet both requirements to be eligible for the promise scholarship. The El Dorado Promise, Kalamazoo Promise, Knox Achieves (Knox County, Tennessee), and Say Yes to Education (Buffalo or Syracuse, New York) require students to attend school in the local public school district. In addition, Kalamazoo Promise and Say Yes to Education require students to live within either the boundaries of the school district for the Kalamazoo Promise (Bartik, Eberts, & Huang, 2010; Miller-Adams, 2009) or within the boundaries of each city for Say Yes to Education (Sohn, Rubenstein, Murchie, & Bifulco, 2017).

The scholarship is prorated based on length of attendance in the school district for El Dorado, Kalamazoo Promise, and Say Yes to Education - Buffalo. Students need to enter the school district in kindergarten to receive 100% of the scholarship. Students who enter in 9th

grade, the last grade of entry for eligibility, receive 65% of the scholarship (Ash & Ritter, 2015; Bartik et al., 2010; Sohn et al., 2017). Knox Achieves and Say Yes to Education-Syracuse, on the other hand, offer 100% of the scholarship to all eligible students (Carruthers & Fox, 2016; Sohn et al., 2017). Students need to enter in 12th grade for Knox Achieves (Carruthers & Fox, 2016) and in 10th grade for Say Yes to Education - Syracuse (Sohn et al., 2017).

Each universal promise program differs as to which institutions are eligible for promise scholarship dollars. Students can use the scholarship at any in-state community college for Knox Achieves (Carruthers & Fox, 2016), at any in-state public college or university for Kalamazoo Promise (Bartik et al., 2010; Miller-Adams, 2009), and at any two-year or four-year college or university nationwide for the El Dorado Promise (Ash & Ritter, 2015). For both locations of Say Yes to Education, students can enroll at any State University of New York (SUNY) school or any City University of New York (CUNY) school as well as approximately 90 private universities across the nation (Sohn et al., 2017).

The five universal promise programs also differ when it comes to what expenses students can use the scholarship for. Knox Achieves and Kalamazoo Promise cover just tuition and fees (Bartik et al., 2010; Carruthers & Fox, 2016), while El Dorado Promise covers tuition, room, board, books, and transportation (Ash & Ritter, 2015). The Say Yes to Education programs cover tuition for all eligible students and offer stipends up to $2,000 to pay for room and board to Pell Grant eligible students who live on campus at either SUNY or CUNY schools (Sohn et al., 2017).

Only two out of the five universal promise programs (El Dorado and Kalamazoo) applied scholarship dollars before federal and state grant aid. These first-dollar scholarships index their scholarship amounts to tuition and fees (Miller-Adams, 2015). Say Yes to Education and Knox

Achieves are last-dollar scholarships. Knox Achieves indexes their maximum scholarship amount to tuition and fees (Carruthers & Fox, 2016), whereas Say Yes to Education indexes their maximum scholarship amount to tuition for students who enrolled in one of the CUNY or SUNY schools or for students from low-income families (defined as families that earn less than $75,000 per year) who enrolled in one of the private institutions. Students with family incomes above $75,000 who enrolled in one of the private institutions are offered up to $5,000 per year (Sohn et al., 2017).

The benefits offered index for the five universal promise programs ranged from zero to positive seven. El Dorado had the highest benefit offered index at seven, followed by Kalamazoo Promise (three), Say Yes to Education - Buffalo and Say Yes to Education - Syracuse (both at two), and Knox Achieves (zero). Based on these values, I hypothesis that 4 out of the 5 promise programs should be expected to increase the educational attainment of students within the promise area because the terms and conditions of the scholarships were generous enough to induce students to enroll in postsecondary schools. Knox Achieves may not have an effect on the educational attainment of its students because the value the program received on the benefits offered index put it in the center of the continuum.

Estimates for K-12 Outcomes

On the K-12 level, the research on the effect of the universal promise programs focused on changes in K-12 enrollments (Bartik et al., 2010; Hershbein, 2013; Miller, 2011; Sohn et al., 2017), academic achievement (Ash & Ritter, 2015; Bartik et al., 2010; Bartik & Lachowska, 2013; Miller, 2011), credit accumulation (Bartik & Lachowska, 2013), high school graduation (Ash & Ritter, 2015), and student behavioral problems such as suspensions and expulsions (Bartik & Lachowska, 2013). Four out of the six studies examined the Kalamazoo Promise

(Bartik et al., 2010; Bartik & Lachowska, 2013; Hershbein, 2013; Miller, 2011). The remaining two studies were on the El Dorado Promise (Ash & Ritter, 2015) and Say Yes to Education in Syracuse and Buffalo (Sohn et al., 2017).

Bartik et al. (2010), Hershbein (2013), and Miller (2011) examined changes in K-12 enrollments in the Kalamazoo Public Schools. Overall, the Kalamazoo Promise increased student enrollments in the public school district by attracting new students into the district and retaining students that might otherwise have left (Bartik et al., 2010; Hershbein, 2013; Miller, 2011). Miller compared enrollment changes in the Kalamazoo Public Schools to three comparison groups: other public school districts in Kalamazoo County, a set of eight public school districts that had student enrollments of similar size to that of Kalamazoo in 2005, and all public school districts across the state. When comparing Kalamazoo Public Schools to school districts that were either similar in size or were located in the same county, Kalamazoo increased their enrollment by 1,000 to 2,000 students in the post-period. This represented a seven to twenty percentage point increase for Kalamazoo.

Student enrollment increased in every grade except for grades ten and eleven as students would be ineligible for the Kalamazoo Promise because they entered the district too late (Bartik et al., 2010; Hershbein, 2013; Miller, 2011). Hershbein (2013) provided evidence that the increase in overall student enrollments was due to a surge of students entering the school district in the first year of the promise. This surge in new students (approximately 40% increase) eventually leveled off and returned to pre-promise trends in the second to 5th year of the Kalamazoo Promise. Approximately 50 to 60% of new students in the first year of the promise came from local school districts, a quarter came from outside of the state, and the rest from either local private or charter schools.

The large increases in the overall student enrollment did not substantially alter the racial composition of the student body. Black, White, and Latino students were equally attracted to the Kalamazoo Public Schools by the Kalamazoo Promise (Bartik et al., 2010; Miller, 2011). There was some evidence that the Kalamazoo Promise attracted higher income and better prepared students in the earlier years of the promise (Hershbein, 2013). Students who entered the Kalamazoo Public Schools were seven percentage points less likely to be eligible for free and reduced lunch and more likely to score in the 85th percentile or above on the state standardized test scores. However, these students were not positively sorting into schools within the district for the first year of the promise. Instead, new students were enrolling in both high and low performing schools (Hershbein, 2013; Miller, 2011). In the second and third years of the Kalamazoo Promise, however, there was evidence that students were sorting into schools with fewer poor students (Hershbein, 2013) and schools with higher test scores (Hershbein, 2013; Miller, 2011).

Sohn et al. (2017) examined changes in K-12 enrollments in Syracuse City School District and Buffalo City School District. They compared the enrollment trends in Syracuse and Buffalo to enrollment trends in a similar school district, Rochester City School District, to isolate the effect of the Say Yes to Education programs. Since Buffalo started four years after Syracuse, the researchers used Buffalo as an additional comparison school district for Syracuse. To check the sensitivity of their results, Sohn et al. also created a synthetic control group.

There were positive increases in the school enrollments for Buffalo and Syracuse. Buffalo experienced a 6-8% increase in enrollment in the post-promise years and Syracuse experienced 1-3% increase in enrollment in the post-promise years. However, the enrollment estimates from Syracuse were not statistically different from zero. Sohn et al. also examined the

enrollment trends in the surrounding areas to identify the source of the new students into the school districts. For Buffalo, new students were coming from primarily private schools and, unlike the new students entering Kalamazoo, were selectively enrolling in middle and high performing district schools for the first two post-promise years. Both students of color and White students increased their enrollment in the district by 9.5% and 6.6%, respectively. For Syracuse, new students were coming from the surrounding suburban schools and selectively enrolling in middle and high performing district schools for all three post-promise years. While a higher percentage of White students enrolled in the district than did students of color, this did not significantly alter the original racial composition of the student body.

Bartik and Lachowksa (2013) examined the effect of the Kalamazoo Promise on student achievement, behavior, and credit accumulation for the same students before and after the Kalamazoo Promise was announced in November 2005. They compared eligible students to ineligible students two years before the promise and three years after the promise. Overall, the Kalamazoo Promise reduced the number of days students spent in suspension by 1 to 2 days. This is an effect size of 0.11-0.15 standard deviations. It also increased the probability of students' earning credits in the year 2007-2008 (two academic years after the announcement) by eight percentage points. There was no effect of the Kalamazoo Promise on high school grade point averages for the overall sample.

The Kalamazoo Promise seemed to have more of an impact on promise eligible Black students compared to the overall sample (Bartik & Lachowska, 2013). The high school grade point average for promise eligible Black students increased by 0.17 standard deviations the year of the announcement, to 0.28 standard deviations one year after the announcement, and finally to

0.63 standard deviations two years after the announcement. Promise eligible Black students also spent two to three fewer days in detention in the post-promise years.

While these estimates were large and positive, researchers need to interpret them cautiously as the estimates may not be measuring solely the effect of the Kalamazoo Promise. Instead, they could be picking up how disadvantaged the comparison group (ineligible Black students) was relative to the treatment group (eligible Black students). To be ineligible for the Kalamazoo Promise, students had to enter the school district in 10^{th} grade or after so all ineligible students had to change their school district at some time during their high school years. Given that changing school districts is disruptive, comparing students who moved to students who did not is not the best approach for estimating an unbiased effect of the Kalamazoo Promise on educational outcomes. The concern is that the estimate may be picking up the difference in outcomes due to the disruption of moving instead of the difference in outcomes due to being eligible for the scholarship. In addition, students who moved may disproportionately have other characteristics that are negatively correlated with college attendance (such as lower socioeconomic status or from single parent families) compared to students who stayed in the same school district for their high school years. In addition, the comparison group is not a true comparison group because these students can never be treated as they have already been ruled ineligible for the Kalamazoo Promise.

Ash and Ritter (2015), Bartik et al. (2010), and Miller (2011) examined the effect of universal promise programs on standardized state exams for students in grades three through eight. Ash and Ritter (2015) employed a two-level exact and propensity score matching design starting at the district level to create a population of comparison school districts to draw one-to-one student-level matches to students in the El Dorado School District. In the post-promise years,

El Dorado students had overall higher test scores on the standardized state mathematics exams by 0.123-0.147 standard deviations and had overall higher test scores on the standardized state literacy exam by 0.104-0.145 standard deviations compared to their matched peers. Instead of fading away, the state standardized test scores increased each year and El Dorado students averaged a gain of 0.064 to 0.078 standard deviations per year.

Similar to Ash and Ritter, Bartik et al. (2010) compared standardized test exams in mathematics and reading for 3rd through 8th graders in the Kalamazoo Public Schools and a set of five school districts in Michigan. Since they did not have test scores for individual students in the comparison school districts, they calculated the district-level change in the mean mathematics and reading scores by each grade level and across the six grades. This limitation also meant that they were unable to adequately adjust for changes in the student compositional differences between the Kalamazoo Public Schools and the set of comparison school districts before and after the Kalamazoo Promise was announced. This is problematic because student demographic changes - not the Kalamazoo Promise itself - may be driving the results in the post-period.

In the post-period, Kalamazoo Public school students increased their reading scores by an average of 2.5 months across the six grade levels, and increased their mathematics test scores by an average of 3 months across the six grade levels. Bartik et al. (2010) also compared the Kalamazoo Public School test scores to the overall mean test scores in Michigan. The results showed that there were similar gains in the mathematics and reading test scores across the state. While they argued that the state is not a fair comparison group, their identification strategy had many flaws and there is not strong evidence that they were able to calculate unbiased estimates for the earlier results that supported their argument.

Miller (2011) also examined changes in the pass rates on the state standardized exams in mathematics and reading for 3rd graders to 8th graders in the Kalamazoo Public Schools. While the pass rates improved in the post-promise years, the pass rates across the state also improved. Miller concluded that the Kalamazoo Promise did not affect the increases in the pass rate on these exams. This provides additional evidence that it is unlikely that the Kalamazoo Promise positively changed students' performance on standardized exams.

Ash and Ritter (2015) employed the same two-level matching design to estimate the effect of the El Dorado Promise on high school graduation. They examined graduation by four measures based on time (i.e. graduating on-time, graduating ever) and time by location (graduating on-time from their 9th grade school district, graduating ever from their 9th grade school district). There was a slight decrease in the graduation rates across the four graduation outcomes for El Dorado students in the post-promise years compared to students in the comparison school districts. However, these differences were not statistically different from zero.

Estimates for Postsecondary Outcomes

Only the Kalamazoo Promise and Knox Achieves have estimates on the effect of the promise scholarship on postsecondary outcomes. Three research studies have been conducted on the Kalamazoo Promise (Andrews, DesJardins, & Ranchhod, 2010; Bartik, Hershbein, & Lachowska, 2015; Miller-Adams & Timmeney, 2013) and one on Knox Achieves (Carruthers & Fox, 2016). Similar to the research on targeted promise programs, the researchers used a difference-in-differences approach to compare eligible and ineligible students in the pre- and post-promise cohorts. Two out of the three studies on the Kalamazoo Promise compared students within the Kalamazoo Public Schools (Bartik et al., 2015; Miller-Adams & Timmeney, 2013). This approach may bias the estimates either upward or downward depending on the

characteristics of the students who were ineligible for the Kalamazoo Promise and because of the spillover effects of the promise scholarship in the school district.[17] Andrews et al. (2010) and Carruthers and Fox (2016) avoided these concerns by comparing students in the promise high schools or schools districts to students in a set of comparable geographical locations outside of the promise area.

Andrews et al. (2010) examined the effect of the Kalamazoo Promise on ACT test score sending behavior for the first class of promise students. The researchers used the institutions where the students sent their ACT scores as a proxy for college applications. In the post-period, there was a six percentage point increase of ACT test scores sent to Michigan public colleges and universities from Kalamazoo test takers. These students also were more likely to send their ACT test scores to the Michigan flagship institutions (Michigan State University and University of Michigan) by 12 percentage points and to the local institutions (Western Michigan University and Kalamazoo Valley Community College) by 12 percentage points and two percentage points, respectively.

Compared to their wealthier counterparts, low income students (defined as students from families who earned less than $50,000 per year) responded differently to the offer of the Kalamazoo Promise. These ACT test takers were more likely to send their test scores to Michigan State University by nine percentage points and less likely to send their test scores to Kalamazoo Valley Community College by 11 percentage points. Taken together, the researchers used these estimates as evidence that the Kalamazoo Promise changed the college choice set for low-income students as the scholarship allowed them to consider institutions that were higher priced and more selective (Andrews et al., 2010).

[17] For a through discussion on why using ineligible students within the Kalamazoo Public Schools may bias the estimates either upward or downward, see Billings, 2018a.

The remaining three papers examined the effect of either the Kalamazoo Promise or Knox Achieves on college enrollment (Bartik et al., 2015; Carruthers & Fox, 2016; Miller-Adams & Timmeney, 2013), credit accumulation (Bartik et al., 2015; Carruthers & Fox, 2016), and degree attainment (Bartik et al., 2015). The college enrollment estimates for the effect of the Kalamazoo Promise were overwhelmingly large and positive. Bartik et al. (2015) found that students who were eligible for the Kalamazoo Promise in the post-period increased their mean enrollment in college by 8.5 percentage points within six months of high school graduation and five percentage points within 12 months of high school graduation. (The 12 month estimate was not statistically significant, however). The authors suggested that the Kalamazoo Promise was accelerating the time in which students enrolled in college after high school graduation, as more students were enrolling within 6 months than within 12 months after their high school graduation.

The largest increases in mean college enrollment were concentrated at the promise-eligible colleges and universities, especially at four-year institutions. In the pre-period, the mean college enrollment for eligible students was 27.7% at Michigan public four-year colleges and universities and it increased to 48.4% in the post-period. This represented a 75% increase in the mean college enrollment at promise-eligible four-year colleges and universities (Bartik et al., 2015).

Bartik et al. (2015) also examined the effect of the Kalamazoo Promise on credit accumulation and degree attainment. However, they did not have the number of college credits attempted or earned in their data. Instead, Bartik et al. used whether the student was enrolled full-time, half-time, or less than half-time as reported by the National Student Clearinghouse as a proxy for credits earned. If the student enrolled full-time, they assigned 12 credits earned; if the student enrolled half-time, they assigned six credits earned; and if the student enrolled less than

half-time, they assigned three credits earned. After approximately eight semesters, students who were eligible for the Kalamazoo Promise took an equivalent of two to three more classes than students who were ineligible for the scholarship. They also were more likely to earn their degrees. Eligible students increased their attainment of any postsecondary degree by nine to twelve percentage points within six years of their high school graduation. Most of this increase in degree attainment was concentrated at the bachelor's degree level, as there was a seven to ten percentage point increase in mean bachelor's degree attainment for eligible students in the post-promise years.

The overwhelmingly large, positive effect of the Kalamazoo Promise on college enrollment was also confirmed by Miller-Adams and Timmeney (2013). They examined the mean college enrollment rates for a regional magnet high school, Kalamazoo Area Math and Science Center (KAMSC), located in the Kalamazoo Public Schools. The KAMSC serves students from multiple school districts so students attending school in the Kalamazoo Public Schools may live outside of the school district, making them ineligible for the scholarship. Exploiting this characteristic of the regional high school, Miller-Adams and Timmeney compared KAMSC students living inside and outside the school district boundaries. In the post-promise years, there was a large, positive shift in the mean college enrollment for Kalamazoo Public Schools KAMSC students towards four-year promise-eligible institutions by 21.3 percentage points.

For Knox Achieves, the college enrollment and credit accumulation estimates for students who were eligible for the scholarship were not as large as they were for the Kalamazoo Promise. Carruthers and Fox (2016) compared students in Knox County to students in two comparison groups, Knoxville Metropolitan Statistical Area and the East Tennessee region. In the post-

period, there was an increase of 3.5-4.0 percentage points in college enrollment and an increase of 3.1-4.9 percentage points in community college enrollment for students within Knox County. They also found that a high school's participation rate in Knox Achieves mattered, as higher participation rates predicted higher college enrollment rates for students within the high school. High school's participation rate was defined as the share of the senior class in each school who participated in the program. For credit accumulation, students who were eligible for Knox Achieves completed a similar number of college credits within 2 years of high school graduation compared to their counterparts.

Carruthers and Fox (2016) also matched participants of Knox Achieves to similar non-participants in Knox County or the Knoxville Metropolitan Statistical Area. Knox Achieves participants were 24.2 percentage points more likely to enroll in college and 29.6 percentage points more likely to enroll in community college within 9 months of their high school graduation. In addition, Knox Achieves participants earned 4.9-6.8 more college credits at Tennessee public colleges and universities within 2 years of their high school graduation than their matched counterparts. This is the equivalent of earning credits for approximately two more classes. It is important to note that these estimates are very large and may be affected by omitted variable bias, given that participants were not randomly selected into the treatment and control conditions. We also cannot compare these participant estimates to equivalent estimates from the Kalamazoo Promise, as research on the Kalamazoo Promise has focused only on students who were eligible - not students who received the scholarship.

Summary

Table 1.2 summarizes the impacts of the universal promise programs on educational outcomes with their corresponding benefits offered index. For the most part, these promise

programs have positively affected the educational attainment of their students. For the K-12 outcomes, the Kalamazoo Promise and Say Yes to Education - Buffalo increased student enrollments in the public school district, drawing students from neighboring public school districts and private schools (Bartik et al., 2010; Hershbein, 2013; Miller, 2011; Sohn et al., 2017). The Kalamazoo Promise also attracted students from charter schools and out of state (Hershbein, 2013). The Kalamazoo Promise and Say Yes to Education increased the enrollment of White, Black, and Latino students within the school district, maintaining the original racial composition of the student body (Bartik et al., 2010; Hershbein, 2013; Miller, 2011; Sohn et al., 2017).

Table 1.2 Summary of the universal promise programs on educational outcomes with their benefits offered index

	Benefits Offered Index	K-12 Outcomes	Postsec Outcomes
Kalamazoo Promise	3	+ enrollment n.s. acad achievement - suspension + credit accumulation	+ access + choice + credit accumulation + degree completion
El Dorado Promise	7	+ acad achievement n.s. hs graduation	--
Knox Achieves	0	--	+ access + choice n.s. credit accumulation
Say Yes to Education-Buffalo	2	+ enrollment	--
Say Yes to Education-Syracuse	2	n.s. enrollment	--

Notes. n.s. stands for not (statistically) significant. hs stands for high school.

There is mixed evidence as to whether the universal promise programs affected academic performance in elementary, middle, and high school (Ash & Ritter, 2015, Bartik & Lachowska, 2013; Bartik et al., 2010; Miller, 2011). Students in grades three through eight in the post-period of the El Dorado Promise increased their scores on the state standardized test exams by an average of 0.064 to 0.078 standard deviations per year (Ash & Ritter, 2015). The Kalamazoo

Promise, on the other hand, had no effect on high school grade point averages (Bartik & Lachowska, 2013) or test scores on the state standardized exams (Bartik et al., 2010; Miller, 2011). The Kalamazoo Promise did reduce the time students spent in suspensions by 1 to 2 days and increased the probability of students earning credits in the second year of the promise (Bartik et al., 2010).

While only 2 out of the 5 universal promise programs can show research evaluating the effect of the promise scholarship on postsecondary outcomes, the results from the Kalamazoo Promise and Knox Achieves are overwhelmingly positive. Both universal promise programs increased college access for eligible students within the post-period by 8.5 percentage points within 6 months of high school graduation for Kalamazoo (Bartik et al., 2015) and by 3.5-4 percentage points within 9 months of high school graduation for Knox Achieves (Carruthers & Fox, 2016). The universal promise programs also induced students to enroll in promise-eligible institutions at higher rates, an increase of 21 percentage points for Kalamazoo Promise (Bartik et al., 2015) and an increase of three to five percentage points for Knox Achieves (Carruthers & Fox, 2016). The Kalamazoo Promise also increased the degree attainment of eligible students by nine to twelve percentage points (Bartik et al., 2015). Knox Achieves is too young of a program to have estimates for degree completion.

There were larger estimates for the Kalamazoo Promise compared to Knox Achieves for college enrollment, college choice, and credit accumulation. This was expected based on values each program received on the benefits offered index as Kalamazoo Promise received a value of three and Knox Achieves a value of zero. One might expect that the Knox Achieves would have had no effect on students' postsecondary outcomes given their low value on the benefits offered index. However, Knox Achieves matched students with community members in 12th grade to

receive assistance applying to college, applying for financial aid, and enrolling in community college. This assistance from the promise program was not reflected in the benefits offered index since it focused solely on the scholarship component of the promise program. I suspect that this mentoring provided by Knox Achieves was driving their positive results on college access and choice.

VII. Conclusion

Promise programs are spreading rapidly across the nation as more areas adopt these programs to address the low educational attainment in their communities and to increase opportunities for economic development (Miller-Adams, 2009, 2015). These policies have spread as communities learn from successful policies in other areas (Berry, 1994; Berry & Berry, 2007; Walker, 1969) or learn from communities that are similar to their own (Karch, 2007; Volden, 2006). Communities may also be motivated to adopt promise programs because they are competing with neighboring cities for scarce resources such as middle-class families, educated labor, and new businesses (Berry, 1994; Berry & Berry, 1990, 2007; Walker, 1969). Other communities may have been motivated by normative pressure from the federal government (Berry & Berry, 2007; Walker, 1969) which has advocated for and supported free community college in prior administrations (The White House, Office of the Press Secretary, 2015).

As promise programs have diffused to different locations, the design of these programs changed. This change can be the result of learning from the successes and failures of earlier programs (Rogers, 1978; Mooney & Lee, 1995), from amending previously adopted versions of a given program (Glick & Hays, 1991), or by adapting the design to better fit the community's needs, context, and budget (Hays, 1996). I graphed the current 140 promise programs based on their student eligibility criteria and benefits offered to show the variability among promise

program designs. Promise programs that have positive values on their benefits offered index are expected to increase the educational attainment of their students. Whereas promise programs that have either negative or zero values on their benefits offered index are expected to have no effect on the educational outcomes of their students.

There are 31 promise programs with positive values on their benefit offered index (22%), 12 promise programs with zero values (9%), and 97 promise programs with negative values (69%). My hypothesis holds true for almost all of the promise programs with program evaluation research. The one exception is Knox Achieves, which has a value of zero, but experienced an increase in average college enrollment for eligible students in the post-period. This is because, in addition to the college scholarship, Knox Achieves offers support services that may induce students to enroll in college. This is not reflected in the benefits offered index because it captures only the scholarship component of the promise program.

My hypothesis is partly verified by LeGower and Walsh (2017), who examined the effect of multiple promise programs on overall K-12 student enrollments. They grouped the promise programs based on student eligibility criteria (universal versus merit-based) and number of eligible postsecondary schools (wide versus limited). They created four categories of promise programs based on these two criteria: universal and wide; universal and limited; merit-based and wide; and merit-based and limited. Universal and wide promise programs had the largest increase in student enrollment (10%) in the post-period, followed by merit-based and wide promise programs (5%), and then universal and limited promise programs (4%). Promise programs that have merit-based criteria with a limited list of postsecondary schools have no effect on student enrollment.

LeGower and Walsh's (2017) differences in estimates on K-12 enrollment by promise program type mirror the graph that I constructed to explain the mixed results of promise program evaluations. Promise programs with universal criteria and more generous benefits have larger, positive effects on students' educational outcomes, and promise programs with targeted criteria and limited benefits have modest or no effect on students' educational outcomes. While LeGower and Walsh did not examine postsecondary outcomes, the student enrollment outcome can be used as a proxy for interest in the promise program. Students are willing to move into the promise school district only when the student eligibility criteria are easy to meet and/or the benefits are generous and flexible (i.e. the scholarship can be used at a wide range of postsecondary schools).

Future research needs to expand upon the work of LeGower and Walsh (2017) by testing the effect of different promise program designs on educational outcomes. This could provide additional context to help researchers, policymakers, and practitioners understand which designs are most effective in increasing the educational attainment of their students. It can also help promise programs to change or amend their design if they find their promise scholarship is not having the desired results.

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Appendix A. The list of promise programs

Year Announced	*Type*	*Name of Program*	*Location*	*State*	*Eligible student score*	*Overall benefits score*
2008	Local	13th Year Promise Scholarship	Seattle, WA	WA	2	-4
2015	Local	50th Anniversary Scholars Program	Philadelphia, PA	PA	-1	-3
2016	Local	Achieve Atlanta	Atlanta, GA	GA	-1	4
2007	Local	Adopt a Fifth Grader	Lake County or Mendocino County, CA	CA	-1	-3
2015	Local	Advantage Shelby County	Shelby County, IN	IN	-1	-4
2007	Local	Aims College Promise (G. Town Promise)	Greely, CO	CO	2	-3
2015	Local	Allentown School District Promise	Allentown, OR	OR	-1	-5
2011	Local	American Dream Scholarship	Miami, FL	FL	-1	-5
2010	Local	Arkadelphia Promise	Arkadelphia, AR	AR	-1	2
2016	Local	Asbury Park College Promise	Asbury Park, NJ	NJ	2	-3
2009	Local	Baldwin Promise (MI Promise Zone)	Baldwin, MI	MI	2	-1
2009	Local	Battle Creek Promise (MI Promise Zone)	Battle Creek, MI	MI	2	-1
2007	Local	Bay Commitment	Bay City, MI	MI	-1	-2
2011	Local	Beacon of Hope	Lynchburg, VA	VA	-1	2
2009	Local	Benton Harbor Promise (MI Promise Zone)	Benton Harbor, MI	MI	2	0
2016	Local	Boston Tuition-Free Community College Program	Boston, MA	MA	-1	-2
2016	Local	Buchanan Promise	Buchanan, MI	MI	2	2
2012	Local	Cabrillo Commitment S4C Scholarships	Santa Cruz County, CA	CA	2	-3
2009	Local	Campus & Community: Together for Good	Hancock, MI	MI	2	-1

Year Announced	*Type*	*Name of Program*	*Location*	*State*	*Eligible student score*	*Overall benefits score*
2011	Local	Central Carolina Scholars	Camden, Sumter, Lee, and Kershaw Counties, SC	SC	-1	-4
2016	Local	Cerritos Complete	ABC Unified School District, Bellflower Unified School District, Downey Unified School District, Norwalk-La Mirada Unified School District, and Paramount Unified School District, CA	CA	1	-2
2013	Local	Challenge Scholars	Grand Rapids, MI	MI	-1	1
2004	Local	Champion City Scholars Program	Springfield, OH	OH	-1	0
2014	Local	Chicago Star Scholarship	Chicago, IL	IL	-1	-1
2016	Local	City of Ontario Community College Scholarships	Ontario, CA	CA	2	-1
2012	Local	Cleveland County Promise	Cleveland, NC	NC	-1	2
2000	Local	College Crusade of Rhode Island	Providence, Pawtucket, Central Falls, Woonsocket, and Cranston, RI	RI	2	2
2016	Local	College of Alameda Promise	Alameda County and City, CA	CA	2	-1
2016	Local	College of Lake County Promise	College Lake County district, IL	IL	-1	-3
2010	Local	Community Scholarship Program	McCracken County, KY	KY	-1	-4
2015	Local	Cooperman College Scholars	Essex County, NJ	NJ	-2	-1
2016	Local	Corcoran Promise	Corcoran High School, CA	CA	1	-1
2003	Local	CORE Promise Scholarship	Philadelphia, PA	PA	2	4
2016	Local	Dabney Promise	Dabney S. Lancaster Community College's service area, VA	VA	-1	-1
2013	Local	Dell and Evelynn Carroll Scholarship	Meridian, Macon, and Blue Mound high school graduates, IL	IL	2	-2
2006	Local	Denver Scholarship Foundation	Denver, CO	CO	-1	2
2008	Local	Detroit College Promise	Detroit, MI	MI	2	1

Year Announced	*Type*	*Name of Program*	*Location*	*State*	*Eligible student score*	*Overall benefits score*
2009	Local	Detroit Promise Zone (formerly Detroit Scholarship Fund) (MI Promise Zone)	Detroit, MI	MI	2	-3
2006	Local	Dyer County Promise	Dyer County, TN	TN	2	-3
2001	Local	Educate and Grow	Carter, Johnson, Sullivan, Washington and Unicoi Counties, TN	TN	2	-3
2007	Local	El Dorado Promise	El Dorado, AR	AR	2	7
2017	State	Excelsior Scholarship	New York	NY	-1	1
2016	Local	Fox Valley Technical College Promise	Fox Valley Technical College district, WI	WI	-1	-1
2017	Local	Free City College Program	San Francisco, CA	CA	2	-1
2011	Local	Future Connect	Multnomah County, Hillsboro, Beaverton, or Columbia County, OR	OR	-1	-3
2014	Local	Galesburg Promise	Galesburg, IL	IL	2	-4
2006	Local	Garrett County Scholarship Program	Garrett County, MD	MD	2	-4
2016	Local	Gateway College Promise	Kenosha, Racine, and Walworth Counties, WI	WI	-1	-3
2003	Local	Give Something Back Foundation - Illinois	Aurora, IL and Will County, IL	IL	-2	3
2011	Local	Great River Promise - Arkansas Northeastern CC	Mississippi County, AR	AR	-1	-3
2010	Local	Great River Promise - Phillips CC	Arkansas or Phillips County, AR	AR	-1	-3
2006	Local	Hammond College Bound Scholarship Program	Hammond, IN	IN	-1	-1
2015	Local	Harper College Promise	Palatine, IL	IL	-1	-3
2013	Local	Hartford Promise	Hartford, CT	CT	-1	3
2009	Local	Hazel Park Promise (MI Promise Zone)	Hazel Park, MI	MI	2	1
2015	Local	Higher Edge Promise	Grossmont Union High School District, CA	CA	-1	-1
2010	Local	Holland-Zeeland Promise	Holland-Zeeland Area, MI	MI	-2	2

Year Announced	*Type*	*Name of Program*	*Location*	*State*	*Eligible student score*	*Overall benefits score*
2007	Local	Hopkinsville Rotary Scholars	Hopkinsville, KY	KY	-1	-3
2013	Local	ISU 4U PROMISE	Des Moines, IA	IA	2	0
2006	Local	Jackson Legacy	Jackson, MI	MI	-2	-3
2009	Local	Jackson Promise (MI Promise Zone)	Jackson, MI	MI	2	-3
2007	Local	Jefferson CAN Community Scholars	Jefferson or Lewis County, NY	NY	-1	-3
2005	Local	Kalamazoo Promise	Kalamazoo, MI	MI	2	3
2016	State	Kentucky Work Ready Scholarship	Kentucky resident	KY	-2	0
2012	Local	La Crosse Promise	La Crosse, WI	WI	2	3
2009	Local	Lansing Promise (MI Promise Zone)	Lansing, MI	MI	2	-2
2015	Local	LeBron James 'I Promise' Program	Akron, OH	OH	-1	-1
2005	Local	Legacy Scholars	Battle Creek, MI	MI	2	-1
2007	Local	Leopard Challenge	Norphlet, AK	AK	-1	1
2008	Local	Long Beach College Promise	Long Beach, CA	CA	2	2
2016	Local	Los Angeles College Promise	Los Angeles Unified School District	CA	2	0
2012	Local	Louisville Rotary Club Scholarship	Jefferson County, KY	KY	-1	-3
2015	Local	Madison Promise	Madison, WI	WI	-1	-3
2016	Local	Manistee County Commitment Scholarship	Manistee County, MI	MI	-2	-1
2006	Local	Mason Promise Scholarship	Mason Public Schools, MI	MI	-2	-2
2016	Local	MCC Future Fund	Mohave County, AZ	AZ	-1	-3
2015	Local	Mid-North Promise Program	six Mid-North communities, IN	IN	2	-2
2015	Local	Milwaukee Area Technical College (MATC) Promise	Milwaukee, WI	WI	-1	-3
2015	State	Minnesota College Occupational Scholarship Pilot Program	Minnesota residents	MN	-1	0
2014	Local	Montclair Online to College	Montclair High School, CA	CA	2	-1
2011	Local	Montgomery County Ohio College Promise	Dayton, OH	OH	-2	-1
2002	Local	Morgan Success Scholarship	Tamaqua Area High School, PA	PA	2	-3
2009	Local	Muskegon Area Promise (MI Promise Zone)	Muskegon, MI	MI	-1	-1

Year Announced	*Type*	*Name of Program*	*Location*	*State*	*Eligible student score*	*Overall benefits score*
2010	Local	New Haven Promise	New Haven, CT	CT	-1	-2
2014	Local	Newark College Promise	Newark, NJ	NJ	-1	3
2016	Local	Newaygo County Promise Zone (MI Promise Zone)	Newaygo County RESA, MI	MI	-1	-3
2015	Local	Nicolet Promise	Nicolet College district, WI	WI	-1	-3
2016	Local	Northcentral Technical College Promise	Northcentral Technical College district, WI	WI	-1	-3
2007	Local	Northport Promise	Northport, MI	MI	2	1
2016	Local	Oakland Promise	Oakland, CA	CA	-1	2
2011	Local	Ontario-Montclair Promise	Ontario-Montclair School District students and Chaffey Joint Union High School, CA	CA	2	0
2015	State	Oregon Promise	Oregon	OR	-1	0
2016	Local	Palomar Promise	San Marcos Unified School District, CA	CA	2	-4
2012	Local	Pensacola Pledge Scholars	Pensacola, FL	FL	-2	-2
2006	Local	Peoria Promise	Peoria, IL	IL	-1	-1
2006	Local	Pittsburgh Promise	Pittsburgh, PA	PA	-1	0
2009	Local	Pontiac Promise Zone (MI Promise Zone)	Pontiac, MI	MI	2	1
2006	Local	Power of YOU - Minneapolis	Minneapolis, MN	MN	-1	-3
2007	Local	Power of YOU - Saint Paul	Saint Paul, MN	MN	-1	-3
2004	Local	Promise for the Future	Pinal County, AZ	AZ	-1	-3
2015	Local	Quincy Promise	Quincy, IL	IL	-1	-4
2016	Local	Rancho Cordova Promise	Rancho Cordova, CA	CA	2	2
2015	Local	Richmond CC Guarantee	Richmond and Scotland Counties, NC	NC	-1	-3
2016	Local	Richmond Promise	Richmond, CA	CA	2	3
2007	Local	Rochester Promise	Rochester, NY	NY	-1	-4
2008	Local	Rockford Promise	Rockford, IL	IL	1	-2

Year Announced	*Type*	*Name of Program*	*Location*	*State*	*Eligible student score*	*Overall benefits score*
2012	Local	Rotary Promise	Louisville, KY	KY	-1	-3
2014	Local	Rusk TJC Citizens Promise	Tyler, TX	TX	-1	-2
2009	Local	Saginaw Promise (MI Promise Zone)	Saginaw, MI	MI	2	-1
2016	Local	San Diego Promise	San Diego, CA	CA	-2	-1
2009	Local	San Francisco Promise	San Francisco, CA	CA	-2	1
2006	Local	San Marcos Promise (PACE Promise)	San Marcos, CA	CA	-1	-4
2016	Local	Santa Ana College Promise	Santa Ana, CA	CA	2	-4
2016	Local	Santa Barbara City College (SBCC) Promise	Santa Barbara, CA	CA	2	-1
2012	Local	Say Yes to Education, Buffalo	Buffalo, NY	NY	2	2
2015	Local	Say Yes to Education, Guilford	Guilford County, NC	NC	2	3
2008	Local	Say Yes to Education, Syracuse	Syracuse, NY	NY	2	2
2016	Local	SCC Success Scholarship	Columbus County, NC	NC	-1	-3
2007	Local	School Counts! Conway	Conway County, AR	AR	-1	-1
2001	Local	School Counts! Cumberland	Cumberland County, NJ	NJ	-1	-4
2010	Local	School Counts! Madisonville	Madisonville, KY	KY	-1	-5
	Local	School Counts! Salem	Salem County, NJ	NJ	-1	-3
2013	Local	Seattle Promise	Seattle, WA	WA	-1	-3
2015	Local	Shoreline Scholars	Shoreline or Lake Forest Park, WA	WA	-2	-2
2016	Local	Siskiyou Promise	Siskiyou County, CA	CA	2	-1
2016	Local	Skyline College Promise	San Bruno, CA	CA	2	-1
2014	Local	South Bay Promise	Centinela Valley School District and Inglewood Unified School District, CA	CA	2	-1
2014	State	Tennessee Promise	Tennessee	TN	2	0
2014	Local	The Cuesta Promise	San Louis Obispo County, CA	CA	2	-3
2011	Local	The Degree Project	Milwaukee, WI	WI	-1	-1
2008	Local	tnAchieves (formerly known as Knox Achieves)	Knoxville, TN	TN	2	0
2007	Local	Tulsa Achieves	Tulsa, OK	OK	-1	-3

Year Announced	*Type*	*Name of Program*	*Location*	*State*	*Eligible student score*	*Overall benefits score*
2008	Local	Valley-Bound Commitment	San Bernardino USD, Rialto USD, and Colton USD, CA	CA	-1	-1
2016	Local	VanGuarantee	Vance, Granville, Franklin and Warren counties, NC	NC	-1	-1
2006	Local	Ventura College Promise	Ventura, CA	CA	2	-3
2001	Local	Washington State Achievers	Cleveland High School, Clover Park High School, Davis High School, Foster High School, Henry Foss High School, Kent-Meridian High School, Kittitas High School, Lincoln High School, Mabton High School, Mariner High School, Mount Tahoma High School, Stevenson High School, Tonasket High School, Truman High School, West Valley High School, Yelm High School, WA	WA	-2	1
2016	Local	West Valley College Community Grant	Saratoga, CA	CA	1	0
2016	Local	Wichita Promise	Sedgwick County, KS	KS	-2	-3
2016	Local	Williams County Graduate Scholarship	Williams County, ND	ND	2	-3
2016	Local	Wisconsin Indianhead Technical College Promise	Shell Lake, WI	WI	-1	-3

CHAPTER 2:
Cultivating A College-Going Culture: Evidence From The Kalamazoo Promise

I. Introduction

In the early 2000s, the city of Kalamazoo, Michigan, and the Kalamazoo Public Schools district were in decline. The city of Kalamazoo lost thousands of jobs as businesses closed or relocated. The city shrank as people moved away from the urban center to the local suburbs. Enrollment in the Kalamazoo Public Schools district decreased by 44% from 1970-71 to 2004-05, spurring a series of budget cuts, school closings, and layoffs (Miller-Adams, 2009).

In November 2005, a group of anonymous donors sought to reverse these trends by establishing a college scholarship program for the city's students. The hope was that the scholarship program would attract families back to the city, thereby strengthening the school district and creating a stock of college-educated labor to interest new businesses (Miller-Adams, 2009). This scholarship program was named the Kalamazoo Promise, and it pays up to 100% of college tuition and fees for students who live within the Kalamazoo Public Schools district, are enrolled in the district for at least four years, graduate from one of the district's high schools, and complete the Kalamazoo Promise application (The Kalamazoo Promise: Information for Seniors and Parents, 2014).

The Kalamazoo Promise is now widely imitated by similar scholarships collectively known as "promise programs." Promise programs award scholarship dollars based on students' residency - students need to live and/or attend school in specific geographic boundaries, and promise programs are often framed as economic development strategies for the local community

(Miller-Adams, 2015). Currently, there are 140 promise programs across the United States (Billings, 2018a). Despite the widespread adoption of promise programs, we lack firm evidence about how these scholarships affect students' decisions. The Kalamazoo Promise is an ideal case for evaluating the effect of a promise program. It is the only program that is old enough to allow the evaluation of effects on postsecondary degree attainment. It targets a community that is racially and socioeconomically diverse, allowing for estimation of effects by demographic subgroup. Finally, it is the most generous promise program. If the Kalamazoo Promise has no effect, it is unlikely that less generous programs will.[18]

I use an instrumental variables difference-in-differences design to examine two main research questions: (1) What is the impact of the eligibility of the Kalamazoo Promise on college attendance, college choice, and degree attainment? and (2) How do these effects differ for student subgroups? In order to estimate the effect of the Kalamazoo Promise, we need a source of variation in eligibility that is plausibly exogenous to students' underlying propensity to attend and complete college. I exploit the unexpected announcement of the Kalamazoo Promise to compare cohorts of students who, based on their grade of enrollment when the scholarship was announced, were and were not eligible for the scholarship. I compare these cross-cohort changes with those in a similar set of poor urban districts statewide.

Unlike previous work (Bartik, Hershbein, & Lachowska, 2015), I analyze statewide data that allows for cross-district comparisons. These statewide data also allow me to assign students' scholarship eligibility based on their district of attendance in 4th or 8th grade, well before the

[18] I evaluated the effect of several, less generous promise programs in Michigan. I found that students who were eligible for the Michigan promise zones increased their college enrollment by 4.3-4.5 percentage points and their persistence to the second year of college by 3.5 percentage points (Billings, 2018b). The Kalamazoo Promise is the most generous among these, allowing students to use the scholarship at any public college or university. It is also a first-dollar scholarship, which allows students to couple the Promise scholarship with federal and/or state grant aid to cover the cost of college attendance. For a more in-depth discussion of first-dollar, please see page 74.

Kalamazoo Promise was announced. Studies that rely solely on students' high school enrollment (Bartik et al., 2015) are potentially biased by endogenous migration into Kalamazoo by families who plan to use the scholarship.

To preview the results, I find that students who were eligible for the Kalamazoo Promise were nine to eleven percentage points more likely to attend college and five percentage points more likely to earn a postsecondary degree compared to students in a set of school districts from across the state. Given baseline rates of enrollment and graduation, this represented an increase in college enrollment of 37-41% and of degree attainment of 26%. Prior estimates of the effect of Kalamazoo Promise found that eligible high school graduates increased their college enrollment by five percentage points within 12 months of graduating high school and increased their degree completion by nine to twelve percentage points within six years from graduating high school (Bartik et al., 2015).

When I examine college enrollment and degree completion by student demographic subgroups, I find that, while the offer of the Kalamazoo Promise increased college enrollment across all subgroups, the positive estimates for degree completion are concentrated on the more advantaged students - i.e. students who were White, Asian, or non-poor. This is a stark contrast to Bartik et al. (2015) as they found that there were large, positive estimates across race/ethnicity and socioeconomic status. Their estimates are different than mine because they used a comparison group that was more disadvantaged than their treatment group. For students to be in the comparison group, they had to move into Kalamazoo after 9th grade, making them ineligible for the Kalamazoo Promise. Students who moved during their high school years are likely to be more disadvantaged than students who remained in the same school district. Movers also may also have other demographic characteristics (they are from less stable family situations, have

unemployed parents, from single parent homes, have lower family incomes, etc.) which may be negatively correlated with educational attainment (Bowen, Chingos, & McPherson, 2009; Swanson & Schneider, 1999; Ziol-Guest, Duncan, & Kalil, 2015). Therefore, it is likely that Bartik et al.'s large, positive estimates are partially picking up these differences in background characteristics rather than just the difference in eligibility for the Kalamazoo Promise.

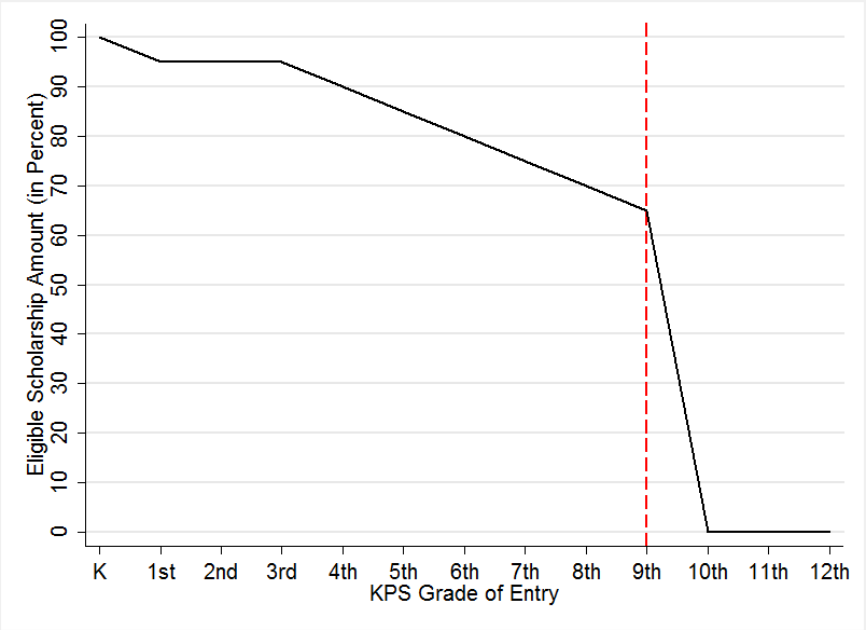
II. The Kalamazoo Promise

The Kalamazoo Promise awards scholarships based on the length of residency within the Kalamazoo Public Schools. The scholarship covers up to 100% of tuition and fees at any public college and university in Michigan for either a maximum of 130 credits or four years (whichever comes first). The scholarship is an increasing function of the grades spent in the district. Figure 2.1 displays the percent of the scholarship that students are eligible for based on their grade of entry. Students who entered Kalamazoo Public Schools in kindergarten are eligible for 100% of the Kalamazoo Promise. The scholarship value drops to 95% of tuition and fees for those who entered the district between 1st and 3rd grade, and then drops by another 5% for each subsequent grade at entry. Students who entered in 9th grade (the last grade of entry to be eligible) receive 65% of the scholarship.

To keep the scholarship during college, Kalamazoo Promise recipients need to maintain a 2.0 GPA each semester, meet the satisfactory academic progress standards of the college, and enroll full-time (with the exception of students enrolled in the Kalamazoo Valley Community College, who could attend part-time starting in 2008. See Miller-Adams, 2009, and The Kalamazoo Promise: Information for Seniors and Parents, 2014).[19] Students have 10 years from the time of their high school graduation to use the Kalamazoo Promise.

[19] The change was made because two-thirds of the first two classes of Kalamazoo Promise recipients who enrolled at Kalamazoo Valley Community College lost their scholarships due to the GPA requirement (Miller-Adams, 2009).

Figure 2.1 Need to enter in 9th grade or before to receive the Kalamazoo Promise



The Kalamazoo Promise is a first-dollar scholarship (Miller-Adams, 2009). "First-dollar" (or "last-dollar") refers to when scholarship dollars are applied to the financial need of the student. In this situation, the promise scholarship is applied first to cover tuition and fees before state or federal grant aid is applied. Students may then use federal and/or state grant aid to cover any remaining tuition or fees (if they were not eligible for 100% of the Kalamazoo Promise) or for living expenses, books, supplies, transportation, and miscellaneous personal expenses. Thus, Kalamazoo Promise recipients can cover more of the cost of college attendance (compared to Kalamazoo Promise ineligible students with similar financial circumstances) due to combining promise scholarship dollars with federal and/or state grant aid.

III. Relevant Research

Human capital theory explains that students weigh the expected costs and expected benefits of college enrollment when deciding whether to invest in higher education (Becker, 1975, 1993; Hansen, 1971; Schultz, 1961; Weisbord, 1968). Financial aid may change this cost-

benefit analysis because it directly reduces the cost of enrollment. This reduction in cost may induce more students to enroll in college.

When students are deciding whether to enroll in college, the college choice literature typically describes this process in three stages, which can begin as early as 7th grade and ends when students matriculate at postsecondary institutions (Cabrera & La Nasa, 2000; Hossler, Braxton, & Coopersmith, 1989). The first stage is the *predisposition* stage and occurs during students' 7th to 9th grades. During this stage, students develop educational and occupational aspirations and decide whether they want to continue their formal education beyond high school (Cabrera & La Nasa, 2000; Hossler et al., 1989). Students enroll in college preparatory curriculum, focus on maintaining adequate academic performance, and search for information on how to pay for college (Cabrera & La Nasa, 2000; Hossler, Schmit, & Vesper, 1999).

In 10th grade through to the middle of 12th grade, students enter the second stage of the college-choice process called *search.* During this stage, students search for information on college and assimilate the information that they have learned to develop a tentative list of institutions that they are interested in (Cabrera & La Nasa, 2000; Hossler et al., 1989). This information may come directly from the institution through brochures, campus visits, or information sessions or indirectly through classmates, family, or guidance counselors (Hossler et al., 1989; Litten, 1982).

The last stage is *choice*. During their 12th grade, students apply to several colleges and universities, receive admission offer(s), and decide which postsecondary institution to attend. The student's choice whether to attend college and which college to attend is based on a combination of individual and institutional characteristics (Hossler et al., 1989). During this stage, students also need to decide whether to apply for financial aid to help pay for college and

receive financial aid packages (if they are eligible) for each postsecondary institution where they have been admitted (Cabrera & La Nasa, 2000; Hossler et al., 1989).

Financial aid is awarded to students based on their financial need, academic merit, or a combination of the two (Archibald & Feldman, 2011; Heller, 2011). In order to receive federal financial aid, as well as most state and institutional aid, students need to complete the Free Application for Federal Student Aid (FAFSA). The FAFSA requires students to answer over a hundred questions on their (and their parents') income, investments, and participation in federal social assistance programs (U.S. Department of Education, 2016). Research showed that the FAFSA acted as a significant barrier for low-income students (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2009; Bird & Castleman, 2016; Dynarski & Scott-Clayton, 2006, 2008; Dynarski, Scott-Clayton, & Wiederspan, 2013). Since the Kalamazoo Promise does not require the FAFSA, and commits scholarship funds years before college decisions are made, the Kalamazoo Promise may have a larger impact on student decisions than traditional, need-based aid.

Merit aid programs, on the other hand, have simple eligibility criteria (Bell, Rowan-Kenyon, & Perna, 2009; Bulger & Henry, 1998; Kirst & Venezia, 2004), but low income and students of color are less likely to be eligible **(**Dynarski, 2002**)**. Merit aid programs award scholarships based on students' standardized test scores, high school GPAs, or a combination of the two (Doyle, 2006; Heller, 2011; Hickman, 2009). Dynarski (2000) examined the Georgia HOPE scholarship (broad-based merit aid program) and found that $1,000 in aid increased the college attendance of middle and high-income youth by 4-6 percentage points. There was no evidence that the Georgia HOPE scholarship increased college access for low income students, but this estimate may have been biased. In addition, Georgia HOPE increased the college attendance of White youth by 12.3 percentage points, but it did not increase the college access of

Black youth. Therefore, this widened the income and racial gap on college attendance in Georgia. Cornwell and Mustard (2002) also examined Georgia HOPE and found that the program tended to shift which type of postsecondary schools that students attend (i.e. affected the college choice margin), but not the college access margin.

Multiple scholars have written reviews that synthesize the effect of tuition or financial aid on college outcomes (Gallet, 2007; Heller, 1997; Kim, 2010; Leslie & Brinkman, 1987, 1988). Overall, these reviews found that a $1,000 decrease in net price increased college enrollment by 3-10 percentage points. Heller (1997) also found that low-income and students of color are more sensitive to decreases in price.

In their review, Dynarski and Deming (2010) pointed out that in the majority of the student price research, aid is correlated with student characteristics that influence decisions about college. They argued that some previous studies produced biased estimates of the effect of price on college enrollment, persistence, and completion. Dynarski and Deming reviewed 24 quasi-experimental studies that exploited an exogenous source of variation in price to estimate the impact on college decisions. The majority of the research focused on federal grants, state merit aid programs, and changes to public tuition. They found that eligibility for $1,000 reduction in price either through grant aid or tuition subsidies increased college enrollment by a more conservative estimate of three to six percentage points compared to prior literature reviews (Gallet, 2007; Heller, 1997; Leslie & Brinkman, 1987, 1988).

Evidence from the prior literature on the effects of financial aid on college enrollment, persistence, and completion, however, may not generalize to the Kalamazoo Promise because its student population and eligibility criteria are so different. The Kalamazoo Promise targets a broader population of students, as there are no academic or financial criteria to limit who is

eligible. In addition, more eligible students may respond to the Kalamazoo Promise because of widespread awareness about the scholarship (Miron et al., 2009, 2012). Further, applying for the scholarship is less burdensome compared to the FAFSA as the Kalamazoo Promise application is one page and only requires contact information and limited academic information.[20]

The Kalamazoo Promise lowers the direct cost of attending college by offering free or discounted tuition and fees to eligible students. This reduction in cost should cause some students to reassess their decision to not enroll in college, because the cost-benefit calculation has changed in favor of investing in college. The Kalamazoo Promise may also change *where* students go to college, since it eliminates the cost differential between (for example) community college and a university. It also may retain students in-state because the Kalamazoo Promise can only be used at Michigan public colleges and universities.[21]

Since the Kalamazoo Promise guarantees financial assistance to students early in their formative years of schooling, it may affect students' behavior during the predisposition stage of the college choice process. Students may decide to work harder in school to achieve higher grades and/or enroll in more rigorous college preparatory courses (Heller, 2006; Schwartz, 2008). We would expect, therefore, that as the program matures, there are more students who are academically prepared to take up the scholarship because these students are in elementary and middle school when the Kalamazoo Promise is announced, and they have more time to plan and prepare for college. This early commitment of financial aid could also change where students

[20] The Kalamazoo Promise application requires students to provide their contact information, date of birth, grade of entry and residency in the Kalamazoo Public Schools school district, year of high school graduation, name of the Kalamazoo Public Schools high school that the student graduated from, and names of up to three postsecondary schools that they applied to or plan to apply to for college (Application for the Kalamazoo Promise Scholarship, 2014).

[21] Starting with the high school class of 2015, students can use the Kalamazoo Promise at 15 private liberal arts colleges in Michigan (Mack, 2014). For the purpose of my study, I examine students who were under the old rules and can only use the Kalamazoo Promise at in-state public colleges and universities.

attend college since more students may be competitive for admission into selective postsecondary schools as they have stronger academic profiles.

A handful of studies have examined the effect of the Kalamazoo Promise on college enrollment, completion, or choice (Andrews, DesJardins, & Ranchhod, 2010; Bartik et al., 2015; Miller-Adams & Timmeney, 2013).[22] Given the timing, samples, and design of these studies, the previous research may have yielded biased estimates of the effect of the Kalamazoo Promise. In the following paragraphs, I discuss the prior research, the limitations of these studies, and how I address these limitations in my study.

In the paper most closely related to my own, Bartik et al. (2015) estimated the effect of the Kalamazoo Promise on college enrollment, credit attainment, and degree completion for high school graduates of the Kalamazoo Public Schools. Within 6 months of graduating high school, students who were eligible for the Kalamazoo Promise were more likely to enroll in college by eight percentage points. When Bartik et al. (2015) doubled the time window to within 12 months of graduating high school, they found students who were eligible for the Kalamazoo Promise were more likely to enroll in college by five percentage points. (The 12 month estimate was statistically insignificant, however.) Eligible students were also more likely to attain any postsecondary degree, by nine to twelve percentage points, within six years of graduating high school. As expected, Kalamazoo Promise-eligible students were concentrated at promise-eligible institutions, which suggested that the Kalamazoo Promise shifted students to attend four-year Michigan public universities.

[22] A larger number of studies have explored other outcomes, such as enrollment in the Kalamazoo district (Bartik, Eberts, & Huang, 2010; Bartik & Lachowska, 2013; Hershbein, 2013; Miller, 2011; Miron & Cullen, 2008), academic achievement (Bartik et al., 2010; Bartik & Lachowska, 2013; Miller, 2011), attitudes and aspirations about school (Miron, Jones, & Kelaher-Young, 2009, 2011, 2012), school climate (Miron et al., 2011), school violence (Miller, 2011), and other school behaviors such as suspension and detentions (Bartik & Lachowska, 2013). Jones, Miron, and Kelaher-Young (2008, 2012) examined teachers' expectations for students and their beliefs after the Kalamazoo Promise started.

The major critique of the research by Bartik et al. (2015) is that their estimates are threatened by the potential of endogenous mobility of students whose families chose to move into Kalamazoo or stay within Kalamazoo to gain access to the scholarship. This is a threat to the identification strategy because families may be trying to manipulate the probability of receiving treatment by choosing where to live because of the availability of the Kalamazoo Promise. If enough families move to or stay within Kalamazoo Public Schools district due to the Kalamazoo Promise, the educational attainment estimates are positively biased because these students will most likely attend college absence of the scholarship given how much they and their families value education. In fact, in another paper, Bartik and Sotherland (2015) found that households with children in eight promise communities (one of which is the Kalamazoo Promise) were significantly less likely to leave the promise communities for at least three years after the promise programs started. I address this limitation by using student's residence before the Kalamazoo Promise was announced to predict Kalamazoo Promise eligibility. I then use the predicted eligibility to estimate the effect on college outcomes.

Bartik et al. (2015) also examined the heterogeneous effects of the Kalamazoo Promise on college outcomes by gender, race, and family income. Gender was the only noticeably different subgroup as there were stronger effects for women (compared to men) as women were more likely to enroll in four-year institutions and earn bachelor's degrees. For race/ethnicity and family income, Bartik et al. found strong, positive estimates on enrollment in four-year institutions and degree completion for White and non-White students as well as poor and non-poor students. As mentioned previously, this is in stark contrast to my findings because their comparison group was more disadvantaged than their treatment group which is likely to have positively biased their estimates. This positive bias is particularly noticeable for their

postsecondary degree completion findings for students of color and low-income students as I found modest to no effect of the Kalamazoo Promise on postsecondary degree completion for these students. I address this concern by using low-income students and students of color in a set of comparable school districts outside of Kalamazoo. These students are an improved comparison group because they were not disadvantaged by moving sometime during their high school years, and theoretically they could be treated if circumstances change (i.e. if the promise scholarship expanded into their community). This is unlike Bartik et al.'s comparison group who can never be treated because they have already been ruled ineligible for their community's promise scholarship.

Using a difference-in-differences approach, Andrews et al. (2010) examined the ACT score-sending behavior of Michigan students who were eligible and ineligible for the Kalamazoo Promise. This study was limited to the first cohort of eligible Kalamazoo Promise students and contains no information on college enrollment or completion. They found students eligible for the Kalamazoo Promise were more likely to send scores to Michigan public universities. Score-sending rose most for the school closest to Kalamazoo (Western Michigan University, by 12 percentage points) and the state's two most selective institutions: University of Michigan (8 percentage points) and Michigan State University (13 percentage points). Their findings were in the same direction and magnitude as my college enrollment estimates for the University of Michigan and Michigan State University (6.8-7.7 percentage points) and approximately a quarter of the size for enrollment at Western Michigan University (3.4-3.8 percentage points). As students can send their ACT scores to multiple institutions, it is not surprising that Andrews et al. had larger estimates than my college enrollment estimates.

Andrews et al. (2010) separately examined effects for students from low-income families (as captured by student-reported income on the ACT survey).[23] Low-income students were more likely to send their ACT scores to Michigan State University (8 percentage points) and less likely to send their ACT scores to Kalamazoo Valley Community College (a decrease of 10 percentage points). Andrews and his coauthors suggested that these estimates taken together provide evidence that the Kalamazoo Promise shifted the college choice set for low income test takers to consider more selective and higher priced postsecondary schools.

Miller-Adams and Timmeney (2013) explored whether the Kalamazoo Promise changed college choice decisions for students attending the Kalamazoo Area Math and Science Center (KAMSC), a regional magnet high school. The study focused on one of the four Kalamazoo Public Schools high schools and compared eligible and ineligible Kalamazoo Promise students within the same high school. Eligible students were more likely to enroll in Michigan public postsecondary schools and less likely to enroll in Michigan private postsecondary schools. Miller-Adams and Timmeney suggested that students attended selective public postsecondary schools like the University of Michigan and Michigan State University because these students were academically high achieving and presumably competitive for admission.

IV. Identification Strategy

I use a counterfactual framework to estimate the effect of the Kalamazoo Promise on educational attainment. Under the counterfactual framework (Holland, 1986; Morgan & Winship, 2007; Murnane & Willet, 2011; Rubin, 1974; Shadish, Campbell, & Cook, 2002), each individual has two potential outcomes: Y_1 is the value under the treatment condition and Y_0 is the

[23] Unlike these authors, I do not rely on self-reported income, but rather on an indicator of economic disadvantage obtained from the state's administrative data systems.

value under the control condition. Conceptually, the individual treatment effect is the difference between the two potential outcomes or $Y_1 - Y_0$ for each individual.

Since it is not possible to observe both potential outcomes for each person, we are left with a missing data problem where we can observe Y_1 only for individuals in the treatment condition and observe Y_0 only for individuals in the control condition. This is called the fundamental problem of causal inference (Holland, 1986) and it can be solved by using a *group* of individuals in the control condition as the counterfactual for a *group* of individuals in the treatment condition. If the people are randomly assigned to either the treatment or the control condition, the two groups should be, on average, statistically the same in baseline observable and unobservable characteristics.

Sometimes randomized experiments are not always feasible, and researchers need to seek out quasi-experimental research designs such as natural experiments to estimate the average treatment effect of education policies and programs. Natural experiments are events that occur in the real world such as natural disasters or unexpected policy changes where assignment is not under the control of researchers, but participants seem to be effectively randomly sorted into treatment and control conditions due to the natural event (Angrist & Pischke, 2009; Murnane & Willet, 2011). The Kalamazoo Promise is an example of a natural experiment because it was an abrupt policy change that sorted students across the state into either the treatment condition or control condition based on time and location.

To estimate the effect of the Kalamazoo Promise, I use a difference-in-differences design to compare changes across cohorts in the educational outcomes of students in Kalamazoo and in other comparable school districts within the state. A simple pre-post comparison (that is, a first difference) would examine changes in the educational outcomes of students from Kalamazoo

before and after the scholarship was introduced in 2006, and attribute this difference to the program. But this estimate would be biased by any secular time trends that affect all students in the state or by endogenous mobility into the school district. I therefore also calculate this difference for students in other comparable school districts in the state, and subtracted this from the difference in Kalamazoo (a second difference).

This difference-in-differences estimate can be represented by the following regression:

$$(1) \qquad Y_{cdi} = \gamma_0 + \gamma_1(KP\_Elig_{di}) + \gamma_2(Post_{ic}) + \gamma_3(KP\_Elig_{di} * Post_{ic}) + \beta X_{idc} + \varepsilon_{cdi}$$

Here, Y_{cdi} is outcome Y (representing college access, college choice, and degree completion) for student i in school district d and cohort year c. KP_Elig_{di} is a dummy indicating eligibility for the Kalamazoo Promise, $Post_{ic}$ is a dummy indicating whether a student graduated from high school after 2006 or not, and $KP\_Elig_{di} * Post_{ic}$ is the interaction between these two variables. I also estimate variants of this equation where $Post_{ic}$ is replaced by a set of grade cohort dummies and KP_Elig_{di} is replaced by a set of district dummies. I use this approach because it eliminates any observed or unobservable characteristics that are time-invariant within grade cohorts and school districts that may affect the difference-in-differences estimate. The vector of student demographics is represented by βX_{idc} and includes age, gender, race/ethnicity, limited English proficiency, migrant status, poverty indicator, special education status, and 11th grade state standardized exam scores in math, reading, science, and social studies. I included these student demographics because prior literature has provided evidence that these student demographic characteristics may be correlated with the outcomes of interest. The error term is represented by ε_{cdi}. I use robust standard errors clustered at the school district level because students' outcomes in the same school district are not independent and most likely correlated with each other. By clustering the standard errors within school districts, I am addressing this dependence.

The coefficient of interest is γ_3, which is the difference-in-differences estimate of the effect of the Kalamazoo Promise eligibility on college access, college choice, and degree completion controlling for student covariates. I can identify the coefficients for the four groups (pre-promise Kalamazoo high school graduates, post-promise Kalamazoo high school graduates, pre-promise comparison high school graduates, and post-promise comparison high school graduates) in equation (1) by replacing KP_Elig_{di} and $Post_{ic}$ with ones or zeroes. Students who are Kalamazoo high school graduates receive a value of one and students who are comparison high school graduates receive a value of a zero. Students who are in the post-promise high school graduate cohorts receive a value of one or a zero otherwise. Table 2.1 displays the coefficients in equation (1) that represent each of the four groups. Therefore, the difference-in-differences coefficient is just the average difference in the outcomes of the Kalamazoo Promise high school graduates controlling for student demographics net the average difference in outcomes for the comparison high school graduates controlling for student demographics across the pre- and post-promise cohorts.

Table 2.1 Identifying the coefficients of interest in the difference-in-differences model

	Kalamazoo hs graduates	Comparison hs graduates	**Difference**
Pre-Promise cohorts	$\gamma_0 + \gamma_1$	γ_0	γ_1
Post-Promise cohorts	$\gamma_0 + \gamma_1 + \gamma_2 + \gamma_3$	$\gamma_0 + \gamma_2$	$\gamma_1 + \gamma_3$
Difference	$\gamma_2 + \gamma_3$	γ_2	$\boldsymbol{\gamma_3}$

Given that the eligibility requirements for the Kalamazoo Promise are widely known and the scholarship is available to any student who meets the criteria, it may influence where families live and where parents send their children to school. Students in families that value education may be more likely to either move to or stay within the Kalamazoo Public Schools district to gain access to the scholarship. In fact, attracting such families to the city was a central goal of the

scholarship. This endogenous mobility will positively bias the difference-in-differences estimate, because families who plan to send their children to college will move into the district, thereby increasing Kalamazoo's college attendance rate even if no child's likelihood of attending college is affected by the scholarship.

Prior research on the Kalamazoo Promise has ignored the endogenous mobility of students when estimating the effect of the Kalamazoo Promise on student outcomes (Bartik, Eberts, & Huang, 2010; Bartik et al., 2015; Bartik & Lachowska, 2013; Miller, 2011; Miller-Adams & Timmeney, 2013). However, some of these same researchers (Bartik et al., 2010; Hershbein, 2013; Miller, 2011) have provided evidence of increased K-12 enrollments in the Kalamazoo Public Schools - sometimes in the same paper. Miller (2011) found that the Kalamazoo Public Schools increased their enrollment by 1,000 to 2,000 students in the post-period when comparing Kalamazoo to school districts that were either similar in size or were located in the same county as Kalamazoo. Hershbein (2013) estimated that there was a 40% increase of new students in the Kalamazoo Public Schools entering the school district in the first year of the promise. In the second to fifth year of the promise, enrollments leveled off and returned to pre-promise trends.

In a more recent paper, Bartik and Sotherland (2015) directly focused on the in- and out-migration rates of eight promise communities (one of which was Kalamazoo). They found evidence of endogenous mobility as households with children under 18 were less likely to leave the promise communities for at least three years after the promise scholarships were implemented. Given these findings, these papers (Bartik et al., 2010; Bartik et al., 2015; Bartik & Lachowska, 2013; Miller, 2011; Miller-Adams & Timmeney, 2013) may have biased estimates for the effect of the Kalamazoo Promise on student outcomes.

Andrews et al. (2010) is the one Kalamazoo Promise paper that did not need to address endogenous mobility as they focused on the first cohort of Kalamazoo Promise eligible students. Given the short time frame of when the Kalamazoo Promise was announced and when the first cohort could use the funds, 12th graders from other areas could not have moved into the school district to take advantage of the offer of tuition-free college. However, the short time frame also meant that they were not able to examine the actions that students could have taken in later cohorts to prepare themselves for college, which may have further changed their college choice sets (a main finding from their paper).

To determine whether endogenous mobility is a threat to my identification strategy, I examine the in- and out-migration of students in the Kalamazoo Public Schools and comparison school districts from 2003 to 2013 (the time period of my sample). The outcomes that I use are exits and entrances within the academic year and between the academic years. I examine exits and entrances in two time points because I assume that students who moved due to the Kalamazoo Promise would be more likely to move between academic years because they will gain credit for the entire year of attendance as opposed to moving within the academic year.

For the exit outcomes, I coded a student as a "within academic year exit" if the student was in the Kalamazoo Public Schools in the fall semester, but was not enrolled in the Kalamazoo Public Schools in the spring semester of the same academic year. The student is coded as a "between academic year exit" if the students was enrolled in the Kalamazoo Public Schools in the fall semester *t*, but was not enrolled in the Kalamazoo Public Schools in the following fall semester $t + 1$. I included all grades (K-12) in the "within academic year exit," but I only included kindergarten to 11th grades for the "between academic year exit" to distinguish an exit

from graduation since the majority of students tend to graduate from high school after their 12th grade (as opposed to graduating early in 10th or 11th grade).

For the entrance outcomes, I coded a student as a "new entrant within the academic year" if the student was enrolled in the Kalamazoo Public Schools in the spring semester of an academic year, but she was not enrolled in the fall semester of that same academic year. A student is coded as a "new entrant between the academic years" if the student was enrolled in the Kalamazoo Public Schools in the fall semester *t*, but was not enrolled in the school district in the previous fall semester *t* - 1. I included all grades (K-12) in the "new entrant within the academic year," but I only included 1st to 12th grades for the "new entrant between academic years" as all kindergarten students were considered new to the school district because the state administrative data does not contain preschool enrollments.

Since I am interested in determining whether there is a difference in the mean exit rate and mean entrance rate across school districts and time, I estimate a difference-in-differences equation similar to equation (1) with the dependent variable as either a student exit from the Kalamazoo Public Schools or a student entrance into the Kalamazoo Public Schools. These estimates provide evidence on whether there was endogenous mobility in the Kalamazoo Public Schools by students being more or less likely to leave/enter the school district after the announcement of the Kalamazoo Promise. Table 2.2 displays these difference-in-differences estimates for within and between academic years.

There is evidence of endogenous mobility as there was a sharp decline in the percent of students exiting the Kalamazoo Public Schools after the announcement of the Kalamazoo Promise. In the post-period, the mean within academic year exit rate for the Kalamazoo Public Schools decreased by 1.4 percentage points and the mean between academic years exit rate for

the Kalamazoo Public Schools decreased by 7.5 percentage points compared to the mean exit rates in a set of comparison school districts. I also graphed the difference in mean exit rates between Kalamazoo Public Schools and comparison school districts for pre- and post-promise years across all grades. Figure 2.4 in Appendix B displays these graphs. For mean entrance rates, however, there was no evidence of a change in the Kalamazoo Public Schools after the announcement of the Kalamazoo Promise.

Table 2.2 Mobility outcomes of K-12 students in Kalamazoo Public Schools in 2003-2013 using a difference-in-differences approach

Outcome	Exit within AY	Exit between AY	New entrance within AY	New entrance between AY
KP_Fall * Post	-0.014***	-0.075***	0.0002	-0.007
S.E.	(0.003)	(0.016)	(0.0001)	(0.016)
KPS pre-mean	0.06	0.19	0.001	0.14
Grades included	K-12	K-11	K-12	1-12
Demographics included	Y	Y	Y	Y
N	711,735	617,346	711,735	580,905

Notes. All regressions include school district fixed effects and year fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, and eligibility for free and reduced price lunch. The robust standard errors are clustered by the students' fall school district.
*** significant at 1%; **significant at 5%; *significant at 10%

This is surprising given that prior research has found large increases in enrollment for the Kalamazoo Public Schools after the announcement of the Kalamazoo Promise (Bartik et al., 2010; Hershbein, 2013; Miller, 2011). However, my prior analysis ignored that students need to enter the school district by 9th grade to be eligible for the Kalamazoo Promise. Therefore, it could be that students are more likely to move into the Kalamazoo Public Schools if they were in an eligible grade - from kindergarten to 9th grade. I use a dummy variable to indicate whether the student was in one of these grades ($EligGR_{idg}$) and incorporated the grade dummy into equation

(1), which allows me to estimate whether the mean entrance rate is different in the post-period when students were in one of the eligible grades.

The difference-in-difference-in-differences regression is represented by the following equation:

$$(2) \quad Y_{idtg} = \gamma_1(KP\_Fall_{idt} * Post_{it}) + \gamma_2(EligGR_{idg} * Post_{it}) + \gamma_3(EligGR_{idg} * KP\_Fall_{idt}) + \gamma_4(EligGR_{idg} * KP\_Fall_{idt} * Post_{it}) + \beta X_{idtg} + \delta_g + \delta_t + \delta_d + \varepsilon_{idtg}$$

Y_{idtg} indicates whether student *i* in grade *g* in school district *d* and year *t* entered Kalamazoo Public Schools during the academic year. KP_Fall_{idt} is a dummy variable indicating whether a student is enrolled in Kalamazoo Public Schools in the fall semester of year *t*. $EligGR_{idg}$ is a dummy variable indicating whether a student is enrolled in grade *g* that determined Kalamazoo Promise eligibility (kindergarten to 9th grade). I also include grade fixed effects δ_g. $Post_{it}$, βX_{idtg}, δ_t, δ_d, ε_{idtg} are the same as in equation (1). I use robust standard errors clustered by the students' fall school district.

The difference-in-difference-in-differences estimate is represented by γ_4 and the estimates are displayed in Table 2.3. I include all post cohorts in my sample for columns (1) and (2). For columns (3) and (4), I restrict my sample to the first cohort after the announcement of the Kalamazoo Promise since Hershbein (2013) found that the surge in enrollment was due to students moving into the Kalamazoo Public Schools only during the first post-promise year. In the second year to fifth year of the Kalamazoo Promise, he found that entrance rates returned to pre-promise rates. For "entrance within the academic year," the first post-promise year was 2006 as students could have moved into the Kalamazoo Public School in the spring semester of 2006, immediately after the announcement in the fall. For "entrance between academic years," the first post-promise year was 2007 as students' first chance to move between academic years was

during the summer of 2005-06, entering the Kalamazoo Public Schools in the 2006-07 academic year.

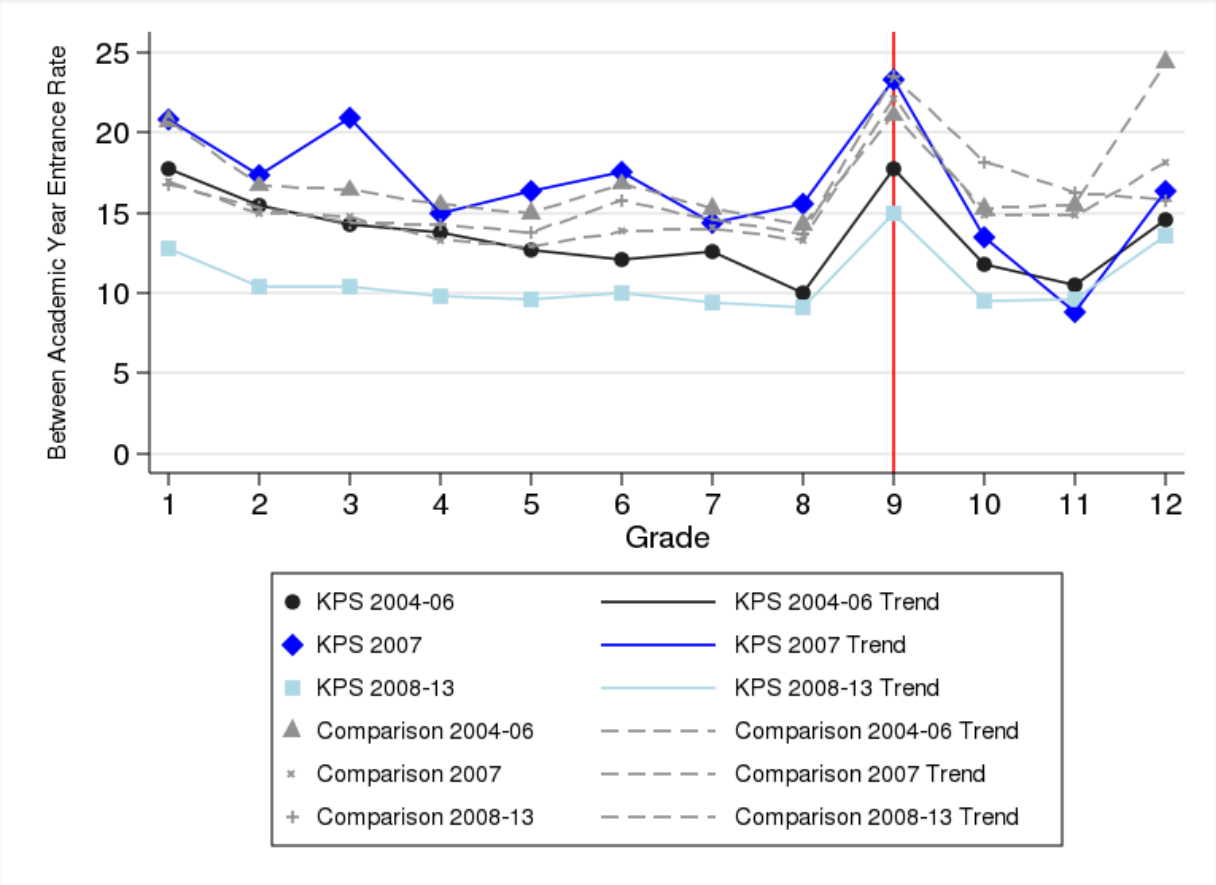
Table 2.3 The entrance of new students into the Kalamazoo Public Schools in 2003-2013 using a difference-in-difference-in-differences approach

Outcome	New entrance within AY: All cohorts (1)	New entrance between AY: All cohorts (2)	New entrance within AY: First cohort - 2006 (3)	New entrance between AY: First cohort - 2007 (4)
EligGR * KP_Fall * Post	0.0001	-0.021***	-0.00004	0.027***
S.E.	(0.0003)	(0.008)	(0.0004)	(0.005)
KPS pre-mean	0.001	0.15	0.001	0.16
Grades included	K-12	1-12	K-12	1-12
Demographics included	Y	Y	Y	Y
N	711,735	580,905	288,569	257,880

Notes. All regressions include school district fixed effects, year fixed effects, and grade fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, and eligibility for free and reduced price lunch. The robust standard errors are clustered by students' fall school district. Columns 1 and 2 include the academic years of 2003-2013. Columns 3 includes the academic years of 2003-2006. Column 4 includes the academic years of 2004-2007.
*** significant at 1%; **significant at 5%; *significant at 10%

To explain the difference in estimates for the between academic year entrance rate in columns 2 and 4, I graph the mean entrance rate between academic years for students in the Kalamazoo Public Schools and comparison school districts for three time points: pre-promise years (2004-06), first post-promise year (2007), and remaining post-promise years (2008-2013). The graph is displayed in Figure 2.2. There are three Kalamazoo Public Schools trend lines for the three time periods and they are represented in black or different shades of blue. There are three comparison school district trends lines for the three time periods and they are represented in different shades of gray. The red vertical line is at 9^{th} grade, which indicates the last grade of entry for Kalamazoo Promise eligibility.

Figure 2.2 The entrance rate between academic years in Kalamazoo Public Schools and comparison school districts, 2004-2013



In the first post-promise year (represented in bright blue), students were more likely to enter the Kalamazoo Public Schools for all grades in the grade eligibility window (1st grade to 9th grade) by an average of 2.7 percentage points. As expected, 9th grade is the grade with the highest percent of new students entering the Kalamazoo Public Schools as this is the last grade of entry for Kalamazoo Promise eligibility. In 10th grade through 12th grade, the percent of new students drop back down to resemble pre-promise trends (represented in black).

For the remaining post-promise years (represented in light blue), students were less likely to enter the Kalamazoo Public Schools for all grades in the grade eligibility window compared to the pre-promise trends. This explains the overall negative estimate for between academic years

entrance rate in column (2). Overall, this led to a decline in the mean entrance rate during the grade eligibility window by an average of 2.1 percentage points. For the non-eligible grades, the mean entrance rate resembled the mean entrance rate in the pre-promise years. My analysis confirmed the results from Hershbein (2013) that students were more likely to enroll in Kalamazoo Public Schools in the first post-promise year, but not in subsequent post-promise years.

Based on my analysis, there is evidence that the average entrance and exit rates of students into/out of the Kalamazoo Public Schools differed in pre- and post-promise years. Students were more likely to stay in the Kalamazoo Public Schools compared to students in the comparison school districts after the Kalamazoo Promise was announced. In addition, more students entered the Kalamazoo Public Schools - at least for the 2006-07 academic year - for 1st through 9th grade. Therefore, KP_Elig_{di} in equation (1) may be endogenous and its coefficient positively biased.

To address the concerns about the endogenous predictor (KP_Elig_{di}), I use an instrument that removes the endogenous variation (i.e., factors that students or their families can manipulate to receive treatment) and only uses the exogenous variation to predict Kalamazoo Promise eligibility (i.e. factors that students or their families cannot manipulate to receive treatment). The instrument I use is an interaction of whether the student was a 4th grader in the Kalamazoo Public Schools and whether the student was in the 4th grade cohort of 1998 or later. I assign eligibility based on 4th grade district because all cohorts in the sample were in 4th grade at least a year before the Kalamazoo Promise was announced (students who are 4th graders in 1998 were 12th graders in 2005-2006, assuming on-time progression in school). Therefore, the Kalamazoo Promise could not have affected students' 4th grade schooling locations since it did not exist yet.

Table 2.4 shows the cohort structure of the sample and verifies that all cohorts in the sample were in 4th grade at least a year before the Kalamazoo Promise was announced. The rows are the academic years starting in 1994-95 and ending in 2012-13. The columns are the high school graduating classes from 2003 to 2013, and each cell represents the grade that the high school graduating class is in for that academic year. For example, the high school graduating class of 2005 is in 4th grade in 1996-97. The yellow highlighted line represents the year that the Kalamazoo Promise was announced. In the year that the Kalamazoo Promise was announced, the pre-promise cohorts had already graduated from high school, and the post-promise cohorts were in a range of grades from 5th to 12th depending on the cohort. This table verifies that all cohorts were in their 4th grade location at least a year before the Kalamazoo Promise was announced.

The instrument is valid if it meets two conditions: (1) there is a strong correlation between students who are 4th graders in Kalamazoo Public Schools in 1998 and later and whether they are eligible for the Kalamazoo Promise (instrument relevance) and (2) the instrument is only correlated with educational outcomes through eligibility for the scholarship (instrument exogeneity) (Angrist & Pischke, 2009; Murnane & Willet, 2011). The rule of thumb is that the first stage F-statistic needs to meet or exceed 10 to satisfy instrument relevance and is reported in the results tables.

I combine the instrumental variable estimation with the difference-in-differences approach to estimate an instrumental variable, difference-in-differences equation. This model unites the strengths of the difference-in-differences design and addresses the concern that students may have manipulated their eligibility through residential choice. While I model this process in two steps in equations (3) and (4), the regressions are estimated simultaneously.

Table 2.4 The cohort structure of the sample by academic year and high school graduating class

	High School Graduating Class										
	Pre Promise Cohorts			Post Promise Cohorts							
Academic Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1994-95	4	3	2	1	K						
1995-96	5	4	3	2	1	K					
1996-97	6	5	4	3	2	1	K				
1997-98	7	6	5	4	3	2	1	K			
1998-99	8	7	6	5	4	3	2	1	K		
1999-00	9	8	7	6	5	4	3	2	1	K	
2000-01	10	9	8	7	6	5	4	3	2	1	K
2001-02	11	10	9	8	7	6	5	4	3	2	1
2002-03	12	11	10	9	8	7	6	5	4	3	2
2003-04		12	11	10	9	8	7	6	5	4	3
2004-05			12	11	10	9	8	7	6	5	4
2005-06				12	11	10	9	8	7	6	5
2006-07					12	11	10	9	8	7	6
2007-08						12	11	10	9	8	7
2008-09							12	11	10	9	8
2009-10								12	11	10	9
2010-11									12	11	10
2011-12										12	11
2012-13											12

Note. Yellow highlight represents the year that the Kalamazoo Promise was announced.

In the first stage, eligibility for the scholarship is predicted based on 4th grade cohort and district:

(3) $$KP\_Elig_{cdi} = \pi_1(KPS\_4_{id} * Post\_4_c) + \beta X_{idc} + \delta_c + \delta_d + \varepsilon_{cdi}$$

KP_Elig_{cdi}, the endogenous regressor, indicates whether a student meets all the requirements of the Kalamazoo Promise (spending at least four years in the district, living in the boundaries of the school district, and graduating from a district high school). KPS_4_{id} is a dummy variable that indicates whether a student was a 4th grader in the Kalamazoo Public Schools in 1995-2005. $Post\_4_c$ is a dummy variable indicating whether a student was in 4th grade in 1998 or later. βX_{idc} is the same as equation (1) except that 11th grade standardized exam scores is replaced with 4th grade standardized exam scores in math and reading. δ_c is a set of 4th grade cohort fixed effects, δ_d is 4th grade school district fixed effects, and ε_{cdi} is the error term.

Predicted values from this equation are then used to replace the endogenous regressor KP_Elig_{cdi} in equation (1):

(4) $$Y_{cdi} = \pi_2(\widehat{KP\_Elig_{cdi}}) + \beta X_{idc} + \delta_c + \delta_d + \varepsilon_{cdi}$$

The coefficient π_2 is the instrumental variables difference-in-differences estimate which uses exogenous variation in the instrument to estimate the impact of Kalamazoo Promise eligibility on postsecondary access, choice, and attainment.

I compare the students in Kalamazoo to students in seven poor urban school districts from across the state. To select school districts that were classified as poor, I used eligibility for free and reduced price lunch as a proxy for poverty and calculated the mean eligibility for free and reduced price lunch for all 4th graders within the state and within each school district in the year 2005. I selected 2005 because it was the year before the Kalamazoo Promise was announced. Given that 70% of Kalamazoo Public School 4th graders were eligible for free and

reduced price lunch in 2005, I wanted to choose other urban school districts with a similar level of poverty as Kalamazoo. I initially selected the other 13 urban school districts that were in the same quartile as Kalamazoo for the percent of 4th graders who were eligible for free and reduced price lunch. I dropped 6 of the 13 school districts because they started a promise program sometime during the last three years of my study (2010-2013). Therefore, the later cohorts in the comparison school districts may have had access to a promise scholarship, which would have biased the estimate of the effect of the Kalamazoo Promise downwards since both the treatment students and some comparison students received the offer of the treatment.

The final group of comparison school districts is a set of seven poor urban school districts from across the state that did not start a promise program between the years of 2003-2013. The demographic and academic characteristics of the Kalamazoo Public Schools and the comparison school districts are in Table 2.5. In 2005, the Kalamazoo Public Schools and the comparison school districts were approximately similar on the enrollment of Black, Asian, Pacific Islander, Native American, and Alaskan Native students with approximately half of the students identified as Black and about 2-3% of students identified as Asian, Pacific Islander, Native American, or Alaskan Native. There were slightly more Latino students and slightly fewer White students in the comparison school district compared to Kalamazoo Public Schools. The comparison school districts also had a higher mean percent of students eligible for free and reduced lunch by 9.7 percentage points. In general, the Kalamazoo Public School students had a higher mean score on their state standardized exams in 11th grade, 8th grade, and 4th grade compared to the comparison school district.

Table 2.5 Characteristics of Kalamazoo Public Schools and comparison poor urban school districts in 2005

	Kalamazoo Public Schools (1)	All Comparison School Districts (2)	Flint (3)	Godfrey Lee (4)	Godwin Heights (5)	Grand Rapids (6)	Jackson (7)	Muskegon (8)	Van Dyke (9)
Demographics									
Number of schools	25	183	40	6	6	90	14	15	12
Number of students	10,447	63,178	19,195	1,655	2,144	23,295	6,438	6,477	3,974
Number of teachers	677	3,877	1,126	97	148	1,562	380	343	222
Number of guidance counselors	17	80	27	2	3	30	5	8	5
Percent Native American or Alaskan Native	0.012	0.008	0.005	0.005	0.008	0.009	0.013	0.012	0.010
Percent Asian or Pacific Islander	0.018	0.015	0.003	0.010	0.052	0.013	0.017	0.017	0.065
Percent Latino	0.083	0.138	0.026	0.512	0.271	0.247	0.047	0.104	0.017
Percent Black	0.466	0.504	0.796	0.147	0.181	0.407	0.402	0.481	0.196
Percent White	0.399	0.326	0.176	0.334	0.590	0.248	0.592	0.430	0.758
Percent special education students	0.137	0.187	0.131	0.138	0.157	0.238	0.190	0.188	0.185
Percent limited English proficiency	0.087	0.105	0.040	0.334	0.111	0.201	0.013	0.049	0
Percent eligible for free and reduced price lunch	0.599	0.696	0.686	0.677	0.729	0.715	0.699	0.657	0.686
Standardized exam scores									
Percent proficient on 11th grade MME math	0.46	0.25	0.21	0.29	0.27	0.08	0.41	0.38	0.26
Percent proficient on 11th grade MME reading	0.64	0.46	0.50	0.47	0.45	0.21	0.63	0.50	0.53
Percent proficient on 11th grade MME science	0.52	0.27	0.22	0.32	0.31	0.09	0.45	0.32	0.29
Percent proficient on 11th grade MME writing	0.43	0.28	0.29	0.29	0.35	0.11	0.39	0.37	0.22
Percent proficient on 8th grade MEAP math	0.49	0.35	0.27	0.55	0.54	0.32	0.46	0.39	0.43
Percent proficient on 8th grade MEAP science	0.45	0.36	0.32	0.53	0.64	0.30	0.47	0.38	0.48
Percent proficient on 8th grade MEAP soc studies	0.19	0.12	0.08	0.16	0.42	0.11	0.19	0.13	0.11
Percent proficient on 4th grade MEAP math	0.58	0.48	0.49	0.83	0.75	0.38	0.58	0.33	0.66
Percent proficient on 4th grade MEAP reading	0.70	0.67	0.67	0.93	0.76	0.61	0.76	0.58	0.79
Percent proficient on 4th grade MEAP writing	0.28	0.42	0.37	0.40	0.43	0.51	0.37	0.26	0.55
District finances									
Per-pupil revenue from all sources	12,185	12,633	14,064	10,442	10,726	12,091	11,775	12,807	11,950
Per-pupil total instructional expenditures	7,208	6,928	7,509	6,426	7,085	6,557	6,962	6,664	6,790
Per-pupil total instructional salaries	6,613	6,543	6,940	6,116	6,803	6,179	6,730	6,501	6,561

Notes. Each cell in the comparison school district column is student weighted except for total sum of schools, students, teachers, and guidance counselors.

I also estimate the same instrumental variable, difference-in-differences model replacing 4th grade school district and 4th grade cohort with 8th grade school district and 8th grade cohort.[24] Unlike the previous specification, students who were in 8th grade in the last four cohorts (cohorts 2010-2013) were young enough that they could have moved into the Kalamazoo Public Schools district after the Kalamazoo Promise was announced and met the eligibility requirements for at least 65% of the scholarship. Therefore, I only use students who were in their 8th grade school district location at least a year before the Kalamazoo Promise was announced. Therefore, the 8th grade sample corresponds to the high school graduating cohorts of 2003-2009.

I estimate heterogeneous treatment effects for students based on their race/ethnicity, gender, academic achievement, and family income. I am interested in these student subgroups because prior research has shown that students who are low-income, Black or Latino, men, or with low academic achievement have lower educational attainment, on average, than their counterparts (Baum, Ma, & Payea, 2010; Bound, Lovenheim, & Turner, 2010; Bowen et al., 2009). By examining the heterogeneous treatment effects, it provides evidence of which type of students benefit from the Kalamazoo Promise.

V. Data and Samples

I used a longitudinal administrative student-level dataset that has the universe of elementary and secondary public school students in Michigan. It has a rich set of demographic and academic data including which school the student is enrolled in over time. Using this dataset, I constructed three samples of students who attended Michigan public schools in the years 2003-2013. I have three pre-Kalamazoo Promise cohorts (2003-2005) and eight post-Kalamazoo Promise cohorts (2006-2013). The samples start at different time points in their schooling (4th

[24] I used 8th grade as a starting point because I defined Kalamazoo Promise eligibility as whether students enter the Kalamazoo Public Schools by 8th grade instead of 9th grade due to limitations in my data. See Limitations section on how I define Kalamazoo Promise eligibility.

grade, 8th grade, and high school graduation), but they correspond to the same expected high school graduation cohorts assuming on-time progression in school. As mentioned previously, the 8th grade sample contains four fewer cohorts because students who were young enough to move into the Kalamazoo Public Schools to be eligible for any percent of the Kalamazoo Promise were dropped.

I examined whether the demographic or academic characteristics between school districts and grade cohorts change over time for my three samples. If there were drastic demographic shifts in student demographics in the post-period that were correlated with the probability of students attending college, the findings may be a result of these changing demographics instead of the availability of the Kalamazoo Promise. Table 2.6 displays the sample means for 4th grade and 8th grade cohorts in the Kalamazoo Public Schools and the set of poor urban school districts before and after the Kalamazoo Promise started. Table 2.19 in Appendix B displays the sample means for the high school graduation cohorts.

The column of interest is labeled "D-in-D" and it is the difference-in-differences estimate between Kalamazoo Public Schools and poor urban school districts before and after the Kalamazoo Promise started. For example, the difference-in-differences estimate for the change in enrollment of Latino 4th graders in Kalamazoo Public Schools decreased by 2.3 percentage points in the post-period, which was not statistically significant.

There were some statistically significant demographic shifts within the Kalamazoo Public Schools in the post-period. For 4th graders, there was an increase of special education students by 1.6 percentage points. For 8th graders, there was an increase of limited English proficiency students by 1.0 percentage points, an increase of special education students by 1.8 percentage points, and an increase of Black students by 2.0 percentage points. The other demographic

Table 2.6 Demographic information for 4th and 8th grade cohorts before and after the Kalamazoo Promise started

	4th grade (HS Graduation 2003-2013)							8th grade (HS Graduation 2003-2009)						
	KPS			Poor Urban				KPS			Poor Urban			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	D-in-D	Pre	Post	Post-Pre	Pre	Post	Post-Pre	D-in-D
Demographics														
Female	0.488	0.479	-0.009	0.503	0.494	-0.009	0.0002	0.495	0.482	-0.013	0.510	0.498	-0.012	-0.0002
Black	0.399	0.477	0.078	0.430	0.515	0.085	-0.007	0.418	0.480	0.062	0.495	0.537	0.042	0.020*
Latino	0.040	0.072	0.033	0.061	0.117	0.056	-0.023	0.051	0.069	0.019	0.090	0.120	0.030	-0.011
Asian	0.007	0.012	0.005	0.013	0.012	-0.001	0.006	0.013	0.011	-0.002	0.016	0.015	-0.002	-0.001
White	0.546	0.429	-0.117	0.483	0.348	-0.135	0.018	0.511	0.431	-0.080	0.387	0.321	-0.066	-0.014
Age	9.905	9.897	-0.008	10.010	9.990	-0.020	0.014	13.930	13.910	-0.020	14.050	14.050	0	-0.021
Limited English proficiency	0.011	0.022	0.011	0.011	0.019	0.007	0.004	0.016	0.027	0.011	0.025	0.026	0.001	0.010***
Migrant status	0.002	0.0003	-0.002	0.005	0.000	-0.004	0.002	0.002	0.001	-0.001	0.007	0.001	-0.006	0.005
Special education status	0.069	0.082	0.013	0.064	0.061	-0.003	0.016***	0.048	0.072	0.024	0.055	0.062	0.006	0.018***
Economically disadvantaged	0.216	0.338	0.122	0.222	0.341	0.119	0.003	0.231	0.324	0.093	0.245	0.342	0.097	-0.003
Academic information														
Std MEAP 4th grade math	-0.264 (1.174)	-0.208 (1.135)	0.056	-0.365 (0.987)	-0.449 (1.013)	-0.084	0.139*							
Std MEAP 4th grade reading	-0.282 (1.094)	-0.222 (1.092)	0.060	-0.401 (1.040)	-0.448 (1.046)	-0.047	0.108							
Std MEAP 8th grade science								-0.345 (1.028)	-0.429 (1.066)	-0.084	-0.558 (1.072)	-0.664 (0.973)	-0.106	0.023
N	2,127	6,097	8,224	10,635	34,606	45,241	53,465	1,902	2,969	4,871	10,380	16,510	26,890	31,761

Notes. Age is calculated on March 1st in the year the student is either a 4th grader or 8th grader. Limited English proficiency, migrant status, special education, and economically disadvantaged are measured in the year the student is in 12th grade. MEAP/MME exams are standardized in the year the student took the test. The column labeled D-in-D is the difference-in-differences estimate and due to rounding may not exactly match. The standard errors are clustered at either the 4th or 8th grade school district.

*** significant at 1%; **significant at 5%; *significant at 10%

characteristics remained statistically unchanged before and after the Kalamazoo Promise started for the Kalamazoo Public Schools students across both samples.

Along with examining demographic shifts in the Kalamazoo Public Schools, I am interested in exploring whether the academic performance of students changed in the post-period. If there is an increase in the college attendance of Kalamazoo Public School students, it could be attributed to an increase in their standardized test scores since students who scored higher on their standardized test scores tend to enroll in college at higher rates than students who do not perform as well. I used the state standardized score in each test year to examine the academic performance of students compared to the mean state performance on the Michigan Education Assessment Program (MEAP) exams. For the 4th grade Kalamazoo Promise cohorts, Kalamazoo Public Schools students earned higher scores on the 4th grade MEAP mathematics and reading exam by 0.139 and 0.108 standard deviations, respectively. The difference-in-differences estimate on the reading exam was not statistically significant. For the 8th grade cohorts in the Kalamazoo Public Schools, Kalamazoo Public Schools students earned higher scores on the 8th grade MEAP science exam by 0.023 standard deviations, but it was not statistically different from zero.[25]

I used the National Student Clearinghouse (NSC) to construct my college access, college choice, and degree completion outcomes. The NSC contains postsecondary enrollment and degree information for 93% of college students in the United States (Dynarski, Hemelt, & Hyman, 2013). I define college access as enrolling in any postsecondary institution within one year of high school graduation. I define college choice as enrolling in a specific type of postsecondary institution within one year of high school graduation. For example, the type of

[25] These MEAP subject exams were selected because they were the only subject exams that were administrated for all cohorts in either 4th grade or 8th grade.

postsecondary institution could be Michigan public colleges and universities, Michigan private colleges and universities, or Michigan flagship universities (University of Michigan and Michigan State University). I define postsecondary degree attainment as completing any postsecondary degree (certificate, associate's, or bachelor's degree) within four or six years of high school graduation.

The starting point for calculating the time window for the college access, college choice, and degree completion outcomes is different depending on the sample. For the high school graduation sample, the time window started from the date of their actual high school graduation. For the 4th and 8th grade samples, the time window started from the month and year of their *expected* high school graduation based on when they were in 4th or 8th grade.

VI. Limitations

There are several limitations in this study. Students are eligible for the Kalamazoo Promise if they live within the Kalamazoo Public Schools boundary, enroll in the district in 9th grade or before, graduate from one of the district's high schools, and complete the Kalamazoo Promise application. I approximate Kalamazoo Promise eligibility in my dataset using three criteria: (1) living within the school district boundary, (2) enrollment in the school district in high school, and (3) graduating from one of the district's high schools. Students who were assigned the Kalamazoo Public Schools as their residential school district in 12th grade were considered to be living within the school district boundary. Students who enrolled in Kalamazoo Public Schools in 8th grade, 11th grade, and graduated from one of the four high schools met the enrollment and graduation criteria. If students met all three criteria, they were considered eligible for the Kalamazoo Promise.

Due to limitations of the data, I am not able to observe which school district students were attending during their 9th or 10th grades. Therefore, I may have misclassified some students as ineligible for the Kalamazoo Promise who entered the Kalamazoo Public Schools in 9th grade, the last grade of entry. This biases the estimates of college outcomes downwards. Table 2.20 in Appendix B displays the number of students eligible for the Kalamazoo Promise by each sample.

Another limitation of my study is that I am missing college enrollment records for eight promise eligible postsecondary schools - including the local community college, Kalamazoo Valley Community College. I removed these colleges because they did not share their enrollment records with the National Student Clearinghouse within my time window of enrollment for the first cohort in my sample. In robustness of the results section, I discuss my estimates and calculate how large of an underestimate these results are for the effect of the Kalamazoo Promise on college access and two-year college enrollment. Since the NSC has a record of the Kalamazoo Valley Community College awarding its first degree on December 15, 2004, I was able to include Kalamazoo Valley Community College in the degree completion outcome.

My analysis focused on increasing the educational attainment of students within the Kalamazoo Public Schools. However, the Kalamazoo Promise has the potential to strengthen other assets besides human capital such as economic and social assets within Kalamazoo (Miller-Adams, 2009). To have a full picture of the impact of the Kalamazoo Promise on its community, readers should seek out additional research that have focused their attention of these economic and social assets.

VII. Results

I examined how scholarship eligibility affected students' college access, college choice, and degree completion. I also estimated the effect of the Kalamazoo Promise on college

outcomes at specific promise-eligible postsecondary schools such as the local institutions, the Michigan flagships, and postsecondary schools that offered Kalamazoo Promise recipients extra financial incentives to enroll. In the last subsection, I focused on the differences in estimates among subgroups of students based on their gender, race/ethnicity, socioeconomic status, and prior academic performance.

A. College Access

Table 2.7 displays the effect of the offer of the Kalamazoo Promise on college access within one year of high school graduation. Columns 1 and 2 display the difference-in-differences results for students who graduated from high school in 2003-2013. The estimates in the first column use ineligible high school graduates in seven poor urban school districts as the counterfactual. The second column is the estimates from Bartik et al. (2015) who use ineligible high school graduates from Kalamazoo Public Schools as the counterfactual. The estimates in the third column are my attempt to replicate the estimates from Bartik et al. (2015). Since I only have one pre-promise cohort with Kalamazoo Valley Community College enrollment, I drop the first two pre-promise cohorts (2003 and 2004) to see whether I can replicate the results from Bartik et al. (2015) because they have enrollments for Kalamazoo Valley Community College for all three pre-periods. Thus, column 3 is the difference-in-differences estimate for students who graduated from high school in 2005-2013.

Table 2.7 The impact of the Kalamazoo Promise on college enrollment using a difference-in-differences approach for high school graduates

	HS graduates (HS Grad 2003-2013)		
Outcome	D-in-D (1)	Bartik et al. (2015) (2)	Replication of Bartik et al. (2015) (3)
Enroll in any college within 1 yr of actual/expected hs grad	0.111***	0.053	0.023
	(0.025)	(0.042)	(0.027)
KPS pre-mean	0.40	0.60	0.71
N	32,496	5,415	4,146
Enroll in 4-yr college within 1 yr of actual/expected hs grad	0.081***	0.095**	0.086
	(0.008)	(0.040)	(0.085)
KPS pre-mean	0.37	0.41	0.41
N	32,496	5,415	4,146
High school graduating classes	2003-2013	2003-2013	2005-2013
Counterfactual			
Ineligible KPS students	N	Y	Y
Ineligible Poor Urban students	Y	N	N

Notes. Column 1 includes student demographics, graduation year fixed effects, and high school school district fixed effects. Robust standard errors are clustered at the high school school district. Column 2 is the estimates from Bartik et al. (2015). Column 3 includes high school fixed effects, graduation year fixed effects, race, gender, and free and reduced lunch status to replicate the Bartik et al. (2015) estimates. Robust standard errors are clustered at the high school. Postsecondary schools are included if they had participated in the NSC by March 31, 2004 for Columns 1 and 2. Postsecondary schools are included if they had participated in the NSC by March 31, 2006 for Columns 3 to include Kalamazoo Valley Community College.
*** significant at 1%; **significant at 5%; *significant at 10%

High school graduates from the Kalamazoo Public Schools increased their college enrollment by 11.1 percentage points compared to high school graduates in the poor urban school districts. When I use ineligible high school graduates within Kalamazoo Public Schools as the counterfactual (column 3), there is a decrease in the estimate as high school graduates from the Kalamazoo Public Schools only increased their college enrollment by 2.3 percentage points. The difference in estimates could be that ineligible students within Kalamazoo Public Schools

received some benefits from attending school with a promise scholarship even though they are not eligible for the scholarship. This would bias the estimates in columns 2 and 3 downwards which is consistent with the smaller estimates that Bartik et al. (2015) and I find compared to column 1. The increases in enrollment were mainly concentrated at four-year colleges and universities as college enrollment increased by 8.1-8.6 percentage points at this type of postsecondary schools for the post-cohort Kalamazoo high school graduates.

The estimates in column 3 are my attempt to replicate the estimates from Bartik et. al (2015) using the model that they described in their paper. As mentioned previously, I needed to drop the first two pre-promise high school graduate cohorts because I do not have Kalamazoo Valley Community College enrollments for these students. Therefore, I used the high school graduate cohorts of 2005-2013 to replicate the results from Bartik et al. who used the high school graduate cohorts of 2003-2013.

My estimate for enrollment in any college is approximately half the size of the Bartik et al. estimate (0.023 compared to 0.053). This may be due to the differences in our samples to estimate these results especially if the mean college access trend was different in the first two pre-promise cohorts compared to the last. The difference between the KPS pre-mean in columns 2 and 3 suggest this may be the case. For the four-year college enrollment estimate, I able to more closely replicate the findings from Bartik et al. (2015). While my estimate is slightly lower than the estimate from Bartik et al. (8.6 percentage points compared to 9.5 percentage points), it is similar in magnitude and direction.

Since we are concerned that starting with the high school graduate cohorts produced biased estimates due to the endogenous mobility of families who planned to use the Kalamazoo Promise, Table 2.8 displays the first stage, reduced form, and instrumental variables difference-

in-differences estimates for 4th grade and 8th grade cohorts. The 4th grade cohort corresponds to the high school classes of 2003-2013. The 8th grade cohort corresponds to the high school classes of 2003-2009.

Table 2.8 The impact of the Kalamazoo Promise eligibility on college enrollment using an instrumental variables difference-in-differences approach

	4th grade (HS Grad 2003-2013)			8th grade (HS Grad 2003-2009)		
Outcome	First stage (1)	RF (2)	IV (3)	First stage (4)	RF (5)	IV (6)
Enroll in any college within 1 yr of expected hs grad	0.364***	0.034***	0.093***	0.457***	0.047***	0.103***
	(0.002)	(0.011)	(0.027)	(0.001)	(0.014)	(0.029)
KPS pre-mean	--	0.24	0.24	--	0.28	0.28
N	53,465	53,465	53,465	31,761	31,761	31,761
Enroll in 4-yr college within 1 yr of expected hs grad	0.364***	0.010	0.027	0.457***	0.022***	0.048***
	(0.002)	(0.010)	(0.026)	(0.001)	(0.005)	(0.011)
KPS pre-mean	--	0.21	0.21	--	0.25	0.25
N	53,465	53,465	53,465	31,761	31,761	31,761
First-stage F-test	839.90			2296		

Notes. Students in all cohorts are in their 4th grade or 8th grade location before the Kalamazoo Promise is announced. Columns 1 and 4 are the probability of either 4th graders or 8th graders in KPS that are predicted to be eligible for the Kalamazoo Promise. Columns 1-3 include student demographics, 4th grade cohort fixed effects, and 4th grade school district fixed effects. Columns 4-6 include student demographics, 8th grade cohort fixed effects, and 8th grade school district fixed effects. Postsecondary schools are included if they had participated in the NSC by March 31, 2004.
Robust standard errors are clustered at either the 4th grade or 8th grade school district. The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.
*** significant at 1%; **significant at 5%; *significant at 10%

The first-stage estimates predicted the probability of 4th grade students (column 1) or 8th grade students (column 4) in Kalamazoo Public Schools who were eligible for the Kalamazoo Promise. Approximately 36% of post cohort 4th graders and 46% of post cohort 8th graders were predicted to be eligible for the scholarship. Therefore, the take up of the Kalamazoo Promise was not universal and approximately 64% of 4th graders and 54% of 8th graders did not receive the

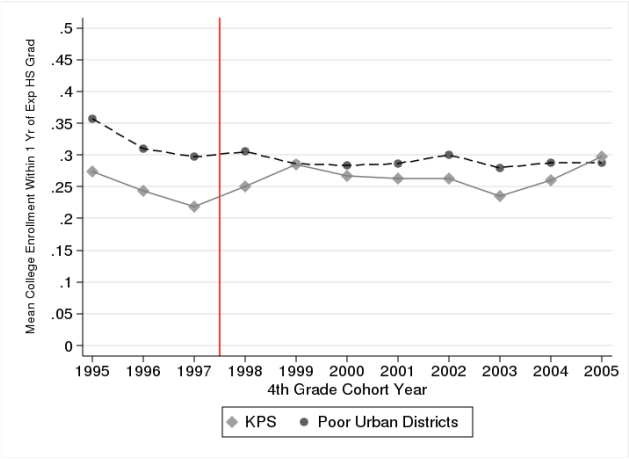
Kalamazoo Promise. Since I did not know the location of students in 9th grade (the last grade of entry to be eligible for the Kalamazoo Promise), students who entered the Kalamazoo Public Schools in 9th grade were classified as ineligible. Therefore, my first stage most likely underestimated the probability of students who were eligible for the Kalamazoo Promise.

I graphed the reduced form estimates for 4th graders and 8th graders in Figure 2.3 for enrollment in any college and enrollment in any four-year college. The x-axis represents the cohort year for the sample and the y-axis is the mean college enrollment outcome within one year of expected high school graduation. The red vertical line represents the year that the Kalamazoo Promise was announced and separates the pre-promise cohorts from the post-promise cohorts. Students from Kalamazoo Public Schools are represented by the gray diamonds and students from the poor urban school districts are represented by the black circles.

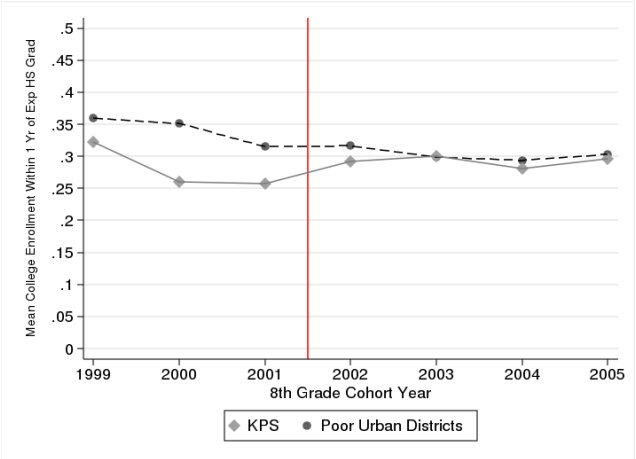
Figure 2.3 Reduced form estimates for mean college enrollment within one year of expected high school graduation for 4th and 8th graders

I. Any college

A. 4th grade

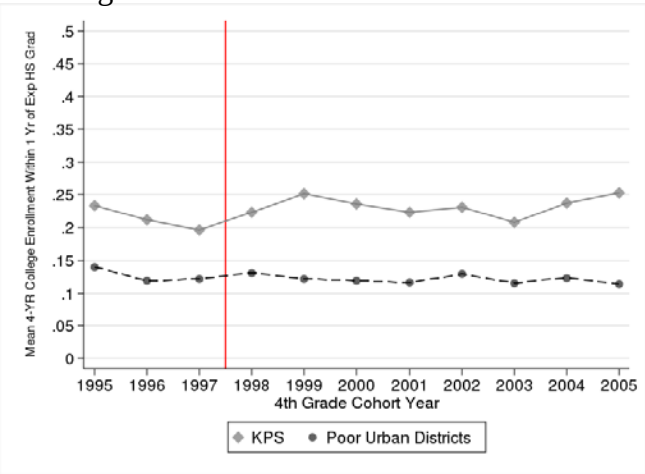


B. 8th grade

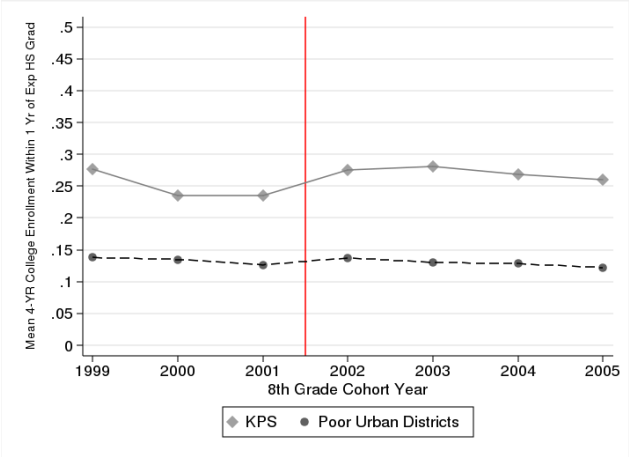


II. Any four-year college

A. 4th grade



B. 8th grade



I graphed the reduced form (difference-in-differences) estimates to examine the parallel trends assumption. If the poor urban school districts are a good counterfactual for the Kalamazoo Public Schools, then the average change in college enrollment for Kalamazoo Public School students should equal the average change in college enrollment for the poor urban students absent of the treatment. I can visually assess this difference by examining the trends in college enrollment for Kalamazoo Public Schools and urban poor districts in the pre-period. The parallel assumption trend held for enrollment in any four-year college for 4th and 8th graders, but not for enrollment in any college for 4th and 8th graders.

The reduced form estimates are the difference in outcomes between student cohorts in the Kalamazoo Public Schools in either 4th or 8th grade compared to student cohorts in poor urban school districts in either 4th or 8th grade before and after the Kalamazoo Promise started (columns 2 and 5). Students who enrolled in Kalamazoo Public Schools in the post 4th grade cohorts increased their college enrollment by 3.4 percentage points and increased their enrollment in four-year universities by 1.0 percentage point (column 2). Students who enrolled in the Kalamazoo Public Schools in the post 8th grade cohorts increased their college enrollment by 4.7

percentage points and increased their enrollment in four-year universities by 2.2 percentage points (column 5).

The reduced form estimate is the intent-to-treat estimate or the effect of offering the Kalamazoo Promise scholarship to students. However, not all students who attended Kalamazoo Public Schools in the post-period were eligible for the scholarship by the time they graduated from high school. Students may have moved out of the district and graduated from non-eligible high schools or not originally lived within the district, but attended the Kalamazoo Public Schools due to school choice. This would bias the estimates downward as students who were identified as treated (i.e. being offered the Kalamazoo Promise scholarship) were not actually eligible to receive the scholarship. Therefore, to estimate the impact of receiving the Kalamazoo Promise on students' educational outcomes, I used an instrumental variables difference-in-differences approach (columns 3 and 6).

The instrumental variables difference-in-differences estimates are the reduced form estimates divided by the first-stage estimates. They scale up the coefficient based on the probability of students in the post cohorts who were eligible for the Kalamazoo Promise. While I discuss the first and second stages separately to explain the intuition behind the approach, the instrumental variables difference-in-differences regression is estimated simultaneously. Since this is my preferred specification, I focus on these estimates to discuss the results.

There is evidence that the Kalamazoo Promise had strong, positive impacts on college enrollment within one year of high school graduation. Students in the 8th grade cohorts who were eligible for the Kalamazoo Promise increased their enrollment in any college by 10.3 percentage points and any four-year college by 4.8 percentage points. Based on baseline enrollment, this is

an increase of college enrollment by 37% and four-year college enrollment by 19%. These results were consistent with the estimates for eligible students in the 4th grade cohorts.

B. College Choice

Table 2.9 displays the estimates for postsecondary choice focusing on *where* students decided to attend college instead of *whether* students decided to attend college. Since Kalamazoo Promise students can only use the scholarship at public Michigan colleges and universities, there were large and expected increases in college enrollment within one year of high school graduation at any public institution in the state. Eligible Kalamazoo Promise students increased their college enrollment by 18.9-19.5 percentage points at any promise-eligible institution and increased their enrollment by 10.0-11.0 percentage points at any four-year promise-eligible institution. This changed the public four-year college-enrollment rate to 26-30% in the post Kalamazoo Promise period which represented a 58-63% increase over time. It also provides evidence that the Kalamazoo Promise shifted students towards four-year institutions, specifically Michigan public schools.

There was also a corresponding decrease in enrollment of 4.2-4.3 percentage points at Michigan private schools. The majority of these effects were concentrated at four-year Michigan private colleges and universities. While enrollment at private colleges is modest in the pre-period, hardly any of Kalamazoo Promise eligible students enrolled in these schools post promise. Thus the scholarship is achieving what it was designed to do - increase college enrollment and keep students at in-state public schools for their college education.

Table 2.9 The impact of Kalamazoo Promise eligibility on college choice enrollment decisions

	4th grade (HS Grad 2003-2013)			8th grade (HS Grad 2003-2009)		
	First stage	RF	IV	First stage	RF	IV
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Enroll in MI public within 1 yr of expected hs grad	0.364***	0.069***	0.189***	0.457***	0.089***	0.195***
	(0.002)	(0.011)	(0.027)	(0.001)	(0.017)	(0.035)
KPS pre-mean	--	0.18	0.18	--	0.21	0.21
Enroll in MI 4-yr public within 1 yr of expected hs grad	0.364***	0.036***	0.100***	0.457***	0.050***	0.110***
	(0.002)	(0.010)	(0.024)	(0.001)	(0.004)	(0.007)
KPS pre-mean	--	0.16	0.16	--	0.19	0.19
Enroll in MI private within 1 yr of expected hs grad	0.364***	-0.015***	-0.042***	0.457***	-0.020***	-0.043***
	(0.002)	(0.002)	(0.004)	(0.001)	(0.002)	(0.004)
KPS pre-mean	--	0.03	0.03	--	0.03	0.03
Enroll in MI 4-yr private within 1 yr of expected hs grad	0.364***	-0.012***	-0.034***	0.457***	-0.017***	-0.036***
	(0.002)	(0.002)	(0.004)	(0.001)	(0.002)	(0.005)
KPS pre-mean	--	0.02	0.02	--	0.03	0.03
N	53,465	53,465	53,465	31,761	31,761	31,761
First stage F-test	839.90			2296		

Notes. Students in all cohorts are in their 4th grade or 8th grade location before the Kalamazoo Promise is announced. Columns 1 and 4 are the probability of either 4th graders or 8th graders in KPS that are predicted to be eligible for the Kalamazoo Promise. Columns 1-3 include student demographics, 4th grade cohort fixed effects, and 4th grade school district fixed effects. Columns 4-6 include student demographics, 8th grade cohort fixed effects, and 8th grade school district fixed effects. Postsecondary schools are included if they had participated in the NSC by March 31, 2004.

Robust standard errors are clustered at either the 4th grade or 8th grade school district. The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.

*** significant at 1%; **significant at 5%; *significant at 10%

C. Degree Completion

Table 2.10 displays the impact of eligibility for the Kalamazoo Promise on postsecondary degree attainment within four and six years of high school graduation. Postsecondary degree attainment includes bachelor's degrees, associate's degrees, and certificates. I used two time windows for degree attainment to examine whether the Kalamazoo Promise was decreasing time-to-degree since the scholarship only offers four years of support. To have the same window of time for each high school graduation cohort, I needed to limit the estimates to older cohorts

Table 2.10 The impact of Kalamazoo Promise eligibility on postsecondary degree completion for high school graduates using a difference-in-differences approach

	KPS HS Graduates vs Poor Urban HS Graduates		Bartik et al. (2015)		KPS Eligible vs Ineligible HS Graduates	
Outcome	within 4-years of hs grad (1)	within 6-years of hs grad (2)	within 4-years of hs grad (3)	within 6-years of hs grad (4)	within 4-years of hs grad (5)	within 6-years of hs grad (6)
Earn any degree	0.011	0.043***	0.004	0.091*	0.017	0.085
	(0.008)	(0.006)	(0.032)	(0.047)	(0.047)	(0.060)
KPS pre-mean	0.15	0.31	0.18	0.36	0.15	0.33
Earn bachelor's degree	0.009**	0.033***	0.004	0.067*	0.007	0.055
	(0.004)	(0.011)	(0.024)	(0.041)	(0.021)	(0.040)
KPS pre-mean	0.11	0.26	0.14	0.30	0.11	0.28
Earn any MI public degree	0.041***	0.088***	--	--	0.007	0.099***
	(0.006)	(0.005)	--	--	(0.039)	(0.030)
KPS pre-mean	0.09	0.22	--	--	0.09	0.24
Earn any MI private degree	-0.009**	-0.015***	--	--	0.009***	0.003
	(0.003)	(0.003)	--	--	(0.002)	(0.011)
KPS pre-mean	0.03	0.04	--	--	0.03	0.04
N	24,834	18,632	3,869	2,905	3,563	2,618

Notes. Columns 1 and 2 include student demographics, graduation year fixed effects, and high school school district fixed effects. Robust standard errors are clustered at the high school school district. Columns 3 and 4 are estimates from Bartik et al. (2015). Columns 5 and 6 include high school fixed effects, graduation year fixed effects, race, gender, and free and reduced lunch status to replicate Bartik et al. (2015) estimates. Robust standard errors are clustered at the high school. Postsecondary schools are included if the NSC has a record of them awarding at least one degree by July 31, 2009.

*** significant at 1%; **significant at 5%; *significant at 10%

who have had at least four or six years elapse since their high school graduation. For the four-year estimates, I had five post-cohorts (classes of 2006-2010) and for the six-year estimates, I had three post-cohorts (classes of 2006-2008). I had to drop students who graduated from high school in 2011 and after for the four-year estimates and 2009 and after for the six-year estimates because they were too young to be included.

To replicate the results from Bartik et al. (2015), I compared eligible and ineligible high school graduates of Kalamazoo Public Schools on their mean postsecondary degree attainment in columns 5 and 6. The difference-in-differences estimate for four-year degree completion was 1.7 percentage points and the difference-in-differences estimate for six-year degree completion was 8.5 percentage points, neither of which was statistically significant. My replication estimates are slightly smaller than the findings from Bartik et al., 0.017 compared to 0.004 for four-year degree completion and 0.085 compared to 0.091 for six-year degree completion.

However, the estimates in columns 3-6 may be positively biased for two reasons: the comparison group is more disadvantaged than the treatment group, and students may have either stayed within or moved to the Kalamazoo Public Schools to gain eligibility for the Kalamazoo Promise. Since ineligible students are those who moved into Kalamazoo after their 9th grade year, Bartik et al. and my replication estimates compared students who stayed in the same school district for high school versus students who moved school districts during high school. It is likely that students who moved were less well off than those students that stayed and have other demographic characteristics that are negatively correlated with degree completion (such as unemployed parents, less stable family situations, from single parents, etc.). Since the counterfactual group (movers) in columns 3-6 was more disadvantaged than the treatment group (stayers), this leads to positively biased estimates.

Due to these positively biased estimates, I compared eligible Kalamazoo high school graduates to ineligible high school graduates in seven poor urban school districts in columns 1 and 2. The difference-in-differences estimate for four-year degree attainment was an increase of 1.1 percentage points and for six-year degree attainment was an increase of 4.3 percentage points. The four-year degree attainment estimate was not statistically significant. These estimates were roughly half the size of the estimates of Bartik et al. (2015) and consistent with the narrative that their findings were positively biased.

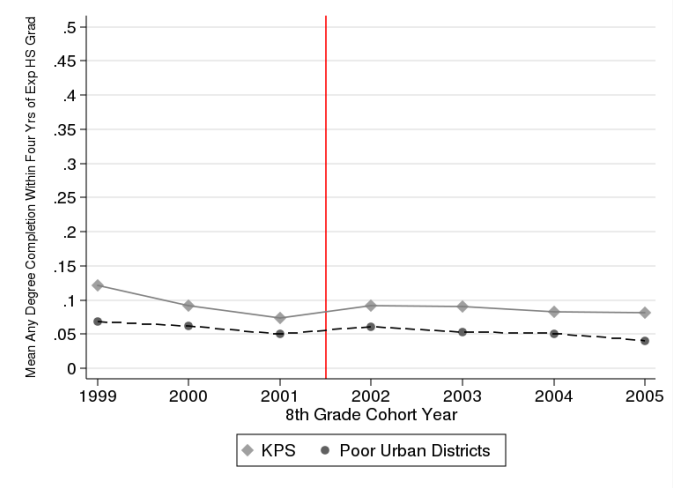
However, the estimates in columns 1 and 2 did not address the second concern for biased positive estimates - endogenous mobility. Students in the high school classes of 2010 and after were 8th graders or younger when the Kalamazoo Promise was announced. Therefore, they had enough time to move into Kalamazoo Public Schools before high school. Therefore, these estimates can still be positively biased. Therefore, I calculated the instrumental variables difference-in-differences degree completion estimates for 8th graders who were in their 8th grade location before the Kalamazoo Promise existed. Therefore, the Kalamazoo Promise could not have affected the choice of students' 8th grade location.

Figure 2.4 displays the graphs for the difference-in-differences estimates for any degree completion within four and six years of expected high school graduation. I graphed the difference-in-differences estimate to examine the parallel trends between Kalamazoo Public School students and poor urban students in the pre-period. The parallel trends assumption held for both four-year and six-year degree completion outcomes. Table 2.11 shows the first-stage, reduced form, and instrumental variable estimates for 8th graders. The cohorts in the four-year degree completion estimate were the expected high school cohorts of 2003-2009 and the cohorts

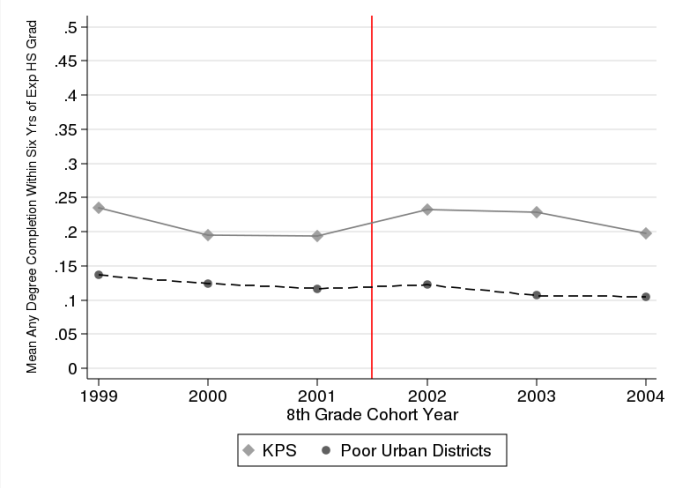
in the six-year degree completion estimates were the expected high school classes of 2003-2008. Table 2.21 in Appendix B displays these same estimates for 4th graders.

Figure 2.4 Reduced form estimates for mean degree completion within four and six years of expected high school graduation for 8th graders

A. Any degree within 4 years



B. Any degree within 6 years



The four-year degree attainment estimates were close to zero for any postsecondary degree and any bachelor's degree. Therefore, the Kalamazoo Promise was not decreasing time-to-degree for eligible students. Instead, the effects were concentrated on the six-year degree attainment estimates. Eligible students increased the probability of any degree attainment within six years of their expected high school graduation by 5.4 percentage points and probability of bachelor's degree attainment within six years of their expected high school graduation by 3.3 percentage points. Similar to the enrollment results, these students were more likely to earn their degrees at promise colleges and universities and were less likely to earn their degrees at promise-ineligible colleges and universities (i.e. private Michigan colleges and universities). Thus, the Kalamazoo Promise boosted the college attainment rate by 26% (21% in the pre-period to 26% in the post-period).

Table 2.11 The impact of Kalamazoo Promise eligibility on postsecondary degree completion for 8th graders using an instrumental variable difference-in-differences approach

	within 4 years of expected high school graduation (HS Grad 2003-2009)			within 6 years of expected high school graduation (HS Grad 2003-2008)		
	First stage	RF	IV	First stage	RF	IV
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Earn any degree	0.457***	-0.001	-0.001	0.441***	0.024***	0.054***
	(0.001)	(0.005)	(0.010)	(0.001)	(0.004)	(0.009)
KPS pre-mean	--	0.09	0.09	--	0.21	0.21
Earn bachelor's degree	0.457***	-0.001	-0.003	0.441***	0.014***	0.033***
	(0.001)	(0.002)	(0.004)	(0.001)	(0.003)	(0.006)
KPS pre-mean	--	0.07	0.07	--	0.17	0.17
Earn any MI public degree	0.457***	0.021***	0.045***	0.441***	0.053***	0.120***
	(0.001)	(0.003)	(0.005)	(0.001)	(0.002)	(0.005)
KPS pre-mean	--	0.06	0.06	--	0.15	0.15
Earn any MI private degree	0.457***	-0.006***	-0.012***	0.441***	-0.010***	-0.022***
	(0.001)	(0.002)	(0.004)	(0.001)	(0.002)	(0.005)
KPS pre-mean	--	0.02	0.02	--	0.02	0.02
N	31,761	31,761	31,761	26,672	26,672	26,672
First stage F-test	2296			1628		

Notes. Students in all cohorts are in their 8th grade location before the Kalamazoo Promise is announced. Columns 1 and 4 are the probability of 8th graders in KPS that are predicted to be eligible for the Kalamazoo Promise. All regressions include student demographics, 8th grade cohort fixed effects, and 8th grade school district fixed effects. Columns 1-3 are the expected high school classes of 2003-2009 and columns 4-6 are the expected high school classes of 2003-2008. Postsecondary schools are included if the NSC has a record of them awarding at least one degree by July 31, 2009.

Robust standard errors are clustered at the 8th grade school district. The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.

*** significant at 1%; **significant at 5%; *significant at 10%

D. Specific Promise-Eligible Institutions

Since previous research on the Kalamazoo Promise found an effect on the ACT score sending behavior of promise eligible students to specific Michigan public institutions (Andrews et al., 2010), I examined the impact of Kalamazoo Promise eligibility on college enrollment and degree completion at three groups of promise eligible institutions: local institutions (Western Michigan University for enrollment and Western Michigan University and Kalamazoo Valley

Community College for completion), Michigan flagships (University of Michigan and Michigan State University), and Michigan institutions that offered extra financial incentives to Kalamazoo Promise recipients (Eastern Michigan University, Lake Superior State University, Wayne State University, and Western Michigan University). These schools offered free or reduced room and board to Kalamazoo Promise students for at least the first eligible cohort of students.[26]

Table 2.12 contains the college enrollment estimates and Table 2.13 displays the degree attainment estimates at these three types of promise-eligible institutions. For Kalamazoo Promise eligible students, there was an increase in enrollment by 6.8-7.7 percentage points at Michigan flagships and increase in enrollment by 2.4-3.5 percentage points at the extra financial incentives universities in the post-period. As the extra financial incentives institutions include Western Michigan University, the increase in college enrollment for eligible students in the post-period was concentrated at this institution.

These enrollment estimates were smaller, but consistent with the estimates calculated by Andrews et al. (2010). They found there was an increase in the ACT score sending behavior for promise eligible students to the University of Michigan (increase of 8 percentage points), Michigan State University (13 percentage points), Wayne State University (7 percentage points), and Western Michigan University (12 percentage points) after the Kalamazoo Promise was announced. It makes sense that there were larger estimates for ACT score sending behavior as students can send their ACTs to multiple institutions, but they only enroll at one institution.

[26] Specifically, Western Michigan University (located in Kalamazoo) offered four years of free room and board to the first eligible cohort (Western Michigan University, 2005). Wayne State University offered to cut room and board by 50% for Kalamazoo Promise students (Miller-Adams, 2009), Lake Superior State University offered free housing to Kalamazoo Promise students (Lake Superior State University, 2005), and Eastern Michigan University offered reduced room and board to Kalamazoo Promise students (Miller-Adams, 2009).

Table 2.12 The impact of Kalamazoo Promise eligibility on enrollment for specific promise-eligible institutions

	4th grade (HS Grad 2003-2013)			8th grade (HS Grad 2003-2009)		
Outcome	First stage (1)	RF (2)	IV (3)	First stage (4)	RF (5)	IV (6)
Enroll in WMU within 1 yr of expected hs grad	0.364***	0.014***	0.038***	0.457***	0.016***	0.034***
	(0.002)	(0.003)	(0.007)	(0.001)	(0.002)	(0.005)
KPS pre-mean	--	0.09	0.09	--	0.11	0.11
Enroll in MI flagship within 1 yr of expected hs grad	0.364***	0.025***	0.068***	0.457***	0.035***	0.077***
	(0.002)	(0.004)	(0.011)	(0.001)	(0.002)	(0.005)
KPS pre-mean	--	0.04	0.04	--	0.04	0.04
Enroll in extra financial incentives colleges within 1 yr of expected hs grad	0.364***	0.013***	0.035***	0.457***	0.011***	0.024***
	(0.002)	(0.003)	(0.008)	(0.001)	(0.003)	(0.006)
KPS pre-mean	--	0.10	0.10	--	0.13	0.13
N	53,465	53,465	53,465	31,761	31,761	31,761
First stage F-test	839.90			2296		

Notes. Students in all cohorts are in their 4th grade or 8th grade location before the Kalamazoo Promise is announced. Columns 1 and 4 are the probability of either 4th graders or 8th graders in KPS that are predicted to be eligible for the Kalamazoo Promise. Columns 1-3 include student demographics, 4th grade cohort fixed effects, and 4th grade school district fixed effects. Columns 4-6 include student demographics, 8th grade cohort fixed effects, and 8th grade school district fixed effects. Postsecondary schools are included if they had participated in the NSC by March 31, 2004. WMU refers to Western Michigan University. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.

Robust standard errors are clustered at either the 4th grade or 8th grade school district. The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.
*** significant at 1%; **significant at 5%; *significant at 10%

Table 2.13 The impact of Kalamazoo Promise eligibility on degree completion for specific promise-eligible institutions

	4th grade (HS Grad 2003-2008)			8th grade (HS Grad 2003-2008)		
Outcome	First stage (1)	RF (2)	IV (3)	First stage (4)	RF (5)	IV (6)
Earn local degrees within 6 yrs of expected hs grad	0.336***	0.002	0.006	0.441***	0.004***	0.010***
	(0.002)	(0.002)	(0.006)	(0.001)	(0.001)	(0.002)
KPS pre-mean	--	0.09	0.09	--	0.10	0.10
Earn MI flagship bachelor's degree within 6 yrs of expected hs grad	0.336***	0.017***	0.053***	0.441***	0.027***	0.062***
	(0.002)	(0.003)	(0.007)	(0.001)	(0.001)	(0.002)
KPS pre-mean	--	0.03	0.03	--	0.04	0.04
Earn extra financial incentive bachelor's degree within 6 yrs of expected hs grad	0.336***	-0.002	-0.007	0.441***	-0.002	-0.006*
	(0.002)	(0.002)	(0.005)	(0.001)	(0.001)	(0.003)
KPS pre-mean	--	0.07	0.07	--	0.08	0.08
N	27,898	27,898	27,898	26,672	26,672	26,672
First stage F-test	297.20			1628		

Notes. Students in all cohorts are in their 4th grade or 8th grade location before the Kalamazoo Promise is announced. Columns 1 and 4 are the probability of either 4th graders or 8th graders in KPS that are predicted to be eligible for the Kalamazoo Promise. Columns 1-3 include student demographics, 4th grade cohort fixed effects, and 4th grade school district fixed effects. Columns 4-6 include student demographics, 8th grade cohort fixed effects, and 8th grade school district fixed effects. Postsecondary schools are included if NSC has a record of them awarding at least one degree by July 31, 2009. Local refers to Western Michigan University and Kalamazoo Valley Community College. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.

Robust standard errors are clustered at either the 4th grade or 8th grade school district. The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.

*** significant at 1%; **significant at 5%; *significant at 10%

While Kalamazoo Promise eligible students increased their enrollment at the three types of promise-eligible universities, there is a stark difference in the degree completion at these different groups of schools. Students who were eligible for the Kalamazoo Promise increased their bachelor's degree attainment by 5.3-6.2 percentage points from Michigan flagships within six years of their expected high school graduation. However, bachelor's degree attainment at the

extra financial incentive universities remained relatively unchanged, and any degree attainment at the local institutions (Western Michigan University and Kalamazoo Valley Community College) did not fare much better (an increase of 0.6-1.0 percentage points).

One explanation is that student demand for the Michigan flagships is high, and admission counselors can choose to select only students who they expect will succeed and obtain degrees. Another explanation is that students, in general, may struggle to attain degrees from the extra financial incentive universities and the local institutions within six years (i.e. the average six year degree completion rate is 43% at the extra financial incentives and 33% at the local institutions compared to the average six year degree attainment rate of 81% at the Michigan flagships).[27] Therefore, the Kalamazoo Promise is not enough to overcome this low degree attainment environment. Additionally, the modest to no degree attainment effect could also be a combination of student and institutional characteristics with lower prepared and financially needy students attending lower resourced postsecondary institutions.

E. Heterogeneous Effects

Given that the Kalamazoo Promise has no academic requirements, there is concern that some students will enroll in college, but fail to earn degrees because they were not adequately prepared for college. If this is true, it may discourage students in later cohorts to attend college if they witnessed multiple students failing to meet minimum college standards. These failures may be particularly salient for nonwhite and poor students who traditionally have lower postsecondary degree attainment (Baum et al., 2010; Bowen et al., 2009).

To compare the estimates of different students across demographic and academic subgroups, I estimated the heterogeneous treatment effects of the offer of the Kalamazoo

[27] Author's calculation from the Integrated Postsecondary Education Data System (IPEDS) from the year 2004-05. Kalamazoo Valley Community College had a 12% degree/certificate completion rate within 150% of normal time. I averaged this with Western Michigan University's six year bachelor's degree attainment rate of 54%.

Promise on college outcomes for 4th and 8th graders. The five student subgroups were: gender, race/ethnicity, economically disadvantaged, and academic performance. For race/ethnicity, White or Asian students were compared to Black or Latino students. For economically disadvantaged, students who were eligible for free and reduced price lunch in 12th grade were categorized as such. For academic performance, students were grouped by their quartile test score on the first-time they took either the 4th grade MEAP math exam, 4th grade MEAP reading exam, or 8th grade MEAP science exam. I chose those subject exams because they were the only subject(s) that were administered to all cohorts in the 4th grade and 8th grade samples.

Table 2.14 displays the heterogeneous instrumental variables difference-in-differences treatment effect for gender, race, and socioeconomic status on five enrollment outcomes for 8th graders. Table 2.22 in Appendix B contains the estimates for 4th graders. The five enrollment outcomes are: any college, Michigan four-year public university, Michigan four-year private university, Michigan flagships, and extra financial incentives schools. All eligible Kalamazoo Promise students across the demographic subgroups experienced substantial increases in their college enrollment within one year of high school graduation. In the post-period, college enrollment increased by 36-51% and Michigan four-year public college enrollment increased by 50-93% for eligible students across the demographic subgroups. For Michigan private four-year college enrollment, the offer of the Kalamazoo Promise had a negative impact.

I also estimated the heterogeneous treatment effects for enrolling in two specific groups of promise eligible institutions - Michigan flagships and extra financial incentive schools. There were large positive estimates for the probability of enrolling in both groups of universities with larger increases for Michigan flagships across the demographic subgroups. For the extra

Table 2.14 The impact of Kalamazoo Promise eligibility on enrollment by student demographics for 8th graders

	8th grade (HS Grad 2003-2009)					
	Female	Male	White or Asian	Black or Latino	Not Economically Disadvantaged	Economically Disadvantaged
Enroll in any college within 1 yr of expected hs grad	0.111***	0.093***	0.167***	0.082**	0.159***	0.071*
	(0.030)	(0.032)	(0.027)	(0.032)	(0.022)	(0.043)
KPS pre-mean	0.30	0.26	0.36	0.19	0.31	0.18
Enroll in MI 4-yr public within 1 yr of hs grad	0.104***	0.119***	0.181***	0.076***	0.138***	0.102***
	(0.017)	(0.005)	(0.012)	(0.010)	(0.007)	(0.011)
KPS pre-mean	0.21	0.16	0.26	0.11	0.21	0.11
Enroll in MI 4-yr private within 1 yr of hs grad	-0.036***	-0.037***	-0.048***	-0.020***	-0.042***	-0.019***
	(0.004)	(0.006)	(0.004)	(0.006)	(0.007)	(0.006)
KPS pre-mean	0.03	0.02	0.04	0.01	0.03	0.01
Enroll in MI flagship within 1 yr of hs grad	0.101***	0.052***	0.102***	0.056***	0.101***	0.054***
	(0.009)	(0.003)	(0.005)	(0.009)	(0.005)	(0.005)
KPS pre-mean	0.04	0.05	0.07	0.02	0.05	0.01
Enroll in extra financial incentives colleges within 1 yr of hs grad	-0.015	0.067***	0.059***	0.026***	0.015***	0.061***
	(0.011)	(0.003)	(0.006)	(0.009)	(0.004)	(0.010)
KPS pre-mean	0.15	0.10	0.18	0.07	0.14	0.09
N	15,878	15,883	12,030	19,424	22,166	9,595

Notes. The cells report IV difference-in-differences estimates and include 8th grade school district fixed effects and 8th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Economically disadvantaged status is measured in the 12th grade. Postsecondary schools are included if they had participated in the NSC by March 31, 2004. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.

Robust standard errors are clustered at the 8th grade school district.

*** significant at 1%; **significant at 5%; *significant at 10%

financial incentives schools, there were larger increases in enrollment for students from the more disadvantaged demographic pair (i.e. male, Black or Latino, and economically disadvantaged).

Since the Kalamazoo Promise had no academic requirements, I examine whether students who were more academically prepared were better able to take advantage of the college scholarship. Table 2.15 displays the instrumental variables, difference-in-differences estimates for the academic achievement subgroups based on students' first-time test score on 8th grade MEAP science exam. Table 2.23 in Appendix B contains the estimates for 4th graders using 4th grade MEAP math and reading exams. For the most part, eligible students who scored in the first and second quartiles for science experienced larger college enrollment increases than eligible students who scored in the third or fourth quartiles. Since the first and second quartiles represent students who fall below the mean on the 8th grade science exam, the treated students may be more responsive to attending college now that college was either free or discounted.

There were smaller impacts for students who scored in the third and fourth quartiles because these students were more academically prepared for college and most likely were already planning to enroll in college before the unexpected offer of the Kalamazoo Promise. For the Michigan flagship schools, there were large increases in college enrollment to the University of Michigan and Michigan State University for eligible students in the second, third, and fourth quartile students. This suggests that higher achieving students respond to the offer of free or reduced tuition by enrolling in more selective and higher priced postsecondary schools.

Table 2.15 The impact of Kalamazoo Promise eligibility on enrollment by student academic achievement subgroups for 8th graders

	8th grade (HS Grad 2003-2009)			
	Science Q1	Science Q2	Science Q3	Science Q4
Enroll in any college within 1 yr of expected hs graduation	0.046	0.124***	0.167***	0.119***
	(0.028)	(0.030)	(0.019)	(0.035)
KPS pre-mean	0.08	0.23	0.41	0.63
Enroll in MI 4-yr public within 1 yr of hs graduation	0.035***	0.150***	0.176***	0.132***
	(0.010)	(0.012)	(0.026)	(0.014)
KPS pre-mean	0.04	0.15	0.30	0.44
Enroll in MI 4-yr private within 1 yr of hs graduation	-0.020***	-0.019***	-0.052***	-0.052***
	(0.005)	(0.007)	(0.011)	(0.009)
KPS pre-mean	0.01	0.01	0.04	0.09
Enroll in MI flagship within 1 yr of hs graduation	0.004	0.048***	0.103***	0.170***
	(0.003)	(0.008)	(0.008)	(0.015)
KPS pre-mean	0.003	0.02	0.07	0.13
Enroll in extra financial incentives colleges within 1 yr of hs graduation	0.040***	0.136***	0.039***	-0.060***
	(0.011)	(0.008)	(0.011)	(0.010)
KPS pre-mean	0.026	0.11	0.21	0.30
N	15,358	7,916	5,055	3,432

Notes. The cells report IV difference-in-differences estimates and include 8th grade school district fixed effects and 8th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Students are grouped into quartiles based on their first-time exam scores on the 8th grade MEAP science test. The science exam is chosen because it is the only subject exam given to all 8th grade cohorts in the sample. Postsecondary schools are included if they participate in the NSC by March 31, 2004. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.
Robust standard errors are clustered at the 8th grade school district.
*** significant at 1%; **significant at 5%; *significant at 10%

Table 2.16 contains the estimates for the effect of Kalamazoo Promise eligibility on degree completion with six years of expected high school graduation for the same demographic

Table 2.16 The impact of Kalamazoo Promise eligibility on degree completion by student demographic subgroups for 8th graders

	8th grade (HS Grad 2003-2008)					
	Female	Male	White or Asian	Black or Latino	Not Economically Disadvantaged	Economically Disadvantaged
Earn any degree within 6 yrs of expected hs grad	0.095***	0.011	0.117***	-0.015	0.089***	0.020
	(0.012)	(0.010)	(0.011)	(0.012)	(0.009)	(0.027)
KPS pre-mean	0.23	0.19	0.28	0.13	0.23	0.14
Earn any MI public bachelor's degree within 6 yrs of expected hs grad	0.129***	0.047***	0.144***	0.036***	0.117***	0.066***
	(0.007)	(0.005)	(0.009)	(0.006)	(0.008)	(0.012)
KPS pre-mean	0.13	0.11	0.18	0.05	0.14	0.04
Earn MI flagship bachelor's degree within 6 yrs of expected hs grad	0.089***	0.035***	0.083***	0.038***	0.087***	0.028***
	(0.005)	(0.004)	(0.008)	(0.005)	(0.005)	(0.004)
KPS pre-mean	0.03	0.04	0.06	0.01	0.05	0.005
Earn MI extra financial incentive bachelor's degree within 6 yrs of expected hs grad	-0.004	-0.006**	0.015***	-0.010***	-0.006	0.015***
	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)	(0.002)
KPS pre-mean	0.09	0.07	0.12	0.04	0.09	0.04
N	13,302	13,370	10,408	15,994	19,090	7,582

Notes. The cells report IV difference-in-differences estimates and include 8th grade school district fixed effects and 8th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Economic disadvantaged status is measured in the 12th grade. Postsecondary schools are included if NSC has a record of them awarding at least one degree by July 31, 2009. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.
Robust standard errors are clustered at the 8th grade school district.

*** significant at 1%; **significant at 5%; *significant at 10%

subgroups of 8th graders. There are four degree completion outcomes: any postsecondary degree completion, bachelor's degree attainment at Michigan public institutions, bachelor's degree attainment at Michigan flagship universities, and bachelor's degree attainment at extra financial incentives universities. Table 2.24 in Appendix B displays the estimates for 4th graders.

The previous positive enrollment patterns for all students did not hold as there were stark differences between some demographic subgroup pairs on degree attainment. Students in more advantaged subgroups who were eligible for the Kalamazoo Promise increased their postsecondary degree attainment by almost double than their more disadvantaged demographic pair. For example, eligible non-economically disadvantaged students increased their degree attainment by 8.9 percentage points compared to economically disadvantaged students who increased their degree attainment by only 2.0 percentage points. The estimate for economically disadvantaged students was not statistically significant. In addition, the offer of the Kalamazoo Promise had a negative, statistically insignificant impact on degree attainment for Black and Latino students. For Michigan public bachelor's degree attainment, there were modest impacts for poor and racially underrepresented students. This provided further evidence that the more traditionally advantaged students were better equipped to utilize the offer of free or discounted college to earn postsecondary degrees.

I examined the degree completion impacts by student achievement quartiles to determine whether students who were more academically prepared earned postsecondary degrees at higher rates than those students who were less prepared. Table 2.17 displays these estimates for 8th graders on the 8th grade MEAP science exam. Table 2.25 in Appendix B contains the same estimates for 4th graders on the 4th grade MEAP mathematics and reading exams. Students in the highest quartile experience strong, consistent gains in degree completion as earning any degree

increased by 7.9 percentage points and earning any Michigan public degree increased by 13.6 percentage points. Eligible students across all quartiles increased their bachelor's degree attainment at Michigan public universities by 4.6-13.6 percentage points.

Table 2.17 The impact of Kalamazoo Promise eligibility on degree completion by student achievement subgroups for 8th graders

	8th grade (HS Grad 2003-2008)			
	Science Q1	Science Q2	Science Q3	Science Q4
Earn any degree within 6 yrs of expected hs grad	0.017	0.177***	-0.034**	0.079**
	(0.019)	(0.016)	(0.014)	(0.034)
KPS pre-mean	0.06	0.13	0.34	0.50
Earn any MI public bachelor's degree within 6 yrs of expected hs grad	0.046***	0.134***	0.061***	0.136***
	(0.010)	(0.007)	(0.016)	(0.012)
KPS pre-mean	0.01	0.07	0.21	0.33
Earn MI flagship bachelor's degree within 6 yrs of expected hs grad	-0.0005	0.028***	0.051***	0.181***
	(0.002)	(0.004)	(0.008)	(0.012)
KPS pre-mean	0.003	0.01	0.07	0.12
Earn MI extra financial incentive bachelor's degree within 6 yrs of expected hs grad	0.031***	0.065***	-0.034***	-0.046***
	(0.008)	(0.003)	(0.006)	(0.008)
KPS pre-mean	0.01	0.06	0.14	0.20
N	12,703	6,701	4,325	2,943

Notes. The cells report IV difference-in-differences estimates and include 8th grade school district fixed effects and 8th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Students are grouped into quartiles based on their first-time exam scores for the 8th grade MEAP science test. The science exam is chosen because it is the only subject exam given to all 8th grade cohorts in the sample. Postsecondary schools are included if NSC has a record of them awarding at least one degree by July 31, 2009. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students. Robust standard errors are clustered at the 8th grade school district.
*** significant at 1%; **significant at 5%; *significant at 10%

Students who were eligible for the Kalamazoo Promise and scored in the second through fourth quartiles on the science exam increased their bachelor's degree attainment at the Michigan flagships by 2.8-18.1 percentage points with the largest estimate for students in the fourth quartile. This suggests that students with better academic preparation were more likely to capitalize on the opportunity to attend these more selective flagships and had sufficient academic preparation to persist and earn their bachelor's degrees.

The pattern for degree attainment across the academic achievement quartiles at the extra financial incentive schools implies that students who scored in the third and fourth quartiles were less likely to earn their degrees at these institutions. For eligible students in the fourth quartile, this was because they were less likely to attend these schools. For eligible students in the third quartile, it is unclear why there was a negative estimate for degree completion as they were more likely to enroll at the extra financial schools by 3.9 percentage points in the post-period.

VIII. Robustness of the Results

Since I did not have the Kalamazoo Valley Community College enrollment for the high school classes of 2003 and 2004, the results discussed above did not include Kalamazoo Valley Community College (with the exception of when I tried to replicated Bartik et al.'s results in Table 2.5 in column 3). However, the National Student Clearinghouse database improves its coverage of postsecondary institutions over time, and I do have the Kalamazoo Valley Community College enrollments for the class of 2005. Therefore, I limited the samples to one pre-promise cohort (class of 2005) and created an alternative college enrollment outcome that included any postsecondary institution in the balanced panel of schools that reported at least one student enrollment by March 31, 2006. (I selected this date because it is within the one year time window for the class of 2005's high school graduation). Along with Kalamazoo Valley

Community College, this included three additional promise-eligible schools: Gogebic Community College, Northern Michigan University, and Oakland University.

I tested the robustness of the results by comparing the college enrollment estimates under the original balanced panel of postsecondary schools to the estimates under the alternative specification that included Kalamazoo Valley Community College. I limited the original estimates to one pre-period to match the alternative estimates and to eliminate the potential differences in including different cohorts between the two models. I compared the estimates for three outcomes: enrollment in any college, enrollment in any two-year college, and enrollment in any four-year college or university. These estimates are displayed in Table 2.18, and are labeled as either "Original" or "Alt(ernative)" to delimitate the differences between the estimates across the three samples.

Across all of the samples, I underestimated the effect of the Kalamazoo Promise on college access by 5.6-10.2 percentage points. As expected, the large differences in enrollment estimates were concentrated at the two-year college level since the original model did not include Kalamazoo Valley Community College. Therefore, the results that I discussed above underestimate the effect of the Kalamazoo Promise on enrollment in any college within one year of actual/expected high school graduation.

However, the estimates for enrollment at any four-year college and university were very similar between the two models. Since the original model already included the local four-year universities for the treatment and control students, the addition of two non-local promise-eligible universities did not substantially change the estimates under the alternative specification. Therefore, I find no evidence that the four-year enrollment estimates produced by the original

model underestimated the effect of the Kalamazoo Promise on enrollment at any four-year college or university.

Table 2.18 Comparison of college enrollment estimates including and excluding Kalamazoo Valley Community College

	HS Grad (HS Grad 2005-2013)		8th grade (HS Grad 2005-2009)		4th grade (HS Grad 2005-2013)	
	Original D-in-D	Alt D-in-D	Original IV	Alt IV	Original IV	Alt IV
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Enroll in any college within 1 yr of hs grad	0.092***	0.148***	0.067**	0.169***	0.133***	0.228***
	(0.025)	(0.025)	(0.034)	(0.033)	(0.032)	(0.032)
KPS pre-mean	0.41	0.68	0.26	0.44	0.22	0.38
N	26,359	26,359	23,968	23,968	45,347	45,347
Enroll in 2-yr college within 1 yr of hs grad	0.036	0.090**	0.032	0.137***	0.061	0.150***
	(0.034)	(0.035)	(0.038)	(0.039)	(0.043)	(0.044)
KPS pre-mean	0.03	0.31	0.03	0.22	0.03	0.19
N	26,359	26,359	23,968	23,968	45,347	45,347
Enroll in 4-yr college within 1 yr of hs grad	0.064***	0.068***	0.043***	0.040***	0.089***	0.091***
	(0.009)	(0.009)	(0.015)	(0.014)	(0.027)	(0.027)
KPS pre-mean	0.38	0.39	0.24	0.24	0.20	0.20
N	26,359	26,359	23,968	23,968	45,347	45,347

Notes. All samples include only one pre-promise cohort. Original refers to the original model that excludes Kalamazoo Valley Community College (KVCC) enrollment. Alternative refers to the alternative model that includes KVCC enrollment. Columns 1-2 include student demographics, graduation year fixed effects, and high school school district fixed effects. Columns 3-4 include student demographics, 8th grade cohort fixed effects, and 8th grade school district fixed effects. Columns 5-6 include student demographics, 4th grade cohort fixed effects, and 4th grade school district fixed effects. Postsecondary schools are included if they had participated in the NSC by March 31, 2004 for Columns 1, 3, and 5. Postsecondary schools are included if they had participated in the NSC by March 31, 2006 for Columns 2, 4, and 6.
Robust standard errors are clustered at either the 4th grade, 8th grade, or 12th grade school district.
*** significant at 1%; **significant at 5%; *significant at 10%

IX. Conclusion

Students responded strongly to the offer of the Kalamazoo Promise by enrolling in college and completing their postsecondary degrees. Eligible students increased their college attendance by 9-11 percentage points and increased their degree attainment by 5 percentage points. The enrollment estimates hold across the five subgroups of students. It is particularly encouraging that Black and Latino students and poor students experienced seven to eight percentage point gain in their enrollment to any college and 8-10 percentage point gain in their enrollment to any Michigan public four-year university within one year of their expected high school graduation.

Consistent with previous research on the Kalamazoo Promise (Andrews et al., 2010; Bartik et al., 2015; Miller-Adams & Timmeney, 2013), students responded to the offer of free or reduced tuition by deciding to enroll at the promise-eligible schools. Most of the impacts were concentrated at four-year Michigan public colleges and universities as there was a 10.0-11.6 percentage point increase in enrollment in the post-period. This represented a 58-63% increase in enrollment at promise-eligible universities for Kalamazoo Promise eligible students (16-19% in the pre-period to 26-31% in the post-period). Therefore, the Kalamazoo Promise was successful at inducing students to further their education beyond their high school diploma and enroll in college - thus, cultivating a college-going culture within the Kalamazoo Public Schools.

To compare my estimates to prior research on the Kalamazoo Promise, the size of my any enrollment and any degree completion estimates differ from Bartik et al. (2015). This is because their estimates were either positively or negatively biased depending on the outcome because Bartik et al. started with high school graduates and used ineligible students within the Kalamazoo Public Schools as their counterfactual group. One reason that their any college enrollment estimates were smaller than my estimates (5 percentage points compared to my 9-11

percentage points) is because their estimates may be negatively biased due to their counterfactual group, ineligible high school graduates from Kalamazoo. Most likely, these students received some benefits from the increase in quality of the school district after the Kalamazoo Promise started and the encouragement by teachers and school administrators for all students to attend college - especially for high school graduates in the later cohorts.

My any degree attainment estimates are smaller than Bartik et al.'s estimates (5 percentage points compared to their 9-12 percentage points). In this case, their estimates were most likely positively biased for this outcome due to their choice of the counterfactual group. To be ineligible, students had to move into the Kalamazoo Public Schools after their 9th grade. Therefore, it is likely that these high school graduates who moved were less well off than the high school graduates that stayed and have other demographics characteristics that were negatively correlated with degree completion. While these ineligible students may have been able to beat the odds and enroll in college due to changes in the school environment encouraging them to attend, they were not able to make it through and complete because of their other background characteristics that put them at a disadvantage. Therefore, this produced artificially higher mean degree completion findings for eligible students compared to ineligible students, which led to positively biased degree completion estimates.

Since the main purpose of the Kalamazoo Promise is to revitalize the city of Kalamazoo partly through creating a stock of educated labor to attract new businesses to the area, it is essential that the scholarship positively affects degree attainment. While the overall degree completion estimates are promising for some students, there are stark differences in the attainment rates based on race/ethnicity and socioeconomic status. In general, White, Asian, and non-poor students have strong, positive impacts on degree completion (9-12 percentage point

increase) while Black, Latino, and poor students have very modest or negative impacts (-1.5 percentage point decrease to 2.0 percentage point increase). These estimates are completely different from the estimates by Bartik et al. (2015) who found positive impacts for poor students and students of color. Their estimates are positively biased since their counterfactual group was much worse off at baseline.

The differences in degree completion by race/ethnicity and socioeconomic status is very concerning and represents a significant loss to Kalamazoo as degree recipients bring positive benefits to a community such as increasing the wages for all citizens (Moretti, 2004), volunteering more in their community, and are less likely to need public assistance (Baum et al., 2010). There are also losses to the individual as students who attend college, but do not earn degrees lose time and foregone earnings since they chose to enroll in college full-time instead of pursuing other activities such as working full-time, starting a family, traveling, etc.

The results are also concerning to the wider promise program community because many of these programs are adopted in struggling urban areas similar to the demographics of the city of Kalamazoo. Given that the Kalamazoo Promise is one of the more generous promise scholarships, the degree attainment effects are most likely the highest of the promise programs. These estimates provide evidence that money may not be enough. Thus, future research needs to examine how Kalamazoo Promise recipients - and other promise students - are faring in college to better understand how to support these students and move the needle on degree completion for all.

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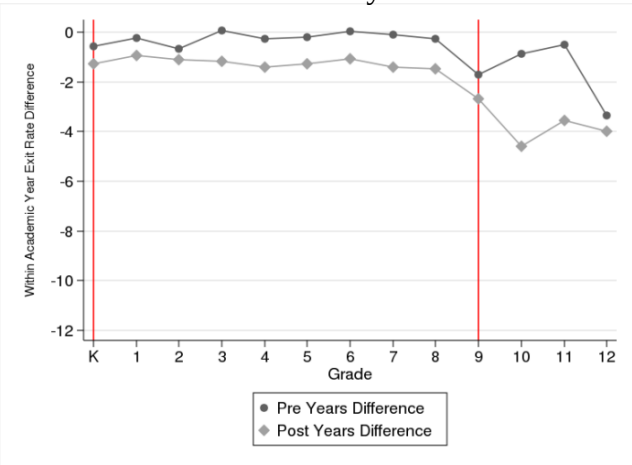
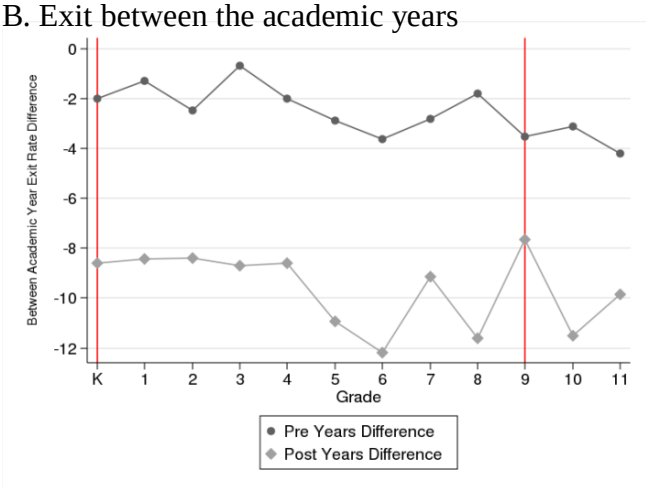
Appendix B. Additional figures and tables for the Kalamazoo Promise analysis

Figure 2.5 Student exit rates in the Kalamazoo Public Schools and comparison school districts, 2003-2013

A. Exit within the academic year



B. Exit between the academic years



Notes. The black line with circles is the pre-period mean difference in student exits between Kalamazoo Public Schools and comparison school districts. The gray line with diamonds is the post-period mean difference in student exits between Kalamazoo Public Schools and comparison school districts. The red vertical lines at kindergarten and 9th grade represent the grade eligibility window for the Kalamazoo Promise.

Table 2.19 Demographic information for high school graduates before and after the Kalamazoo Promise started

	HS graduates (2003-2013)							HS graduates (2003-2013)						
	KPS Eligible			KPS Ineligible				KPS			Poor Urban			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	D-in-D	Pre	Post	Post-Pre	Pre	Post	Post-Pre	D-in-D
Demographics														
Female	0.531	0.519	-0.012	0.535	0.531	-0.004	-0.008	0.534	0.525	-0.009	0.552	0.550	-0.002	-0.006
Black	0.359	0.417	0.058	0.311	0.416	0.105	-0.046**	0.360	0.429	0.069	0.477	0.540	0.063	0.007
Latino	0.043	0.073	0.031	0.090	0.063	-0.026	0.057	0.057	0.071	0.014	0.088	0.130	0.042	-0.028
Asian	0.015	0.019	0.004	0.053	0.053	0.000	0.004	0.023	0.023	0.000	0.021	0.017	-0.004	0.004
White	0.578	0.481	-0.097	0.543	0.462	-0.081	-0.016	0.556	0.468	-0.088	0.403	0.306	-0.097	0.010
Age	18.150	18.180	0.030	18.230	18.340	0.110	-0.074	18.170	18.210	0.040	18.330	18.400	0.070	-0.023
Limited English proficiency	0.025	0.044	0.019	0.120	0.067	-0.054	0.073	0.052	0.050	-0.002	0.056	0.063	0.007	-0.008
Migrant status	0.004	0.001	-0.003	0.022	0.001	-0.021	0.019	0.008	0.001	-0.007	0.013	0.001	-0.012	0.005
Special education status	0.045	0.051	0.006	0.098	0.065	-0.033	0.039**	0.056	0.054	-0.002	0.096	0.118	0.022	-0.023**
Economic disadvantage	0.284	0.465	0.181	0.380	0.478	0.098	0.084**	0.323	0.479	0.156	0.378	0.606	0.228	-0.073***
Academic information														
Std MEAP/MME 11th grade math	0.084 (0.971)	-0.040 (1.029)	-0.124	0.115 (1.246)	0.011 (1.123)	-0.105	-0.019	0.093 (1.014)	-0.062 (1.054)	-0.154	-0.359 (0.919)	-0.535 (1.036)	-0.176	0.023
Std MEAP/MME 11th grade reading	0.144 (0.971)	-0.035 (0.982)	-0.179	0.049 (1.050)	0.057 (1.093)	0.008	-0.187**	0.132 (1.002)	-0.040 (1.000)	-0.172	-0.210 (0.920)	-0.418 (0.988)	-0.208	0.037
N	961	2,882	3,843	357	902	1,259	5,102	1,447	3,935	5,382	7,600	19,514	27,114	32,496

Notes. Age, limited English proficiency, migrant status, special education, and economic disadvantage are measured in the semester of high school graduation. MEAP/MME exams are standardized in the year the student took the test. The column labeled D-in-D is the difference-in-differences estimate and due to rounding, the numbers may not exactly match. The standard errors are clustered at the high school for KPS Eligible-Ineligible sample and high school school district for KPS-Poor Urban sample.

*** significant at 1%; **significant at 5%; *significant at 10%

Table 2.20 The number of eligible Kalamazoo Promise students for each sample and academic year

4^{th} grade year	4^{th} grade sample	8^{th} grade year	8^{th} grade sample	High school grad year	HS grad sample
1995	[279]	1999	[348]	2003	[349]
1996	[276]	2000	[328]	2004	[339]
1997	[226]	2001	[264]	2005	[273]
1998	225	2002	276	2006	282
1999	244	2003	318	2007	330
2000	286	2004	363	2008	374
2001	280	2005	338	2009	362
2002	269	2006	332	2010	357
2003	271	2007	344	2011	361
2004	295	2008	372	2012	402
2005	283	2009	381	2013	414
Total	2,934	Total	3,664	Total	3,843

Notes. Eligibility for the Kalamazoo Promise is defined as lived within KPS school district and enrolled in a KPS school in 8^{th} grade, 11^{th} grade, and graduated from a KPS high school. Numbers in brackets are the predicted number of students who are eligible for the Kalamazoo Promise if the scholarship existed for those cohorts.

Table 2.21 The impact of Kalamazoo Promise eligibility on postsecondary degree completion for 4th graders using an instrumental variable difference-in-differences approach

	within 4 years of expected high school graduation (HS Grad 2003-2010)			within 6 years of expected high school graduation (HS Grad 2003-2008)		
Outcome	First stage (1)	RF (2)	IV (3)	First stage (4)	RF (5)	IV (6)
Earn any degree	0.346***	-0.004	-0.011	0.336***	0.013**	0.037***
Robust cluster standard error	(0.002)	(0.003)	(0.008)	(0.002)	(0.004)	(0.012)
KPS pre-mean	--	0.08	0.08	--	0.18	0.18
Earn bachelor's degree	0.346***	-0.008**	-0.023**	0.336***	0.0004	0.001
Robust cluster standard error	(0.002)	(0.004)	(0.011)	(0.002)	(0.006)	(0.018)
KPS pre-mean	--	0.06	0.06	--	0.14	0.14
Earn any MI public degree	0.346***	0.010***	0.029***	0.336***	0.034***	0.100***
Robust cluster standard error	(0.002)	(0.002)	(0.006)	(0.002)	(0.003)	(0.007)
KPS pre-mean	--	0.05	0.05	--	0.13	0.13
Earn any MI private degree	0.346***	-0.002**	-0.007**	0.336***	-0.005**	-0.015***
Robust cluster standard error	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)	(0.005)
KPS pre-mean	--	0.01	0.01	--	0.02	0.02
N	38,212	38,212	38,212	27,898	27,898	27,898
First stage F-test	683.50			297.20		

Notes. Students in all cohorts are in their 4th grade location before the Kalamazoo Promise is announced. Columns 1 and 4 are the probability of 4th graders that are predicted to be eligible for the Kalamazoo Promise. All regressions include student demographics, 4th grade cohort fixed effects, and 4th grade school district fixed effects. Postsecondary schools are included if the NSC has a record of them awarding at least one degree by July 31, 2009.

Robust standard errors are clustered at the 4th grade school district. The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.

*** significant at 1%; **significant at 5%; *significant at 10%

Table 2.22 The impact of Kalamazoo Promise eligibility on enrollment by student demographic subgroups for 4th graders

	4th grade (HS Grad 2003-2013)					
	Female	Male	White or Asian	Black or Latino	Not Economically Disadvantaged	Economically Disadvantaged
Enroll in any college within 1 yr of expected hs grad	0.157***	0.022	0.180***	0.080***	0.185***	0.021
	(0.042)	(0.019)	(0.028)	(0.030)	(0.027)	(0.036)
KPS pre-mean	0.26	0.23	0.31	0.17	0.26	0.18
N	26,416	27,049	21,567	31,349	36,790	16,675
Enroll in MI 4-yr public within 1 yr of hs grad	0.125***	0.077***	0.191***	0.071**	0.132***	0.085***
	(0.023)	(0.027)	(0.025)	(0.028)	(0.023)	(0.023)
KPS pre-mean	0.18	0.14	0.21	0.09	0.18	0.10
N	26,416	27,049	21,567	31,349	36,790	16,675
Enroll in MI 4-yr private within 1 yr of hs grad	-0.030***	-0.038***	-0.032***	-0.030***	-0.035***	-0.028***
	(0.005)	(0.008)	(0.007)	(0.005)	(0.004)	(0.005)
KPS pre-mean	0.03	0.02	0.03	0.01	0.03	0.01
N	26,416	27,049	21,567	31,349	36,790	16,675
Enroll in MI flagship within 1 yr of hs grad	0.095***	0.040***	0.113***	0.049***	0.094***	0.059***
	(0.010)	(0.012)	(0.007)	(0.014)	(0.013)	(0.007)
KPS pre-mean	0.04	0.04	0.06	0.02	0.05	0.004
N	26,416	27,049	21,567	31,349	36,790	16,675
Enroll in extra financial incentives colleges within 1 yr of hs grad	0.029***	0.044***	0.068***	0.049***	0.018***	0.074***
	(0.011)	(0.007)	(0.005)	(0.013)	(0.007)	(0.013)
KPS pre-mean	0.12	0.08	0.14	0.06	0.11	0.08
N	26,416	27,049	21,567	31,349	36,790	16,675

Notes. The cells report IV difference-in-differences estimates and include 4th grade school district fixed effects and 4th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Economically disadvantaged status is measured in the 12th grade. Postsecondary schools are included if they had participated in the NSC by March 31, 2004. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.

Robust standard errors are clustered at the 4th grade school district.

*** significant at 1%; **significant at 5%; *significant at 10%

Table 2.23 The impact of Kalamazoo Promise eligibility on enrollment by student achievement subgroups for 4th graders

	4th grade (HS Grad 2003-2013)							
	Math Q1	Math Q2	Math Q3	Math Q4	Reading Q1	Reading Q2	Reading Q3	Reading Q4
Enroll in any college within 1 yr of expected hs grad	0.114**	0.162***	0.172***	0.031	0.110**	0.090**	0.145***	0.084*
	(0.053)	(0.029)	(0.039)	(0.041)	(0.053)	(0.038)	(0.043)	(0.049)
KPS pre-mean	0.07	0.17	0.30	0.57	0.07	0.21	0.33	0.52
N	22,170	13,458	9,888	7,949	21,730	13,778	9,939	8,018
Enroll in MI 4-yr public within 1 yr of hs grad	0.056**	0.158***	0.164***	0.074***	0.076**	0.069**	0.123***	0.143***
	(0.027)	(0.023)	(0.022)	(0.015)	(0.036)	(0.032)	(0.017)	(0.019)
KPS pre-mean	0.03	0.10	0.21	0.40	0.03	0.13	0.24	0.36
N	22,170	13,458	9,888	7,949	21,730	13,778	9,939	8,018
Enroll in MI 4-yr private within 1 yr of hs grad	-0.008*	-0.046***	-0.011*	-0.056***	-0.023***	-0.034***	-0.020**	-0.048***
	(0.004)	(0.005)	(0.007)	(0.009)	(0.004)	(0.005)	(0.010)	(0.008)
KPS pre-mean	0.004	0.02	0.02	0.07	0.01	0.02	0.03	0.06
N	22,170	13,458	9,888	7,949	21,730	13,778	9,939	8,018
Enroll in MI flagship within 1 yr of hs grad	-0.007	0.037***	0.120***	0.127***	0.010	0.009	0.075***	0.182***
	(0.007)	(0.014)	(0.012)	(0.010)	(0.008)	(0.010)	(0.016)	(0.014)
KPS pre-mean	0.005	0.01	0.04	0.13	0.004	0.03	0.05	0.11
N	22,170	13,458	9,888	7,949	21,730	13,778	9,939	8,018
Enroll in extra financial incentives colleges within 1 yr of hs grad	0.078***	0.129***	0.054***	-0.063***	0.073***	0.066***	0.069***	-0.060***
	(0.010)	(0.014)	(0.010)	(0.011)	(0.012)	(0.014)	(0.008)	(0.011)
KPS pre-mean	0.02	0.06	0.14	0.25	0.02	0.08	0.15	0.23
N	22,170	13,458	9,888	7,949	21,730	13,778	9,939	8,018

Notes. The cells report IV difference-in-differences estimates and include 4th grade school district fixed effects and 4th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Students are grouped into quartiles based on their first-time exam scores on the 4th grade MEAP mathematics or reading test. The mathematics and reading exams are chosen because they are the only subject exams given to all 4th grade cohorts in the sample. Postsecondary schools are included if they participate in the NSC by March 31, 2004. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.

Robust standard errors are clustered at the 4th grade school district.

*** significant at 1%; **significant at 5%; *significant at 10%

Table 2.24 The impact of Kalamazoo Promise eligibility on degree completion by student demographic subgroups for 4th grade

	4th grade (HS Grad 2003-2008)					
	Female	Male	White or Asian	Black or Latino	Not Economically Disadvantaged	Economically Disadvantaged
Earn any degree within 6 yrs of expected hs grad	0.111***	-0.037***	0.142***	-0.063***	0.087***	-0.014
	(0.017)	(0.014)	(0.017)	(0.013)	(0.022)	(0.026)
KPS pre-mean	0.20	0.17	0.24	0.11	0.20	0.12
N	13,753	14,145	12,860	14,714	20,507	7,391
Earn any MI public bachelor's degree within 6 yrs of expected hs grad	0.110***	0.033***	0.146***	0.007	0.110***	0.038***
	(0.017)	(0.012)	(0.019)	(0.008)	(0.017)	(0.006)
KPS pre-mean	0.12	0.10	0.15	0.05	0.12	0.04
N	13,753	14,145	12,860	14,714	20,507	7,391
Earn MI flagship bachelor's degree within 6 yrs of expected hs grad	0.092***	0.016**	0.089***	0.023***	0.075***	0.036***
	(0.007)	(0.008)	(0.009)	(0.007)	(0.010)	(0.005)
KPS pre-mean	0.03	0.04	0.05	0.01	0.04	0.002
N	13,753	14,145	12,860	14,714	20,507	7,391
Earn MI extra financial incentive bachelor's degree within 6 yrs of expected hs grad	-0.020***	0.009*	0.010*	-0.010***	0.005	-0.015***
	(0.007)	(0.005)	(0.006)	(0.004)	(0.007)	(0.004)
KPS pre-mean	0.08	0.05	0.09	0.03	0.07	0.04
N	13,753	14,145	12,860	14,714	20,507	7,391

Notes. The cells report IV difference-in-differences estimates and include 4th grade school district fixed effects and 4th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Economically disadvantaged status is measured in the 12th grade. Postsecondary schools are included if NSC has a record of them awarding at least one degree by July 31, 2009. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.

Robust standard errors are clustered at the 4th grade school district.

*** significant at 1%; **significant at 5%; *significant at 10%

Table 2.25 The impact of Kalamazoo Promise eligibility on degree completion by student achievement subgroups for 4th graders

	4th grade (HS Grad 2003-2008)							
	Math Q1	Math Q2	Math Q3	Math Q4	Reading Q1	Reading Q2	Reading Q3	Reading Q4
Earn any degree within 6 yrs of expected hs grad	0.020	0.095***	-0.092***	0.078***	-0.007	0.063**	-0.016*	0.082***
	(0.020)	(0.016)	(0.015)	(0.018)	(0.023)	(0.026)	(0.009)	(0.028)
KPS pre-mean	0.05	0.11	0.25	0.43	0.05	0.13	0.24	0.42
N	10,954	6,934	5,561	4,449	11,064	6,946	5,285	4,603
Earn any MI public bachelor's degree within 6 yrs of expected hs grad	0.010	0.063***	0.016	0.111***	-0.022	0.006	0.119***	0.116***
	(0.010)	(0.009)	(0.021)	(0.016)	(0.014)	(0.013)	(0.013)	(0.020)
KPS pre-mean	0.02	0.05	0.14	0.29	0.02	0.08	0.12	0.28
N	10,954	6,934	5,561	4,449	11,064	6,946	5,285	4,603
Earn MI flagship bachelor's degree within 6 yrs of expected hs grad	-0.011**	-0.019**	0.062***	0.124***	-0.005	-0.029***	0.065***	0.147***
	(0.005)	(0.009)	(0.006)	(0.011)	(0.007)	(0.008)	(0.009)	(0.006)
KPS pre-mean	0.004	0.01	0.04	0.11	0.003	0.02	0.03	0.10
N	10,954	6,934	5,561	4,449	11,064	6,946	5,285	4,603
Earn MI extra financial incentive bachelor's degree within 6 yrs of expected hs grad	-0.007	0.035***	-0.068***	-0.024***	-0.026***	-0.016	0.019***	-0.048***
	(0.004)	(0.010)	(0.004)	(0.007)	(0.003)	(0.011)	(0.007)	(0.006)
KPS pre-mean	0.015	0.03	0.10	0.16	0.016	0.05	0.08	0.16
N	10,954	6,934	5,561	4,449	11,064	6,946	5,285	4,603

Notes. The cells report IV difference-in-differences estimates and include 4th grade school district fixed effects and 4th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Students are grouped into quartiles based on their first-time exam scores for the 4th grade MEAP mathematics or reading test. The mathematics and reading exams are chosen because they are the only subject exams given to all 4th grade cohorts in the sample. Postsecondary schools are included if NSC has a record of them awarding at least one degree by July 31, 2009. Michigan flagship refers to University of Michigan and Michigan State University. Extra financial incentive colleges are Western Michigan University, Wayne State University, Lake Superior State University, and Eastern Michigan University. These institutions offer either free or reduced room and board for Kalamazoo Promise students.

Robust standard errors are clustered at the 4th grade school district.

*** significant at 1%; **significant at 5%; *significant at 10%

CHAPTER 3:
Echo Of A Promise: The Impact Of State-Designated Michigan Promise Zones

I. Introduction

In the last decade, promise programs (also known as place-based college scholarships or free college programs) have caught the interest of policymakers in cities and states striving to revitalize their local economy and increase the college attainment of their citizens (Miller-Adams, 2015). Typically, these promise programs offer eligible students up to 100% of tuition and fees to attend college. Eligibility for the scholarship is based on students' residency; students need to live and/or attend school for a minimum number of years within specific geographic locations - usually school districts, cities, or states. Currently, there are 140 promise programs in 31 states (Billings, 2018a).

The Kalamazoo Promise was the catalyst for the promise program movement. In November 2005, a group of anonymous donors offered college scholarships to any eligible student enrolled in the local school district in Kalamazoo, Michigan (Miller-Adams, 2009). Students can use the scholarship at any public college or university within the state, and those who are eligible for 100% of the scholarship can receive up to a bachelor's degree tuition-free (The Kalamazoo Promise: Information for Seniors and Parents, 2014).

The Kalamazoo Promise has received substantial media attention since its inception, and awareness of the program has spread across the United States (Miller-Adams, 2009, 2015). Several groups of researchers have evaluated the effect of the Kalamazoo Promise on the local school district (Miller-Adams & Fiore, 2013; Miron, Jones, & Kelaher-Young, 2011), on

students (Andrews, DesJardins, & Ranchhod, 2010; Bartik, Hershbein, & Lachowska, 2015; Bartik, Eberts, & Huang, 2010; Bartik & Lachowska, 2013; Billings, 2018a), and on teachers (Jones, Miron, & Kelaher-Young, 2008, 2012). Overall, the Kalamazoo Promise has proven to be effective as it has attracted new students to enroll in the local public school district (Hershbein, 2013), raised teachers' expectations for their students, (Jones et al., 2008, 2011), and increased educational attainment for eligible students (Bartik et al., 2015; Billings, 2018b).

As news of the strong, positive results of the Kalamazoo Promise has spread, it has inspired other school districts and communities to start local promise programs (Miller-Adams, 2009, 2015). In the majority of cases, the new programs have kept the "promise" label, but have changed the design of the scholarship. In some cases, this label is the only similarity to the Kalamazoo Promise as these new programs have offered less money, have restricted where students can use the scholarship, and have not covered 100% of tuition and fees. They also have added new eligibility criteria beyond residency. Some programs now require students to meet minimum high school grade point averages or ACT/SAT scores, to place into college-level courses, maintain a minimum attendance record in high school, and/or demonstrate financial need (Billings, 2018a).

Due to these differences in design, the evaluations of promise programs are mixed, since not all programs increase the educational attainment of their students. Rather, these differences in design affect which students are eligible and what benefits they receive, essentially controlling how effective these programs are in reaching their stated goals. There is no evidence that two of the promise programs that added merit-based criteria (Pittsburgh Promise and New Haven Promise) had an effect on college access (Bozick, Gonzalez, & Engberg, 2015; Daughtery & Gonzalez, 2016). Instead, the Pittsburgh Promise may have influenced the college choice margin

by shifting *where* students attend college by encouraging them to enroll in in-state colleges and universities (Bozick et al., 2015).

As the promise program movement was gaining momentum, Governor Granholm, the governor at the time, signed into a law a bill that recognized 10 communities in Michigan as promise zones. The purpose of these promise zones is to transform communities by creating new jobs, to diversify the state economy, and to expand access to higher education (Michigan Department of Treasury, 2009). Based on the state legislation, promise zones are required to offer a tuition-free pathway, up to an associate's degree, for all eligible students within the public school district. To be eligible for the scholarship, students need to reside within the geographic boundaries of the school district, enter the school district by a specific grade, graduate from high school, submit the Free Application for Federal Student Aid (FAFSA), and complete a promise zone application (Michigan Promise Zone Authority Act, 2009).

To date, there is no research on whether these Michigan promise zones increase college access, choice, and persistence. I evaluate the effect of the scholarships on students' college outcomes to add to the growing literature on promise programs and to address some of the weaknesses in the identification strategies of prior promise program research. I examine this set of last-dollar promise programs to inform administrators and policymakers as to whether these promise programs are increasing the college enrollment, choice, and persistence of their students and to offer suggestions grounded in the literature on how to improve their effectiveness. In addition, it is important to study these last-dollar promise programs because they are now more prevalent than the first-dollar design as 76% of promise programs have a last-dollar design[28] (Billings, 2018a). In this paper, I use an instrumental variable difference-in-differences design to

[28] First-dollar or last-dollar refers to the timing of when scholarship funds are applied to tuition and fees either *first* before state and grant aid or *last* after state and grant aid have already been applied. For a discussion of first-dollar and last-dollar, see page 159.

examine two research questions: (1) What is the impact of promise zone eligibility on college enrollment, college choice, and college persistence? (2) How do these effects differ for student subgroups?

To preview my results, I find that students who were eligible for the promise scholarships increased their overall college enrollment by 4.3-4.5 percentage points in the post-period. They also increased their enrollment in community colleges by two percentage points with most of the effects concentrated on in-state community colleges. For persistence, students who were eligible for the promise scholarship were also more likely, by 3.5 percentage points, to persistence to the second year of college in the post-period. While these results are promising and they suggest that the students were more likely to enroll in college and persist at least for two academic years, none of the coefficients were estimated with sufficient precision to be statistically significant.

In contrast, the Kalamazoo Promise increased college attendance by nine to eleven percentage points and degree completion by five percentage points (Billings, 2018b). Since the results of the promise zones are approximately half as large as the Kalamazoo Promise, I suggest that the differences in impact may be due to the differences in design of the promise scholarships. The Michigan promise zones offer substantially less money, are mainly focused on the community college level, and students can only receive up to an associate's degree for free. Since the benefits of the promise zone scholarships are not as comprehensive and generous as those of the Kalamazoo Promise, this disparity in benefits impacts whether the offer of the promise zone scholarship can change whether students enroll in college.

II. Michigan Promise Zones

In January 2009, Governor Granholm signed 10 new promise zones into law. The promise zones provided a tuition-free pathway for all eligible students living within those zones to attend

college. The State of Michigan allowed cities, towns, counties, school districts, or intermediate school districts to apply for promise zone status. To be eligible to apply, the applicants had to show evidence of need by meeting or exceeding the state average poverty level for families with children under age 18 and provide proof of community buy-in by approving the creation of a promise zone by a local public hearing (Michigan Department of Treasury, 2009).

The Michigan Department of Treasury awarded the first 10 qualified applicants promise zone status from a total of 15 applicants in April 2009.[29] The 10 selected promise zones were: Baldwin Community Schools, Battle Creek Public Schools, Benton Harbor Area Schools, the City of Detroit, the School District of the City of Hazel Park, Jackson Public Schools, the Lansing School District, the Muskegon Area Intermediate School District, the School District of the City of Pontiac, and the Saginaw School District (Michigan Department of Treasury, 2009). Based on the promise zone legislation, each promise zone had to (a) offer scholarships to all eligible residents who graduated from a promise zone high school, and (b) provide free tuition and fees for at least an associate's degree to one or more eligible postsecondary institutions (Michigan Promise Zone Authority Act, 2009). The promise zones interpreted the legislation to support students "for at least an associate's degree" as either a total number of credits or total number of years enrolled. Battle Creek, Hazel Park, and Lansing interpreted associate's degree to mean a total number of credits (62 credits for Battle Creek and Hazel Park and 65 credits for Lansing). Baldwin, Benton Harbor, Detroit, Saginaw, and Pontiac interpreted associate's degree to mean a total number of years enrolled (two years for Benton Harbor, Saginaw, and Pontiac, three years for Detroit, and four years for Baldwin).

[29] The five communities that applied, but were not selected were: Newaygo County RESA, River Rouge, Covert, Crystal Falls, and Flint (C. Wilbur, personal communication, November, 17, 2015).

The promise zones were given flexibility to decide on their residency requirements, maximum scholarship amounts, and eligible postsecondary schools. Therefore, there was considerable variation in the residency criteria and the benefits offered by the zones. For example, the minimum grade of entry to receive 100% of the scholarship ranged from 5th grade in Benton Harbor and Hazel Park to 11th grade in Detroit. The maximum scholarship amounts varied from $2,200 per year in Hazel Park to $5,800 per year in Benton Harbor. For more information on each promise zone scholarship, Table 3.1 summarizes basic information listing the first eligible high school class, grade of entry for full and minimum scholarship, time limit to first use the scholarship, eligible postsecondary schools, maximum scholarship amounts per year, and renewal academic-eligibility criteria while in college.

In terms of benefits offered to students, the promise zones were not as generous as prior promise scholarships such as the Kalamazoo, El Dorado, Pittsburgh, or New Haven Promises. They were initially conceived with the assumption that the Michigan Promise Scholarship[30] (the state's broad-based merit aid program) would still exist and partially cover tuition and fees for students who planned to enroll in any in-state public four-year college or university (C. Wilbur, personal communication, November 17, 2015). The promise zones then would fill the gap for students who either planned to earn only associate's degrees or for students who were not initially eligible for the Michigan Promise Scholarship to start at a community college and then transfer to a four-year university. Students were offered a second chance to be eligible for the Michigan Promise Scholarship if they successfully completed 60 credits of college with at least a

[30] The Michigan Promise Scholarship offered students up to $4,000 ($1,000 to initially enroll, $1,000 in the beginning of their sophomore year, and $2,000 at the end of their sophomore year if they earned a cumulative 2.5 GPA) to enroll in any in-state public college or university. To be eligible for the scholarship, high school seniors had to earn qualifying scores on all four subject exams of the 11th grade state standardized exams or receive a composite score of at least a 21 on the ACT (Michigan Department of Treasury, 2008).

cumulative 2.5 GPA (Michigan Department of Treasury, 2008). Unfortunately in the fall of 2009, the Michigan Promise Scholarship was eliminated (Keeping, 2009).

In order for a promise zone to begin offering scholarships, it had to have a development plan approved by the Michigan Department of Treasury and raise enough private funds to cover the cost of the scholarships for all eligible students for at least the first two years of the program. In the third year of operation, promise zones were able to automatically capture half of the growth in the state education tax within the zone's boundaries to help fund the scholarship[31] (How Promise Zones Work, n.d.; Michigan Promise Zone Authority Act, 2009).

Given the differences in the initial startup costs, their capacity to fundraise, and timing of an approved development plan, the promise zones became operational in a rolling pattern, with Baldwin as the first operational promise zone in 2010 and ending with Muskegon Area ISD in 2015. Currently, 9 out of the 10 promise zones are operational. Jackson Promise decided to dissolve on July 13, 2015, because they had raised only 3% of the $2.1 million needed to become operational (Smith, 2015). In April 2016, Newaygo County Regional County Educational Service was selected as the tenth promise zone to replace Jackson (Scott, 2016) as Newaygo County was next in line from the original pool of applicants (C. Wilbur, personal communication, March 23, 2017).

[31] Promise zones can only capture the state education tax (SET) within the boundaries of their school districts. The SET is indexed to a base year and promise zones receive half of the growth in the SET each year that the SET exceeds the base year SET. For example, the SET in Baldwin increased by $135,620 in 2015-16 from the base year SET. In 2016-17, Baldwin Promise was able to automatically capture half of $135,620 ($67,810) to fund the promise scholarships (Wilbur, 2017).
Originally the base year was proposed as the year before the promise zone started awarding scholarships, but due to the Great Recession, the SET declined for several years in almost all of the promise zones. Therefore, the base year for each zone was set to the lowest year for the SET within a six-year window (one year before to five years after the promise zone awards scholarships)(C. Wilbur, personal communication, April 5, 2017). In 2016-17, the average tax capture for the six promise zones was approximately $50,300. Detroit and Battle Creek did not capture taxes in 2016-17 (Wilbur, 2017).

Table 3.1 Information on student eligibility and benefits offered for the eight operational Michigan promise zone scholarships

Promise zone (first eligible high school class)	Grade of entry for full scholarship	Grade of entry for min scholarship (min %)	Time limit - years after hs grad to use scholarship	Eligible postsecondary schools	Max scholarship amount per year	Renewal academic criteria
Baldwin (2010)	9	12 (25%)	4	Any public or private university or CC	$5,000	2.0 GPA; Full-time enrollment
Battle Creek (2012)	8	10 (50%)	5	Kellogg CC	Indexed to KCC tuition and fees (~$3,000 + $1000 book stipend)	15 credits per year
Benton Harbor (2011)	Any - 2011 & 2012 5 - 2013+	(N/A) - 2011 & 2012 12 - 2013+ (25%)	5	Any public CC or trade/vocational school	Indexed to CC tuition and fees (~$5,800)	2.0 GPA; Full-time enrollment
Detroit (2013)	11	N/A	1	Henry Ford CC, Macomb CC, Oakland CC, Schoolcraft CC, and Wayne County CC	Indexed to CC tuition and fees (~$4,300)	2.0 GPA; Full-time enrollment; Meet SAP standards
Hazel Park (2012)	5	12 (20%)	4	Oakland CC or any public or private uni or CC	Indexed to OCC tuition and fees (~$2,200)	2.0 GPA; Full-time enrollment
Lansing (2012)	10	N/A	1	Lansing CC or Michigan State	Indexed to LCC tuition and fees (~$2,600)	6 credits per semester; Meet SAP standards
Pontiac (2011)	9 - 2011 8 - 2012 7 - 2013 6 - 2014	12 - 2011 (25%) 12 - 2012 (20%) 12 - 2013 (17%) 12 - 2014 (15%)	5	Any public or private university or CC	$3,000 (reimbursement for books after 2014 if not used max amt)	Full-time enrollment
Saginaw (2012)	6	10 (25%)	3	Any public or private university, CC, or trade school	Indexed to Delta College tuition and fees (~$2,700 for 2 yr; $2,000 for 4 yr)	Full-time enrollment

III. Relevant Literature

While there is a growing literature on the evaluation of promise programs (see Billings, 2018b for a review), research focused on college outcomes have been limited. The review by Billings focused on four older promise programs (Kalamazoo, Knox Achieves, Pittsburgh, and New Haven) because there is research evaluating their impact on postsecondary outcomes. The results of the success of the programs were mixed because these four promise programs differ in design (i.e. which students were eligible and what benefits students received from the scholarship) and implementation (i.e. which students were aware of the scholarship and how involved the community was in supporting students to attend college). Overall, the Kalamazoo Promise and Knox Achieves increased the educational attainment of their students and the Pittsburgh Promise and the New Haven Promise had no effect on students' college outcomes.

The majority of evidence as to whether promise programs work is based on the Kalamazoo Promise. Students are eligible for the Kalamazoo Promise if they live within the school district, enroll in the school district by 9th grade, graduate from one of the four eligible high schools, and complete a one-page Kalamazoo Promise application (The Kalamazoo Promise: Information for Seniors and Parents, 2014). The Kalamazoo Promise has substantially increased college enrollment and degree completion and has led more students to remain in-state for college (Bartik et al., 2015; Billings, 2018a). Eligible students increased their college enrollment by 9.3-11.4 percentage points within one year of expected high school graduation and increased their degree completion by five percentage points within six years of expected high school graduation. Students were also more likely to attend any four-year promise eligible institutions by 10-11 percentage points given that the price differential between in-state community colleges and universities was either reduced or eliminated (Billings, 2018b).

While the Kalamazoo Promise served as a pioneering program for the promise movement, many of the newer promise programs have failed to replicate Kalamazoo's results. One main reason is the newer promise programs have changed the design of the scholarship by adding extra eligibility criteria and switching from a first-dollar scholarship to a last-dollar scholarship (Miller-Adams, 2015).[32] First- or last-dollar refers to the timing of when promise scholarship dollars are applied - either *first* before institutional, state, and federal grant aid or *last* after the provision of such aid. If a student is eligible for institutional, state, or federal grant aid that exceeds her tuition and fees, she does not receive any promise scholarship dollars under a last-dollar design.

A major consequence of the last-dollar design is that these promise scholarships tend to subsidize middle and high income students who are not eligible for need-based financial aid. Since middle- and high-income students are more likely, on average, to enroll in college than low-income students (Ma, Pender, & Welch, 2016), the last-dollar design may not increase overall college enrollment because the majority of these students would have attended college without the provision of the promise funding. Instead, it may shift middle and high income students to a different set of postsecondary institutions.

For low-income students who need the scholarship dollars the most, last-dollar promise scholarships usually just act as a source of information - potentially making students more aware of the college application process and of their local postsecondary choices. Last-dollar promise scholarships do not increase the total amount of money that is offered to low-income students because their tuition and fees are paid for by federal, state, or institutional grant aid. Given the differences in design and eligibility criteria compared to the Kalamazoo Promise, the effect of

[32] See Billings (2018a) for a more detailed discussion of the diffusion of promise programs across the United States and reasons why promise programs may have changed their design as they spread.

these newer last-dollar promise programs (Knox Achieves, Pittsburgh, and New Haven) were mixed.

Staring with the high school class of 2009, Knox Achieves offered free tuition and fees for students in Knox County to attend any Tennessee community college or technical college. Knox Achieves was similar in design to the Michigan promise zones because it was a last-dollar scholarship for students to attend community colleges. To receive the scholarship, students were required to sign up in 12th grade, regularly meet with their assigned community mentor, graduate from high school, complete the FAFSA, and enroll in an eligible postsecondary institution (Carruthers & Fox, 2016). Unlike the Michigan promise zones, however, Knox Achieves provided college coaching to its students.

Carruthers and Fox (2016) estimated the effect of being eligible for Knox Achieves on college enrollment and credit accumulation. The researchers used a difference-in-differences approach to compare the postsecondary outcomes of 12th graders in Knox County to 12th graders in either the East Tennessee region or Knoxville Metropolitan Statistical Area. In the post-period, Knox County students increased their enrollment in any college by 3.5-4 percentage points and their enrollment in community colleges by 3-5 percentage points within 9 months of their high school graduation.

Pittsburgh and New Haven added merit-based criteria to their promise scholarships by requiring students to earn a minimum high school grade point average (2.5 for Pittsburgh and 3.0 for New Haven) and a minimum of 90% attendance in high school (Gonzalez, Bozick, Tharp-Taylor, & Phillips, 2011; Gonzalez et al., 2014).[33] New Haven students also had to meet two additional criteria: no expulsions on their school record and the completion of 40 hours of

[33] The Pittsburgh Promise changed their minimum grade point average and attendance criteria over the first three cohorts (Gonzalez et al., 2011). I list the current eligibility criteria.

community service in high school (Daugherty & Gonzalez, 2016; Gonzalez et al., 2014). Students could use these scholarships at any in-state two-year or four-year postsecondary institution (Gonzalez et al., 2011; Gonzalez et al., 2014).

Evaluations of the Pittsburgh and New Promises used difference-in-differences method to estimate the effect of promise eligibility on college enrollment (Bozick, Gonzalez, & Engberg, 2015; Daugherty & Gonzalez, 2016). However, these studies used ineligible students within the same district as the counterfactual group. Theoretically, this is not a good counterfactual because these students could never be treated because they have already been ruled ineligible for their community's promise scholarship. Empirically, ineligible students were most likely worse off than eligible students because they did not meet the minimum promise scholarship criteria, and most likely had other background characteristics that were negatively correlated with college attendance. Therefore, these estimates on the effect of the Pittsburgh and New Haven Promise on postsecondary outcomes may have been positively biased given that the counterfactual group was so disadvantaged relative to the treatment group.

Indeed, Bozick et al. (2015) found that the difference-in-differences estimate for college enrollment was positive, but not statistically significant. This confirms what I expected that the estimates on college outcomes may be positively biased due to the selection of a more disadvantaged counterfactual group and not a direct result of the Pittsburgh Promise. There also was an increase in the odds of eligible students enrolling in four-year public colleges in the post-period (a difference-in-differences estimate of 0.36). Bozick et al. concluded that the Pittsburgh Promise may have changed *where* students went to college, but not *whether* they went to college.

Daugherty and Gonzalez (2016) used regression discontinuity and difference-in-differences designs to estimate the effect of the New Haven Promise on college enrollment and

persistence. Since the New Haven Promise has a minimum grade point average to be eligible for the scholarship, the researchers exploited this criterion for a regression discontinuity analysis. Their treatment group was students who were right above the 3.0 grade point average cut-off and were eligible for the New Haven Promise, and their counterfactual group was students who were right below the 3.0 grade point average cut-off and ineligible for the New Haven Promise. Daugherty and Gonzalez (2016) found that their estimates were highly sensitive to their model specifications, as students who were right above the 3.0 cut-off increased their enrollment in any college by 1-8 percentage points and any public college by 6-14 percentage points. Since a 3.0 grade point average may also serve as an eligibility threshold for other college programs and policies (such as institutional merit scholarships or college admission), Daugherty and Gonzalez concluded that the regression discontinuity estimates may not have captured the separate impact of the New Haven Promise on college enrollment.

For the difference-in-differences analysis, Daugherty and Gonzalez (2016) compared the college enrollment rates of students graduating from New Haven Public Schools before and after the promise scholarship was introduced for six high school classes (three pre-period cohorts and three post-period cohorts). Students who were eligible for the New Haven Promise had similar college enrollment and persistence rates compared to ineligible students in the post-period years. Because the difference-in-differences results were nearly zero and the regression discontinuity results varied widely by model specifications, Daugherty and Gonzalez concluded that the New Haven Promise did not have a significant impact on the postsecondary enrollment or persistence for the first three cohorts of students.

In summary, the Kalamazoo Promise and Knox Achieves positively influenced the educational attainment of their students whereas the Pittsburgh Promise and New Haven Promise

had either modest or no effect on their students' postsecondary outcomes. The Kalamazoo Promise and Knox Achieves are universal promise programs, meaning that they created their eligibility criteria so that most students within the school district would be eligible for the promise scholarship. In contrast, the New Haven and Pittsburgh Promises targeted students within the school district based on their academic merit and attendance in high school. The differences in findings among the promise programs may have been due to the differences in scholarship design and implementation.

IV. How Promise Zones Affect College

Human capital model explains that students weigh the costs and benefits of enrolling in college to decide whether to attend postsecondary education (Becker, 1975, 1993; Hansen, 1971; Schultz, 1961; Weisbord, 1968). When the benefits exceed the costs, students will enroll in college. Since promise programs offer scholarships, they can directly lower the cost of college by reducing the amount of tuition and fees, assuming that these costs are not already covered by federal or state grant aid. This reduction in college price should induce more students to enroll in college because the cost-benefit analysis has changed in favor of college attendance.

Promise programs may also affect the college choice process which is often described by the higher education literature as a series of stages. The most well-known model is by Hossler, Braxton, and Coopersmith (1989), and they described the college choice process in three stages: *predisposition*, *search*, and *choice*. During predisposition, students develop educational and occupational aspirations and decide whether they want to continue their formal education beyond high school. During search, students seek out information on college and assimilate the information that they have learned to develop a tentative list of institutions that they are interested in applying to. During choice, students apply to several colleges and universities,

receive admission offer(s), and decide which postsecondary institution to attend. They also decide whether to apply for financial aid to help pay for college (Cabrera & La Nasa, 2000; Hossler et al., 1989).

Since the promise programs provide an early commitment of financial aid, this promise of funds may change students' behavior in junior high and high school because college now feels more attainable (Heller, 2006; Schwartz, 2008). This is particularly salient for low-income and first generation students, who tend to overestimate the cost of college and underestimate the amount of available financial aid (De La Rosa, 2006; De La Rosa & Tierney, 2006; Grodsky & Jones, 2007). During the predisposition stage of the college choice process, students may decide to engage in positive academic behaviors such as enrolling in rigorous college preparatory classes, spending more time and effort on their schoolwork, and actively participating in classroom discussions and activities.

The promise zones may also change how students allocate time spent on school, work, and leisure. During high school, students allocate time to labor, leisure, and schooling. The assumption is that students who allocate more time to schooling often enroll in more challenging, rigorous courses during high school. When individuals enter the work force after their formal education ends, they only allocate time to labor and leisure. Therefore, students choose the amount of time to allocate to school and labor that will maximize their utility during the times that they are enrolled in secondary education (Kim, Kim, DesJardins, & McCall, 2015).

In a recent paper, Kim et al. (2015) used this random utility model to estimate the effect of completing algebra II on college access and success. They also discussed the different factors that influence the allocation of time between the three activities (see Kim et al., 2015, for a through discussion of students' preferences and how the local labor market conditions influence

students' choices). Therefore, the promise zones may increase the amount of time that students allocate to schooling because eligible students want to spend more time to prepare for college by enrolling in rigorous coursework and earning good grades in their classes.

In the Kalamazoo Public Schools, there is evidence that students changed their behavior and attitude about school in positive ways and exerted more effort due to the offer of the Kalamazoo Promise. From 2007-2014, Kalamazoo Public School students increased their enrollment in rigorous college preparatory courses as seen by the rise in the number of students that took Advanced Placement courses in high schools from 307 to 757 (146%) and by the number of Advanced Placement courses taken from 359 to 1,108 (209%) (The Kalamazoo Promise, 2015). Kalamazoo Public School students also noticed an improved outlook for their classmates' attitudes about school and believed that there was an increase in their classmates' motivation to succeed due to the Kalamazoo Promise (Miron, Jones, & Kelaher-Young, 2009, 2012).

Promise programs may also spark changes in the school district by increasing college preparatory courses and college awareness activities for all students. Ash and Ritter (2014) conducted interviews and focus groups with district personnel, administrators, and teachers after the El Dorado Promise was announced. The El Dorado Public Schools staff discussed the school district's shift in focus to prepare all students for college by setting high expectations for students, increasing the awareness of college for students in elementary and middle school, and encouraging more students, especially disadvantaged students to enroll in college preparatory courses. Similarly, teachers in the Kalamazoo Public Schools changed their beliefs, expectations, and behavior after the announcement of the Kalamazoo Promise (Jones, Miron, & Kelaher-Young, 2008, 2012). These teachers discussed the fact that the Kalamazoo Promise brought

positive attention to the school district and created a sense of excitement and urgency to prepare all students to succeed in college in order to avoid wasting the promise scholarship. Teachers felt more empowered in their jobs and more supported in their work. This led them to report increased willingness to try new things in the classroom and spend more time and energy with their students.

These changes in students' preparation for college and an increased level of support from the school district may have shifted which postsecondary institutions students chose to attend. Students' stronger academic profiles allowed them to apply and compete for admission to selective four-year colleges and universities during the choice stage of the college choice process. Students' stronger academic profiles also may have increased the likelihood that they would be awarded institutional merit scholarships to cover expenses beyond tuition and fees such as room, board, books, and other educational expenses. Therefore, we can conclude that promise programs may affect not only *whether* students enroll in college, but *where* students choose to enroll if their improved academic credentials allowed them to gain admission to more selective colleges and universities and to receive additional funding from these schools.

V. Data and Sample

I used a longitudinal administrative dataset of the universe of public K-12 students in Michigan. The administrative dataset contained a rich set of demographic and academic information as well as their schooling locations for elementary and secondary school years.

I constructed two samples of students: (1) 5^{th} graders in 2000-2007 and (2) 12^{th} graders in 2007-2014. Primarily, I used the 5^{th} grade sample for the instrumental variable difference-in-differences method and the 12^{th} grade sample for the difference-in-differences method. While the samples started at different time points in the students' schooling, both corresponded to the same

expected high school classes of 2007-2014, assuming on-time progression in school. There are three to six pre-period cohorts and two to five post-period cohorts, depending on when each promise zone started (2010-2013). I selected public school students, including charter school students that attend 5th or 12th grade in either the promise zone school districts or the comparison school districts.

To select charter school students, I used ArcGIS to identify charter school buildings (based on their latitude and longitude) that were located within the boundaries of the 22 public school districts. I included charter school students in the analysis because students' enrollment in this type of school counted towards their tenure in the public school system for 4 out of the 8 promise zones.

I used the National Student Clearinghouse (NSC) to create the postsecondary outcomes for the analysis. The NSC contains postsecondary enrollment and degree information for 93% of college students in the United States (Dynarski, Hemelt, & Hyman, 2013). To create a balanced panel of postsecondary schools across the time period of my analysis, I only included colleges and universities that share their enrollment records with the NSC by March 31, 2008. This ensures that the changes in postsecondary outcomes were due to the promise zone, rather than changes in the National Student Clearinghouse participation over time.[34]

The postsecondary outcomes that I use in my analysis were college access, college choice, and college persistence. I define college access as enrolling in any postsecondary institution within one year of their expected high school graduation. I define college choice as enrolling in any two-year college, enrolling in any Michigan two-year college, or enrolling in

[34] Bay Mills Community College was removed from the analysis since it did not share their enrollment records with the National Student Clearinghouse until June 2015. Since Bay Mills Community College was not a local community college for either my treatment or control school districts, its removal should not bias the postsecondary estimates.

any promise-eligible institutions within one year of their expected high school graduation. I define college persistence by three outcomes: enrolling in at least two full-time semesters within one year of their expected high school graduation, enrolling in at least four full-time semesters within two years of their expected high school graduation, and persisting to their second year of college within two years of their expected high school graduation.

VI. Identification Strategy

In this study, I am interested in estimating the effect of the promise zones on college enrollment, college choice, and college persistence. In any quasi-experimental analysis, we are concerned that the observable and non-observable characteristics of people who decide to participate are different from those of people who decide not to participate. This problem is referred to as selection bias and it can either positively or negatively bias our estimates so that we do not achieve a "true" effect of the program. Therefore, our estimate is a combination of the "true" effect plus a portion of the estimate that is selection bias. To isolate the "true" effect of the program, I need to find a source of exogenous variation that as good as random sorts people into either the treatment or the control condition.

One way that researchers have solved the problem of selection bias is by taking advantage of experiments that occur naturally in society either through an abrupt change in policy or through unexpected events such as natural disasters. These "natural" experiments plausibly randomly assign people to treatment and control conditions, and researchers can exploit this randomization to estimate the effect of the treatment on the outcomes of interest.

The promise zones are an example of a natural experiment because the policy change sorted students into either the treatment or control condition based on their cohort year and school district location. To estimate the effect of the promise zones on postsecondary outcomes, I

pooled the eight promise programs together to compare changes in postsecondary outcomes across cohorts of students in the promise zones and in a set of 13 comparison school districts. This is represented by the following difference-in-differences equation:

$$(1) \qquad Y_{idc} = \gamma_1(PZ\_Elig_{id} * Post_{ic}) + \beta X_{idc} + \delta_d + \delta_c + \varepsilon_{idc}$$

Y_{idc} is the outcome Y (representing college access, college choice, and college persistence) for student i in school district d and cohort c. PZ_Elig_{id} is a dummy indicating a school district that becomes a promise zone. $Post_{ic}$ is a dummy indicating whether a student is expected to graduate from high school after the promise zone started awarding scholarships (2010-2013 depending on the zone). I include school district fixed effects (δ_d) and cohort fixed effects (δ_c) because it eliminates any observed or unobservable characteristics that are time-invariant within grade cohorts and school districts that may affect the difference-in-differences estimate. The vector of student demographic characteristics is represented by βX_{idc}, which include age, gender, race/ethnicity, limited English proficiency, migrant status, poverty indicator, special education status, state standardized exam score, and the interaction of race and cohort fixed effects. ε_{idc} is the error term. I included these student demographics because prior literature has provided evidence that these student demographic characteristics may be correlated with the outcomes of interest. I include the interaction of race and cohort fixed effects because there is evidence that the racial demographic composition changes in the post-period for some promise zone school districts. The error term is represented by ε_{cdi}.

The coefficient of interest is γ_1, which is the difference-in-differences estimate and it represents the effect of promise zone eligibility on postsecondary outcomes. Mathematically, it is the change in the mean of cohorts' postsecondary outcomes within the promise zones,

differenced with the mean change of cohorts' postsecondary outcomes within the comparison school districts. I use robust standard errors that are clustered by the 5th grade school district.

I compare the students in promise zones to students in 13 urban poor districts from across the state. To construct the comparison group, I created a list of urban poor districts that were eligible to apply for promise zone status (i.e. the school district met or exceeded the average poverty level for families with children under 18), but did not do so. Since I do not have the poverty level for each school district, I used eligibility for free and reduced price lunch as a proxy for poverty and calculated the mean eligibility for free and reduced price lunch for all 5th graders within each school district and across the state in 2009, the year that the promise zones were selected. There were 10 urban school districts that either met or exceeded the state average for eligibility for free and reduced price lunch, but did not apply for promise zone status. I also included Flint City School District who applied, but was not awarded promise zone status, and Jackson Public Schools and Muskegon City Public Schools (two treated school districts) in the comparison school districts because their promise zones did not award scholarships during the time period of my study.

The total comparison group contains a set of 13 urban poor school districts. The demographic and academic characteristics of the treatment and control school districts are displayed in Table 3.2. I also show the characteristics for each promise zone separately to present the variation among the promise zone school districts. Detroit is the largest promise zone with 199 schools, 94,907 students, and 5,953 teachers and Baldwin in the smallest promise zone with 4 schools, 581 students, and 41 teachers. Five out of eight promise zones enroll more students who identify as either Black or Latino compared to students who identify as either White or Asian. Across all promise zones, there is a higher percentage of students in 5th grade who scored

Table 3.2 Characteristics of promise zone and comparison school districts in 2009

	All Promise Zones (1)	Baldwin (2)	Battle Creek (3)	Benton Harbor (4)	Detroit (5)	Hazel Park (6)	Lansing (7)	Pontiac (8)	Saginaw (9)	Comparison School Districts (10)
Demographics										
Number of schools	338	4	26	14	199	11	38	20	26	204
Number of students	146,655	581	10,508	3,605	94,907	5,231	14,576	7,492	9,755	84,911
Number of teachers	9,110	41	626	246	5,953	277	881	462	623	5,042
Number of guidance counselors	286.3	0.7	15.7	5	215	4.6	21.3	10	14	122.5
Percent Native American or Alaskan Native	0.004	0.007	0.007	0.002	0.003	0.012	0.012	0.003	0.002	0.005
Percent Asian or Pacific Islander	0.016	0.002	0.036	0.001	0.008	0.011	0.046	0.038	0.014	0.017
Percent Latino	0.091	0.024	0.067	0.020	0.078	0.015	0.157	0.192	0.130	0.068
Percent Black	0.734	0.301	0.272	0.879	0.864	0.355	0.458	0.623	0.636	0.384
Percent White	0.130	0.549	0.555	0.031	0.024	0.591	0.324	0.107	0.196	0.493
Percent special education students	0.165	0.189	0.144	0.164	0.163	0.126	0.185	0.166	0.189	0.142
Percent limited English proficiency	0.065	0	0.046	0.001	0.071	0.046	0.042	0.133	0.054	0.114
Percent eligible for free and reduced price lunch	0.734	0.895	0.573	0.872	0.748	0.584	0.679	0.849	0.793	0.641
Standardized exam scores										
Mean ACT composite score	15.68	15.59	17.31	13.73	15.56	16.81	15.91	14.04	16.14	16.70
Percent proficient on 11th grade MME math	0.193	0.105	0.393	0.076	0.161	0.299	0.258	0.050	0.249	0.291
Percent proficient on 11th grade MME ela	0.266	0.179	0.387	0.084	0.263	0.361	0.280	0.116	0.275	0.336
Percent proficient on 11th grade MME reading	0.356	0.385	0.498	0.167	0.345	0.459	0.387	0.199	0.392	0.426
Percent proficient on 11th grade MME science	0.248	0.237	0.460	0.076	0.222	0.347	0.289	0.125	0.282	0.351
Percent proficient on 5th grade MEAP math	0.536	0.786	0.617	0.549	0.490	0.644	0.659	0.570	0.629	0.693
Percent proficient on 5th grade MEAP ela	0.566	0.762	0.693	0.487	0.520	0.682	0.710	0.534	0.650	0.662
Percent proficient on 5th grade MEAP reading	0.619	0.810	0.746	0.567	0.576	0.728	0.752	0.590	0.694	0.706
Percent proficient on 5th grade MEAP science	0.634	0.762	0.796	0.567	0.598	0.705	0.764	0.531	0.652	0.719
District finances										
Per-pupil revenue from all sources	13,020	35,295	11,346	11,760	13,344	11,532	12,967	12,967	11,725	12,690
Per-pupil total instructional expenditures	7,768	8,113	6,520	7,566	8,108	7,360	7,221	7,840	6,829	7,359
Per-pupil total instructional salaries	7,158	7,573	5,837	7,046	7,547	5,881	6,690	6,922	6,382	6,928

Notes. Battle Creek includes two public school districts: Battle Creek Public Schools and Lakeview Public Schools. The comparison school districts are a set of 13 public school districts. They are Clarenceville School District, Dearborn School District, Fitzgerald School District, Flint City School District, Godrey-Lee Public School District, Godwin Heights Public School District, Jackson Public Schools, Muskegon City School District, Niles Community Schools, Southfield Public Schools, Taylor School District, Van Dyke Public Schools, and Wyoming Public Schools. Ela stands for English language arts.

proficient on their 5th grade Michigan Educational Assessment Program (MEAP) exams in science, math, English language arts, and reading compared to the percentage of students who scored proficient on their 11th grade Michigan Merit Exams (MME) in science, math, English language arts, and reading.

Since there was a delay between when the promise zones were selected and when the promise zones started awarding scholarships, students and their families have time - in some cases, several years - to move into the school district to gain access to the scholarship. This endogenous mobility may positively bias the difference-in-differences estimate because families who expected their children to go to college will either move or stay within the district. Therefore, PZ_Elig_{id} in equation (1) may be endogenous if students based their schooling location on whether they would be eligible for the promise scholarship.

To determine whether this is a threat to my identification strategy, I examine the mobility of students in promise zone districts and urban poor school districts from 2006 to 2014. The mobility outcomes that I examine are exits and entrances to the districts within the academic year and between academic years. I use within and between academic years because students who moved due to the scholarship should be more likely to move between academic years since they gained credit for the entire year of attendance as opposed to moving within the academic year.

For the exit outcomes, a student is coded as a "within academic year exit" if the student was in the promise zone school district in the fall semester, but was not enrolled in the school district for the spring semester of the same academic year. The student is coded as a "between academic year exit" if the student was in the promise zone school district in the fall semester *t*, but was not enrolled in the school district in the following fall semester $t + 1$. I only focused on the grades kindergarten to 11th grade for "between academic year exits" because I wanted to

distinguish an exit from graduation since the majority of students graduated from high school after their 12^{th} grade.

For the entrance outcomes, a student is coded as a "new entrant within the academic year" if the student was enrolled in a promise zone school district in the spring semester of an academic year, but she was not enrolled in the fall semester of that same academic year. A student is coded as "new entrant between the academic years" if the student was enrolled in a promise zone school district in the fall semester *t*, but was not enrolled in the school district in the previous fall semester *t*-1. I focused only on grades one through twelve for "between academic year entrants," as all kindergarten students were considered to be new to the school district because the state administrative data does not contain preschool enrollments.

I estimate a difference-in-differences equation similar to equation (1) with the dependent variable as either student exit from the promise zone school districts or student entrance into the promise zone school districts. This allows me to estimate the mean entrance and exit rates of students in the promise zone school districts before and after the promise zones started to determine whether the mean entrance and exit rates have changed. Table 3.3 displays these difference-in-differences estimates for between and within academic years. In the post-period, there was a less than one percentage point decline in students exiting the promise zone school districts within the academic year and 2.6 percentage point decline in students exiting the promise zone school district between academic years. These estimates were statistically insignificant. For the entrance rates, there was a 0.1 percentage point increase in new students entering the promise zone school districts within academic years and a 1.8 percentage point increase in new students entering promise zone school districts between academic years in the post-period. The later estimate was statistically insignificant.

Table 3.3 Mobility outcomes of K-12 students in promise zone school districts in 2006-2014 using a difference-in-differences approach

Outcome	Exit within AY	Exit between AY	New entrance within AY	New entrance between AY
PZ_Fall * Post	-0.002	-0.026	0.0006*	0.018
S.E.	(0.004)	(0.017)	(0.0003)	(0.011)
Promise zone pre-mean	0.06	0.24	0.002	0.14
Grades included	K-12	K-11	K-12	1-12
Demographics included	Y	Y	Y	Y
N	1,892,981	1,771,398	1,892,981	1,746,860

Notes. All regressions include school district fixed effects and year fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, and interactions of race and year fixed effects. The robust standard errors are clustered by the students' fall school district.
*** significant at 1%; **significant at 5%; *significant at 10%

While this analysis showed some evidence for endogenous mobility, it ignored that students needed to enter the school district by specific grades to be eligible for the promise scholarships. Since the range of eligible grades varied between promise zones, I use the widest range (5^{th} to 12^{th} grade) to represent the grade eligibility window. If the promise zone scholarship influenced where students attended school, a higher proportion of students should either move to or stay within the promise zones during these grades. I use a dummy variable to indicate whether the student was in one of these grades ($EligGR_{idg}$) and incorporate the grade dummy into equation (1), which will allow me to estimate whether the mean entrance or exit rate is different when students were in the eligible grades.

The difference-in-difference-in-differences regression is represented by the following equation:

$$(2) \quad Y_{idtg} = \gamma_1(PZ\_Fall_{idt} * Post_{it}) + \gamma_2(EligGR_{idg} * Post_{it}) + \gamma_3(EligGR_{idg} * PZ\_Fall_{idt}) + \gamma_4(EligGR_{idg} * PZ\_Fall_{idt} * Post_{it}) + \beta X_{idtg} + \delta_g + \delta_t + \delta_d + \varepsilon_{idtg}$$

Y_{idtg} indicates whether student *i* in grade g in school district *d* and year *t* entered or exited the promise zone school district during the academic year. $EligGR_{idg}$ is a dummy indicating whether a student is enrolled in grade g that determined promise zone eligibility (5^{th} grade to 12^{th} grade). PZ_Fall_{idt} is a dummy variable indicating whether a student is enrolled in a promise zone school district in the fall semester of year *t*. I also include grade fixed effects δ_g. $Post_{it}$, βX_{idtg}, δ_t, δ_d, ε_{idtg} are the same as in equation (1). I use robust standard errors clustered by the students' fall school district.

The coefficient of interest is γ_4, which is the difference-in-difference-in-differences estimate. It compares the mean mobility of promise zone and urban poor students in grades 5^{th} to 12^{th} in the pre-promise years and post-promise years. Table 3.4 displays the difference-in-difference-in-differences estimates.

Table 3.4 Mobility outcomes of K-12 students in promise zone school districts in 2006-2014 using a difference-in-difference-in-differences approach

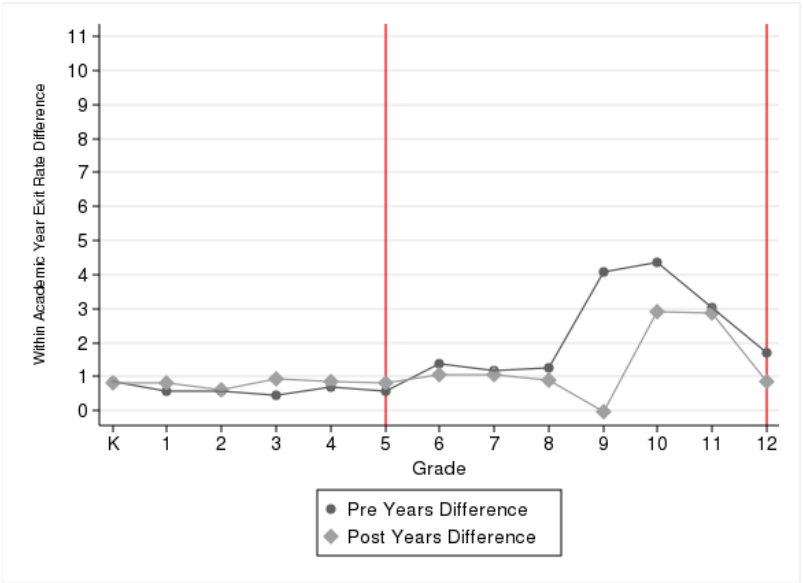
Outcome	Exit within AY	Exit between AY	New entrance within AY	New entrance between AY
EligGR * PZ_Fall * Post	-0.013**	-0.017	0.0005*	0.003
S.E.	(0.005)	(0.014)	(0.0003)	(0.006)
Promise zone pre-mean	0.04	0.22	0.001	0.13
Grades included	K-12	K-11	K-12	1-12
Demographics included	Y	Y	Y	Y
N	1,892,981	1,771,398	1,892,981	1,746,860

Notes. All regressions include school district fixed effects, year fixed effects, and grade fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, and the interactions of race and year fixed effects. The robust standard errors are clustered by students' fall school district.
*** significant at 1%; **significant at 5%; *significant at 10%

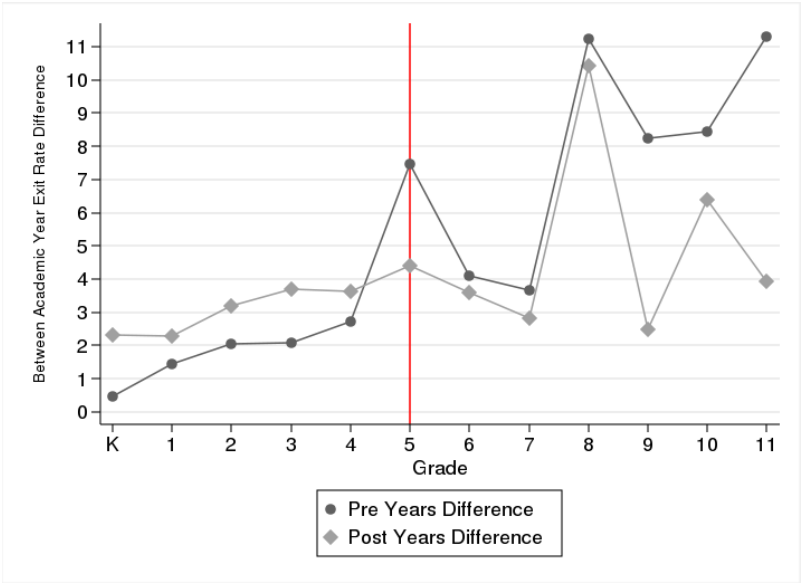
I also graphed student exits and entrances into the promise zone school districts across grades in Figure 3.1 before and after the promise zones started. By subtracting the promise zone mean from the comparison school district mean, the lines represent a difference in the student

Figure 3.1 Mobility outcomes of K-12 students in the promise zone and comparison school districts, 2006-2014

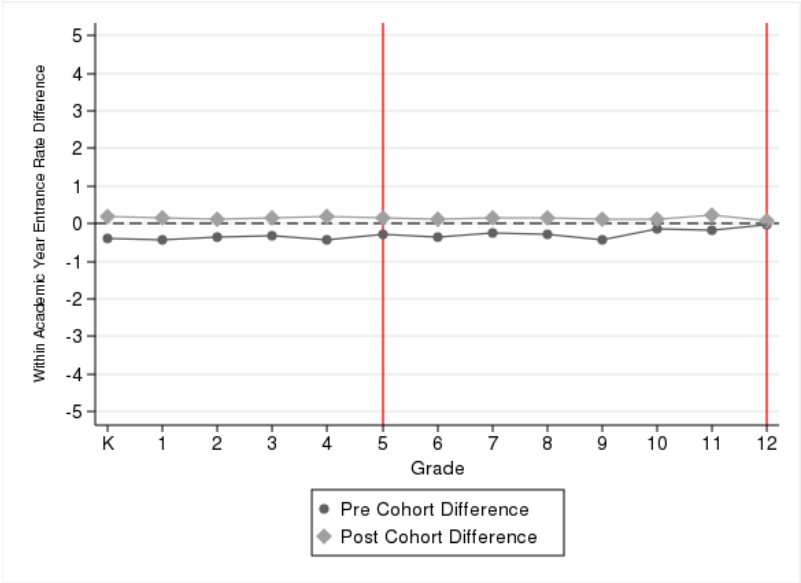
A. Exit within the academic year



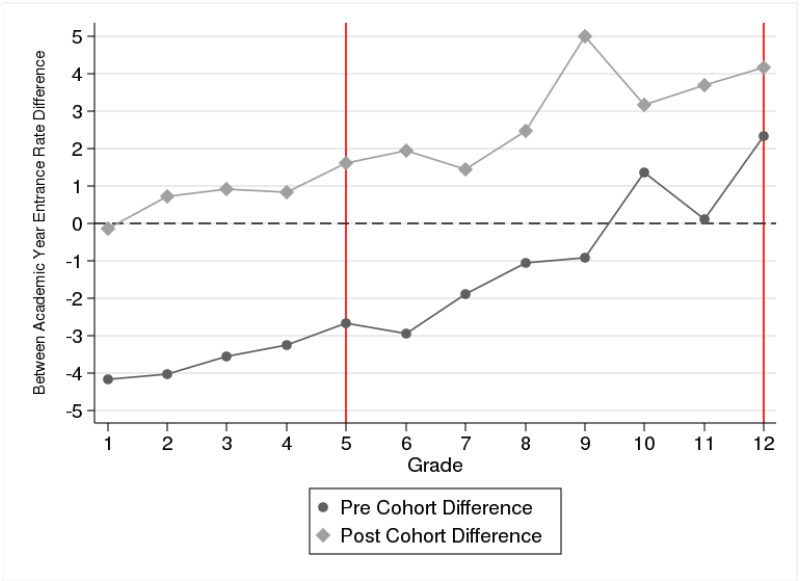
B. Exit between academic years



C. New entrance with the academic year



D. New entrance between academic years



mean exit or entrance rates between promise zone and comparison school districts. The black line with circles is the pre-period mean difference, and the gray line with diamonds is the post-period mean difference. I include red vertical lines at 5th and 12th grade to represent the grade eligibility window.

Figure 3.1A and B show the mean difference in student exits before and after the promise zones started. For grades K-4 which are not included in the grade eligibility window, there was a slightly higher percentage of student exits in the post-period, but similar overall mean trends for the pre- and post-period. The exit-rate trend switched for students during the grade eligibility window (grades five through twelve) as the post-period mean exit rate difference was now lower than the pre-period mean exit-rate difference. Therefore, we can see that students were less likely to leave promise zone school districts if they were enrolled in grades that determine scholarship eligibility (a decline of 1.3 percentage points for within academic year exits and a decline of 1.7 percentage points for between academic year exits). These exit rate findings were similar to the research by Bartik and Sotherland (2015), who examined the in- and out-migration rates of eight promise program communities (one of which was Kalamazoo). They found that households with children under 18 were less likely to leave the promise program communities for at least three years after the promise scholarships were implemented.[35]

Figure 3.1C and D show the difference in the entrance rates for students in the pre- and post-periods. Regardless of the grade, students in the post-period have higher mean rates of entrance compared to students in the pre-period across all grades. This pattern of lower entrance rates in the pre-period may explain why these schools districts were interested in applying for promise zone status, as they may have wanted to attract new students into the district. However,

[35] In their paper on the effect of the Kalamazoo Promise (Bartik et al., 2015), they ignored this evidence of endogenous mobility which is biasing their findings.

the difference-in-difference-in-differences estimates were nearly zero for both entrance rates. Therefore, students who entered the promise zone school districts in the post-period were not more likely to enter during the grade eligibility window.

Since there is evidence that a higher percentage of students stayed within the promise zone school districts in the post-period, scholarship eligibility may be endogenous and its coefficient biased. To address the endogeneity of PZ_Elig_{id}, I use an instrument to predict scholarship eligibility. The instrument that I use is an interaction between two dummy variables - whether a student is in 5th grade in one of the promise zones and whether a student is in a 5th grade cohort that is expected to graduate from high school after the promise zones were operational. I base my instrument on 5th grade because students were in their 5th grade school district across all eight cohorts at least 2 years before the promise zones were selected by the state. Therefore, students' 5th grade location could not have been affected by the promise zones since they did not exist yet.

The instrument is a valid instrument if it meets two conditions: (1) instrument relevance and (2) instrument exogeneity (Angrist & Pischke, 2009; Murnane & Willet, 2011). Instrument relevance refers to whether there is a correlation between eligibility for the promise zone scholarship (regressor of interest) and post 5th grade cohorts in promise zone school districts (instrument). The rule of thumb is that the first stage F-statistic needs to meet or exceed 10 to satisfy instrument relevance and is reported in the results tables. Instrument exogeneity refers to whether the instrument is correlated with postsecondary outcomes only through eligibility for the promise zone scholarship.

I combine the instrument variables estimation and difference-in-differences approach to estimate an instrumental variable difference-in-differences equation. This allows me to examine

the mean differences in postsecondary outcomes across cohorts and school districts *and* address the concern that students are able to manipulate their eligibility for the scholarship. While I model the first and second stages separately in equations (3) and (4), I estimate these equations simultaneously.

I predict promise zone eligibility based on 5th grade location and cohort year in the following first stage difference-in-differences equation:

$$PZ\_Elig_{idc} = \pi_1(PZ\_5_{id} * Post_{ic}) + \beta X_{idc} + \delta_c + \delta_d + \varepsilon_{idc} \quad (3)$$

PZ_Elig_{idc}, the endogenous regressor, is a dummy variable indicating whether the student meets the requirements for any percent of the promise zone scholarship (lives within the promise zone, spends at least one to three years in the school district depending on the zone, and graduates from high school).[36] PZ_5_{id} is a dummy variable indicating whether a student is a 5th grader in a promise zone school district. $Post_{ic}$, βX_{idc}, δ_c, δ_d, and ε_{cdi} are the same as equation (1).

The predicted values from equation (3) replace PZ_Elig_{idc} in equation (4) for the second stage difference-in-differences equation:

$$Y_{idc} = \pi_2\left(\widehat{PZ\_Elig_{idc}}\right) + \beta X_{idc} + \delta_c + \delta_d + \varepsilon_{idc} \quad (4)$$

The coefficient π_2 is the instrumental variable difference-in-differences estimate, which uses exogenous variation in the instrument to estimate the impact of eligibility for the promise zone scholarship on postsecondary outcomes. I use robust standard errors that are clustered by the 5th grade school district.

I estimate the same instrumental variable difference-in-differences regression replacing the dummy variable for eligibility for any percent of the scholarship (PZ_Elig_{idc}) with a dummy

[36] Students are also required to complete the FAFSA and promise zone application, but I did not have access to that information.

variable for eligibility for 100% of the scholarship ($PZ\_Elig100_{idc}$). This analysis compares the salience of the offer of "free" college when students are deciding to enroll and persist in college.

I also estimate differential treatment effects for student subgroups based on race/ethnicity, gender, academic performance, and family income. Since Black, Latino, and low income students are more likely to be eligible for the Pell grant and state need-based grant aid, the treatment for the promise zones varies across student subgroups. For these students, the promise zones act as an information treatment only, which at best informs students on the college-going process (i.e. their college options, the deadlines for applications, the process to apply for college and federal financial aid). However, prior research has shown that information alone tends not to influence whether students enroll in college (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2009). Therefore, it is essential to understand which types of students benefit from the promise zones and how students' eligibility for federal and state grant aid directly influenced their response to the offer of tuition-free college compared to their more advantaged counterparts.

Since there are fewer than thirty school districts, typical methods such as cluster-robust standard errors tend to fail as the standard errors are downwards biased which leads researchers to falsely conclude that there is an effect when there is not (Type I error). Therefore, I also used wild cluster bootstrap-t method clustered by 5^{th} grade school districts to calculate p-values as recommended by Cameron, Gelbach, and Miller (2008). In the results tables, I included cluster-robust standard errors and p-values calculated by wild cluster bootstrap-t methods for comparison.

VII. Limitations

There are several limitations in this study. The research study describes the college choice process to understand how the promise zones may affect whether students enroll in college and which postsecondary institution that they decide to enroll. However, I only model the last stage of the college choice process by focusing on college access and choice. In order to strengthen the connection between the college choice process and the impact on promise zones, future research should examine outcomes in the aspiration and choice stages such as whether students inspire to attend two-year or four-year postsecondary institutions, the probability of applying to specific postsecondary schools, and the probability of being offered institutional or merit aid at these institutions.

Another limitation of the study is that it is too early to assess one of the main goals of the promise zones - to create a stock of college educated labor - because not enough post-promise cohorts have graduated from high school since the promise zones have been awarding scholarships. For five out of eight promise zones, only one to two cohorts of students may have had time to finish their associate degree assuming that they enrolled directly after high school and completed their degree within two years of their expected high school graduation. Therefore, future research needs to estimate the effect of the promise zones on degree completion when more time has passed.

Lastly, this research study focused only on the effect of the promise zones on postsecondary outcomes. However, the promise zones have other policy goals such as strengthening the K-12 school systems by increasing school enrollments and high school graduation rates and helping to boost the local economy by creating new jobs and attracting new

businesses to the zones. To have a full picture of the impact of the promise zones, future research needs to explore the K-12, economic development, and community outcomes.

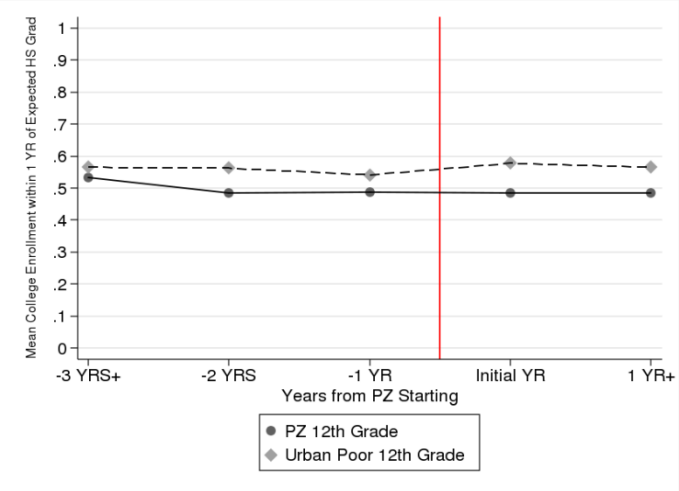
VIII. Results

A. College Enrollment

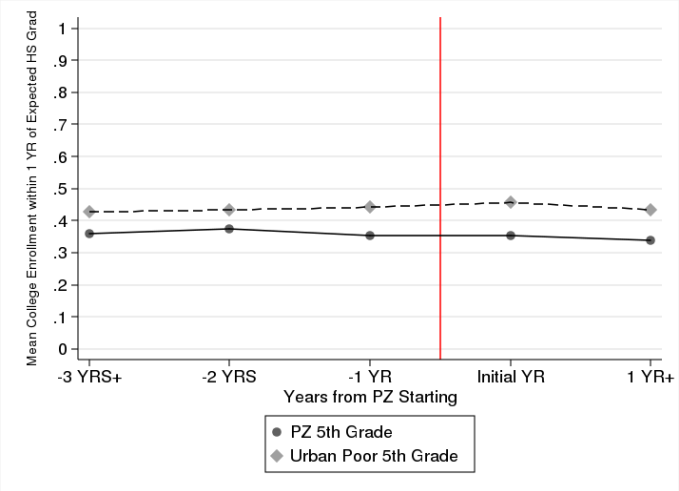
Before I discuss the difference-in-differences or instrumental variable difference-in-differences results, I graphed the mean enrollment for students in the promise zones and comparison school districts. Figure 3.2 displays the college enrollment trends for 12th graders in 2007-2014 and 5th graders in 2000-2007. Since the promise zones started in four different years (from 2010-2013), the x axis represents the number of years either before or after the promise zones started. I top coded the maximum value to represent one or more years after the promise zones started and bottom coded the minimum value to represent three or fewer years before the promise zone started. The red vertical line indicates the separation between pre-promise and post-promise cohorts.

Figure 3.2 Mean college enrollment within one year of expected high school graduation

A. 12th graders



B. 5th graders



I graphed the difference-in-differences estimates for 12th and 5th graders to examine the parallel trends assumption. If the poor urban school districts are a good counterfactual for the promise zones, then the average change in college enrollment for promise zone students should equal the average change in college enrollment for the poor urban students absent of the treatment. I can visually assess this difference by examining the trends in mean college enrollment for promise zones and urban poor districts in the pre-period. The parallel assumption trend held for both samples as the mean college enrollment trends for promise zone and poor urban students were similar in the pre-period.

In the post-period, the mean enrollment in any postsecondary institution increased by about one percentage point for 12th and 5th graders in the promise zones. Table 3.5 displays the difference-in-differences estimates for the graph. Columns 1 and 2 display the difference-in-differences estimates for 12th graders and columns 3 and 4 display the difference-in-differences estimates for 5th graders. Columns 2 and 4 show estimates that control for student demographic characteristics and for the interactions of race and grade cohort fixed effects.

For 12th graders, 52% of promise zone students in the pre-period enrolled in any college within one year of their expected high school graduation. In the post-period, college enrollment increased by 2.0 percentage points in the promise zones, controlling for student demographic characteristics. The college enrollment estimates for 12th graders in columns 1-2 may be positively biased due to endogenous mobility. Students who were planning on attending college were more likely to stay in the promise zone to meet the eligibility requirements of the promise scholarship.

Table 3.5 The difference-in-differences estimates for the impact of promise zones on college enrollment for 12th and 5th graders

Outcome	12th grade (1)	12th grade (2)	5th grade (3)	5th grade (4)
Enroll in any college within 1 year of expected high school graduation	0.013	0.020	0.014	0.010
Robust cluster standard error	(0.023)	(0.020)	(0.013)	(0.013)
Wild cluster bootstrap p-value	[0.636]	[0.384]	[0.352]	[0.532]
PZ pre-mean	0.52	0.52	0.36	0.36
N	102,618	102,618	194,773	194,773
Demographics included	N	Y	N	Y

Notes. All regressions include either 5th or 12th grade school district fixed effects and either 5th or 12th grade cohort fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, and either 11th grade MME subject exams (math, science, social studies, reading, and writing) for 12th grade sample or 5th grade MEAP science exam for 5th grade sample, and the interactions of race and cohort fixed effects. Students with missing gender, race, and age are dropped.
There are robust standard errors clustered at the 12th or 5th grade school district. For comparison, the p-values are also calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008).

For 5th graders, 36% of promise zone students enrolled in college within one year of their expected high school graduation. In the post-period, college enrollment increased by one percentage point, controlling for student demographic characteristics. The 5th grade estimates in columns 3-4 represent the intent-to-treat estimates and can be interpreted as the effect of *offering* the promise scholarship to students in the promise zone. This is not the effect of *receiving* the promise scholarship as some students were not eligible for the promise scholarship since they did not meet the requirements. While the estimates were positive, they were imprecise given that the standard errors were about the same size as the coefficients. Therefore, I am not able to conclude that there was a statistically significant change in the post-period.

Since there is evidence that the 12th grade difference-in-differences estimates are positively biased, I address the endogenous mobility concern by using an instrument to predict

promise scholarship eligibility for 5th grade students based on whether they attended 5th grade in one of the promise zone school districts and whether they were in a 5th grade cohort that was expected to graduate high school after the promise zone started awarding scholarships.

Table 3.6 displays the instrumental variable difference-in-differences estimates based on predicted scholarship eligibility for any percent and 100% of the promise scholarship. Columns 1 and 4 display the first stage estimates. Approximately 22-21% of 5th graders in one of the promise zone school districts were predicted to be eligible for any percent of the scholarship, and 21-20% of the 5th graders were predicted to be eligible for 100% of the scholarship. There was little difference in the probability of 5th graders who were predicted to be eligible for 100% and any percent because 5th grade was the lowest grade of entry to receive 100% of the scholarship across the eight promise zones. Therefore, 5th graders who were predicted to meet the requirements for any eligibility were also predicted to meet the requirements for 100% eligibility. Therefore, I am not able to disentangle the differences between the effect of any or 100% scholarship eligibility on college outcomes using the 5th grade sample.

Columns 2 and 4 are the reduced form estimates. The reduced form estimates are the same as the difference-in-differences estimates from Table 3.5 as the reduced form and difference-in-differences estimates are comparing the mean college enrollment of 5th graders in promise zone school districts and urban poor school districts within one year of their expected high school graduation. The reduced form estimate is the intent-to-treat estimate and can be interpreted as the effect of *offering* the promise scholarship.

However, some promise zone students did not meet the eligibility requirements for the scholarship. These students may have been ineligible because they did not graduate high school or if they did graduate, may not have graduated from a promise eligible high school. They may

also have left the promise zone after 5th grade and failed to reenter by the minimum grade of entry, or did not live within the school district boundaries, but attended the promise zone schools due to school choice policies. This means that the reduced form estimates may be interpreted as a lower bound estimate of the effect of the promise zones on college enrollment because not all offered students were able to access the scholarship.

Table 3.6 The impact of eligibility for the promise zone scholarship on overall college enrollment

	Combined Promise Zones			Combined Promise Zones with Demographics		
Outcome	First stage (1)	RF (2)	IV (3)	First stage (4)	RF (5)	IV (6)
Any Eligibility						
Enroll in any college within 1 year of expected high school graduation	0.212	0.014	0.064	0.224	0.010	0.043
Robust cluster standard error	(0.026)	(0.013)	(0.062)	(0.028)	(0.013)	(0.059)
Wild cluster bootstrap p-value		[0.352]	[0.412]		[0.532]	[0.500]
PZ pre-mean		0.36	0.36		0.36	0.36
First stage F-test	6269			5585		
N	194,773	194,773	194,773	194,773	194,773	194,773
100% Eligibility						
Enroll in any college within 1 year of expected high school graduation	0.201	0.014	0.067	0.211	0.010	0.045
Robust cluster standard error	(0.022)	(0.013)	(0.065)	(0.025)	(0.013)	(0.062)
Wild cluster bootstrap p-value		[0.336]	[0.436]		[0.548]	[0.544]
PZ pre-mean		0.36	0.36		0.36	0.36
First stage F-test	5919			5262		
N	194,773	194,773	194,773	194,773	194,773	194,773

Notes. All regressions include 5th grade school district fixed effects and cohort fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, standardized 5th grade MEAP science exam, and the interactions of race and 5th grade cohort fixed effects. Students with missing gender, race, and age are dropped.

There are robust standard errors clustered at the 5th grade school district. For comparison, the p-values are also calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008).

The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.

Postsecondary schools are included if they had participated in the NSC by March 31, 2008.

Columns 3 and 6 are the instrumental variable difference-in-differences estimates and can be interpreted as the impact of *receiving* the promise zone scholarship (or the local average treatment effect). The instrument variables difference-in-differences estimate is the reduced form estimate divided by the first stage estimate. This scales up the coefficients of the reduced form estimate based on the probability of students within the promise zones who were predicted to be eligible for the scholarship. While I discuss the first and second stages separately to explain the intuition behind the approach, the instrumental variables difference-in-differences regression is estimated simultaneously. Since the instrumental variable difference-in-differences approach is my preferred specification, I focus on these estimates to discuss my results.

There was a 4.3 percentage point increase in college enrollment for students who were *eligible for any percentage of the scholarship,* controlling for student demographic characteristics. This estimate increased slightly to 4.5 percentage points for students who were *eligible for 100% of the scholarship*. In the post-period, the mean college enrollment for promise zone students increased by 12-13% from a base of 36%. The estimates on college enrollment were positive and large enough to be meaningful in size. However, none of the coefficients were estimated with sufficient precision to be statistically significant.

I also estimated the instrumental variable difference-in-differences estimates separately for each promise zone to determine whether any of the promise zones were successful in increasing the overall college enrollment. Table 3.12 displays these results and Figure 3.3 shows the graphs of the reduced form estimates, which are both located in Appendix C. The instrumental variable estimates for 5 out of 8 promise zones were large and positive ranging from 4.5 to 34.4 percentage point increase in mean college enrollment in the post-period. However, the standard errors were similar to the pooled estimates as they were larger than the

point estimates so I cannot conclude that the promise zones had a statistically significant impact on increasing the overall college enrollment for eligible students.

B. College Choice

Since the maximum award of the promise scholarship covered tuition and fees at community colleges, I examined the effect of the promise zone eligibility on postsecondary choice, focusing on enrollment in community colleges. Table 3.7 displays the results of these estimates focusing on enrollment in any community college and enrollment in any Michigan public community college within one year of expected high school graduation. Similar to the overall enrollment results, there was an increase in community college enrollment of two to three percentage points for eligible students in the post-period. However, since the standard errors were so large, the coefficients were not estimated with sufficient precision to be statistically significant.

There is substantial variation among the eight promise zones as to which postsecondary institutions students can attend to use the scholarships. Battle Creek restricts their students to a single local community college. On the other end of the spectrum, four promise zones (Baldwin, Hazel Park, Saginaw, and Pontiac) allow students to use the scholarship at any in-state public or private college or university. However, the maximum amounts are indexed to the local community college tuition for Hazel Park and Saginaw, or a flat amount for Baldwin and Pontiac, but that maximum amount does not cover 100% of tuition and fees at four-year universities. Detroit, Benton Harbor, and Lansing fall in the middle on how limited or comprehensive they are for where students could use the promise scholarships. Detroit students can use the scholarship at five local community colleges, Benton Harbor students can use the scholarship at any Michigan community college, and Lansing students can use the scholarship at either the local community college or Michigan State University.

Table 3.7 The impact of promise eligibility on college choice

Outcome	Combined Promise Zones First stage (1)	RF (2)	IV (3)	Combined Promise Zones with Demographics First stage (4)	RF (5)	IV (6)
Any Eligibility						
Enroll in any 2-year college within 1 year of expected high school graduation	0.212	0.006	0.030	0.224	0.005	0.023
Robust cluster standard error	(0.026)	(0.009)	(0.040)	(0.028)	(0.011)	(0.046)
Wild cluster bootstrap p-value		[0.548]	[0.512]		[0.604]	[0.592]
PZ pre-mean		0.20	0.20		0.20	0.20
First stage F-test	6269			5585		
N	194,773	194,773	194,773	194,773	194,773	194,773
Enroll in Michigan public 2-year college within 1 year of expected high school graduation	0.212	0.006	0.027	0.224	0.004	0.019
Robust cluster standard error	(0.026)	(0.009)	(0.041)	(0.028)	(0.011)	(0.046)
Wild cluster bootstrap p-value		[0.584]	[0.600]		[0.844]	[0.684]
PZ pre-mean		0.18	0.18		0.18	0.18
First stage F-test	6269			5585		
N	194,773	194,773	194,773	194,773	194,773	194,773
100% Eligibility						
Enroll in any 2-year college within 1 year of expected high school graduation	0.201	0.006	0.032	0.211	0.005	0.025
Robust cluster standard error	(0.022)	(0.009)	(0.043)	(0.025)	(0.011)	(0.049)
Wild cluster bootstrap p-value		[0.520]	[0.552]		[0.644]	[0.604]
PZ pre-mean		0.20	0.20		0.20	0.20
First stage F-test	5919			5262		
N	194,773	194,773	194,773	194,773	194,773	194,773
Enroll in Michigan public 2-year college within 1 year of expected high school graduation	0.201	0.006	0.029	0.211	0.004	0.020
Robust cluster standard error	(0.022)	(0.009)	(0.044)	(0.025)	(0.011)	(0.049)
Wild cluster bootstrap p-value		[0.500]	[0.536]		[0.808]	[0.752]
PZ pre-mean		0.18	0.18		0.18	0.18
First stage F-test	5919			5262		
N	194,773	194,773	194,773	194,773	194,773	194,773

Notes. All regressions include 5th grade school district fixed effects and 5th grade cohort fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, standardized 5th grade MEAP science exam, and the interactions of race and 5th grade cohort fixed effects. Students with missing gender, race, and age are dropped.

There are robust standard errors clustered at the 5th grade school district. The p-values are also calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008) for comparison. The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak. Postsecondary schools are included if they had participated in the NSC by March 31, 2008.

Since promise scholarships have been known to shift *where* students went to college and not *whether* they attended college (Bozick et al., 2015), I examined the effect of 100% scholarship eligibility on enrollment in the promise-eligible postsecondary schools within one year of expected high school graduation. Table 3.8 displays these results for each promise zone. The estimates ranged widely across the promise zones, and show four promise zones with positive estimates and four promise zones with negative estimates.

Battle Creek and Lansing were the only promise zones with estimates that were statistically significant, but the estimates were in opposite directions. In Battle Creek, the promise eligible institution is Kellogg Community College. The promise scholarship awards students up to 62 credits at Kellogg Community College and up to a $500 per semester book stipend (Frequently Asked Questions about the Legacy Scholars Scholarship, n.d.). Students who were eligible for 100% of the scholarship in Battle Creek increased their enrollment in Kellogg Community College by 15.8 percentage points (or a 75% increase in enrollment, from 21% in the pre-period to 36.8% in the post-period).

In Lansing, students can use the promise scholarship at either Lansing Community College or Michigan State University. If students enrolled at Michigan State University, the maximum scholarship award they received is capped at 60 credits to cover tuition and fees at Lansing Community College (Apply - Lansing Promise Scholarship Awards, n.d.). In the first year of the scholarship (2012-2013), the average in-district tuition and fees for a full-time undergraduate student at Lansing Community College was $2,630. This covered about 20% of the tuition and fees for a full-time in-state undergraduate student at Michigan State University. Students who were eligible for 100% of the scholarship decreased their enrollment in Lansing Community College and Michigan State University by 15.3 percentage points. When I estimated

Table 3.8 The impact of 100% promise zone eligibility on enrollment in promise eligible institutions within one year of expected high school graduation

	Baldwin (1)	Battle Creek (2)	Benton Harbor (3)	Detroit (4)	Hazel Park (5)	Lansing (6)	Pontiac (7)	Saginaw (8)
First stage	0.213	0.401	0.300	0.170	0.283	0.214	0.189	0.123
F-test	56	1404	582	2468	290	829	721	316
Reduced Form	-0.039	0.063	0.048	-0.001	0.030	-0.033	-0.006	0.040
Robust cluster standard error	(0.011)	(0.001)	(0.009)	(0.007)	(0.017)	(0.002)	(0.013)	(0.012)
Wild cluster bootstrap p-value	[0.612]	[<0.001]	[0.708]	[0.936]	[0.432]	[0.032]	[0.780]	[0.452]
IV	-0.185	0.158	0.162	-0.008	0.106	-0.153	-0.032	0.322
Robust cluster standard error	(0.051)	(0.002)	(0.032)	(0.041)	(0.057)	(0.011)	(0.065)	(0.098)
Wild cluster bootstrap p-value	[0.592]	[<0.001]	[0.724]	[0.896]	[0.488]	[0.032]	[0.704]	[0.444]
PZ pre-mean	0.23	0.21	0.20	0.16	0.34	0.31	0.24	0.29
N	58,834	64,965	61,525	158,336	60,630	68,220	65,568	65,824
Demographics included	Y	Y	Y	Y	Y	Y	Y	Y

Notes. All regressions include 5th grade school district fixed effects and 5th grade cohort fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, standardized 5th grade MEAP science exam, and the interactions of race and 5th grade cohort fixed effects. Students with missing gender, race, and age are dropped.

Promise eligible institutions change for each promise zone. The promise eligible institutions for Baldwin, Hazel Park, Pontiac, and Saginaw: any Michigan public or private college or university; Battle Creek: Kellogg Community College; Benton Harbor: any Michigan public community college; Detroit: Henry Ford, Macomb, Oakland, Schoolcraft, and Wayne County Community Colleges; and Lansing: Lansing Community College or Michigan State University.

There are robust standard errors clustered at the 5th grade school district. For comparison, the p-values are also calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008).

The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.

Postsecondary schools are included if they had participated in the NSC by March 31, 2008.

the effect of 100% of the scholarship on the two institutions separately, I find that the results were concentrated on Lansing Community College as mean college enrollment in Michigan State University remained the same for pre- and post-promise cohorts.

The estimates for the remaining five promise zones varied. Benton Harbor, Hazel Park, and Saginaw had large, positive estimates for college enrollment in the promise-eligible institutions, but they were imprecisely estimated as the standard errors were large. Enrollment in promise eligible institutions for Detroit remained unchanged, as the instrumental variable difference-in-differences estimates was very close to zero. Baldwin had a large, negative estimate for eligible students enrolling in the promise-eligible institutions. This is a surprising result because Baldwin had the most generous promise scholarship, allowing students to enroll in any public or private university in Michigan and paying for up to a bachelor's degree. One reason for the large and imprecise estimate was that Baldwin had a small student body with only 20 to 30 students graduating from high school each year. Given the small size of the cohorts, the decision of even one or two students not to enroll in college would drastically change the mean college enrollment for the cohort.

C. College Persistence

Since it is too early to estimate the effect of the promise zones on degree completion, I examined two intermediate outcomes: full-time enrollment and persistence to their second year of college. These outcomes are critical because they shed light on whether the promise zones will be successful in increasing the percent of people with college degrees, a main goal of the policy (Stanton, 2009). I examined full-time enrollment because seven out of the eight promise zones required students to enroll full-time each semester (or 15 credits for Battle Creek) to initially receive and renew the scholarship.

I used students' enrollment status as reported by the National Student Clearinghouse. However, because there are six community colleges and one public university in Michigan that did not report enrollment status to the National Student Clearinghouse[37] which included one promise eligible college (Macomb Community College), I coded the student as enrolled part-time for those cases where enrollment status was missing.

Table 3.9 displays the estimates for the effect of 100% promise eligibility on full-time enrollment and persistence to their second year of college. For the outcomes that used two years of college enrollment records, I had to drop the last 5th grade cohort in my sample (expected high school graduation class of 2014) because I have college enrollment records for only one year for this cohort. I found the instrumental variable difference-in-differences estimate for enrolling in at least two full-time semesters was close to zero and the estimate for enrolling in at least four full-time semesters was slightly negative.

I also examined students' persistence to their second year of college within one year of their expected high school graduation. Students were coded as persisted if they enrolled in the fall, spring, or summer semester within one year of their expected high school graduation *and* they enrolled in the fall, spring, or summer semester within two years of their expected high school graduation. In the pre-period, 23% of eligible students persisted to their second year college. There was a 3.5 percentage point increase in the post-period, controlling for student demographics. While the direction of the coefficient was positive and promising, it was not estimated with sufficient precision to be statistically significant. Table 3.13 in Appendix C displays the college persistence estimates by each promise zone.

[37] The six community colleges that did not report enrollment status to the National Student Clearinghouse were Delta College, Jackson College, Macomb Community College, Muskegon Community College, Southwestern Michigan College, and St Clair County Community College. Wayne State University was the one public university in Michigan that did not report enrollment status to the National Student Clearinghouse.

Table 3.9 The impact of 100% promise eligibility on college persistence

	Combined Promise Zones			Combined Promise Zones with Demographics		
Outcome	First stage (1)	RF (2)	IV (3)	First stage (4)	RF (5)	IV (6)
100% Eligibility						
Enrolled in at least two full-time semesters within 1 year of expected high school graduation	0.201	0.004	0.021	0.211	0.0005	0.002
Robust cluster standard error	(0.022)	(0.007)	(0.036)	(0.025)	(0.009)	(0.040)
Wild cluster bootstrap p-value		[0.696]	[0.640]		[0.956]	[0.960]
PZ pre-mean		0.12	0.12		0.12	0.12
First-stage F-test	5919			5262		
N	194,773	194,773	194,773	194,773	194,773	194,773
Enrolled in at least four full-time semesters within two years of expected high school graduation	0.214	0.001	0.003	0.222	-0.003	-0.013
Robust cluster standard error	(0.024)	(0.005)	(0.021)	(0.027)	(0.005)	(0.021)
Wild cluster bootstrap p-value		[0.868]	[0.668]		[0.848]	[0.676]
PZ pre-mean		0.07	0.07		0.07	0.07
First-stage F-test	4123			3738		
N	174,048	174,048	174,048	174,048	174,048	174,048
Persistence to the second year of college	0.214	0.010	0.049	0.222	0.008	0.035
Robust cluster standard error	(0.024)	(0.009)	(0.042)	(0.027)	(0.010)	(0.044)
Wild cluster bootstrap p-value		[0.332]	[0.312]		[0.416]	[0.472]
PZ pre-mean		0.23	0.23		0.23	0.23
First-stage F-test	4123			3738		
N	174,048	174,048	174,048	174,048	174,048	174,048

Notes. All regressions include 5th grade school district fixed effects and 5th grade cohort fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, standardized 5th grade MEAP science exam, and the interactions of race and 5th grade cohort fixed effects. Students with missing gender, race, and age are dropped.
There are robust standard errors clustered at the 5th grade school district. For comparison, the p-values are also calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008). The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.
Postsecondary schools are included if they had participated in the NSC by March 31, 2008.

D. Heterogeneous Effects

Students may have responded differently to the promise zone scholarship based on their demographic or academic characteristics. The last-dollar design may attract middle or high income students to the promise eligible institutions because they received scholarship dollars to

attend. This offer of aid may have been unusual for middle and high income students especially if their families' incomes were too high, making them ineligible for other sources of aid. The promise zone scholarships may also be salient to lower achieving students who may struggle to gain admission to college. The open admission policies of community colleges guarantee that they will be accepted if they apply, and the promise scholarship will have alleviated their concern about how to pay for college. This may have induced lower achieving students to enroll in the promise eligible community colleges.

Given these scenarios, I estimated the heterogeneous treatment effects for the offer of the promise scholarship on college outcomes. I used four student subgroups based on gender, race/ethnicity, economic disadvantage, and academic performance. For race/ethnicity, I compared White and Asian students to Black and Latino students. Based on their 12th grade year, I identified students as economically disadvantaged if they received free and reduced price lunch (FRPL), supplemental nutrition assistance program (SNAP), or temporary assistance for needy families (TNAF), or if they were homeless, migrant, or in foster care. For academic performance, I grouped students by their quartile score for the first-time they took the 5th grade Michigan Educational Assessment Program (MEAP) science exam. I selected the science exam because it was the only MEAP exam consistently administered to all 5th graders in my sample.

Table 3.10 and Table 3.11 display the heterogeneous treatment effect for the student subgroups on four college outcomes: enrollment in any college, enrollment in any Michigan public community college, enrollment in at least two full-time semesters within one year of high school graduation, and persistence to the second year of college. For college enrollment, the more advantaged students in the demographic pairs experienced larger, positive estimates than do their counterparts. This also seemed to be the case for enrolling in Michigan community

Table 3.10 The impact of 100% promise eligibility on college enrollment, college choice, and persistence by student demographic groups

	Female	Male	White or Asian	Black or Latino	Not Economically Disadvantaged	Economically Disadvantaged
Enroll in any college within 1 year of expected high school graduation	0.002	0.103	0.092	-0.004	0.037	0.033
p-value	[0.976]	[0.104]	[0.504]	[0.952]	[0.792]	[0.676]
PZ pre-mean	0.43	0.29	0.39	0.36	0.30	0.46
N	97,948	96,825	49,324	144,459	115,637	79,136
Enroll in Michigan public 2-year college within 1 year of expected high school graduation	-0.010	0.058	0.088	-0.034	-0.017	0.044
p-value	[0.856]	[0.380]	[0.212]	[0.612]	[0.864]	[0.372]
PZ pre-mean	0.21	0.15	0.22	0.18	0.15	0.24
N	97,948	96,825	49,324	144,459	115,637	79,136
Enrolled in at least two full-time semesters within 1 year of expected high school graduation	-0.003	0.010	-0.065	0.028	0.032	-0.020
p-value	[0.928]	[0.916]	[0.376]	[0.488]	[0.708]	[0.424]
PZ pre-mean	0.15	0.10	0.17	0.12	0.11	0.15
N	97,948	96,825	49,324	144,459	115,637	79,136
Persistence to the second year of college	0.017	0.061	0.057	0.010	0.074	0.018
p-value	[0.708]	[0.264]	[0.560]	[0.752]	[0.364]	[0.772]
PZ pre-mean	0.28	0.18	0.28	0.22	0.19	0.29
N	87,570	86,478	44,078	129,091	105,232	68,816

Notes. All regressions include 5th grade school district fixed effects and 5th grade cohort fixed effects. All regressions control for other student demographic characteristics that is not the subgroup of interest. Students with missing gender, race, and age are dropped. Economically disadvantaged status is measured in the 12th grade and is inputted as not disadvantaged if missing.
The p-values are calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008).
Postsecondary schools are included if they had participated in the NSC by March 31, 2008.

Table 3.11 The impact of 100% eligibility on college enrollment, college choice, and persistence by academic achievement student subgroups

	Science Q1	Science Q2	Science Q3	Science Q4
Enroll in any college within 1 year of expected high school graduation	0.066	0.033	0.051	0.074
p-value	[0.288]	[0.668]	[0.528]	[0.388]
PZ pre-mean	0.27	0.40	0.47	0.51
N	88,530	48,483	33,206	24,554
Enroll in Michigan public 2-year college within 1 year of expected high school graduation	0.069	0.007	-0.041	0.069
p-value	[0.264]	[0.880]	[0.588]	[0.044]
PZ pre-mean	0.17	0.20	0.20	0.18
N	88,530	48,483	33,206	24,554
Enrolled in at least two full-time semesters within 1 year of expected high school graduation	-0.014	0.013	0.007	0.053
p-value	[0.700]	[0.688]	[0.892]	[0.596]
PZ pre-mean	0.06	0.14	0.19	0.24
N	88,530	48,483	33,206	24,554
Persistence to the second year of college	0.057	0.044	-0.011	0.045
p-value	[0.132]	[0.324]	[0.896]	[0.544]
PZ pre-mean	0.15	0.25	0.31	0.36
N	78,548	43,080	30,022	22,398

Notes. All regressions include 5th grade school district fixed effects and 5th grade cohort fixed effects. Student demographics are controlled for which include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, and the interactions of race and 5th grade cohort fixed effects. Students with missing gender, race, and age are dropped. Students are grouped into quartiles based on their first-time exam scores on the 5th grade MEAP science exam. The science exam is chosen because it is the only subject exam given to all 5th grade cohorts in the sample.
The p-values are calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008).
Postsecondary schools are included if they had participated in the NSC by March 31, 2008.

colleges except that economically disadvantaged students had larger estimates than did non-economically disadvantaged students. The persistence results were mixed and there did not seem to be a consistent pattern as to which demographic pair benefitted. For the academic achievement subgroups, students in the lowest and highest science exam quartiles experienced the largest positive estimates for college enrollment and choice. Similar to the student demographic subgroups, there was not a discernable pattern for the two persistence outcomes.

While there were differences in magnitude between the demographic pairs and the science exam quartiles, the imprecise estimates did not allow me to conclude that the subgroup pairs responded differently to offer of the promise scholarship. Instead, the heterogeneous treatment estimates echoed the results from the main effects that the promise zones may have had a positive effect on some of the postsecondary outcomes, but the coefficients were too imprecisely estimated to be statistically significant. It is possible that adding more cohorts of students to the analysis in the future will lower the standard errors and lead to more precise estimates on the coefficients of interest.

IX. Conclusion

This study is intended to add to the growing literature on promise programs by focusing on a set of last-dollar promise programs in Michigan. It is important to evaluate different types of promise programs, especially last-dollar promise scholarships as they represent 76% of all promise scholarships (Billings, 2018a). By evaluating different types of promise programs, researchers can help inform policymakers as to which programs are working and offer recommendations to promise communities that are not having the desired impacts on their students.

I found initial positive results from the Michigan promise zones for college access, choice, and persistence. Students who were eligible for the promise scholarship increased their college enrollment by 4.3-4.5 percentage points in the post-period. This estimate is similar in size to the estimates by Carruthers and Fox (2016), who found that Knox Achieves (another last-dollar community college promise program) increased the college enrollment for eligible students by 3.5-4 percentage points. In addition, the promise zones had positive estimates for college choice and persistence. Eligible students in the post-period increased their community college

enrollment by two to three percentage points, and persistence to the second year of college by 3.5 percentage points. These estimates are smaller than the estimates by Carruthers and Fox (2016) who found that the Knox Achieves increased community college enrollment by 3.1-4.9 percentage points, but larger than the estimates on college persistence which was effectively zero for Knox Achieves.[38]

However, I have large standard errors on all of my estimates so I cannot conclude anything definitively on the Michigan promise zones just yet. When more time has passed, I could add more cohorts to the sample to hopefully reduce the standard errors to more precisely estimate the effect of the promise zones on postsecondary access, choice, and persistence. However, it is possible that adding more cohorts may change the point estimates of my initial analysis so they will no longer be positive.

There are also questions on how effective the Michigan promise zones were originally set up to be as they were conceived as a multi-part plan by the state to increase college access for Michigan residents by coupling their resources with the Michigan Promise Scholarship. When the Michigan Promise Scholarship was eliminated approximately six months after the promise zones were selected, the promise zones were not given more resources. Due to the disparity in resources, Michigan promise zones were not able to replicate the scholarship design of their inspiration, the Kalamazoo Promise. Therefore**,** we may not expect to see large, positive impacts because the promise zones offer substantially smaller scholarships awards, fewer years to use the scholarship, and restrict postsecondary choice to local community colleges and universities. They are also last-dollar scholarships so students who are eligible for institutional, state, or federal grant aid to cover tuition and fees do not receive any scholarships dollars from the

[38] Carruthers and Fox (2016) measured college persistence by credit accumulation and found that students who were eligible for Knox Achieves completed a similar number of college credits within 2 years of high school graduation compared to ineligible students.

promise zones. In fact, most eligible promise students do not receive any money from the zones (C. Wilbur, personal communication, November 10, 2015). Therefore, the promise zones may have limited ability to affect the college choice process of their students.

Since increasing the scholarship dollars is unlikely and most students do not receive funding directly from the promise zones, the Michigan promise zones could explore how well they are leveraging their community resources. Two of the more successful promise programs, Kalamazoo Promise and Tennessee Promise, involved their communities to promote the importance of a college education and to support their students as they were applying for college. In Kalamazoo, community involvement evolved organically as parents became more involved in the local public schools, and community organizations such as local churches and non-profits offered additional support services to complement the scholarship, such as workshops on applying to college and applying for federal financial aid (Miller-Adams, 2009).

The Tennessee Promise (and its precursor Knox Achieves) took community involvement one step further and imbedded it within the design of the scholarship, requiring students to meet regularly with an assigned community mentor for a total of 10-15 hours during their senior year of high school to help them with the college application and enrollment process as well as in applying for federal financial aid (Carruthers & Fox, 2016). They also created a strong awareness campaign centered on free community college for all. This message was simple and salient, which made it easy to communicate and spread to the targeted populations.

If the Michigan promise zones find that they can better utilize their community resources, they may want to explore whether they can provide community mentors for students, involve additional local non-profits to offer support services that help complement the existing college awareness activities, and build a targeted communication strategy with simple and salient

messages to inform students and their families about the scholarship. There also seems to be a need at least for better communication strategies as one promise zone administrator mentioned that they do not target Detroit students until 12th grade (Melanie D'Evelyn, personal communication, February, 8, 2017). This may be too late to change the educational trajectory of these students given our understanding of the college choice process. Instead, students need to be targeted before high school so they can make decisions on how best to prepare themselves for college.

While the Kalamazoo Promise sparked initial interest in place-based scholarships, it is clear that more research is needed to evaluate the effect of different promise scholarship designs on postsecondary outcomes to better understand how promise programs are affecting students' decisions to enroll and persist in college. It is also clear that more research is needed on the Michigan promise zones. Future research should examine whether students are aware of the promise zone scholarship, when they learned about the promise scholarship, and who informed them of the scholarship. Since the main goal of the promise zones is to increase the stock of college-educated labor within the promise communities, future research should also examine how the promise recipients are doing while enrolled in community college and whether they eventually transfer to four-year colleges and universities to earn their bachelor's degrees.

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Appendix C. Additional tables and figures for the Michigan promise zones analysis

Table 3.12 The impact of 100% promise eligibility on college enrollment within one year of expected high school graduation for each promise zone

	Baldwin (1)	Battle Creek (2)	Benton Harbor (3)	Detroit (4)	Hazel Park (5)	Lansing (6)	Pontiac (7)	Saginaw (8)
First stage	0.213	0.401	0.300	0.170	0.283	0.214	0.189	0.123
F-test	56	1404	582	2468	290	829	721	316
RF	-0.055	0.018	0.030	0.010	0.022	-0.013	-0.011	0.042
Robust cluster standard error	(0.012)	(0.017)	(0.012)	(0.021)	(0.018)	(0.017)	(0.015)	(0.014)
Wild cluster bootstrap p-value	[0.664]	[0.504]	[0.524]	[0.696]	[0.464]	[0.576]	[0.580]	[0.540]
IV	-0.260	0.045	0.100	0.060	0.077	-0.062	-0.056	0.344
Robust cluster standard error	(0.054)	(0.041)	(0.041)	(0.118)	(0.061)	(0.075)	(0.073)	(0.120)
Wild cluster bootstrap p-value	[0.716]	[0.536]	[0.432]	[0.724]	[0.532]	[0.572]	[0.604]	[0.488]
PZ pre-mean	0.26	0.41	0.34	0.36	0.38	0.43	0.30	0.34
N	58,834	64,965	61,525	158,336	60,630	68,220	65,568	65,824
Demographics included	Y	Y	Y	Y	Y	Y	Y	Y

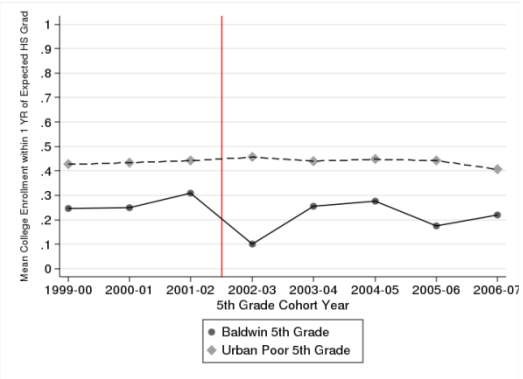
Notes. All regressions include 5th grade school district fixed effects and 5th grade cohort fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, standardized 5th grade MEAP science exam, and the interactions of race and 5th grade cohort fixed effects. Students with missing gender, race, and age are dropped.

There are robust standard errors clustered at the 5th grade school district. The p-values are also calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008) for comparison. The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.

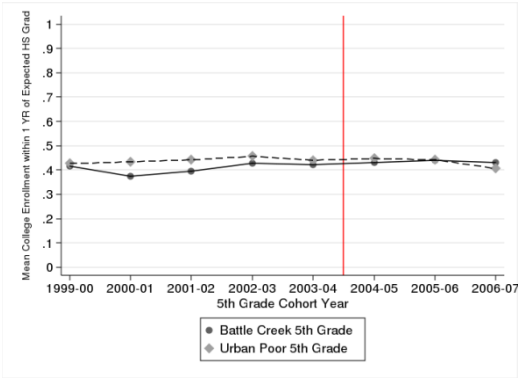
Postsecondary schools are included if they had participated in the NSC by March 31, 2008.

Figure 3.3 Mean college enrollment within one year of expected high school graduation for each promise zone

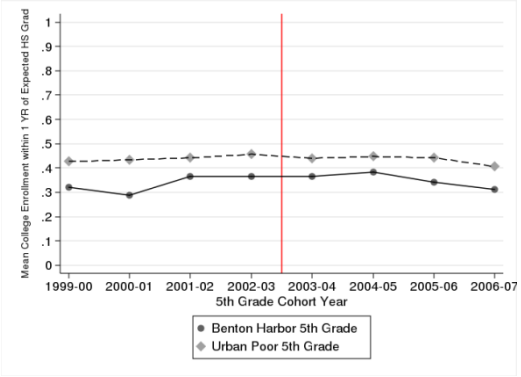
A. Baldwin



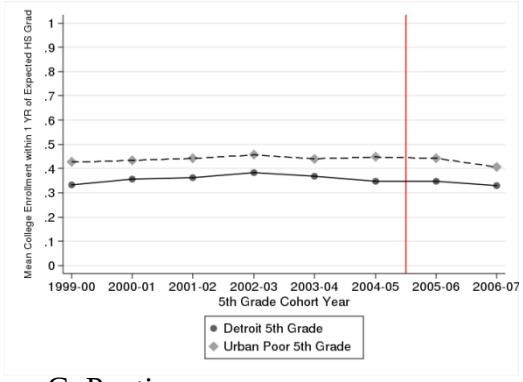
B. Battle Creek



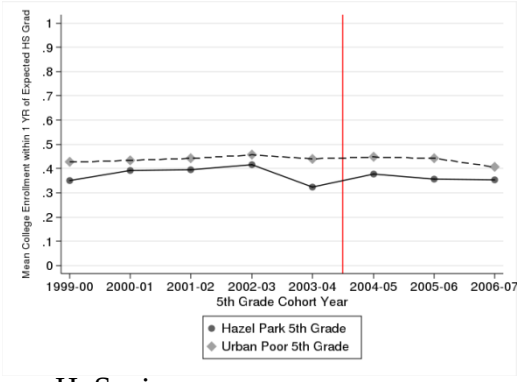
C. Benton Harbor



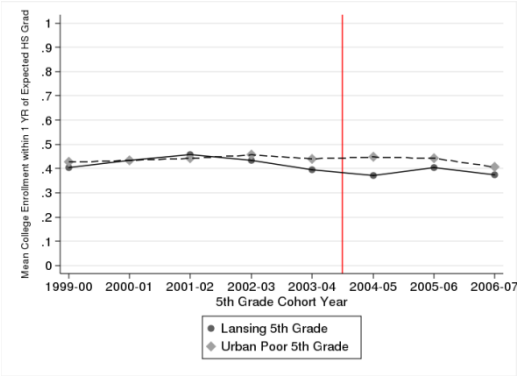
D. Detroit



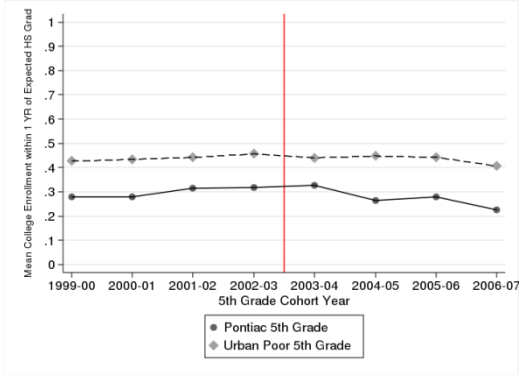
E. Hazel Park



F. Lansing



G. Pontiac



H. Saginaw

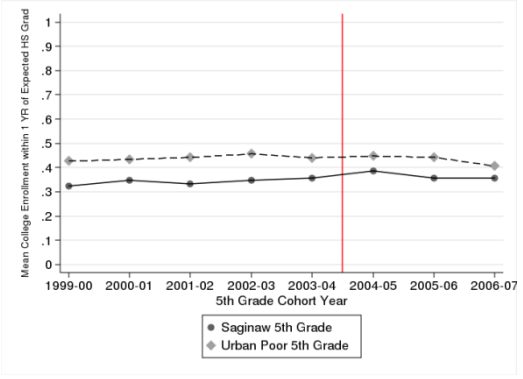


Table 3.13 The impact of 100% promise zone eligibility on college persistence to the second year of college for each promise zone

	Baldwin	Battle Creek	Benton Harbor	Detroit	Hazel Park	Lansing	Pontiac	Saginaw
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First stage	0.193	0.399	0.313	0.180	0.283	0.208	0.186	0.116
F-test	42.68	968.4	493.7	1413	200.3	543.2	555.9	202.5
RF	0.014	0.009	0.020	0.012	0.005	-0.003	-0.010	0.038
Robust cluster standard error	(0.010)	(0.013)	(0.009)	(0.016)	(0.015)	(0.014)	(0.012)	(0.011)
Wild cluster bootstrap p-value	[0.452]	[0.592]	[0.436]	[0.528]	[0.800]	[0.872]	[0.564]	[0.374]
IV	0.070	0.023	0.064	0.068	0.017	-0.014	-0.055	0.333
Robust cluster standard error	(0.050)	(0.032)	(0.029)	(0.089)	(0.053)	(0.066)	(0.061)	(0.097)
Wild cluster bootstrap p-value	[0.512]	[0.688]	[0.452]	[0.552]	[0.844]	[0.936]	[0.552]	[0.440]
PZ pre-mean	0.12	0.28	0.19	0.22	0.25	0.28	0.19	0.23
N	51,771	57,228	54,180	141,551	53,352	60,103	57,756	58,019
Demographics included	Y	Y	Y	Y	Y	Y	Y	Y

Notes. All regressions include 5th grade school district fixed effects and 5th grade cohort fixed effects. Demographics include gender, race, age, special education status, limited English proficiency status, migrant status, poverty indicator, standardized 5th grade MEAP science exam, and the interactions of race and 5th grade cohort fixed effects. Students with missing gender, race, and age are dropped.

There are robust standard errors clustered at the 5th grade school district. The p-values are also calculated by a wild cluster bootstrap-t method as recommended by Cameron, Gelbach, and Miller (2008) for comparison.

The first stage F-test rule of thumb states if the F-test exceeds 10, then the instrument is not weak.

Postsecondary schools are included if they had participated in the NSC by March 31, 2008.