



The impact of state-mandated Advanced Placement programs on student outcomes



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ABSTRACT

This paper examines the effect of a state mandate to offer Advanced Placement (AP) programs at all public high schools on student outcomes. Requiring compliance with this policy could lead to unintended consequences as schools shift resources or students are re-sorted. Using a difference-in-differences estimation strategy, I investigate a 2004 state-wide mandate to offer AP programs in Arkansas and its impact on students' schooling outcomes. Results suggest schools decrease the share of courses dedicated to career and technical education in favor of AP courses. Additionally, enrollment decreases by about 60 students on average, the 4-year graduation rate increases by 2.5 percentage points, and there are generally fewer students scoring in the highest category on two end-of-course exams at schools required to comply with the mandate. Taken together, these results suggest the policy may have at least partially affected the sorting of students across schools.

1. Introduction

Advanced Placement (AP) classes, high school classes that cover college-level curriculum content and offer students the potential to earn college credit while still in high school, are an increasingly common component of the high school curriculum in the United States. For example, the number of schools offering at least one AP class has doubled since 1990, to 18,920 in the 2012–2013 school year, as the College Board has made efforts to increase access to AP courses to traditionally underserved students (College Board, 2013). While the decision to offer AP classes is typically made at the district level, several states (Arkansas, Indiana, Mississippi, South Carolina, and West Virginia) have implemented mandates that require every public high school to offer a minimum number of AP classes. In theory, increasing access to AP classes may improve a variety of student outcomes through the increased exposure to a more rigorous curriculum; however, requiring schools to offer a program they may otherwise not have offered could lead to a reallocation of resources that may produce unintended consequences. For example, in an environment with binding resource constraints, resources might be redistributed from academically weaker students to higher-performing students (as it is the latter who would participate in AP classes), so some students may gain while others are harmed. Moreover, shifts in classmate composition due to some higher-performing students being separated into an AP track or students changing their school choice in response to the possibility of taking AP

classes could generate positive or negative peer effects.

To date, there has been no study estimating the causal impact of state laws mandating AP classes on student outcomes. The purpose of this paper is to study one such policy: a 2004 state mandate to offer a minimum number of AP classes at all public high schools in Arkansas. Addressing this question is important for several reasons. First, knowledge about the impacts of these state mandates would help guide policymakers about whether to continue or introduce these policies. Second, since these state mandates provide plausibly exogenous variation in a school's AP offerings, studying this policy will provide information about the more general question of the causal impacts of AP classes on student outcomes. Although a number of studies provide estimates of the correlations between student outcomes and taking AP classes or attending a school that offers AP classes (e.g., Dougherty, Mellor, & Jian, 2005; Scott, Tolson, & Lee, 2010), these estimates are unlikely to have a causal interpretation because of the non-random selection of students into AP classes and of schools offering AP classes. Further, previous studies have tended to focus on a narrow set of outcomes centered on the higher-performing students who are most likely to participate in AP programs, and largely ignored potential spillover effects to other students. This study directly addresses the potential endogeneity of AP program exposure that is unaccounted for in many of the related studies. In addition, it is among the first to examine a wider set of student outcomes to test for potential impacts on academically weaker students. Finally, it also adds to the small but growing literature

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that rigorously analyzes how high school curriculum choices impact student outcomes (Altonji, Blom, & Meghir, 2012).

The Arkansas law mandating AP classes required all public high schools to provide a minimum of four AP courses, adding one course per year; it was announced in 2004 and schools were required to be in compliance by the 2008–2009 school year. To identify the causal effect of the 2004 Arkansas state AP program mandate, I take advantage of school-time variation in AP class offerings induced by the policy. In particular, only high schools with fewer than the specified four AP classes at the outset would have to expand their AP class offerings in order to become compliant (about 57% of schools in 2003); below, I refer to these as “treatment” schools. Those offering no AP classes at all (about 25% of all schools in 2003 and 33% of treatment schools) would furthermore have to introduce an AP program. Schools already in compliance with the requirements of the mandate in 2003 and thus did not have to change their AP offerings will be considered “control” schools. I use a difference-in-differences strategy to identify the causal impact of the 2004 Arkansas state AP program mandate, comparing changes in student outcomes over time between treatment and control schools. To explore the validity of this empirical strategy, I examine pre-policy trends for the student outcomes for which historical data are available, and also perform sensitivity analyses with samples limited to schools that are closer in size and type.

Using a school level panel data set on public high schools in Arkansas from 2003–2010, there are two main findings of this study. First, the AP mandate decreased the share of school-level course offerings in career and technical education in a nearly one to one ratio coinciding with the increase in AP courses. Second, I find that the number of students enrolled in treatment schools falls by about 60 students on average, the 4-year graduation rate increases by about 2.5 percentage points, and student achievement on the grade 11 literacy and geometry exams generally converge to “Proficient” (i.e., fewer students scoring in the highest category, “Advanced”).

The main findings of higher graduation rates and lower enrollment are suggestive that not all students are benefitting equally from the increased access to AP courses: enrollment may decrease because academically weaker students were harmed, or because certain groups of students may be actively exercising school choice, for example. To investigate this possibility, I estimate the effects of the Arkansas AP mandate that are allowed to be heterogeneous, by the pre-policy average academic performance of the school. I find that the treatment schools with the strongest average academic performance prior to the policy experience a drop in the dropout rate as well as a decrease in the share of students scoring “Advanced” on the grade 11 literacy exam, with no other statistically significant impacts. Schools considered relatively weakest in the pre-policy period appear to be generally unharmed by the policy. On the other hand, the results are suggestive that schools in the middle of the pack may have lost a portion of their academically weaker students, leading to compositional shifts across schools; the impacts of this are less clear and require further study.

The rest of this paper is organized as follows: Section 2 provides a brief history of the AP program in the U.S. and specifically in Arkansas, followed by a description of the mandate and a discussion of the related literature. Section 3 provides a theoretical framework for thinking about the impact of the AP policy and further details the empirical strategy. Section 4 describes the data used to estimate outcomes. Section 5 presents the estimation results, and Section 6 concludes.

2. Background

2.1. Advanced Placement program

The Advanced Placement program officially launched in 1955 under the College Board's administration and consisted of eleven distinct course offerings across 104 U.S. high schools, with 130 colleges rewarding credit for participation in AP classes (College Board, 2013). As

it stands today, the AP program consists of 34 distinct courses that high schools can choose to offer, with nearly 19,000 schools and more than 4,000 colleges and universities participating in the program in the 2012–2013 school year (College Board, 2013). The choice to offer AP classes is typically a district level decision; in particular, research suggests the likelihood of a high school offering AP classes is dependent on having a high-achieving group of students that demand such classes (Iatarola, Conger, & Long, 2011), or being located in an urban area (Gagnon & Mattingly, 2016). To earn college credit, students must achieve a minimum score on a course-specific exam offered in May of each year.¹ The College Board has suggested that regardless of the score received on an AP exam, however, colleges report that admissions decisions are favorably affected by a student's AP experience alone (College Board, 2013).

2.2. Arkansas policy background

The Arkansas legislature passed Act 102 in February of 2004, requiring all public high schools to offer a minimum of four AP classes by the 2008–2009 school year. Additionally, each *district* was to provide one AP class in each of the following subjects: math, English, social science, and science.² Prior to the adoption of the reform, some areas of Arkansas (albeit very few) were already participating in the AP program. Fig. 1 shows remarkably little change to the low student and school-level participation rates in AP before 1984; in the subsequent 20 years, a steady growth in participation across the two groups is observed. Between 2004 and 2008 there is a distinct jump in participation of schools and students coinciding with the AP mandate, with schools reaching a plateau after 2007 (likely due to universal compliance with the mandate), while student participation continues to increase.

While the 2004 mandate applied to all public high schools, not all schools were required to change their AP offerings. As the first panel of Fig. 2 shows, 43% of the schools in my sample were offering four or more AP classes in 2003 while 57% were offering fewer than four; nearly 25% did not have any AP classes at all. By the 2008–2009 deadline, 97% of sample schools were offering at least four AP classes, with only six schools offering less than four AP classes. The significant jump in AP programs from 2003 to 2008 suggests that schools were both responsive to the mandate and made a clear effort to adhere to the deadline. These characteristics make Arkansas a compelling case in which to study the impacts of a state-mandated AP program, as the large variation in AP offerings over time and across schools allows for greater power in testing for impacts.³

Fig. 2b shows schools' actual adherence to the policy over time, depending on whether or not the school was in compliance with the mandate (i.e., had a minimum of 4 AP courses) prior to its adoption. Public high schools that did not meet the mandate in 2003 are defined as “treatment” schools; those that did meet the required four course minimum in 2003 are defined as “control” schools. I use the 2003–2004 school year to define this assignment since it is a true “before” year: because the mandate was passed in February of 2004, schools likely did not have time to adjust their schedules in 2003–2004 to commence with the mandate. Thus, the 2004–2005 school year likely consists of already partially treated schools, even though the deadline for the mandate was not until the 2008–2009 school year. Indeed, as Fig. 2b shows, the interim period from 2004 through 2008 is one of adjustment, as

¹ The required minimum score differs by college, with many colleges requiring a minimum score of 3 out of 5, for example, to be considered for college credit. Furthermore, sitting for an AP exam does not require that the student have participated in the AP class; the exam itself costs \$89 to take, and while some school districts will cover this cost, others require the students to pay for it.

² A.C.A. § 6-16-1204(c).

³ The state mandates in Mississippi and West Virginia are the most similar to the one in Arkansas; however, their respective policies did not induce as big a change in AP offerings as the mandate in Arkansas.

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