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Can the promise of "free" raise college attainment? Lessons from the Milwaukee Area Technical College Promise

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Abstract

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1. Introduction

College promise programs offer to cover students' tuition, but they can promote college enrollment without spending a dollar. Under the "last-dollar" tuition promise model, the promise encourages students to access existing college aid, with the guarantee that the promise program will cover any leftover tuition charges. State and federal aid fully cover community college tuition for low-income students. But students may not know that, or they may not complete the complicated steps to apply for aid. The promise program provides a message of encouragement and an offer of support to all students, in addition to providing small amounts of monetary aid to some qualifying students.

Last-dollar community college promise programs have been implemented in 116 communities as of 2020 (Perna and Leigh, 2020). Their popularity is not surprising, since these programs can be a cost-effective strategy to increase college enrollment and local economic development. There have been relatively few studies estimating their impact, but there is some evidence that these programs can increase college attainment and reduce inequality (Li and Gándara, 2020; Bell and Gándara, 2021). The potential for a promise to have effects even without providing aid has been hypothesized by many researchers (Andrews, 2014; Miller-Adams, 2015; Harnisch and Lebioda, 2016; Billings, 2018) and has been demonstrated in a test of a messaging intervention for university students (Dynarski et al., 2021). As last-dollar community college promise programs proliferate, it is important to know whether this model works and for which students.

This study provides new evidence on a college promise program in Milwaukee, Wisconsin. The Milwaukee Area Technical College (MATC) Promise guaranteed two years of tuition coverage for urban and suburban Milwaukee high school students. Those who applied had to meet several academic criteria, Free Application for Federal Student Aid (FAFSA) and receive need-based financial aid, and enroll full-time at MATC. These requirements made it unlikely that the promise would provide substantial financial support to many students. The program did provide information and encouragement to attend MATC, as well as FAFSA workshops throughout the community (Milwaukee Area Technical College, 2015). The MATC Promise therefore offers a test of whether encouragement, information, and support increase rates of community college matriculation among low-income high school students.

Milwaukee is an important setting to consider. Its public schools are the most racially segregated in America and the third most economically segregated, according to a 2018 study of American cities (Potter, 2022). In the high school class of 2015, just before the MATC Promise was introduced, 45 percent of Milwaukee Public Schools (MPS) graduates matriculated to any college, compared to 70 percent in Wisconsin and 69 percent nationwide (author's calculations, see Table 1). At that time, 59 percent of MPS students were poor, meaning they would qualify for enough state and federal grant aid to fully cover tuition at MATC. A demonstration program promising tuition coverage for some Milwaukee students in the class of 2015 did not raise college matriculation rates relative to a control group, partly due to insufficient college counseling and lack of resources in Milwaukee Public Schools (Harris, 2017; Harris et al., 2020).

We estimated the MATC Promise's effects on rates of applying for federal and state aid, rates of enrolling in college, and rates of completing a college credential within two years. When students shifted their enrollment toward MATC, we examined whether they shifted away from enrolling in universities or from not enrolling in any college.

To estimate the effects of the MATC Promise, we used an interrupted time series approach. Focusing within Milwaukee, we compared high school graduates who were potentially eligible for the Promise to students who graduated just before the Promise was implemented. We modeled trends in effects using data on six cohorts of graduates before the Promise and four cohorts after the Promise. The model tests for a discontinuity between the two fitted trend lines. To better understand which students the Promise was reaching, we estimated the model separately for students with low family income and for students in the inner city.

Our design focused on the change in outcomes when the Promise was introduced for the class of 2016. One threat to this design is that we cannot disentangle the effects of the Promise from the potential effects of other changes from 2015 to 2016. We discuss one such change that is unlikely to have affected two-year college going: Wisconsin required and paid for all students to take the ACT exam during their junior year of high school, starting with the class of 2016. A similar policy in Michigan had no effect on two-year college enrollment, with slightly negative but imprecise effect estimates (Hyman, 2017). To support our main results, we explored a difference-in-difference approach comparing Milwaukee to five other

technical college districts selected to match the pre-Promise trends of local technical college matriculation. That approach yielded similar results.

According to our results, the MATC Promise increased enrollment at MATC by 5 percentage points, from 10 to 15 percent of Milwaukee high school graduating seniors. About half of the increase came from students who would have otherwise not attended college. The remainder was a reallocation of students who would have enrolled at other colleges and universities. There was no evidence that drawing in new students decreased graduation rates in the short term.

The effects of the Promise were concentrated at MPS schools and among lower-income students, where the Promise increased matriculation to MATC by 6 to 7 percentage points. The Promise increased the rate of on-time financial aid application for these students by 5 percentage points. Most remarkably, new MPS students drawn into college by the Promise were more likely to graduate in two years than the pre-Promise average. Even though the promise arrived late in students' high school careers, it helped students match with a college where they could succeed.

We estimate that the Promise caused 200 new college students to matriculate in its first cohort. About 170 students met all the requirements of the Promise (Milwaukee Area Technical College, 2020). Among scholars enrolled in the program, we estimate that fewer than 15 percent received funding. The impact of the Promise therefore extended beyond the number of scholars enrolled in the program and far beyond the number of students funded by the program.

Our results suggest that the Promise's impacts derived from students' realization that they could attend MATC for free. Since that was true before the Promise, we can also conclude that the opacity of the financial aid system had depressed enrollment prior to the Promise's messaging campaign. The MATC Promise had some complexity of its own, and it is possible that promise programs with even fewer eligibility rules and application steps might have a larger impact.

The next section discusses last-dollar community college promise programs. The following section provides details on the MATC Promise. We then discuss our data and empirical approach to estimating the effects of the Promise. We then describe the results and conclude

with a discussion of how our findings might inform policymaking in Milwaukee and the nation.

2. Background on last-dollar community college promise programs

A full history of promise programs is beyond the scope of this paper, but Millett et al. (2020) and Miller-Adams (2021) both provide excellent summaries. Perna and Leigh (2018) organize promise programs into seven types. The unifying theme across programs is college affordability, but programs vary widely in the amount of aid they provide and at which colleges it can be used, as well as in the eligibility criteria and application steps.

Last-dollar community college promises are the most common type, representing 116 out of the 425 programs in the database of Perna and Leigh (2020). Anderson (2019) and Rosinger et al. (2021) also classified college promise programs and identified last-dollar community college programs as an important and growing type. In this section, we focus on that type and discuss some key outstanding questions about its effectiveness.

2.1. Design, goals, and challenges of last-dollar community college promise programs

The goal of a college promise program is to promote college attainment in a community. The support the program provides, the way it defines eligibility, and the way the program design is communicated all combine to determine how effective a program might be toward its goal.

Promise programs vary widely, but they are often defined as being "place-based." Typically the opportunity to apply for a promise is open to any student living in a place, which could be a city, a community college district, or a state. The programs are often named for that place, which communicates that any student in that place might be able to benefit. Some of the motivation that a promise program provides is immediately available to any student who hears about it.

Promise programs are distinct from state or federal grant aid, though there are many similarities and complementarities. State and federal aid programs (e.g., the Pell Grant) tend to provide a formula-based amount of financial aid that varies from one student to the next based on income or academic requirements (Office of Postsecondary Education, 2017; National Association of State Student Grant and Aid Programs, 2021). The resulting effect on each

student's college price is unclear until after they apply. Promise programs send a simpler message that college is "free" for all residents who meet a set of basic criteria. Since last-dollar promise programs build on state and federal aid, the amount they deliver is also unknown until after an application, and they may also impose financial and academic requirements. However, the final outcome of free tuition is potentially more clear and predictable with a promise of last-dollar aid. In summary, Promise programs do not change students' eligibility for state and federal aid, but they encourage students to access that aid.

Any direct support from a promise program is only available to students who meet additional requirements and enroll in college. Some requirements exclude students based on factors that are clear and impossible to change, such as age or graduation cohort (we use a cohort cutoff to separate students into a treatment group and a control group in this study). Other requirements are also based on factors students cannot change, such as family income, but whether or not a student qualifies might not be immediately clear. A student who hears about the promise program might take steps to apply to the promise or to college before learning whether they were eligible for aid. Still other requirements might provide an incentive for students to change their behavior to become eligible. These include academic requirements, financial aid application requirements, or restrictions on where students can enroll in college and whether they must enroll full-time.

The effect of each design feature depends in part on how salient that feature is to students. If the benefits of the program are emphasized, even students who are likely to be ineligible might become more interested in college (leading to a short-term positive effect on college attainment). Those same students might become disillusioned when they do not qualify for aid from the promise (possibly leading to smaller positive or even negative long-term effects). If the benefits of the promise are emphasized without clear communication of the application process, some students who are likely to be eligible might fail to complete the necessary steps to receive the benefits (decreasing the positive short-term effect). Ultimately, we expect that the students who are most likely to change their behavior in response to the program are those who receive clear communication about the program and are potentially eligible based on income, academic requirements, and an intention to attend the local community college.

The focus on community colleges is an important aspect of these programs. By limiting

its focus to local community colleges, a promise program might draw students away from universities and reduce the likelihood that they will attain a bachelor's degree (Goodman, 2008; Goodman et al., 2017; Cohodes and Goodman, 2014; Pretlow et al., 2022; Mountjoy, 2022; National Student Clearinghouse, 2022). However, students might not be familiar with community college as an option. They might only know of elite universities and residential four-year colleges from news and pop culture. Making it clear that there is a low-cost local option they can access is potentially impactful.

The focus on low-income students is also an important aspect of many promise programs. A message promising free tuition could promote equity by increasing college-going among students from lower-income families and racial/ethnic minorities. These students are at risk of under-investing in college (Bulman and Cunha, 2021), at least partially because they systematically overestimate the price of college (Grodsky and Jones, 2007; Horn et al., 2003). These problems are particularly acute in Milwaukee (Goldrick-Rab, 2016).

A guarantee of free tuition might fall short. Students still have to complete the Free Application for Federal Student Aid (FAFSA) a form whose complexity clearly keeps some students from accessing aid and succeeding in college (Dynarski and Scott-Clayton, 2006; Mishory et al., 2020). Providing FAFSA support tends to have greater impacts than information or nudges alone, and not all promise programs offer that support (Bettinger et al., 2012; Dynarski et al., 2022a; Carrell and Sacerdote, 2017; Bird et al., 2021). Students must file the FAFSA each year to maintain access, a requirement that many students fail to meet (Kofoed, 2017; Bahr et al., 2018).

Even if a promise program is successful at getting students to access state and federal aid to fully cover tuition, there are typically significant additional costs of attendance not covered by aid or the promise. Students drawn to enroll by a promise could still drop out because of non-tuition costs: books, supplies, living expenses, and forgoing full-time work (Kelchen et al., 2017; Ma and Pender, 2021). Students might lose access to the promise at several points because they fail to meet eligibility requirements, application steps, or they drop to part-time or non-qualifying enrollment.

A tuition promise may not be enough to support degree completion. Most promises are limited to two years of support, and community college degrees typically take longer to

complete (Shapiro et al., 2016). Students on the margin of going to college who are drawn in by a promise might not progress to credit-bearing coursework (Pluhta and Penny, 2013) or graduate at the same rates.

2.2. Evidence on effects of last-dollar community college promise programs

The discussion above raises several key questions for research. To what extent do last-dollar community college promise programs increase rates of college application, matriculation, and graduation? Which students respond? Do last-dollar community college promise programs reduce inequality? To what extent are increases in community college attainment a result of drawing students from non-enrollment, as opposed to drawing students from enrolling at other colleges? Do students drawn to matriculate end up graduating?

The discussion also suggests we should test for these effects on all students in the community, since students who are not ultimately eligible still received some encouragement, information, and potentially new community supports brought about by the promise program.

The most relevant programs for our study focus on last-dollar promise programs to attend a specific community college. Pluhta and Penny (2013) found an increase in matriculation to the local community college following the introduction of a promise of one year of tuition coverage, with no academic or income requirements for students at a single local high school. Though the study lacked a control group, the four-fold increase in matriculation for the first eligible cohort suggested a significant effect.

A systematic review of research with quasi-experimental or experimental control groups for promise programs identified no studies of last-dollar community college promise programs as of 2016 (Swanson et al., 2016). Since then, Ruiz et al. (2020) studied two programs promising last-dollar tuition coverage at a local community college, introduced in 2011 and 2012. They compared changes in college attainment in counties where students were eligible relative to neighboring counties where students were not eligible. Using aggregated data over several years, they were not able to conclude whether the promise program had positive effects on college attainment. Bell and Gándara (2021) studied a last-dollar community college promise program in Tulsa, with a focus on how it affected racial inequality. That study found positive effects on bachelor's degree attainment and transfer to universities among minority students.

Li and Gándara (2020) studied 32 community college promise programs introduced from 2005 to 2014. They compared changes in matriculation in colleges eligible for the promises relative to selected control groups of other colleges. They estimated that promise programs increased matriculation by an average of 180 students per year (similar to our main estimate implying an increase of 200 students in MATC Promise's first year).

There is some evidence of how effects differ by program characteristics, student characteristics, and over time. Ratledge et al. (2021) randomly assigned coaching and outreach to some students eligible for a last-dollar community college promise in Detroit. The added coaching had a positive impact on college attainment beyond the tuition support alone. Li and Gándara (2020) estimated their model separately for groups of promise programs with different design features. They found that programs without advising and with academic requirements tended to have larger effects, an unexpected set of results. Gándara and Li (2020) used a similar design to study 33 community college promise programs with a focus on heterogeneous effects for different students and over time since program inception. They found larger effects in the first program cohort, and a mix of results suggesting that academic requirements, income requirements, and program generosity tend to also shape the race/ethnicity and gender of students who are affected by the program. Implementation studies of several promise initiatives suggest that the best-designed programs are responsive to local needs (Taylor and Lepper, 2018; Willard et al., 2019).

Statewide free community college programs show what local programs might look like at scale. At least 12 states have statewide last-dollar community college tuition promises (Callahan et al., 2019; Davidson et al., 2020), but the programs in Oregon and Tennessee have been most rigorously evaluated.

The Oregon Promise offers last-dollar tuition coverage at any community college in the state, for high school graduates meeting GPA requirements, income limits, application steps, and enrolling in a first-year experience course at college. For students who would receive less than $1,000 in last-dollar aid, the Oregon Promise provides a minimum of $1,000 in support (therefore going beyond tuition in many cases). Gurantz (2019) estimated that, relative to changes in a control group of similar states, the Oregon Promise caused an increase of 4 to 5 percentage points in community college enrollment for the first two cohorts (high

school classes of 2016 and 2017) from a base of 20 percent enrollment in community colleges. Hodara and Childress (2021) point out that the program imposed an income limit to focus on low-income, minority, and English language learner student applicants, but that imposing a GPA requirement disproportionately excluded students from these same groups.

The Tennessee Promise was scaled up from a county-based promise that provided last-dollar community college tuition support for high school graduates, without any other eligibility requirements, in addition to offering mentorship and support. Carruthers and Fox (2016) evaluated the effects of the county-based program Knox Achieves, using comparison groups of students from other parts of Tennessee. They found positive impacts of Knox Achieves on matriculation (an increase of 4 percentage points on a base of 18 percent) even though most students did not receive financial support from the program. Nguyen (2020) found similar effect sizes for the statewide Tennessee Promise, compared to changes in enrollment in other states. Over half of the increase in matriculation appeared to come from students who would not have attended college. Odle et al. (2021) found that the statewide Tennessee Promise reduced the rate of students taking loans.

What made these programs successful? One possibility is that the promise programs changed student decisions by delivering financial support. There is strong evidence that lowering the price of college through financial aid increases attainment for low-income students (Dynarski et al., 2022b; Page and Scott-Clayton, 2016; Nguyen et al., 2019). Lower community college tuition also increased enrollment (Denning, 2017; Acton, 2021). However, if money were the only factor, then the effects per dollar for these promise programs would have to be much higher than is generally found in the literature.

Another possibility is that the guarantee of aid can change student behavior even without offering new funding. Students who received letters informing them of aid eligibility responded by enrolling at higher rates to a public university (Dynarski et al., 2021). In a similar setting, (Burland et al., 2022) showed that zero tuition had a stronger impact for students than a model where they applied for aid to cover tuition. The amount of financial aid students qualify for can change year-to-year, so the certainty that tuition will be covered can be beneficial.

The next section describes the details of the MATC Promise. Like the programs discussed

in this section, it provides relatively little financial support, but still has the potential to increase college attainment and decrease inequality through messaging.

3. The MATC Promise

This section discusses the Milwaukee context and the details of the MATC Promise. Given those facts, we discuss how the Promise might affect college attainment.

3.1. College-going and college aid in Milwaukee

Table 1 describes the characteristics and college outcomes of high school students in MPS, the MATC district, Wisconsin, and the United States in spring 2015, drawing on data from the Stanford Education Data Archive and the National Student Clearinghouse (National Student Clearinghouse, 2018).

Milwaukee is the state's largest urban area and is more racially diverse than Wisconsin or the United States. In the class of 2015, 55 percent of MPS high school graduates were Black, and 26 percent were Hispanic. Those percentages were 34 percent Black and 20 percent Hispanic in the MATC district, 10 percent Black and 12 percent Hispanic in Wisconsin, and 16 percent Black and 26 percent Hispanic nationwide. The rate of economic disadvantage was 59 percent of students in MPS, 46 percent in the MATC district, 41 percent in Wisconsin, and 54 percent nationwide. Less than half (45 percent) of MPS graduates matriculated to college in the first year after high school, compared to 61 percent in the MATC district, 70 percent in Wisconsin, and 69 percent nationwide. Wisconsin high school graduates had a higher rate of matriculation to community and technical colleges (35 percent) than the nation (25 percent), but in Milwaukee the rate was 17 percent for MPS and 17 percent for the MATC district.

The MATC Promise is not the first program to address college affordability in Wisconsin. For over 50 years, the state-funded Wisconsin Grant has provided grants to students from low-income families. Technical college students who received increased Wisconsin Grant aid had a higher likelihood of staying enrolled and completing degrees (Anderson, 2020b). The program is not salient or simple however. The grant requires that students file the FAFSA. However, unlike the formula-based and fully funded Pell Grant, students do not know their

Wisconsin Grant amount until months after filing when the state finishes allocating grants from a limited budget. During the 2010s, many qualifying students missed out on first-come first-served Wisconsin Grant aid by applying too late (Anderson, 2020a). Therefore FAFSA filing is not the only important step in Wisconsin: students must also file early.

The Wisconsin Scholars Grant is a privately funded supplement to federal Pell Grant and state-funded Wisconsin Grant. It offers $1,800 per year for two-year college students, and the aid can be used to cover living expenses (i.e., beyond tuition). It has no high school academic or application requirements. It is automatically awarded to a random subset of the qualifying students after they have already matriculated full-time and received a Pell Grant. Anderson and Goldrick-Rab (2018) and Anderson et al. (2020) used the randomized design to evaluate the program's effects on two-year college persistence and credential completion, and did not find evidence that the program increased college attainment during its early years of operation starting in fall 2009. Contrary to the present study, the Wisconsin Scholars Grant represents a test of funding only, with no messaging or community supports.

Another approach was taken by a different private grant, the Degree Project, in the demonstration project we referenced above. The Degree Project was announced as a free college promise to high school freshmen in the class of 2015 at 18 of the 36 high schools in MPS. Compared to the Wisconsin Grant, Wisconsin Scholars Grant, and the MATC Promise, it potentially provided a larger dollar amount: the Degree Project promised to cover the full cost of attendance (including living expenses) at Wisconsin colleges. But unlike the Wisconsin Grant or Wisconsin Scholars Grant, students had to meet several academic requirements during high school (Harris et al., 2020).

The Degree Project did not meet its goals of increasing college attainment and reducing inequality, for several reasons. Academic requirements and the random selection constrained the program's message and institutional reach. A one-time demonstration for only half of the high schools had limited potential to cause lasting change to support college-going in the community. The aid was not delivered until the middle of students' first semester at college, further weakening its impact.

Students involved in the Degree Project did not gain a better understanding of the complicated process of financing college (Reavis, 2022). The challenge for the MATC Promise,

initiated a few years after the Degree Project, would be to deliver a clear message of affordability to the same community, while offering fewer dollars of aid to attend just one institution.

3.2. MATC Promise program features and communication

The MATC Promise is a promise program focused on one two-year college, Milwaukee Area Technical College. In the 2015-16 school year, the majority of MATC's 35,600 students were adults enrolling part-time and working toward collegiate transfer or associate's degree programs (Wisconsin Legislative Fiscal Bureau, 2017). MATC leaders hoped the Promise would boost MATC enrollment by 1,000 to 3,500 full-time students matriculating directly from Milwaukee high schools each year (Herzog, 2015). The Promise is funded by private donations to the MATC Foundation, which promotes the program as a way for donors to help build Milwaukee's economic and civic future.

Starting with the graduating class of 2016, the program was potentially available to all students in the MATC district, a defined area made up of public K-12 districts in the urban and suburban Milwaukee area. The college and foundation promised to pay remaining tuition and fees at MATC, after federal and state grant aid, for up to two years of college, for qualifying students who applied and enrolled full-time at MATC.

Table 2 describes the MATC Promise as it was introduced in September 2015 (Milwaukee Area Technical College, 2015). Students had to apply for the Promise by December 1 of that year and file the FAFSA by March 15 of that year.

The key requirement at that point was a value below 3,000 for the Expected Family Contribution (EFC) on the FAFSA. The EFC is an index of college financial resources. For high school students, the main components are family income and assets (which increase the EFC) and other family members in college (which decrease the EFC). In the class of 2016, the lowest-income students received an EFC of zero and qualified for $5,815 in Pell Grant aid and $1,084 in state-funded Wisconsin Grant aid for a total of $6,899 in public aid for school year 2016-17 (Federal Student Aid, 2016; Wisconsin Higher Educational Aids Board, 2016). Students with the maximum Promise-eligible EFC of 3,000 qualified for $3,599 in public aid. Tuition and fees at MATC in 2016-17 for most students amounted to $188 per credit. Two

full-time semesters cost between $4,512 (for 24 credits) and $5,640 (for 30 credits). However, the distribution of EFCs is not uniform: of students with an EFC below 3,000 in 2016-17, 70 percent had an EFC of zero and 85 percent had an EFC low enough to qualify for at least $5,640 in Wisconsin and federal grant aid (Office of Postsecondary Education, 2017). Therefore we estimate that the maximum the Promise might provide in 2016-17 was around $2,040. But for the vast majority of students (at least 85 percent if Milwaukee students mirrored the national distribution) the Promise would provide no aid.

If they met FAFSA and EFC requirements, then students would have to complete academic requirements for their senior year: a 2.0 senior year GPA, 90 percent senior year attendance, and on-time graduation. Before enrolling at MATC, students would have to score 16 or higher on the ACT exam.

The student could take up the Promise by enrolling full time in MATC out of high school, continuing to take a minimum of 12 credits per semester, getting a 2.0 GPA in college courses, doing 8 hours of service each semester, continuing to file the FAFSA and have a low EFC, and attending mandatory MATC workshops to support promise scholars with academic and career counseling.

Students and families would hear about the program in several ways between the initial announcement in September 2015 and potentially enrolling at MATC one year later. In its simplest form, the Promise represented "free college." To use the Promise, however, students needed more information about the requirements and benefits.

In its marketing, MATC emphasized the simple message of two years of free tuition. But MATC also invested resources in helping students meet the academic and application criteria and in preparing them to manage college obligations. MATC worked with local districts to assist students in completing the FAFSA, and to provide mentorship, academic advising, career counseling, ACT tutoring, and instruction in financial literacy (Milwaukee Area Technical College, 2015). Milwaukee mayor Tom Barrett and US Senator Tammy Baldwin each held press conferences with the president of MATC to encourage Promise applicants and others to complete the FAFSA in early March 2016 (Milwaukee Area Technical College, 2016; Dikanovic, 2016).

The program has evolved and expanded since 2016 (see www.matc.edu/promise/high-

school.html). Currently there are no service, attendance, or ACT requirements. The application deadlines for the Promise and FAFSA applications have been shifted from December and March to both being in July. The EFC maximum has been increased. The program now supports up to 75 credits that do not need to be taken consecutively, rather than four consecutive semesters. Also, a similar program has been created for adult students.

3.3. Potential impacts of the MATC Promise

The Promise could have important effects at several stages. The fast-approaching Promise application deadline could get students thinking about and preparing for college. The FAFSA deadline and assistance could increase students likelihood of filing earlier, filing correctly, or filing at all. The academic and ACT requirements, along with mentoring and counseling, could have encouraged some students to reallocate time and effort toward preparing for college academically. The focus on MATC could get students to consider that institution, when they otherwise would have attended another college or no college at all. The focus on full-time enrollment could encourage students to take more credits than they otherwise would have at MATC. The service and coaching requirements during college might help some students stay engaged. And finally, the financial support for those who qualified might have increased persistence toward a credential.

Below we directly test for effects on five of these outcomes: filing the FAFSA by March 15, matriculating to MATC, matriculating to any college, matriculating to a university, and earning a college credential at any college within two years.

While we lack data on academic requirements, we know the Promise made an immediate impact on students' college intentions. MATC reported that 2,944 Promise applications had been filed by the December 1, 2015 deadline, less than three months after the program was announced (Milwaukee Area Technical College, 2015). If all 2,944 applicants from the class of 2016 enrolled at MATC, that would represent a doubling of MATC matriculation from the class of 2015 to the class of 2016. It would also bring the rate of two-year college enrollment in Milwaukee even with the state average of 35 percent.

Ultimately, an average of 170 students per cohort would meet all the requirements of the Promise over its first three cohorts of operation (Milwaukee Area Technical College, 2020).

MATC did not report the grant amounts disbursed to students. As discussed above, most of the qualifying students probably did not receive any funding from the Promise. Given the small number who were likely funded, if the program is to meet its goal of increasing MATC enrollment by thousands of students, it must influence the majority of those students through the non-monetary aspects of the program.

The next section describes our approach to estimating how the MATC Promise affected college attainment overall in the MATC district, for MPS students, and for economically disadvantaged students.

4. Empirical approach

4.1. Data

We gathered data on Milwaukee students, drawing from a longitudinal data system including all public high school graduates in Wisconsin from the classes of 2010 through 2019. The data come from the Wisconsin Department of Public Instruction (DPI), which combines information from schools, the state, and the National Student Clearinghouse (NSC). For more information, see dpi.wi.gov/wisedash/help/glossary. These data were combined with financial aid information from the Wisconsin Higher Educational Aids Board (HEAB) and then shared with researchers in a deidentified format. Because local promise programs interact with public instruction and public college aid, this research informs the mission of DPI and HEAB. This research was approved by the RAND Human Subjects Protection Committee.

The FAFSA records identify whether students filed the FAFSA by March 15, the deadline for the first cohort of the MATC Promise. The NSC records identify any enrollment and credential completion at MATC, at a university, or at any other college. Attainment at for-profit colleges is inconsistently measured in the NSC data, so we expect that our measure of any college enrollment will undercount students who attend for-profit colleges (Dynarski et al., 2015).

Our data do not identify whether students applied for or ultimately qualified for the MATC Promise. We identified students exposed to the Promise based on their high school cohort and K-12 school district. Since the Promise might have effects on students through its

messaging and community supports, and we cannot identify which students might have been directly affected by different aspects or by spillovers from other students, we use aggregated data to measure overall shifts in FAFSA filing, enrollment, and credential completion after the Promise was implemented.

We explored effects on these outcomes in two subgroups where students might be more likely to be eligible for and know about the Promise, though we cannot precisely measure either mechanism. We define a subgroup of low-income students as those who received free or reduced-price lunch during high school. Eligibility was based a on family income below 185 percent of the federal poverty guideline. This measure does not exactly match the income eligibility limit for the Promise, but it is observable regardless of Promise application status. We also restrict the sample to students in MPS. In MPS, the rate of attending MATC among college-goers was much higher, suggesting a greater familiarity and preference for MATC. There are many other differences between MPS and the suburbs (as shown in Table 1), so this subgroup analysis is not a direct test of any particular feature. Given the lower baseline rate of college going in MPS, this analysis is a test of whether the Promise reduced inequality by having stronger effects on MPS students.

4.2. Interrupted time series analysis

To estimate the effect of a program like the MATC Promise, we need to compare outcomes under the program to a counterfactual representing what would have happened in the absence of the program. We used a model fitted on several cohorts of pre-Promise students, extended one year into 2016, to represent that counterfactual.

An interrupted time series analysis (ITSA) is appropriate when longitudinal data are available before and after an intervention, but there is not a good comparison group available. Since Milwaukee is so unique withing the state, our preferred design focuses on Milwaukee only. In a robustness check, we also used an iterative method to select a set of control groups from other technical college districts.

We estimated the following ITSA model. We used the software described by Linden (2015) to estimate this model. The estimation is weighted by the number of students in each time period t. We followed the algorithm in Linden (2015) to select a single-lag autocorrelation

structure and calculate Newey-West standard errors. The conclusions are robust to other lag structures. The model allows for linear trends in the outcome that can change slope before and after the introduction of the Promise.

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 P_t + \beta_3 P_t T_t + \epsilon_t$$

In this equation, Y_t represents an outcome (e.g., matriculation rate) for cohort t (e.g., class of 2016). T_t represents the time since the start of the study in equally-spaced periods (years). P_t represents the cohorts affected by the Promise, which are 2016 and later. ϵ_t is an idiosyncratic error term. β_0, β_1, β_2, and β_3 are parameters to be estimated. They represent the level of the outcome at the start of the study, the linear trend in outcomes in the pre-intervention period, the level jump in outcomes at the point of the intervention relative to the trend fitted in the pre-intervention period, and the change in linear trend after the intervention. We do not have enough years of data for an even more flexible model of trends. Below we will see that the standard linear model fits the matriculation data well.

Our primary focus is β_2. The assumption required to identify β_2 as the effect of the MATC Promise is as follows: absent the Promise, student outcomes would have been continuous from the class of 2015 to the class of 2016, with no jump or discontinuity. This approach could be confounded by year-to-year changes happening in the city, that affect college-going for high school graduates, but that are not related to the Promise.

The primary threat to this assumption is the statewide mandate that all high school juniors take the ACT exam. The exam was paid for by the state and offered during class time. The mandate increased ACT-taking from 73 to 100 percent of high school graduates (ACT Research, 2016). Like the MATC Promise, it first affected the class of 2016 and it might have increased college-going by providing some students with information that college might be feasible for them.

We cannot disentangle the effects of the ACT mandate from those of the MATC Promise, but we suspect it had a far smaller effect on community college matriculation than the Promise did. Empirical evidence from other contexts suggests that ACT mandates has

no effect or a small negative effect on enrollment at two-year institutions, meaning there should be little effect on the β_2 coefficient estimate when the outcome is community college matriculation or overall college matriculation (Klasik, 2013; Hurwitz et al., 2015; Goodman, 2016; Hyman, 2017). Researchers found that mandating the ACT increased enrollment at universities and more selective institutions, which might add to the β_2 coefficient estimate when the outcome is university enrollment, or might have little effect if the main mechanism of the ACT mandate was to reshuffle students among universities.

4.3. Selecting a comparison group

A weakness of the ITSA model is the lack of a comparison group to control for other changes that occurred for all groups at the same time as the intervention. The ITSA model rests on the assumption that absent the intervention, the pre-intervention trend in outcomes would continue without jumping. A comparison group that was not subject to the intervention could help support that assumption by showing no jump in outcomes at the point of the intervention.

The multiple-group model fully interacts all terms with an indicator for being in the treated group. That indicator for Milwaukee is denoted M in the following equation. This model may also include covariates $\mathbf{X}$ to directly control for differences between the treated group and the comparison groups.

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 P_t + \beta_3 P_t T_t + \beta_4 M + \beta_5 M T_t + \beta_6 M P_t + \beta_7 M P_t T_t + \mathbf{X_t'}\beta_{\mathbf{8}} + \epsilon_t$$

A good comparison group will track the intervention group closely during the pre-intervention period. Linden (2015) provides an algorithm to select among candidate comparison groups. Run the interacted model above with the candidate comparison group. If you cannot reject differences in the level (β_4) or slope (β_5) of the outcome before the policy change, then include that comparison group in your model. We followed that procedure, estimating the multiple-group model for the outcome of matriculating to the local technical college, using each of the other 15 technical college districts in the state besides MATC. We included covariates measuring the percent of students with economic disadvantage, percent

men, percent White students, and percent Black students.

There were five districts with p-values above 0.10 for both the level and slope in the pre-Promise period, meaning we could not reject that the district had equal outcomes to Milwaukee. Two of those districts were in the north central part of Wisconsin, two in the southwest part of Wisconsin, and one was in a distant suburb outside Milwaukee. Since we matched the control group based on two-year college matriculation only, we only report that result for this robustness check using the multiple-group model. We remove covariates in the final results so that the coefficients for the treated group are identical to the single-group model.

The potential bias on two-year college matriculation from the statewide ACT mandate is still present when using a control group approach, if the effects of the mandate were different in Milwaukee than in the control areas. It is likely that the ACT mandate differentially affected Milwaukee relative to other parts of the state, since rates of early ACT taking before the mandate tended to be lower among Black students who are concentrated in Milwaukee (ACT Research, 2016). To the extent that effects of the ACT mandate were similar across the state, the control group specification is a step toward controlling for those trends.

5. Results

This section explores the effect of the MATC Promise visually and quantitatively. The positive effects of the Promise on college-going are clear. The solid line in Figure 1 shows that the rate of matriculating to MATC in the MATC district jumped from about 10 percent in the class of 2015 to about 15 percent in the class of 2016. The rest of the analyses quantify this effect using the estimated trends pre- and post-Promise, confirm that the same effect was not experienced by comparison districts, quantify the effect for other outcomes, and explore how the effects varied for subgroups within the MATC district.

Table 3 reports estimates of the impact of the MATC Promise. Each row of the table is a different estimation of one of the models specified in the previous section. Each row reports the baseline rate of the outcome, which is the rate in 2015 predicted using the estimated coefficients of the slope and intercept of the linear trend in the pre-Promise period. Each row then reports the estimated jump from 2015 to 2016, with the standard error and significance

of that estimate.

The first set of results refers to all students in the MATC district, about 8,760 graduates per year across 10 cohorts of graduates. There was some indication of a positive effect on FAFSA filing, but the estimate was not statistically significant. There was a statistically significant increase in matriculation to MATC, rising 4.9 percentage points from a predicted counterfactual baseline of 9.9 percent (quantifying the jump in the solid line in Figure 1). There was a statistically significant increase in any college going, rising 2.3 percentage points from a baseline of 61.1 percent. Therefore, about half (2.3 out of 4.9) of the effect on MATC enrollment came from drawing students from no college into college enrollment. The rest came from reductions in enrollment to other institutions. There was some indication of a negative effect (1.7 percentage points) on matriculation to a university, but the estimate was not statistically significant. The university outcome is the one most likely to have been affected by the ACT mandate. In the absence of the mandate we would expect a lower negative value, perhaps accounting for the entire 2.6 percentage-point difference between the MATC effect and overall college effect. There was no apparent change in the graduation rate from the class of 2015 to the class of 2016, but this outcome was very infrequent with a baseline of 1.9 percent.

The second set of results includes a comparison group and only reports the outcome of matriculation at the local technical college, since that was the outcome we used to select the comparison districts. It confirms that the jump of 5 percentage points was experienced by MATC only. Figure 1 shows that a student-weighted average of all five districts was nearly identical to MATC in the trend in matriculation, but still had a much higher level of matriculation (by about 15 percentage points). That level stayed the same from 2015 to 2016 with no estimated discontinuity.

The third set of results refers to students with economic disadvantage within the MATC district. Among lower-income students, there was a larger and statistically significant effect on filing the FAFSA by March 15. Even though low-income students qualify for more aid on average, their baseline rate of filing the FAFSA was lower than the overall MATC district average (28.4 percent versus 38.9 percent). That rate was increased by 4.9 percentage points after the Promise. Relative to the overall MATC district results, the impacts on matriculation

to MATC were larger for the district's low-income students, and a larger portion of the effect came from drawing in students who would not have enrolled in college at all. The Promise increased matriculation by 6.4 percentage points, from a baseline of 12.5 percent. The increase in college going was 4.0 percentage points, from a baseline of 44.8 percent. The effect on credential completion was again small and not statistically significant.

The fourth set of results refers to graduates from MPS. The estimates were similar to those among students with economic disadvantage, with the exception of a larger and statistically significant effect on credential completion. The increase was 0.9 percentage points, or a total of about 29 students, which represents a large increase on the baseline of 0.8 percent. That increase is proportionally larger, relative to its baseline, than the increase in matriculation. That suggests that students drawn into MATC by the Promise raised two-year completion rates among students matriculating from MPS.

To complement the subgroup analyses and display an exhaustive and mutually exclusive grouping, Figure 2 shows matriculation rates to MATC for four student groups in the MATC district. The largest group, about half of students, graduated outside MPS and were not classified as economically disadvantaged. Those students had the lowest rates of matriculation to MATC at baseline and the smallest apparent effect of the Promise. All three of the other groups, with low family income, attending MPS, or both, had higher rates of matriculation to MATC and a large visible jump in 2016. Within MPS, for both income groups, the trend leading into 2016 was flat. Outside MPS among low-income students, the trend in matriculation to MATC was declining leading into 2016 and then reversed its trend after the Promise.

These results indicate that the increase in matriculation was larger than the number of students who met Promise requirements. We can use the sample sizes in Table 3 to calculate the number of new college students we expect, and then compare that to the number of students who met all the requirements and became Promise scholars. Multiplying the 4.9 percentage point estimate by the 8,760 individuals per cohort in Milwaukee suggests that the Promise could draw 430 students to MATC per year. Considering college-going at any institution, the increase of 2.3 percentage points implies that 200 new college students enrolled because of the Promise. MATC reports that about 170 students became Promise scholars in

each cohort (Milwaukee Area Technical College, 2021), and we estimate that 85 percent of those did not receive financial support. We conclude that the program had positive effects among some students who did not qualify for the program, and among many students who received no financial support.

6. Discussion and conclusion

The MATC Promise set a goal to increase educational attainment and equity in one of the nation's most segregated cities. We found evidence that it encouraged students to apply for and access federal aid, resulting in higher rates of college-going.

Building evidence on the MATC Promise is important in its own right, as the program continues to be offered to over 8,000 high school graduates in the MATC district each year. Our results are also important to other similar programs in over 100 other places nationwide. Our results are consistent with studies showing that community college promises have reduced inequality by having stronger effects on lower-income students (Carruthers and Fox, 2016) and on minority students (Bell and Gándara, 2021).

These programs would not work if students already knew about and accessed the aid they needed. Last-dollar programs take advantage of existing state and federal funds offered to students. Therefore the findings in Milwaukee further support the idea that the complexity of college pricing is a barrier for students, particularly low-income students who rely on multiple sources of aid. Our results are consistent with recent evidence on a financial aid message delivered to individual university students, making them aware of public aid and raising their matriculation rates (Dynarski et al., 2021). Programs that focus on providing information and support can also have positive impacts on matriculation (Cunha et al., 2018).

There is more to learn about both MATC Promise and other last-dollar community college programs. Our study of the MATC Promise is based on state records and public information about the program. We view this as a first step to establishing program effects, and future research should use survey and interview data to dig into the mechanisms that drove these effects. Implementation research is needed to first measure program features (e.g., the extent of FAFSA completion support provided by MATC Promise) and then disentangle how different program design features matter.

The best way to isolate the effects of specific features would be to compare similar student groups with access to an array of slightly different programs that were randomly assigned. That is not possible at scale, particularly because promise programs are community-wide. A promise cannot be randomly assigned to individual students while faithfully representing the important messaging features of a community promise program (Harris et al., 2020). Therefore, we are forced to try to understand program effectiveness from studying a variety of programs available to different communities and offering different design features.

We focused on the first Promise cohort, when the requirements were the most stringent and students and educators had the least time to react to them. It is possible that the program is more effective in its current form, since it could potentially reach more students after the removal of several requirements. It is also possible that the program has become more effective over time through clearer messaging and the continued dissemination of information. Figure 1 there is a slight decrease in the rate of matriculation to MATC after the class of 2016. It is unclear what other trends might be contributing to that slight decrease in Milwaukee, since there is a marked decrease in technical college enrollment in the comparison group of other technical college districts.

Within our study design, there are important impacts we could not measure in our data set. We were unable to observe effects on college intentions (Odle, 2022), high school academics, high school graduation, longer-term college persistence, and bachelor's degree completion. We were unable to observe how students accumulated debt during college, or how they fared in the job market after leaving college. These are important parts of the overall cost-benefit for students and should be a focus of future research. Research should also measure the social net benefit in terms of net migration, tax revenues, and the local labor market.

Low costs and potentially high returns of the last-dollar model have driven repeated proposals for a national promise program, most recently in the Biden Administration's American Families Plan of 2021 (see www.whitehouse.gov/briefing-room/statements-releases/2021/04/28/fact-sheet-the-american-families-plan/). As colleges, states, and the federal government consider how best to leverage financial aid, our results provide additional evidence that promising zero tuition sends a powerful message of possibility to students.

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Tables and figures

Table 1: Students in spring 2015 in Milwaukee, Wisconsin, and the United States

Percent of students (%)	MPS	MATC area	Wisconsin	United States
Setting				
Urban	100	61	32	30
Suburban	0	39	28	43
Rural or small town	0	0	40	27
Race/ethnicity				
Asian	6	5	4	5
Black	55	34	10	16
Hispanic	26	20	12	26
Native	1	1	1	1
White	13	41	73	53
Family income				
Economically disadvantaged	59	46	41	54
College outcomes				
Matriculated at any college	45	61	70	69
Matriculated at community college	17	17	35	25

Sources: Stanford Education Data Archive (SEDA) and the National Student Clearinghouse (NSC) *High School Benchmarks*. Data are restricted to districts with 12th grade as the highest grade level. NSC data refer to high school graduates from the class of 2015 matriculating to college in academic year 2016-17. Wisconsin-based matriculation and graduation measures come from student-level data shared by the Wisconsin Department of Public Instruction (DPI). National matriculation measures come from National Student Clearinghouse (2018).

Table 2: MATC Promise eligibility and benefits for 2016 cohort

Requirements	
Geographic	Live or attend school in MATC area
Promise application	Apply to Promise and MATC by December 1
FAFSA	File by March 15
Income eligibility	Eligible for Pell Grant, EFC $<$ 3,000
High school grades	Senior year GPA 2.0 or higher
High school attendance	Senior year attendance 90% or higher
High school graduation	On-time graduation
ACT	Composite score 16 or higher
Enrollment	Enroll with 12 or more credits
College grades	Maintain 2.0 GPA at MATC
College service	Participate in 8 hours of service learning each semester
Benefits	
Tuition and fees paid	After application of federal and state grants
Support	Wraparound service workshops (participation required)

Table 3: Interrupted time series regression estimates

	Baseline	Effect of Promise	(Standard Error)
All of MATC district			
(8,760 HS graduates per year)			
Filed FAFSA by March 15†	39.2	1.5	(1.2)
Matriculated at MATC	9.9	4.9	***(0.3)
Matriculated at any college	61.1	2.3	***(0.3)
Matriculated at a university	43.4	−1.7	(0.4)
Graduated in 2 years from any college†	1.9	0.1	(0.2)
Compared to selected WTCS districts			
(student population-weighted)			
Matriculated at local technical college	9.9	5.2	***(1.6)
Economic disadvantage, MATC district			
(3,557 HS graduates per year)			
Filed FAFSA by March 15†	28.3	4.9	**(1.6)
Matriculated at MATC	12.2	6.4	***(0.3)
Matriculated at any college	44.2	4.0	***(0.6)
Matriculated at a university	27.0	−1.0	(0.5)
Graduated in 2 years from any college†	1.0	0.4	(0.3)
MPS			
(3,220 HS graduates per year)			
Filed FAFSA by March 15†	30.7	5.1	*(2.0)
Matriculated at MATC	12.1	6.9	***(0.3)
Matriculated at any college	45.2	3.6	***(0.6)
Matriculated at a university	28.9	−1.9	(1.1)
Graduated in 2 years from any college†	0.8	0.9	***(0.1)

† Limited to class of 2017 and earlier

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

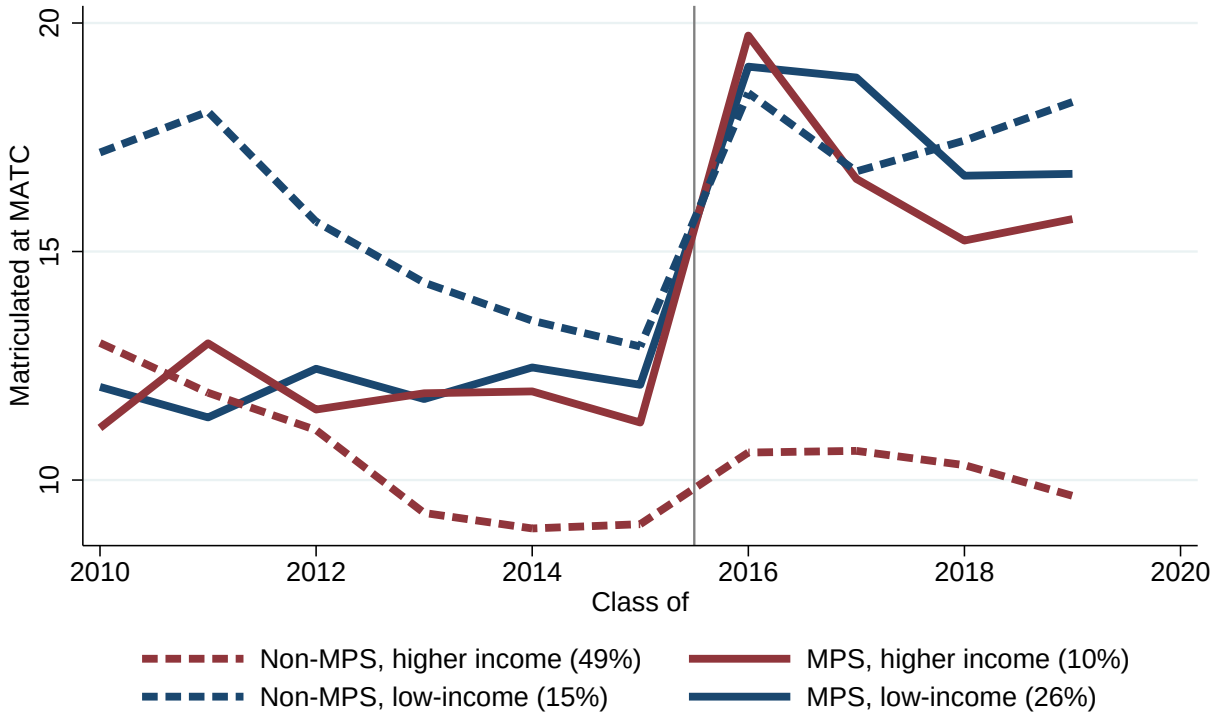
Source: Authors' calculations using data from Wisconsin Department of Public Instruction (DPI), National Student Clearinghouse (NSC), and the Wisconsin Higher Educational Aids Board (HEAB).

Notes: Estimated using interrupted time series command from Linden (2015) with Newey-West standard errors and one autoregressive lag. "Baseline" is the counterfactual matriculation in 2016, based on the predicted value of the pre-Promise linear trend in the treated group. "Effect of Promise" is the jump from the pre-Promise trend line to the post-Promise trend line at 2016. For the row comparing to selected WTCS districts, the effect differences out the jump in the comparison group and is weighted by the number of students in each group.

Figure 1: Matriculating to local technical college in MATC district and a comparison group of five selected technical college districts

Source: Authors' calculations using data from Wisconsin Department of Public Instruction (DPI) and National Student Clearinghouse (NSC).

Figure 2: Matriculating to MATC in subgroups of students in the MATC district



Source: Authors' calculations using data from Wisconsin Department of Public Instruction (DPI) and National Student Clearinghouse (NSC).