

Paper 4: Pay-Offs from Expanding Summer Credit Recovery in Algebra

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Background / Context:

As described in the background for Paper 1, the consequences of failing core academic courses during the first year are dire. In Chicago, over a quarter of students fail at least one semester of algebra in their ninth grade year, and only 13% of students who fail both semesters of Algebra I in ninth grade graduate in 4 years.

Offering credit recovery options is one strategy to deal with high failure rates. The primary goal of credit recovery programs is to give students an opportunity to retake classes that they failed in an effort to get them back on track and keep them in school (Watson & Gemin, 2008). It makes theoretical sense to try to get students to recover their algebra credits early, in the summer after ninth grade—before they take geometry or Algebra II and chemistry, and to put them back on track towards graduation. But there is little evidence about the extent to which expanding credit recovery leads to substantive improvements in student progression and outcomes. While it seems like a good idea, the pay-off may not actually be large for a number of reasons: few students who failed in the prior year may show up in the summer for credit recovery; few students may pass even if they do show up; and the gains of attending summer school for learning and for credit accumulation may be very small compared to students' initial deficits in skills or the number of total credits they eventually need to recover. Thus, schools might put in substantial effort to hire teachers and find facilities for credit recovery with little pay-off in terms of their schools' on-track rates, test scores, and later graduation rates.

Purpose / Objective / Research Question / Focus of Study:

This study examines the benefits of offering expanded credit recovery options for ninth grade algebra, relative to business as usual (i.e., the summer programming schools would offer in the absence of efforts to expand credit recovery). Evidence of the effects of credit recovery for getting students back on track for graduation is lacking, and this study presents the opportunity to generate such evidence.

Setting:

The setting will be neighborhood high schools in Chicago in 2008-2012. CPS is the third-largest U.S. district, serving more than 404,151 students in 681 schools. For this study, we include all neighborhood high schools (no charter or selective enrollment schools), excluding a group of schools that were participating in another district-sponsored algebra program. The district is 87% low-income and 42% African American and 44% Latino.

Population / Participants / Subjects:

The population consists of all first-time ninth grade students who entered regular neighborhood high schools between 2008 and 2012. On average, there were 20,292 students in each cohort. For some analyses the population is only students who failed second semester algebra (Algebra

IB), of which there were 3,820 in 2011. All neighborhood high schools that were not in the excluded for the reasons described below are included for analysis (86 schools).

In this study, some high schools in CPS received funding to implement at least two Algebra I credit recovery courses during the summer sessions of 2011 and 2012— at least one online and one face-to-face section. Fifteen schools participated in 2011; in total they offered 18 pairs of sections (36 total). Thirteen schools participated in 2012; in total they offered 20 pairs of sections (40 total) (see paper 1 for details).

Fifteen CPS high schools participated in this project in summer 2011. The participating schools were similar to other schools in CPS in most respects, with a few notable differences. They were larger schools than typical; they enrolled 1,785 students, on average, compared with an average enrollment of 729 students in high schools across CPS. This difference was expected because we could implement the study only in schools that were large enough to have sufficient students to fill at least two sections of second-semester algebra over the summer. The study schools also disproportionately served more Latino students and fewer African-American students than the district as a whole (see Figure 3 in Appendix B).

Intervention / Program / Practice:

The extra funding schools received as part of participating in this study increased their capacity to provide algebra credit recovery over the summer, so that all ninth grade students who wanted to recover the credit over the summer could do so. To boost enrollments in summer algebra credit recovery, a set of outreach activities were implemented in each school to encourage ninth grade students who failed the second semester of Algebra I to attempt to recover the credit in the summer. This included presentations to groups of failing students by study team members, calls to students' homes, and letters sent home about the importance of passing algebra and recovering credits. We define the presence of the extra online course, plus the push to motivate students to enroll in credit recovery, as “expanded credit recovery options.”

Schools were invited to participate in the study based on two main criteria. The primary criterion was the number of students who failed second semester algebra in the prior year. Researchers ranked schools by the number of students who failed in the prior year and considered those with the most failures in prior year eligible to be invited to participate. Schools could have large numbers of algebra failures because they had high failure rates, or because they were large schools, or both. The second criterion was that they were not closed for construction over the summer, and could potentially offer summer school. Each summer, a number of schools were closed for construction. We excluded charter schools from consideration because their students' transcripts do not appear in the centralized data system. We also did not consider schools that were in one area of the district whose area chief had refused participation because of other algebra-related initiatives being implemented.

Research Design, Data Collection and Analysis:

Schools were eligible for the study if they had enough ninth-grade students who failed Algebra IB to satisfy the study design (40 students per school, 20 in each condition). To select schools, all CPS neighborhood high schools were rank-ordered by the number of ninth-grade Algebra IB failures in 2010, one year before the year-1 implementation, and recruited according to their

position in the list. If a school could not participate due to construction during summer, or did not want to participate in the study, the next school on the list was recruited for the study, until a sample of 20 sections of each condition was reached.

This study conducts two types of analysis, using difference-in-difference approach where there are multiple embedded comparisons. We model outcome differences between two pre-intervention cohorts (2009 and 2010) and two post-intervention cohorts (2011 and 2012). The outcome variables include recovery rates in Algebra IB, on-track for 10th grade rates, and 10th grade PLAN scores. Outcomes for the school-level analysis include: (1) recovery rates (among students who failed algebra I); (2) percentage of students starting their second year of high school with full credits in algebra; (3) 9th grade on-track rates at the end of summer; and (4) math scores on the PLAN exam taken at the beginning of October of 10th grade. Outcomes for the student-level analysis include: (1) recovered algebra credit; (2) on-track at the beginning of the second year of high school; and (3) math score on the PLAN exam.

The school-level analysis examines the intent-to-treat (ITT) effect, that is, the effect of receiving an invitation to participate in summer credit recovery. This analysis exploits the fact that invitation was determined by the number of failures in 2010. Thus, we compare differences in the outcomes from pre- to post-intervention years between schools above the threshold and schools below the threshold. We include failure rates and school size in the current year as control variables. Additional control variables include students' background characteristics--students' math scores on standardized tests at the end of eighth grade and beginning of ninth grade, number of semester courses failed in ninth grade, whether they failed 0, 1 or two semesters of algebra, race, gender, SES, and school fixed effects.

The student-level analysis examines the effect of attending summer algebra credit recovery course where attendance is defined as receiving a summer grade in algebra IB (i.e., those who did not attend summer classes or who dropped without a grade are counted as not attending, receiving a grade of "F" or higher count as attending summer school) using an instrumental variables approach. We use district records, rather than our own records for schools that participated in the study for consistency. We estimate the compliers average treatment effects by taking advantage of the two known exogenous sources of variation affecting attendance in Algebra IB in the summer. One source of variation was whether schools received an invitation to participate on the basis of the number of failures in 2010. School-by-year interaction terms can be used as instruments to estimate the effect of program participation among those who are induced to participate. The year-by-school interactions affect the outcome through their effect on program participation, while the year fixed effects capture other historical events that are assumed to be the same for the treated and comparison schools. A second source of variation was whether or not the school was under construction, which was decided by the district independently from this study. Interaction terms between construction status and year provide an additional instrument to model participation in expanded credit recovery. We use additional control variables as described above.

Findings / Results:

We have just received students' transcript data and test scores through 2011-12 from the district, and are currently preparing the data for analysis. In addition, we should receive students' PLAN

scores after they take the exam in October. All analyses will be completed by January 2013, well in time for presenting at the spring SREE meeting.

From the first year of implementation, it looks as if schools that participated in the study substantially increased their credit recovery rates. Participating schools nearly doubled their second semester Algebra I credit recovery rate in the first year in which the study was conducted, compared to the prior year—from 12% in 2010 to 23% in 2011—by offering expanded Algebra I credit recovery options to students.

This preliminary finding suggests that participation in this study did significantly expand access to credit recovery options. It sets the stage for the analyses of the effects of expanding credit recovery on school- and student-level outcomes that will be reported in full in this paper.

Conclusions:

The conclusions (and ensuing discussion with participants) will be informed by the forthcoming results of the study.

Appendix A. References

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Appendix B. Tables and Figures

Figure 1. Theory of Action Behind Summer Online Algebra Credit Recovery

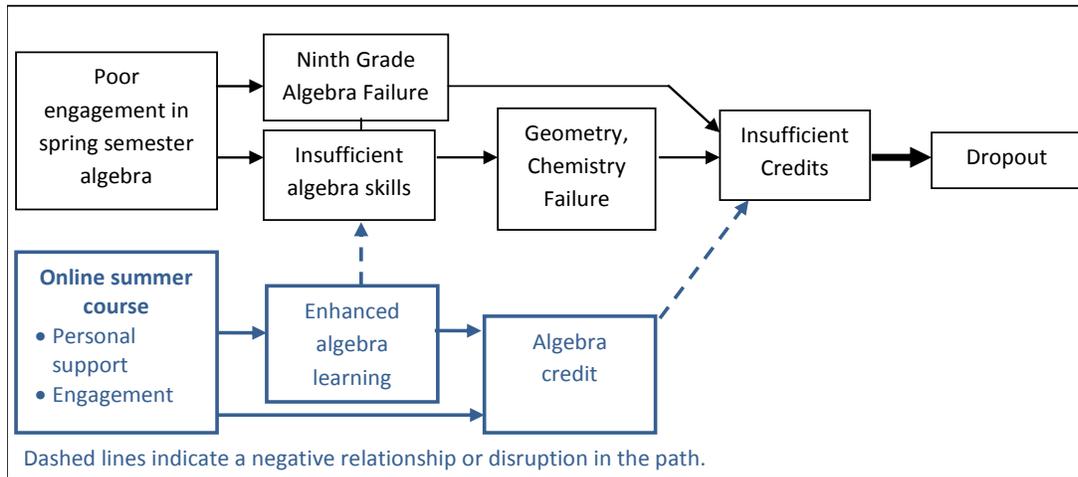


Table 1: Number and Percentage of Students Per Condition by Block, Summer 2011

Condition	Gender	Passed Algebra IA		Failed Algebra IA		Algebra IA Status Unknown		Total
		Number	Percent of Students by Condition	Number	Percent of Students by Condition	Number	Percent of Students by Condition	
F2F	Female	44	15%	28	10%	31	11%	103
	Male	70	24%	58	20%	59	20%	187
	<i>Total</i>	<i>114</i>	<i>39%</i>	<i>86</i>	<i>30%</i>	<i>90</i>	<i>31%</i>	<i>290</i>
Online	Female	45	15%	37	12%	35	11%	117
	Male	73	24%	60	20%	56	18%	189
	<i>Total</i>	<i>118</i>	<i>39%</i>	<i>97</i>	<i>32%</i>	<i>91</i>	<i>30%</i>	<i>306</i>

Table 2: Number and Percentage of Students Per Condition by Block, Summer 2012

Condition	Gender	Passed Algebra IA		Failed Algebra IA		Algebra IA Status Unknown		Total
		Number	Percent of Students by Condition	Number	Percent of Students by Condition	Number	Percent of Students by Condition	
F2F	Female	56	14%	52	13%	41	10%	149
	Male	83	21%	95	24%	70	18%	248
	<i>Total</i>	<i>139</i>	<i>35%</i>	<i>147</i>	<i>37%</i>	<i>111</i>	<i>28%</i>	<i>397</i>

Online	Female	53	13%	55	14%	44	11%	152
	Male	81	21%	93	24%	69	17%	243
	<i>Total</i>	<i>134</i>	<i>34%</i>	<i>148</i>	<i>37%</i>	<i>113</i>	<i>29%</i>	<i>395</i>

Figure 2. Credit Recovery Course Grades by Condition for Cohort 1

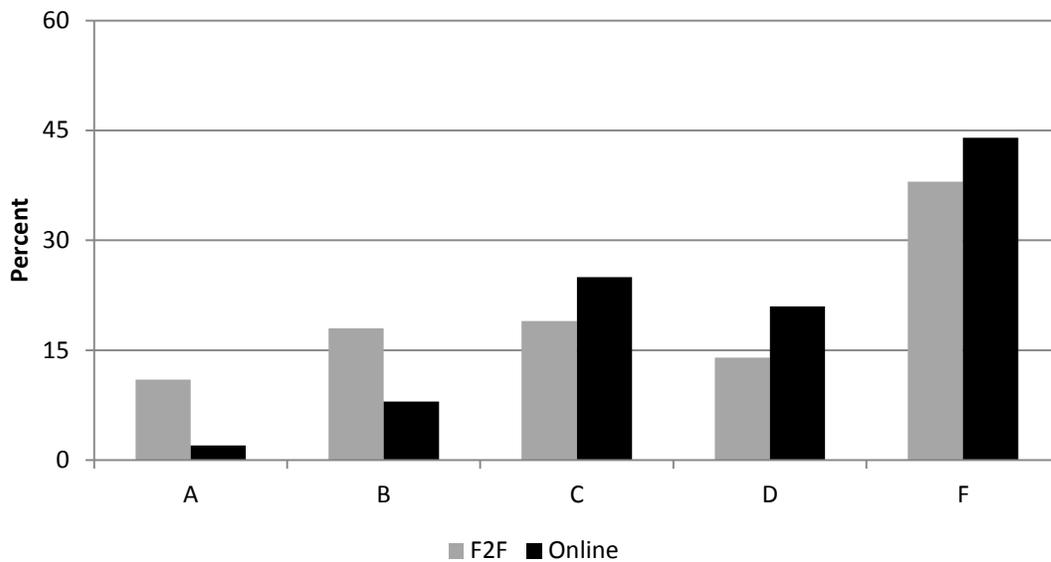


Figure 3. Characteristics of Study Schools and CPS High Schools

