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COMMENTARY

# Aiming High and Falling Short

## California's Eighth-Grade Algebra-for-All Effort

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The U.S. is in the midst of an effort to intensify middle schoolmathematics curricula by enrolling more eighth-graders in Algebra. California is at the forefront of this effort, and in 2008 the state moved to make Algebra the accountability benchmark test for 8th-grade mathematics. As a result, between 2004 and 2013, the proportion of California eighth-graders enrolled in Algebra or more advanced math classes nearly doubled, to approximately 65 percent. This effort was predicated on the notion that students learn more in academically challenging educational environments and supported by findings showing that exposing a student to more rigorous curricula and instruction increased achievement.

However, policy efforts like California's Algebra push do more than change a handful of students' course-enrollment patterns. Rather, they aim to make broad systematic changes in school curricula and organization. These systematic changes may have spillover effects for students who enroll in 8th-grade Algebra as well as their peers who enroll in less-advanced mathematics courses, particularly when schools transition from highly differentiated systems of mathematics instruction to relatively untracked Algebra-for-all systems.

This study takes advantage of this unevenly-implemented policy to understand the effects of curricular intensification in middle school mathematics. Specifically, we use district-level panel data from all California K–12 public school districts to estimate the effects of increasing 8th-grade Algebra enrollment rates on students' 10th-grade mathematics achievement, as measured by the California High School Exit Exam (CAHSEE). Districts responded to the state's Algebra-for-all effort in a variety of different paths toward intensifying middle school mathematics curricula. This variation makes it possible for us to use a difference-in-difference model to separate the effects of increasing 8th-grade Algebra enrollments on students' 10th-grade CAHSEE achievement from a wide range of measurable time-varying district characteristics (such as student demographics) as well as any other district characteristic that does not vary over time.

Our district fixed effects analyses paint a very discouraging picture of the effects of intensifying middle school mathematics curricula by enrolling more students in 8th-grade Algebra. Contrary to the common-sense predictions of "opportunity to learn" theory and the findings of previous observational studies, our results suggest that broad-based efforts to enroll more students in 8th-grade Algebra have negative effects on student achievement in large school districts and no benefits in small or medium districts. Supplementary analyses indicate that the effects of increasing 8th-grade Algebra enrollment rates are consistently negative across mathematics domains, ranging from the relatively simple (Number Sense) to the more advanced (Measurement and Geometry; Algebra I).

*The full study is in Domina, T., McEachin, A., Penner, A., & Penner, E. (2014). Aiming High and Falling Short: California's Eighth-Grade Algebra-for-All Effort. Educational Evaluation and Policy Analysis September 2015 vol. 37 no. 3 275-295.*

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