Expanding Access in a Semi-Public Education Market: Evidence from a Large High School Expansion

César Garro-Marín*
University of Edinburgh

Masyhur Hilmy†
University of New South Wales

October 2025
[Click here for latest version]

Expanding access to secondary education remains a significant challenge in many developing countries, where schooling is often a mix of public and private provision. This paper exploits Indonesia's large-scale high school expansion to study how students and private schools respond to greater public secondary supply. Beginning in the early 2000s, the government built over 6,000 public high schools in 15 years, targeting low-enrollment districts and phasing construction nationwide. We exploit these features to estimate the expansion's effects using a staggered Difference-in-Differences design á la Callaway and Sant'Anna (2021). Despite the expansion's scale and persistence, we find no evidence of any sizable negative impact on private high schools. The expansion neither crowded out new private school investment nor reduced the quality of private school students. Furthermore, we find that while the expansion increased high school enrollment, there were large differences by gender and student background. The largest gains were concentrated among male students from more educated households, who likely face lower barriers to participation.

Keywords: secondary schooling, human capital, public policy, private education, gender inequality
JEL Codes: I21, I22, I25, I28, O15

*School of Economics. Email: cgarrom@ed.ac.uk.
†School of Economics. Email: m.hilmy@unsw.edu.au.

1 Introduction

Participation in secondary education remains low in many developing countries, especially at the upper secondary level. Although expanding access through public investment remains a policy priority (Crawfurd et al., 2021), many of these countries also have a sizable private sector that operates alongside public schools and compete for similar students (The World Bank, 2025). Expanding public secondary provision can therefore alter market dynamics by intensifying competition and changing the incentives faced by both private providers and students. Yet systematic evidence on how such expansions affect private schools and students remains scarce.

In this paper, we study how students and private providers respond to increases in public secondary supply. We exploit Indonesia's large-scale expansion of public high schools during the 2000s. Indonesia provides an ideal setting for this analysis: it is a large developing country with an active private education sector that competes directly with public schools. At the end of the 1990s, despite good lower-secondary coverage, Indonesia's 40% upper-secondary enrollment rate lagged behind comparable countries. In response, the government launched an ambitious construction program that built over 6,000 public high schools and added more than 2.4 million upper-secondary seats over 15 years.

We estimate the effects of this expansion using a staggered Difference-in-Differences (DiD) design that exploits variation in the timing and intensity of school construction across Indonesian districts. The government targeted districts with initially low-high school participation—*expansion districts*—, with limited construction in already well-serviced districts—*control districts*. The roll out was also staggered, with some districts starting construction earlier than others. We leverage these features, together with the recent advances in the DiD literature, to estimate the dynamic effects of the expansion. Our main results rely on event-study estimates that aggregate 2×2 DiD designs à la Callaway and Sant'Anna (2021), which avoid the pitfalls of traditional Two-Way Fixed Effects (TWFE) estimators (Baker et al., 2025).

We begin by documenting the scale and persistence of the government's intervention. After the expansion began, public high school construction in targeted districts rose sharply and remained high for more than a decade. In the first eight years alone, new public schools nearly doubled the number of high schools in these districts, adding about 9% of the district's initial stock each year. The expansion increased capacity in both the general academic track—aimed at continued study at universities—and the vocational track—aimed at direct labor-market entry—roughly in proportion to their initial sizes.

Next, we show how private providers responded to the public expansion. In Indonesia, public high schools are generally cheaper but charge tuition broadly comparable to private schools, and both compete for overlapping student pools. Despite the scale of the government's intervention, we find little evidence of crowding out among private schools. Construction of private schools in expansion districts did not slow; if anything, it increased slightly two to five years after expansion began. Overall, private school investment continued at a comparable pace in both expansion and control districts after the intervention began.

Greater competition from public schools could have affected providers other than market entry, such as changes in student composition or tuition income. If public schools were perceived to be of higher quality than private schools, marginal high-performing students in private schools could be drawn to the newly created public schools. However, exit exam data show that private school students in treated districts did not score worse after the expansion. Competition from new public schools could also have reduced private school revenues, limiting their expansion. Instead, we find continued private entry. These results suggest that in settings with low baseline secondary participation, governments can expand public supply without substantially affecting the private market.

Next, we examine students' responses to the public expansion. The intervention increased upper-secondary enrollment by roughly four percentage points within five years—an increase of about 12% relative to the baseline rates. Furthermore, we find positive spillovers at lower levels of education: middle school enrollment also rose as the availability of upper-secondary schools expanded, consistent with higher perceived returns to continued schooling.

However, we find substantial heterogeneity in the enrollment gains by gender and parental background. The largest gains in high school attendance occurred among male students from more advantaged families. Five years after the expansion, enrollment in this group had risen by over 6 percentage points (p.p.). In contrast, women's gains were smaller (3 p.p.) and driven by less educated households. This pattern contrasts with responses at the middle-school level, which were similar across genders and driven by those with less-advantaged backgrounds.

These results suggest that while the expansion successfully reduced the cost of attending upper-secondary school in underserved areas, the marginal beneficiaries were primarily students who faced lower barriers to participation. In contrast, when access is already widespread, as in middle school, further expansion tends to draw in more disadvantaged students at the margin.

Our paper first contributes to the literature on the impact of expanding educational access by providing new evidence on the effects of expanding upper-secondary education in a large developing country. While most existing evidence focuses on the effects of increasing supply at the primary level, evidence at the secondary level is scarcer. For example, Duflo (2001) estimated the effect of building primary schools in Indonesia, while Burde and Linden (2013) and Barrera-Osorio et al. (2022) estimated the effects of village schools in Afghanistan and Pakistan, respectively. These programs increased enrollments by 32-55 p.p. Khanna (2023) evaluated India's District Primary Education Program (DPEP). Evidence for higher levels of education has focused on the provision of scholarships or the enactment of free secondary education (Brudevold-Newman, 2021; Crawfurd and Ali, 2022).[1] Our paper complements this literature by providing evidence on the effects of increasing public upper-secondary access in a large developing country where upper-secondary is not free.

We also contribute to the literature studying the private provision of education. Existing studies have highlighted that policies enacted by governments often have unintended impacts on the provision of education by private operators. Dinerstein and Smith (2021) found that increased funding to public schools led to an increased exit and reduced entry among private schools in New York. Meanwhile, ideological competition with public schools led to the expansion of religious schools in Indonesia after the 1970s (Bazzi, Hilmy and Marx, 2025). Still, private provision need not always be adversarial to public schools. In Pakistan, private provision with public funding was used to increase access to schooling for disadvantaged children (Barrera-Osorio et al., 2022). Additionally, Andrabi et al. (2024) found an education multiplier, where test scores in private schools also increased following a grant program to public schools. Our paper provides evidence on the interaction between private and public schools resulting from a nationwide expansion of public schools.

[1] Koppensteiner and Matheson (2021) looked into secondary school expansion in Brazil and its relationship to teenage pregnancy.

2 Indonesian Secondary Education and Its Expansion

2.1 Secondary Education in Indonesia

The Indonesian secondary education system is vast, comprising a total of 100,685 schools and servicing approximately 19 million students annually (Ministry of Education, 2025; Central Bureau of Statistics, 2018). It is divided into two levels: middle school or lower secondary (grades 7–9, with roughly 11.9 million students) and high school or upper secondary (grades 10–12, with 9.6 million students). Students start middle school at age 13 and high school at age 16. As of 2018, overall enrollment in secondary stood at 70% of the secondary-age population: 79% for middle school and 61% for high school (Central Bureau of Statistics, 2018). These rates place Indonesia roughly at the median for middle-income countries and well below the 93% average for high-income countries (The World Bank, 2025).

Secondary schools can either be secular or religious. The vast majority of students (88%) attend secular schools, which are regulated by the Ministry of Education. These schools follow curricula more traditionally associated with secondary education (math, sciences, etc). After completing middle school, students in the secular system may choose between two high school tracks: general (*SMA* by its Indonesian acronym) or vocational (*SMK*). In contrast, schools in the religious system emphasize religious education and are regulated by the Ministry of Religious Affairs (Bazzi, Hilmy and Marx, 2025).

General high schools (*SMA*s) account for 55% enrollment and are geared toward preparing students for college. Their curriculum includes subjects such as math, physics, chemistry, and biology, as well as social sciences. Students choose between two curricular streams: natural sciences or social sciences. Students in the natural sciences stream study physics, chemistry, and biology, along with additional hours of mathematics, while those in the social science stream study geography, economics, and sociology, with fewer math hours. In addition to stream-specific courses, students in both streams take Indonesian, English, religious education, civics, arts, and physical education.

Vocational schools (*SMK*s) account for 35% of secondary enrollment and prepare students for direct labor-market entry. Their curricula emphasize technical training and progressively allocate more time to vocational subjects and internships. Time allocation to vocational instruction rises from 26% in grade 10 to 72% in grade 12. Nationwide, vocational high schools offer training for diverse vocational fields, including performing arts, business, IT, energy, and engineering. Technician tracks—such as computer and network technology, light vehicle maintenance, and motorcycle repair—are among the most popular and are predominantly male. Other popular tracks, such as accounting and office administration, attract mostly female students. These programs are widely available, with about three-quarters of all *SMK*s offering at least one of them. The vocational system also includes more specialized programs, such as crustacean aquaculture and thread manufacturing (Ditjen Vokasi, 2021).

Indonesian education also features a sizable private sector presence. Private schools account for a significant share of schools at all levels. At the upper-secondary level, they represent 63% of all the secular schools, and 42% of the enrollment. Although this share of private enrollment is relatively high when compared to other middle countries, it is comparable to those of India (58%), Phillipines (46%), Pakistan (29%), and Peru (28%; The World Bank, 2025). After graduation, students from public middle schools can freely move to private high schools (or vice versa).

Private high schools serve a large swath of the student population and largely compete with public schools in the same market. Public high schools are not free and charge comparable tuition fees to private schools.[2] Private schools are generally perceived to be of worse quality, although there is evidence suggesting that their graduates fare better in the labor market (Bedi and Garg, 2000). In terms of infrastructure, private schools are smaller on average but otherwise similar to public schools. Appendix Table B1 reports average school characteristics using administrative data from the Ministry of Education (see details in Section 3). Public and private schools have comparable class sizes and, when adjusted by size, similar facilities.

2.2 The Expansion in Secondary Education

By the late 1990s, Indonesia's secondary enrollment rates remained well below those of comparable countries, especially at the high school level. During this period, Indonesia's upper-secondary enrollment rate was 40%, versus 60% in East Asia and the Pacific and 49% among middle-income countries (The World Bank, 2025). This low participation attracted policymakers' attention.

In the early 2000s, the Indonesian Government initiated an unprecedented expansion of high school education. The government considered the low secondary participation as a supply problem. The

[2]Data from the Indonesia Family Life Survey (IFLS) for 2007 shows that median annual tuition in public schools was 65% the median cost in private schools. Median public tuition costs in 2007 were about USD 70 and USD 107 in private schools, which amount to 106 and 162 real 2023 dollars.

2000 Medium-Term National Development Plan cited insufficient high school supply as an education bottleneck: of the 2 million children graduating from lower secondary schools each year, Indonesian high schools could accommodate only three-fourths of each cohort (Republic of Indonesia, 2000). As a response, the government started opening new public high schools as never before: it went from opening just 96 new high schools nationwide in 2000 to 568 in 2004.

In Panel (A) of Figure 1, we show the large scale and persistence of the post-2000 high school expansion using administrative data from the Ministry of Education (MoE, 2018, 2025). The Panel reports the annual number of high school openings by ownership type (public or private). Beginning in 2000, the number of new public high schools rose sharply and remained high for over 15 years. Between 2001 and 2018, the government built 6,323 new high schools, almost *thrice* as many as in the two previous decades. This sustained expansion occurred in both the general and vocational tracks (see Panel B). Overall, this rapid construction pace led to a substantial increase in the supply of upper-secondary education. Between 2001 and 2015, the number of high schools per 1000 people in high-school-age rose by 151% (see Panel B of Appendix Figure A1).

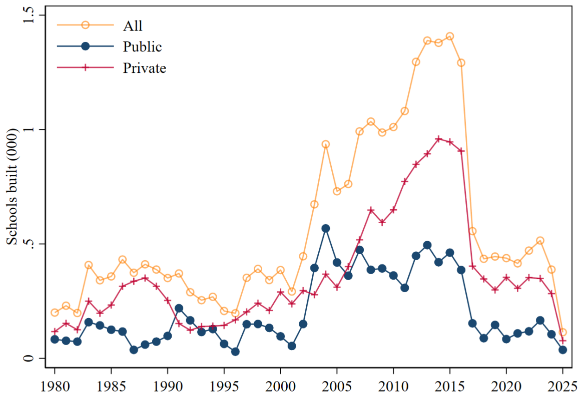
There was also substantial geographic variation in the size of the public secondary expansion across Indonesia. Panel (A) of Figure 2 plots the expansion size across Indonesian districts (the main local administrative unit in Indonesia). The map shows the total number of public high schools built between 2001 and 2018 as a share of the district's 2001 stock of all high schools. Each color cell groups an eighth of the districts, with darker colors denoting larger expansions. There was substantial variation in the expansion size both across districts and within provinces. In the top quartile of districts, new public schools more than doubled the number of high schools, while in the bottom quartile it increased by less than 22%. The scale of the expansion was mainly determined by initial high school coverage, with construction targeting districts with lower enrollment rates (see Section 3.4 for details).

This large expansion was facilitated by further regulatory changes enacted in the early 2000s. In 2002, a constitutional amendment increased public education spending by setting a minimum spending requirement of 20% of state and regional budgets. This minimum spending threshold was also reiterated in the 2003 National Education System Act (Republic of Indonesia, 2003). These budgetary commitments made the expansion possible by providing additional resources for setting up new schools.[3]

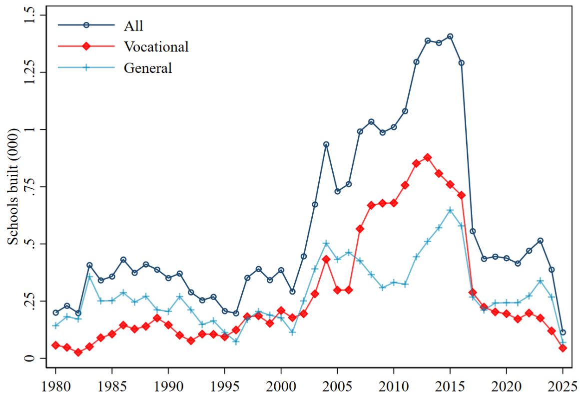
[3]The annotated national budget in some years described allocations for secondary school constructions. In 2008, the figure was 3.6 trillion IDR (USD 351M) to create 325 new general or vocational high schools (Indonesian Ministry of Finance, 2008). Additionally, the government allocated 5M USD for classroom rehabilitation and 55M USD for scholarships.

Figure 1: There was a Large Upper Secondary Expansion

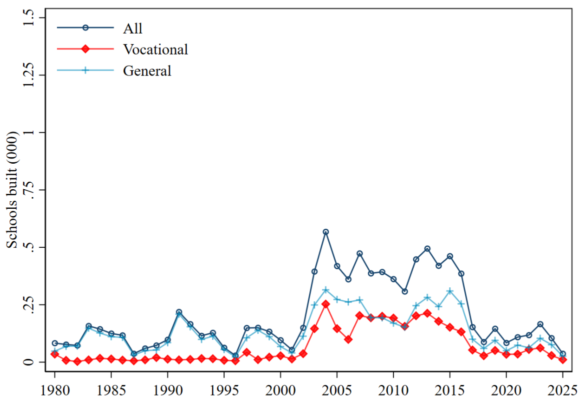
(a) Secondary High Schools by Ownership



(b) All High Schools by Track



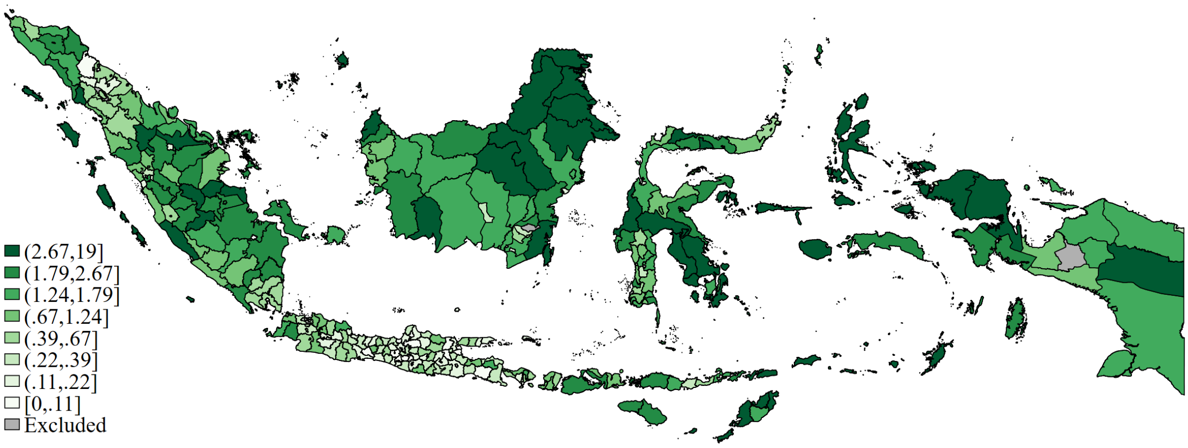
(c) Public High Schools by Track



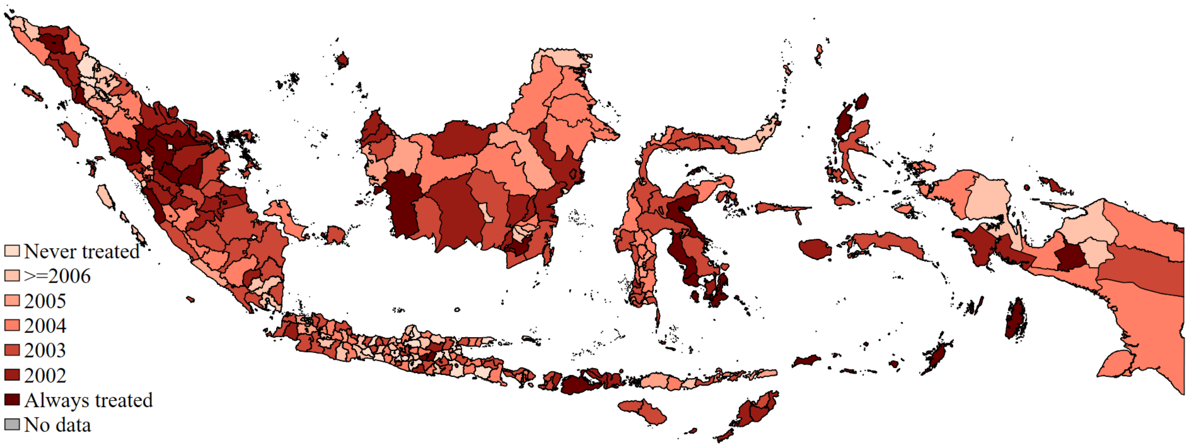
Notes: The figure shows time series of the number of high schools built in Indonesia between 1980 and 2025 by type of ownership and track. Panel (a) shows the total number of schools built, along with a private/public split. Panels (b) and (c) split construction numbers by track. Panel (b) shows totals for all high schools, while (c) restricts it to public high schools. All panels show the number of schools built expressed in thousands. Data from the Education Master Dataset.

Figure 2: There is Large Geographic Variation in the 2001-2018 Public Secondary

(a) Total 2001-2018 Expansion Size



(b) Starting Year of Expansion



Notes: The figure plots the size and starting year of public high school expansion by district. Panel (a) plots the total number of public schools built between 2001 and 2018 as a percentage of the high school stock 2001. Darker colors denote larger expansions. Panel (b) shows the starting year of the expansion. This is the first year in which the district's annual public high school construction exceeded 5% of the 2001 high school stock. Darker colors denote earlier start dates. Both panels exclude two districts with zero initial school stock. Data from the Education Master Dataset.

Besides budgetary allocations, the government also regulated the overall expansion of the secondary education system through ministerial decrees that established minimum requirements for founding new schools.[4] Broadly, applications to open a new school were required to include a feasibility study demonstrating adequate planning—identifying potential sources of students, qualified teaching staff, and sustainable financing. For high schools, the minimum requirements were 20 junior-secondary graduates in the catchment area, one principal, one teacher with a bachelor's degree for each subject taught, and, in the case of vocational high schools, at least two teachers holding bachelor's or associate degrees relevant to the vocational program. The application also required formal approval from the heads of the district and provincial Education Offices.

Although the secondary expansion was driven by the public sector, the private sector also played an important role in increasing supply during this period. Panel (A) of Figure 1 shows that private school openings accelerated in the early 2000s and eventually surpassed public ones. Most of these were new private vocational schools. Nevertheless, because public schools are generally larger, they account for a larger share of the high school seats created since 2000s: public schools represented 38% of the new schools but 55% of the new seats.

3 Data

Our primary analyses combine two main datasets: (i) scraped administrative school-level data from the Indonesian Education Master Dataset and school-level test score data, and (ii) 2001-2018 district-level demographic and employment information from the National Socioeconomic Surveys, SUSENAS by its Indonesian acronym.

3.1 School Administrative Data

We source our school-level data from the Education Master Dataset (*Data Pokok Pendidikan*) compiled by the Indonesian Ministry of Education (MoE, 2018, 2025).[5] This is an administrative dataset that contains detailed school-level information for the universe of Indonesian primary and secondary schools. It is assembled from data that schools regularly report to the ministry, including the number and characteristics of students and staff, as well as detailed information on school characteristics such as programs offered, facilities, location, and the date of establishment. We use Master Dataset as it

[4]Respectively, these are Kepmendiknas/Minister Decree No 60/2002 and Permendikbud/MoE regulation No 36/2014. The former regulated the new school establishment until 2014, when the latter regulation came into force.

[5]The Education Master Dataset was formerly published as Basic Education Data or *Dapodik* in its Indonesian acronym,

was available on its public website in both 2018 and 2025, which gives us a snapshot of the universe of active schools on both those dates.

Our main analyses link district-level outcomes to the timing of each district's public high school expansion, which requires identifying when schools began operating. The Education Master contains the dates of both the establishment and the operational license deeds. The establishment deed records when a school was legally founded and is required before it can admit students. Public schools typically start operations soon after the establishment date (Bazzi, Hilmy and Marx, 2025). Private schools additionally require an operational license to start operations. However, depending on local regulations, these licenses can expire and require renewals. Moreover, temporary interruptions in school operation may require the issuance of a new license from the local education office. Because of this, the establishment year will more accurately reflect the year private schools began operating.

We set the school's establishment date as the date listed in the establishment deed, and if unavailable, we use the operational license year. Throughout the paper, we use the terms "construction year" and "establishment year" interchangeably. There were 994 high schools for which we could not find the establishment year: 391 vocational, and 603 general ones, which we assumed started operations before the period of analysis. These missing-date schools are spread out all across Indonesia and represent just 3% of the total vocational high schools and 4% of the general ones. Their number is also small relative to the number of high schools built between 2001-2025 (5% for vocational and 12% for general), and thus, they are unlikely to affect our results. We use information on the school's location to compute district-level counts of the stock and the number of high schools built by year.

We measure a district's public high school expansion as the ratio of the number of new public schools built in a given year to the district's total number of high school (public and private) in 2001. We refer to this ratio as the *public high school expansion size*. We set analogous definitions for each school type, and for middle schools.

Defining the expansion size relative to the district's initial school stock has two main advantages. First, it ties our measure to the size of the district's education market.[6] Initial school stocks capture both district size and the level of secondary education penetration: the addition of one school in a populous, well-supplied district of Jakarta is likely to have a negligible effect, whereas one additional school can represent a large supply shock in a rural district with only a few schools. Second, scaling by the initial

[6]The number of new schools per target population is another intuitive alternative for measuring the size of the school expansion. Nevertheless, the binned scatter in Appendix Figure A2 shows that our preferred expansion size measure is highly correlated with the number of new schools per target population.

stock size helps avoid classifying routine construction done to keep up with demand as a supply shock.[7]

We identify the start of each district's public high school expansion using annual school construction data. Our main results define the start year as the first year in which the number of public high schools built—during the year—exceeds 5% of the 2001 stock. We choose this threshold to both capture sizable government-driven increases in the district's high school stock, while remaining conservative about the beginning of expansion. On average, affected districts started with 22 high schools and the government built 2.55 new schools in the first expansion year–a 15% expansion just in the first year.

We also use administrative school-level test score data from the School Examination Dataset. This dataset reports school-level outcomes based on students' performance in the national examination, taken at the end of grade 12 prior to graduation. Students in both academic and vocational high schools sit for standardized test in mathematics, Indonesian language, and English, administered simultaneously nationwide.[8] Students receive scores for each subject as well as a total composite score.

For each school, the dataset records the average, maximum, and minimum scores that their students achieved in each examination, as well as the total score. We aggregate the dataset to the district-level for each subject and the total score for different types of schools. We focus on the average scores for the following groupings of schools: all schools, public schools, and private schools. We also analyze the district-level exam statistics separately for academic high schools and vocational high schools. These analyses allow us to investigate possible effects of the policy on students' achievements.

3.2 SUSENAS data

We source our main district-level outcomes from the 2001-2018 waves of the Indonesian National Socieconomic Survey (SUSENAS). This is an annual representative survey collected by the Indonesian Bureau of Central Statistics (BPS) that contains rich data on demographics, education, employment, household consumption, and other topics (Central Bureau of Statistics, 2001–2018).

Our main district-level outcomes include measures of enrollment, educational attainment, and employment for people in or near the official secondary-school age. We measure secondary enrollment at each level (or type) as the share of the district's target population currently attending at that level. We compute enrollment rates for all high schools, vocational high schools, general high schools, and middle

[7]Because we measure the expansion relative to the initial school stock, we exclude from the sample the districts of Central Hulu Sungai and Paniai. Hulu Sungai had no middle schools in 2001, while Paniai had no high schools.

[8]Students also take locally administered tests in additional subjects depending on their track. For instance, students in the natural science SMA stream take physics, biology, and chemistry, while vocational high school students are examined in their respective vocational subjects.

schools.[9] The official secondary ages are 16-18 for high school and 13-15 for middle school. We also create district-level aggregates of educational attainment based on the highest level completed and the highest level attended. We compute aggregates for the shares completing each secondary level among people aged (i) 19-22, (ii) 19-64, and (iii) 50-64. We also compute the shares of individuals who have attended each secondary level for these age ranges, along with the shares completing (ever attending) middle school among 16-18-year-olds. We measure teenage employment using the shares of high-school age people (i) employed, and (ii) in paid employment.[10]

We compute additional district characteristics, primarily used as controls in our estimations. Besides the population shares in middle- and high-school ages, we compute the employment rate among the adult population (aged 19-64) and the shares of adults employed in agriculture, manufacturing, and construction. The industry employment shares are based on our own harmonization of SUSENAS' 1-digit industry classification. Throughout the paper, we combine manufacturing and construction employment into a single category, which we refer to simply as manufacturing.

[9] Unfortunately, SUSENAS data does not allow us to distinguish between attendance at public and private schools. All enrollment data by school ownership comes from the 2018 and 2025 snapshots from the Education Master.

[10] BPS standard employment definition includes unpaid workers among the employed. They work primarily in agriculture and retail. These two sectors alone accounted for 68%, and 23% of unpaid employment, respectively (Central Bureau of Statistics, 2001–2018).

Table 1: High School Characteristics by Ownership and Founding Year

A. High Schools by Ownership	All Schools (1) 2000 or Earlier	All Schools (2) 2001 or later	Public (3) 2000 or Earlier	Public (4) 2001 or later	Private (5) 2000 or Earlier	Private (6) 2001 or later
Private school	0.61	0.57	0.00	0.00	1.00	1.00
Share Vocational	0.37	0.54	0.22	0.39	0.47	0.66
Number of classrooms	18.36	10.72	26.40	13.84	13.17	8.34
Number of labs	3.28	1.77	4.51	2.18	2.49	1.46
Number of libraries	1.00	0.83	1.05	0.92	0.98	0.77
Number of sinks	7.01	4.10	10.63	4.74	4.67	3.60
Has sitting toilet	0.93	0.90	0.94	0.90	0.93	0.90
Number of usable toilets	11.45	7.03	15.99	7.25	8.52	6.86
Has internet	0.69	0.65	0.72	0.62	0.66	0.67
Has grid electricity	1.00	0.96	1.00	0.93	1.00	0.98
Total students	557.78	301.03	870.86	413.98	355.99	214.75
Number of male students	273.30	158.03	383.33	212.91	202.37	116.11
Number of female students	284.48	143.00	487.52	201.07	153.61	98.64
Female student share	0.49	0.47	0.56	0.48	0.44	0.47
Total teachers	33.07	19.66	53.06	28.02	20.18	13.27
Number of male teachers	14.34	8.73	21.95	11.98	9.43	6.25
Number of female teachers	18.73	10.93	31.12	16.05	10.74	7.02
Female teacher share	0.57	0.55	0.59	0.57	0.56	0.53
Teachers per student	0.08	0.10	0.07	0.09	0.09	0.10
Number of classes	18.41	10.99	27.29	14.51	12.68	8.30
Average class size	27.19	24.51	31.14	26.12	24.64	23.29
Observations	7,254	12,721	2,843	5,509	4,411	7,212

Notes: The table shows average high school characteristics by ownership, track, and construction year. The table shows school characteristics as of 2018, as the student counts and infrastructure data are of questionable quality in the 2025 Education Master Dataset. We classify schools according to the year of their establishment decree into established (i) 2000 or earlier, or 2001 or later. The table restricts the sample to schools with valid data in all the characteristics shown in the table. Data from the 2018 Education Master Dataset.

3.3 The District-Level Panel

We combine the Education Master and SUSENAS datasets to construct an annual district-level panel covering 2001–2018. Because during the 2000s, numerous new districts were formed by splitting a larger "parent" district, there were significant changes in district boundaries. We ensure that our panel tracks the *same* geographic units over time by aggregating the split districts up to their December 1999 "parent" district. There were 339 such districts in 1999.[11] We then exclude districts without SUSENAS information in 2001, which leaves us with a slightly smaller set of 317 districts.[12]

[11] For comparison, by 2019 there were 514 districts.

[12] Due to security concerns, SUSENAS 2001 excluded all of Aceh province, and only included some of its districts in 2002 (Central Bureau of Statistics, 2001–2018). These were related to the active armed conflict between pro-independence insurgents

3.4 Characterizing The School High School Expansion

Table 1 reports average school characteristics by ownership type and year of establishment. Columns (1) and (2) summarize all schools. Newer schools are about half the size of older ones but have similar average class sizes. Although the table indicates some infrastructure differences (e.g., laboratories, number of toilets), these largely reflect differences in enrollment size. Columns (3) and (4) present analogous statistics for public high schools, showing a similar pattern: the new schools built by the government after 2000 enroll roughly half as many students as existing schools and have only slightly fewer students per class.

In Table 2, we characterize the geographic distribution of the school. The table shows average district characteristics by the start year of the public high school expansion. All district characteristics are measured as of 2001. Although the government expanded high school supply in most districts (84% of the 317 in our dataset), the rollout was staggered, with some districts receiving treatment earlier than others. Most of the expansion took place between 2001 and 2005: 8% of districts had an active expansion in 2001, and by 2005 the program had reached 76% of districts. Panel (B) of Figure 2 illustrates the geographic variation in the timing of the expansion across districts.

Table 2 also shows that districts differ along several important dimensions. Expansion districts have an initial lower share of high school enrollment and a smaller number of high schools per target population. Moreover, those with lower penetration were targeted first. Targeted districts are also more agricultural and have lower shares of manufacturing employment. Therefore, our estimates in Section 5 control for these initial district characteristics.

Figure 3 further characterizes the districts that experienced the largest expansions between 2001 and 2018. The figure plots the coefficients of a regression of the district's total public high school expansion between 2001 and 2018 on district characteristics in 2001. We standardized all the regressors. In line with the patterns in Table 2, targeted districts are smaller and more agricultural. Moreover, they have lower high school enrollment rates and have higher lower-secondary enrollment.

---

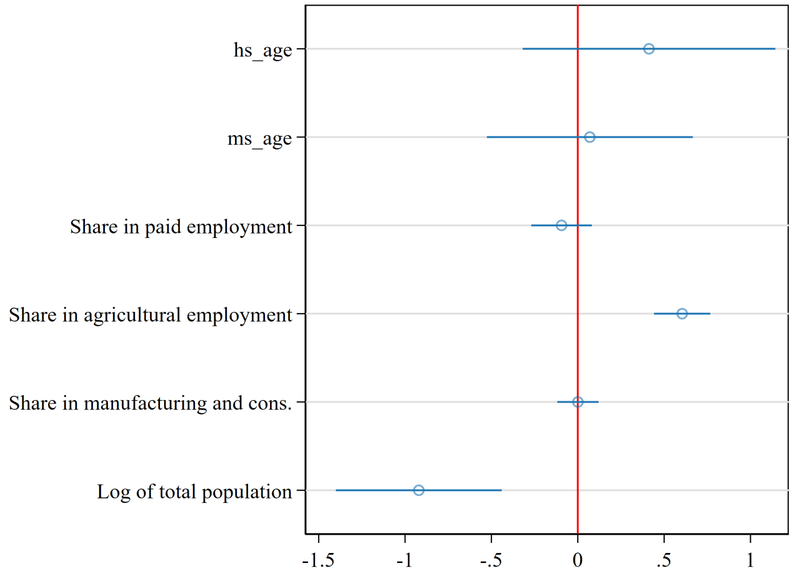
and the Indonesian Government. The conflict escalated after the fall of the Suharto government and went on until 2005 (Human Rights Watch, 2001).

TABLE 2: DISTRICTS CHARACTERISTICS BY STARTING YEAR OF HIGH SCHOOL EXPANSION

	STARTING YEAR OF EXPANSION									
	2001	2002	2003	2004	2005	2006	2007	≥2008	NO EXPANSION	TOTAL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Number of districts	22	41	84	60	17	12	5	26	50	317
Mean population (000)	361	354	605	517	737	748	820	759	1,015	632
Population share	0.04	0.07	0.25	0.15	0.06	0.04	0.02	0.10	0.25	1.00
Share of population aged 13-15	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Share of population aged 16-18	0.06	0.07	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.06
High schools per 1000 15-18 population	0.81	0.78	0.75	0.86	0.91	0.82	0.92	0.96	1.12	0.87
Share attending middle school (aged 13-15)	0.54	0.49	0.48	0.54	0.53	0.48	0.64	0.60	0.66	0.54
Share attending high school (aged 16-18)	0.31	0.29	0.29	0.34	0.36	0.26	0.44	0.44	0.48	0.35
Share employed (aged 19-64)	0.70	0.71	0.71	0.73	0.73	0.75	0.67	0.71	0.69	0.71
Share in paid employment (aged 19-64)	0.56	0.55	0.56	0.56	0.55	0.54	0.59	0.59	0.61	0.57
Share employed (aged 19-22)	0.51	0.53	0.53	0.53	0.54	0.57	0.42	0.51	0.44	0.51
Share in paid employment (aged 19-22)	0.31	0.29	0.31	0.28	0.29	0.26	0.33	0.33	0.35	0.31
Share of agricultural employment	0.58	0.58	0.55	0.56	0.54	0.63	0.28	0.35	0.21	0.49
Share of manufacturing and construction employment	0.11	0.11	0.12	0.12	0.12	0.13	0.20	0.19	0.21	0.14

Notes: The table shows district average district characteristics in 2001 by the starting year of the high school expansion. This is the first year in which high school construction exceeds 5% of the 2001 high school stock. All district aggregates were computed using the SUSENAS sampling weights. The table shows unweighted cross-district means. Districts are defined according to the December 1999 boundaries. Data from SUSENAS 2001-2018 and the Education Master Dataset.

FIGURE 3: PUBLIC HIGH SCHOOL CONSTRUCTION SHOCK AND DISTRICT CHARACTERISTICS



Notes: The figure results of a regression of the total number of public schools built between 2001 and 2018 as a share of the start-of-year high school stock in 2001. All district characteristics were measured in 2001 and are standardized. Data from SUSENAS 2001-2018 and the Education Master Dataset.

4 Empirical strategy

We study the effects of Indonesia's large-scale expansion of public secondary schools by exploiting variation in the extent and timing of the expansion across districts. The government started school construction earlier in some districts than in others, while a subset of districts experienced very little construction. We exploit these features using a staggered Difference-in-Difference à la Callaway and Sant'Anna (2021).

Our results come from event studies to show the dynamic effects of the expansion on the average treated district (ATT) at different time horizons. These estimates can be thought of as being computed in two stages. First, for each period and expansion-timing cohort, we compute 2x2 DiD estimates—i.e., comparisons across 2 periods and 2 groups—that we then appropriately aggregate to obtain treatment effect estimates at different time horizons since the beginning of the secondary expansion. This enable us to examine the short-run effect dynamics while avoiding the negative weight issues associated with the traditional Two-Way Fixed Effect (TWFE) estimators (Baker et al., 2025; Callaway and Sant'Anna, 2021; de Chaisemartin and D'Haultfœuille, 2024; Sant'Anna and Zhao, 2020).

Because treatment cohorts varied in characteristics, all our effect estimates use doubly-robust DiD estimates that control for initial district characteristics. Below, we give a brief explanation of the estimation procedure. Interested readers can refer to Callaway and Sant'Anna (2021) and Baker et al.

(2025) for a more detailed discussion.

4.1 Period by cohort treatment effect

We first estimate the doubly-robust Average Treatment on the Treated (ATT) for each treatment cohort g and year t, denoted as $ATT_{dr}(g,t)$. These estimates adjust for district characteristics in two ways: (i) they allow the counterfactual outcome to depend on district characteristics (regression adjustment), and (ii) they put a higher weight on control districts that are observationally similar to treated districts (inverse probability weighting).

Let us consider first the regression adjustment. The regression-adjusted ATT estimate ($ATT_{ra}(g,t)$) compares average outcomes at time t between the g-treatment cohort and all districts that are not yet treated at year t. More precisely, let G_d be the year in which district d starts treatment. The regression-adjusted ATT is:

$$ATT_{ra}(g,t) \quad = \quad \mathbb{E}\left[Y_{d,t} - Y_{d,g-1} | G_d = g\right] - \mathbb{E}\left[\mathbb{E}(Y_{d,t} - Y_{d,g-1} | X_d, G_d > t) | G_d = g\right] \qquad (1)$$

Expression (1) gives a fairly intuitive DiD-like interpretation to the ATT estimate. The first term on the right-hand side represents the average growth in the outcome among districts in cohort g. The second term is the average control-adjusted change in outcomes among the not-yet-treated—the assumed counterfactual. The adjustment to the counterfactual is intuitive: (1) allows for the trends in the outcomes to depend on district characteristics. We determine these trends by regressing growth in outcomes among the not-yet-treated districts on district covariates. The counterfactual outcome for the treated districts is the predicted value of this regression, evaluated at the treated district characteristics.

The doubly-robust ATT estimator adjusts the assumed counterfactual in outcomes by adding an additional term:

$$ATT_{dr}(g,t) \quad = \quad ATT_{ra}(g,t) - \mathbb{E}\left[w_{g,t}(G_d, X_i)(Y_{d,t} - Y_{d,g-1} - \mathbb{E}\left[\mathbb{E}(Y_{d,t} - Y_{d,g-1} | X_d, G_d > t)\right]\right]$$

The second term in the right-hand side is the weighted path in outcomes for the not-yet-treated units. The weights $w_{g,t}(G_d, X_i)$ are inverse probability weights that weight more heavily control units that, based on their characteristics, would be more likely to start treatment at g. Intuitively, ATT_{dr} adjusts the counterfactual using a weighted-outcome path that places more importance on the control districts that look more similar to those in cohort g.[13]

Identification of the ATT requires conditional parallel trends for each possible treatment cohort and the not-yet-treated control group. In other words, conditional on the covariates, we assume that the potential outcomes of each treatment cohort would have evolved similarly to those of its respective control group. More formally, for every $t \geq g$ and not yet treated group g' we require:

$$\mathbb{E}\left(Y_{d,t}(0) - Y_{d,t-1}(0)|X, G_g = 1\right) = \mathbb{E}(Y_{d,t}(0) - Y_{d,t-1}(0)|X, G_d = g') \tag{IA}$$

where $Y_{d,t}(0)$ denotes the potential outcome in the absence of treatment.

4.2 Aggregation to Event-Study Estimates

We aggregate each cohort-year DiD estimate into event-study estimates. The event-study aggregate e years after treatment is a weighted average of all the estimated treatment effects e years after the start of treatment:

$$ATT_{es}(e) = \sum_g w^{es}_{g,e} ATT_{dr}(g, g+e) \tag{3}$$

with the weights $w^{es}_{g,e}$ being the share of cohort g among the districts exposed to the treatment for exactly e periods.[14]

We also compute averages over specific time windows to improve precision. These are simple averages of the $ATT_{es}(e)$:

$$ATT_{es}(\underline{t} \leq e \leq \bar{t}) \quad = \quad \frac{1}{\bar{t} - \underline{t}} \sum_{\underline{t} \leq e \leq \bar{t}} ATT_{es}(e) \tag{4}$$

[13]The exact expression for weights are given by:

$$w_{g,t}(G, X) \quad = \quad \frac{1_{\{G>t\}} 1_{\{G\neq g\}} p_{g,t}(X)}{1 - p_{g,t}(X)} \Bigg/ \mathbb{E}\left[\frac{1_{\{G>t\}} 1_{\{G\neq g\}} p_{g,t}(X)}{1 - p_{g,t}(X)}\right] \tag{2}$$

where $p_{g,t}(X)$ denote the probability of starting treatment at g given the covariates: $p_{g,t}(X) = \mathbb{E}\left[1_{G_d=g}|X, 1_{G_d=g} + 1_{G_d>t} = 1\right]$.

[14]The weights are formally defined as: $w^{es}_{g,e} = 1_{\{g+e\leq T\}} \frac{\sum_g 1_{\{G=g\}}}{\sum_g 1_{\{g+e\leq T, g\leq T\}}}$.

5 Results

In this section, we present evidence on the impact of the high school expansion on the education markets of the targeted districts. We first show that the government implemented a *sustained* upper-secondary expansion, adding roughly 2.1 new schools per year for nearly a decade. Despite this substantial public investment, we find little evidence of crowding out in the private secondary sector. Finally, we examine enrollment outcomes and show that the expansion significantly increased high school enrollment, but with large differences across gender and parental background. We find that the largest gains were concentrated among male students from more advantaged backgrounds.

All our specifications exclude the 22 districts with an active expansion in 2001 (the "always-treated" districts) and, because by 2005 the expansion was active in most districts, restrict the pre-period to four years. We use not-yet-treated districts as the control group, and control for initial district characteristics (as measured in 2001). As shown in Table 2, expansion districts initially had lower middle and high school enrollment rates, were more agricultural, and had less manufacturing employment. Accordingly, all specifications control for the initial shares of the population of middle- and high-school age, middle school enrollment, and agricultural and manufacturing employment shares for both the inverse probability weighting and the regression adjustment. Conditional on these controls, we find no clear pre-expansion differences between treated and control districts.[15]. Throughout the discussion, we use the terms "expansion district" and "treated district" interchangeably, as well as "no-expansion district" and "control district".

5.1 The Government Carried Out a Large Sustained Expansion of Public Upper Secondary

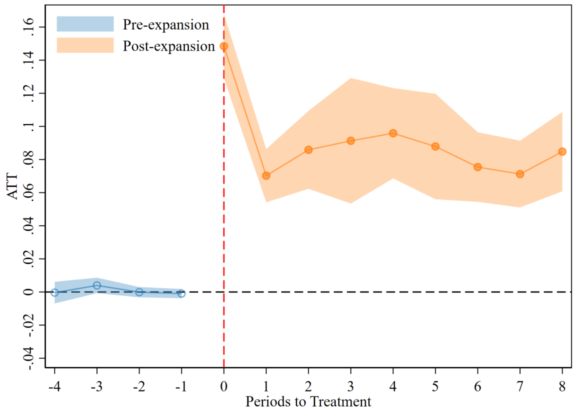
We begin by showing the evolution of public school construction in the affected districts. Figure 4 presents event-study plots in which the outcome is the annual number of newly built public schools of each type (all schools in Panel A, general in B, and vocational in C) expressed as a share of the district's 2001 high school stock. The reference stock, common to all panels, includes all high schools regardless of track or ownership. The shaded regions show the 95% confidence intervals.

Panel (A) of Figure 4 shows that the government shows that the government implemented a sustained

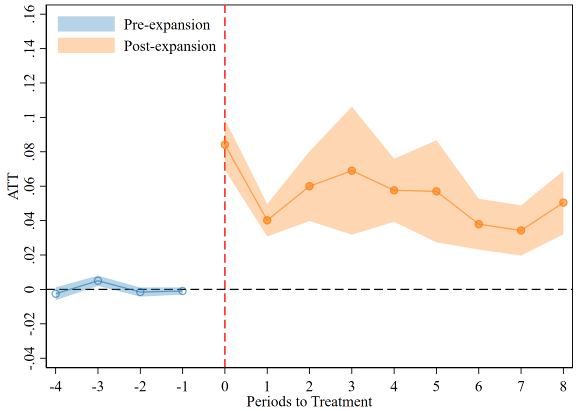
[15]Event-study estimates without controls are available in Appendix Tables B2 and Appendix Figure A3.

Figure 4: There was a Sustained Expansion of Public Upper-Secondary Education

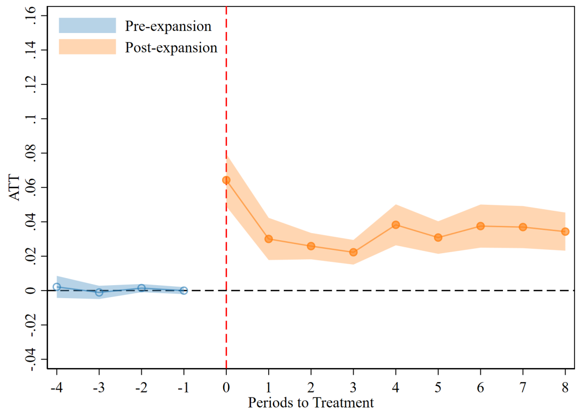
(a) Public All High Schools



(b) Public General High Schools

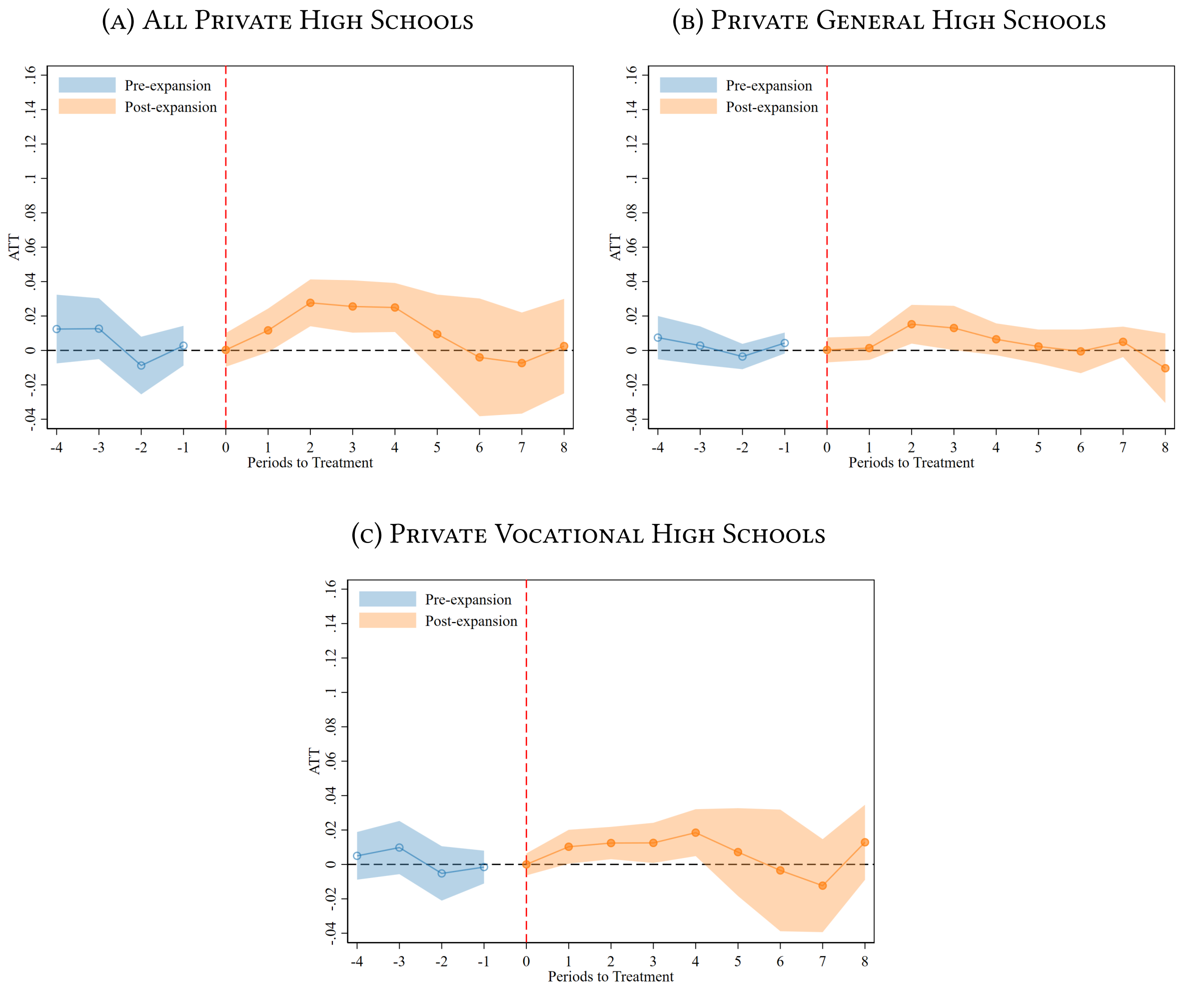


(c) Public Vocational High Schools



Notes: The figure shows event study estimates of the effect of public high school expansion on several district-level outcomes. These are estimates of the Average Treatment Effect on the Treated (ATT) estimated using Doubly Robust Difference-in-Differences Estimators (Callaway and Sant'Anna, 2021). Each panel shows the ATT on the number of public schools for the type indicated in the panel title as a share of the 2001 high school stock —including both public and private—. In all panels, we control for the same set of pre-expansion district characteristics, all measured in 2001, for both the inverse probability weighting and the regression adjustment. These are: the log of the district population, the shares of population aged 13-15 and 16-18, the employment shares in agriculture, manufacturing, and construction, and the share of people aged 13-15 enrolled in middle school. The figure shows 95% confidence intervals. Data from SUSENAS 2001-2018 and the Education Master Dataset.

Figure 5: No Crowding-out on Private School Construction



Notes: The figure shows event study estimates of the effect of public high school expansion on several district-level outcomes. These are estimates of the Average Treatment Effect on the Treated (ATT) estimated using Doubly-Robust Difference in Difference Estimators (Callaway and Sant'Anna, 2021). Each panel shows the ATT on the number of private schools for the type indicated in the panel title as a share of the 2001 high school stock –including both public and private–. In all panels, we control for the same set of pre-expansion district characteristics, all measured in 2001, for both the inverse probability weighting and the regression adjustment. These are: the log of the district population, the shares of population aged 13-15 and 16-18, the employment shares in agriculture and, manufacturing and construction, the share of people aged 13-15 enrolled in middle school.. The figure shows 95% confidence intervals. Data from SUSENAS 2001-2018 and the Education Master Dataset.

expansion. Once underway, the government systematically built more public high schools in treated than in control districts for over a decade, with an average annual expansion of about 9%. Although the lack of any pre-expansion investment is a mechanical result of how we defined the event, the subsequent sustained expansion is not. For the average treated district, this sustained construction effort amounted to roughly 19 new public high schools and (about 4,821 new seats over years shown), raising the number of high schools per thousand target population from 0.78 to 1.31 (an 82% increase). In contrast, construction in the control districts was limited, raising this ratio from 1.08 in 2003 to 1.21 in 2011 (just a 12% increase), the period with the largest public construction activity (see Panel (a) of Figure 1).

Panels (b) and (c) of Figure 4 show that the government expanded the supply of general and vocational schools roughly in proportion to their initial sizes. These panels split the annual construction shock by track, each normalized by the 2001 district's total high school stock. General high schools account for 60% of the public construction shock, matching their share among the high school stock in these districts.

5.2 No Crowding Out of Private High Schools

We next analyze the effects of the expansion on private schools. Assessing the impact of the government's supply push on overall education provision requires examining private-sector responses. The public expansion would not truly increase access to upper-secondary education if it simply displaced private providers.

Figure 5 presents event-study estimates for the overall private school construction (panel a) and separately by track (panels b and c). Despite the large and sustained increases in public investment shown in Figure 1, none of the panels in Figure 5 show any clear negative response by the private sector. If anything, there is actually a small uptick in private investment of roughly 2.2%. annually two to five years after the start of the public expansion.

Importantly, these small point estimates do not reflect an absence of private school entry during this period. On average, treated districts built a total of 13.1 private high schools in the first eight years after the expansion began. Thus, despite the large public construction shock in expansion districts, private-sector activity followed a trajectory similar to that of control districts.

Table 3: ATT Estimates on Average Exam Scores

A. All Schools	(1) Total	(2) Indonesian	(3) English	(4) Math
3 to 5	-0.267	-0.007	-0.126	-0.090
	(0.346)	(0.077)	(0.123)	(0.106)
0 to 2	0.002	-0.037	-0.065	0.030
	(0.249)	(0.040)	(0.054)	(0.064)
Pre-treatment average	-0.028	0.047	0.026	0.025
	(0.178)	(0.039)	(0.041)	(0.050)
B. Public Schools				
3 to 5	0.005	0.145*	0.068	0.085
	(0.331)	(0.077)	(0.102)	(0.090)
0 to 2	-0.220	-0.034	-0.065	0.033
	(0.246)	(0.047)	(0.057)	(0.067)
Pre-treatment average	0.259*	0.055	0.054	0.080
	(0.152)	(0.039)	(0.052)	(0.060)
C. Private Schools				
3 to 5	0.165	0.088	-0.056	0.067
	(0.638)	(0.123)	(0.185)	(0.186)
0 to 2	0.440	0.074	0.026	0.136
	(0.602)	(0.086)	(0.095)	(0.096)
Pre-treatment average	-0.481	0.003	-0.042	-0.021
	(0.332)	(0.058)	(0.067)	(0.068)
Observations	1654	1654	1654	1654
Number of districts	199	199	199	199

Notes: The table shows estimates of the effect of public high school expansion on several district-level outcomes. The table presents event study estimates of the Average Treatment Effect on the Treated (ATT) calculated using Doubly Robust Difference-in-Difference estimators (Callaway and Sant'Anna, 2021). The table shows average effects at three time horizons: the average effect up to four years before the start of the expansion (pre-treatment), 0 to 2 years after the start of the expansion, and 3 to 5 years after the start of the expansion. We control the same set of pre-expansion district characteristics for both the inverse probability weighting and the outcome regression adjustment, all measured in 2001: the log of the district population, the shares of population aged 13-15 and 16-18, the employment shares in agriculture and, manufacturing and construction, the share of people aged 13-15 enrolled in middle school. Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

In addition, the pre-expansion estimates in Figure 5 rule out that government targeted districts with rising upper-secondary demand. Our interpretation of the public high school construction as a supply shock would be invalid if investment primarily responded to increasing demand. However, if that were the case, we would expect higher private school construction *prior* to the onset of government intervention. However, all panels in Figure 5 show small and statistically insignificant pre-expansion estimates. Furthermore, Panel A of Table 4 reports average effect estimates analogous to those in Figure 5, but using coarser time windows to improve precision. All pre-expansion estimates are close to zero and insignificant at the 5% level.

The high school expansion could also have affected private schools by altering their student composition. If public high schools are perceived as higher quality, their increased availability might draw higher-achieving students away from private schools. However, test score evidence provides no indication of declining student performance in private schools. Table 3 reports ATT estimates for student scores on the high school exit exam across several subjects, with scores ranging from 0 to 10. Although the estimates are somewhat noisy, there is no clear evidence of lower performance among private school students following the expansion.

The above results have the limitation that they capture private responses only along the school-construction margin. It is therefore possible that the large public supply expansion affected private schools through other channels—such as changes in enrollment, or tuition fees. Nevertheless, it seems unlikely that private school openings would have continued at the same pace if market conditions had deteriorated. A more plausible explanation is that, given the initially low levels of upper-secondary participation, there was ample room for expansion without significantly increasing competition with private providers.

5.3 Did the Expansion Attract New Students?

The upper-secondary expansion raised enrollment in the affected districts. Panel B of Table 4 reports the estimated effects on enrollment rates at the high school (columns 1–3) and middle school (column 4) levels. High school enrollment rates in expansion districts increased 4.1 p.p. three to five years post-expansion —an increase equivalent to 12% of the pre-expansion enrollment rate. Columns (2) and (3) split enrollment by track. Almost all of the increase (87%) is driven by general high schools. Although the estimates in column (3) suggest a modest rise in vocational enrollment, the magnitudes are too small to draw firm conclusions. Column (4) also shows an increase of 3.6 p.p. in lower-secondary enrollment three to five years post-expansion, suggesting spillovers to lower secondary levels.

Table 4: ATT Estimates of the Public High School Expansion on District-Level Outcomes

A. Private School Construction	(1) All High Schools	(2) General High Schools	(3) Vocational High Schools	(4) Middle Schools
3 to 5	0.020***	0.007*	0.013*	0.004
	(0.006)	(0.004)	(0.007)	(0.004)
0 to 2	0.013***	0.006*	0.008**	0.002
	(0.005)	(0.003)	(0.003)	(0.003)
Pre-treatment average	0.005*	0.003*	0.002	-0.002
	(0.003)	(0.001)	(0.002)	(0.002)
B. Enrollment Rates	**High School (16-18)**	**General HS (16-18)**	**Vocational HS (16-18)**	**Middle School (13-15)**
3 to 5	0.041***	0.036**	0.005	0.036***
	(0.013)	(0.014)	(0.005)	(0.014)
0 to 2	0.011*	0.010*	0.001	0.008
	(0.006)	(0.006)	(0.003)	(0.006)
Pre-treatment average	-0.002	-0.001	-0.002	-0.002
	(0.004)	(0.004)	(0.002)	(0.003)
C. Ever Attended	**High School (19-22)**	**General HS (19-22)**	**Vocational HS (19-22)**	**Middle School (19-22)**
3 to 5	0.027*	0.032**	-0.007	0.008
	(0.014)	(0.013)	(0.004)	(0.009)
0 to 2	0.007	0.005	0.001	0.002
	(0.006)	(0.006)	(0.003)	(0.007)
Pre-treatment average	-0.007*	-0.005	-0.000	-0.004
	(0.004)	(0.003)	(0.002)	(0.003)
D. Graduation Rates	**High School (19-22)**	**General HS (19-22)**	**Vocational HS (19-22)**	**Middle School (16-18)**
3 to 5	0.025	0.044***	-0.008**	0.042**
	(0.016)	(0.015)	(0.004)	(0.019)
0 to 2	0.007	0.011**	-0.000	0.005
	(0.005)	(0.005)	(0.003)	(0.007)
Pre-treatment average	-0.007**	-0.007**	0.001	-0.006
	(0.003)	(0.004)	(0.002)	(0.005)
E. Teenage Employment Outcomes	**Employed (16-18)**	**In Paid Employment (16-18)**		
3 to 5	0.001	-0.007		
	(0.013)	(0.006)		
0 to 2	-0.003	-0.008		
	(0.007)	(0.006)		
Pre-treatment average	0.004	0.002		
	(0.004)	(0.003)		
Observations	5218	5218		
Number of districts	293	293		

Notes: The table shows estimates of the effect of public high school expansion on several district-level outcomes. The table shows event study estimates of the Average Treatment Effect on the Treated (ATT) estimated using Doubly-Robust Difference in Difference Estimators (Callaway and Sant'Anna, 2021). The table shows average effects at three time horizons: the average effect up to four years before the start of the expansion (pre-treatment), 0 to 2 years after the start of the expansion, and 3 to 5 years after the start of the expansion. We control the same set of pre-expansion district characteristics for both the inverse probability weighting and the outcome regression adjustment, all measured in 2001: the log of the district population, the shares of population aged 13-15 and 16-18, the employment shares in agriculture and, manufacturing and construction, the share of people aged 13-15 enrolled in middle school. Appendix Table B2 shows analogous estimates that do not include any controls. Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

Panels C and D of Table 4 present analogous results for alternative measures of secondary education participation. Panel C shows effects on attendance rates for 19–22 year olds. The first cohort fully exposed to the expansion—those aged 16 at the start of the expansion—reaches this age range three years post-expansion. Consistent with this timing, the pre-expansion and 0 to 2 years estimates are small and statistically insignificant. The expansion increased high school attendance among 19–22-year-olds by 2.7 p.p., again driven primarily by general-track schools. Panel D shows corresponding estimates for high school and middle school graduation rates. Increases in graduation rates are broadly consistent with those in attendance, though Panel D suggests somewhat larger effects for the general track.[16]

Finally, panel E of Table 4 presents the estimated effects on teenage employment. Before the expansion, about 33% of high-school-age individuals in expansion districts were employed, roughly half of them in paid work. If increased access to high schools had led teenagers who would otherwise have worked to remain in school, we would expect to see a decline in employment rates. However, the small point estimates in Panel E indicate that this was not the case.

5.4 Who Takes Advantage of the Increased Access?

Who were the students persuaded to attend upper-secondary education by the high school expansion? Tables 5 and 6 examine heterogeneity in enrollment responses by gender and parental background. We find sizable gender differences, with the largest increases in high school enrollment being driven by male students whose parents had attended secondary school. In contrast, the rise in middle-school enrollment was concentrated among students from less-educated families. We interpret this pattern as evidence that the expansion lowered the effective cost of schooling in a context with initially low high-school participation but broader access to lower-secondary education.

Table 5 reports effect estimates three to five years after the start of the expansion. Each estimate is derived from an event study restricted to the specified demographic group. All specifications control for the same initial district characteristics as in the previous results, both in outcome adjustment and inverse probability weighting.

Column (1) in Panel A of Table 5 shows that the overall enrollment response among men is approximately 1 percentage point larger than that among women, while Panel B shows stronger responses among students whose father had attended secondary school (at any level). In Panel C, we split the sample by the father's employment sector. Column (2) indicates similar effects on general-track en-

[16]Each column in Table 4 reports separate regressions that flexibly control for pre-expansion district characteristics. Because these estimates come from different regressions, the effect on graduation rates can exceed that on overall participation.

rollment across sectors, whereas Column (3) suggests a small but statistically insignificant increase in vocational enrollment among students whose fathers work outside of agriculture. Finally, the estimates in Panel E indicate stronger general-track responses among students whose mothers work for pay.

Column (4) of Table 5 reports the effects on middle-school enrollment. Interestingly, responses at the lower-secondary level follow roughly the opposite pattern to that at the high-school level. The expansion led to larger increases among students from less advantaged backgrounds—those whose fathers lack secondary education and work in agriculture. Moreover, the estimates in Panel A suggest stronger responses among female students.

Table 5: ATT Estimates of the Public High School Expansion on District-Level Outcomes by Gender and Parental Background

	In High School (16-18) (1)	In General HS (16-18) (2)	In Vocational HS (16-18) (3)	In middle school (13-15) (4)
A. Gender				
Women	0.031***	0.030**	0.001	0.040***
	(0.009)	(0.012)	(0.007)	(0.013)
Men	0.049**	0.040**	0.009	0.034*
	(0.021)	(0.019)	(0.006)	(0.019)
B. Father's education				
Attended secondary	0.043**	0.033**	0.009	-0.005
	(0.020)	(0.017)	(0.009)	(0.010)
No secondary	0.027**	0.023*	0.004	0.055***
	(0.011)	(0.013)	(0.005)	(0.021)
C. Father's sector				
Agriculture	0.017	0.025**	-0.008	0.041**
	(0.013)	(0.012)	(0.009)	(0.016)
Not agriculture	0.037	0.024	0.013	0.004
	(0.024)	(0.022)	(0.009)	(0.011)
D. Mother in paid employment				
Employed	0.042***	0.053***	-0.011	0.022**
	(0.013)	(0.017)	(0.008)	(0.011)
Not employed	0.038***	0.028**	0.010*	0.047***
	(0.011)	(0.012)	(0.005)	(0.017)
Observations	5218	5218	5218	5218
Number of districts	293	293	293	293

Notes: The table presents estimates of the impact of public high school expansion on different demographic groups three to five years after its initiation. Each table cell presents Average Treatment Effect on the Treated (ATT) on the outcome indicated in the column header for the group indicated in the row header. Each cell presents results from a separate regression, estimated using Doubly Robust Difference-in-Difference Estimators (Callaway and Sant'Anna, 2021). We control the same set of pre-expansion district characteristics for both the inverse probability weighting and the outcome regression adjustment, all measured in 2001: the log of the district population, the shares of population aged 13-15 and 16-18, the employment shares in agriculture and, manufacturing and construction, and the share of people aged 13-15 enrolled in middle school. Appendix Table B3 shows estimates of placebo treatment effects that use the same set of controls. In Addition, Appendix Tables and B5 and B6 show analogous estimates that do not include any controls. Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** , $p < .01$.

Table 6 further explores the sources of the observed gender differences. The table reports enrollment responses by parental background separately for men and women. Columns (1) and (2) show that the expansion primarily attracted male students from more educated households, whereas women's enrollment response was concentrated among those with less-educated parents. Columns (7) and (8) present analogous estimates for lower-secondary enrollment, where gender differences are much smaller.

In Appendix Tables B3 and B4, we present placebo estimates corresponding to Tables 5 and 6. These are the average estimates for the first four years pre-expansion. Reassuringly, with just a few exceptions, all the estimates are generally small and insignificant, which we interpret as evidence supporting our identification assumptions.

6 Conclusions

This paper studies how students and private providers responded to Indonesia's large-scale public high school expansion in the 2000s. This large-scale expansion built over 6,000 new schools over 15 years and targeted areas with low baseline participation and limited access. Using a staggered Difference-in-Differences design á la Callaway and Sant'Anna (2021), we show that the expansion substantially increased upper-secondary enrollment without crowding out private investment.

Despite the large and sustained public construction effort, private high school entry continued at a comparable pace in treated and control districts. Moreover, we find no evidence that the expansion reduced the quality of private school students. This suggests that in settings where secondary participation remains low, public investment can expand access without significantly displacing private supply.

On the demand side, the expansion increased high school enrollment by about four p.p. points within five years (12% of the baseline rates). We also observe spillovers to lower-secondary education, consistent with higher perceived returns to continued schooling. However, the benefits were unevenly distributed: the largest gains accrued to male students from more advantaged households, while increases among women were smaller and concentrated among the less educated.

Taken together, our results highlight that large-scale public investments can meaningfully raise educational participation even in mixed public–private systems, provided that baseline participation is low. Yet they also reveal that supply-side interventions alone are insufficient to ensure equitable

TABLE 6: ATT ESTIMATES OF THE PUBLIC HIGH SCHOOL EXPANSION ON DISTRICT-LEVEL OUTCOMES BY PARENTAL BACKGROUND FOR MEN AND WOMEN

	IN HIGH SCHOOL (16-18)		IN GENERAL HS (16-18)		IN VOCATIONAL HS (16-18)		IN MIDDLE SCHOOL (13-15)	
	WOMEN (1)	MEN (2)	WOMEN (3)	MEN (4)	WOMEN (5)	MEN (6)	WOMEN (7)	MEN (8)
A. FATHER'S EDUCATION								
Attended secondary	0.010	0.063*	0.015	0.044*	-0.005	0.019	-0.002	-0.008
	(0.017)	(0.036)	(0.020)	(0.026)	(0.010)	(0.015)	(0.017)	(0.012)
No secondary	0.023**	0.029*	0.019	0.027	0.004	0.003	0.057***	0.051**
	(0.012)	(0.015)	(0.012)	(0.018)	(0.007)	(0.006)	(0.019)	(0.025)
B. MOTHER'S EDUCATION								
Attended secondary	-0.015	0.056*	-0.020	0.052**	0.005	0.005	0.000	-0.022
	(0.024)	(0.032)	(0.021)	(0.026)	(0.013)	(0.015)	(0.019)	(0.023)
No secondary	0.028**	0.041***	0.027**	0.043**	0.001	-0.001	0.049***	0.041*
	(0.011)	(0.016)	(0.011)	(0.019)	(0.008)	(0.006)	(0.016)	(0.024)
C. FATHER'S SECTOR								
Agriculture	0.008	0.033**	0.014	0.041***	-0.006	-0.008	0.035*	0.044**
	(0.016)	(0.017)	(0.013)	(0.016)	(0.010)	(0.011)	(0.019)	(0.019)
Not agriculture	0.024	0.052	0.011	0.034	0.012	0.018*	0.005	0.003
	(0.017)	(0.038)	(0.020)	(0.034)	(0.011)	(0.009)	(0.016)	(0.025)
D. MOTHER IN PAID EMPLOYMENT								
Employed	0.014	0.061***	0.030	0.067***	-0.015	-0.006	0.034**	0.015
	(0.019)	(0.018)	(0.024)	(0.018)	(0.013)	(0.008)	(0.015)	(0.019)
Not employed	0.031***	0.042*	0.021*	0.032	0.010*	0.009	0.052***	0.045**
	(0.010)	(0.022)	(0.011)	(0.022)	(0.006)	(0.006)	(0.018)	(0.021)
OBSERVATIONS	5218	5218	5218	5218	5218	5218	5218	5218
NUMBER OF DISTRICTS	293	293	293	293	293	293	293	293

Notes: The table presents estimates of the impact of public high school expansion on different demographic groups three to five years after its initiation. Each table cell presents Average Treatment Effect on the Treated (ATT) on the outcome indicated in the column header for the group indicated in the row header. Each cell presents results from a separate regression, estimated using Doubly-Robust Difference in Difference Estimators (Callaway and Sant'Anna, 2021). We control the same set of pre-expansion district characteristics for both the inverse probability weighting and the outcome regression adjustment, all measured in 2001: the log of the district population, the shares of population aged 13-15 and 16-18, the employment shares in agriculture and, manufacturing and construction, the share of people aged 13-15 enrolled in middle school. Appendix Table B4 shows estimates of placebo treatment effects that use the same set of controls. In Addition, Appendix Tables B7 and B8 show analogous estimates that do not include any controls. Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

access. Complementary policies—such as targeted financial aid, support for disadvantaged students, and incentives for female participation—may be needed to ensure that the gains from expansion reach those facing the highest barriers to schooling.

Finally, future work will examine the consequences of this expansion for students' labor market prospects and for the district's local labor markets as a whole. Understanding whether increased access to secondary education translated into improved employment outcomes or shifts in the composition of local labor demand will help determine the returns to such large public investment.

References

Andrabi, Tahir, Natalie Bau, Jishnu Das, Naureen Karachiwalla, and Asim Ijaz Khwaja. 2024. "Crowding in private quality: The equilibrium effects of public spending in education." The Quarterly Journal of Economics, 139(4): 2525–2577.

Baker, Andrew, Brantly Callaway, Scott Cunningham, Andrew Goodman-Bacon, and Pedro H Sant'Anna. 2025. "Difference-in-Differences Designs: A Practitioner's Guide." Journal of Economic Literature (forthcoming).

Barrera-Osorio, Felipe, David S Blakeslee, Matthew Hoover, Leigh Linden, Dhushyanth Raju, and Stephen P Ryan. 2022. "Delivering Education to the Underserverd Through a Public-Private Partnership Program in Afganistan." Review of Economics and Statistics, 104(3): 399–416.

Bazzi, Samuel, Masyhur Hilmy, and Benjamin Marx. 2025. "Religion, Education, and the State." The Review of Economic Studies, rdaf071.

Bedi, Arjun S., and Ashish Garg. 2000. "The effectiveness of private versus public schools: the case of Indonesia." Journal of Development Economics, 61(2): 463–494.

Brudevold-Newman, Andrew. 2021. "Expanding access to secondary education: Evidence from a fee reduction and capacity expansion policy in Kenya." Economics of Education Review, 83: 102127.

Burde, Dana, and Leigh L Linden. 2013. "Bringing education to afghan girls: A randomized controlled trial of village-based schools." American Economic Journal: Applied Economics, 5(3): 27–40.

Callaway, Brantly, and Pedro H.C. Sant'Anna. 2021. "Difference-in-Differences with multiple time periods." Journal of Econometrics, 225(2): 200–230. Themed Issue: Treatment Effect 1.

Cattaneo, Matias D., Richard K. Crump, Max H. Farrell, and Yingjie Feng. 2024. "On Binscatter." American Economic Review, 114(5): 1488–1514.

Central Bureau of Statistics. 2001–2018. "SUSENAS: National Socio-Economic Survey, 2001–2018." Microdata series of nationally representative household surveys (core and modules), multiple waves 2001–2018, Producer and distributor: BPS, Indonesia.

Crawfurd, Lee, and Aisha Ali. 2022. "The Case for Free Secondary Education." In Schooling for All: Feasible Strategies to Achieve Universal Education. , ed. Justin Sandefur, Chapter 3. Center for Global Development.

Crawfurd, Lee, Susannah Hares, Ana Minardi, and Justin Sandefur. 2021. Understanding Education Policy Preferences: Survey Experiments with Policymakers in 35 Developing Countries. Center for Global Development.

de Chaisemartin, Clément, and Xavier D'Haultfœuille. 2024. "Difference-in-Differences Estimators of Intertemporal Treatment Effects." The Review of Economics and Statistics, 1–45.

Dinerstein, Michael, and Troy D Smith. 2021. "Quantifying the supply response of private schools to public policies." American Economic Review, 111(10): 3376–3417.

Ditjen Vokasi. 2021. "Laporan Kinerja Direktorat Jenderal Vokasi Tahun 2020." Direktorat Jenderal Pendidikan Vokasi Kementerian Pendidikan dan Kebudayaan.

Duflo, Esther. 2001. "Schooling and labor market consequences of school construction in Indonesia: Evidence from an unusual policy experiment." American Economic Review, 91(4): 795–813.

Human Rights Watch. 2001. "Indonesia: The War in Aceh."

Indonesian Ministry of Finance. 2008. "State Budget of the Republic of Indonesia: Financial Note and State Budget for Fiscal Year 2008." Jakarta: Ministry of Finance, Republic of Indonesia.

Khanna, Gaurav. 2023. "Large-Scale Education Reform in General Equilibrium: Regression Discontinuity Evidence from India." Journal of Political Economy, 131(2): 549–591.

Koppensteiner, Martin Foureaux, and Jesse Matheson. 2021. "Secondary Schools and Teenage Childbearing: Evidence from the School Expansion in Brazilian Municipalities." World Bank Economic Review, 35(4): 1019–1037.

Ministry of Education. 2018. "Basic Education Statistics." Accessed: December 1, 2018.

Ministry of Education. 2025. "Education Master Data (Data Induk Pendidikan)." `https://data.kemendikdasmen.go.id/data-induk`, Accessed: June 1, 2025.

Republic of Indonesia. 2000. "Law No. 25 of 2000 on the National Development Programme (Propenas) 2000–2004." National development plan for 2000–2004.

Republic of Indonesia. 2003. "Law No. 20 of 2003 on the National Education System." Jakarta: Government of the Republic of Indonesia. (Unofficial English translation).

Rios-Avila, Fernando, Pedro H. C. Sant'Anna, and Brantly Callaway. 2021. "csdid: Difference-in-Differences with Multiple Periods." Stata package.

Sant'Anna, Pedro H.C., and Jun Zhao. 2020. "Doubly robust difference-in-differences estimators." Journal of Econometrics, 219(1): 101–122.

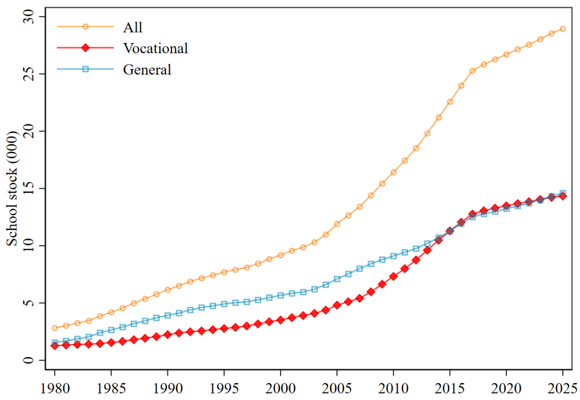
The World Bank. 2025. "Education Statistics – All Indicators (EdStats) DataBank."

Appendix

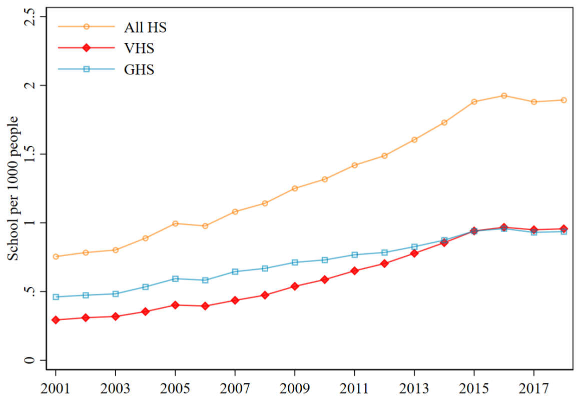
A Figures

Figure A1: There was a Large Expansion in the High School Stock

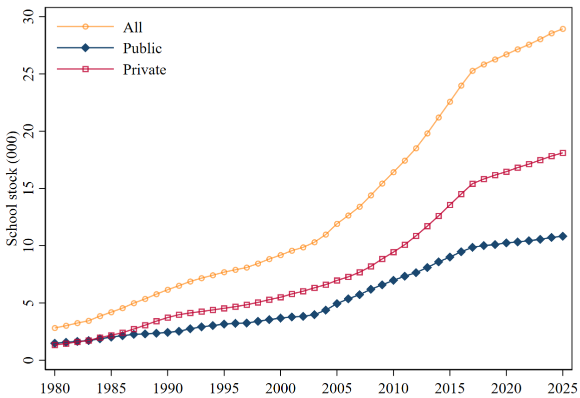
(a) High School Stock



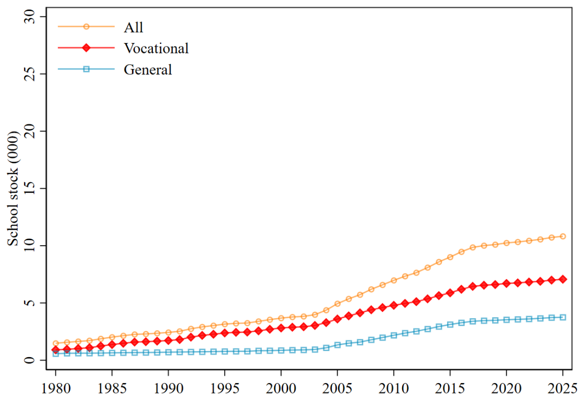
(b) High Schools per Thousand Age-Relevant People



(c) High School Stock by Ownership

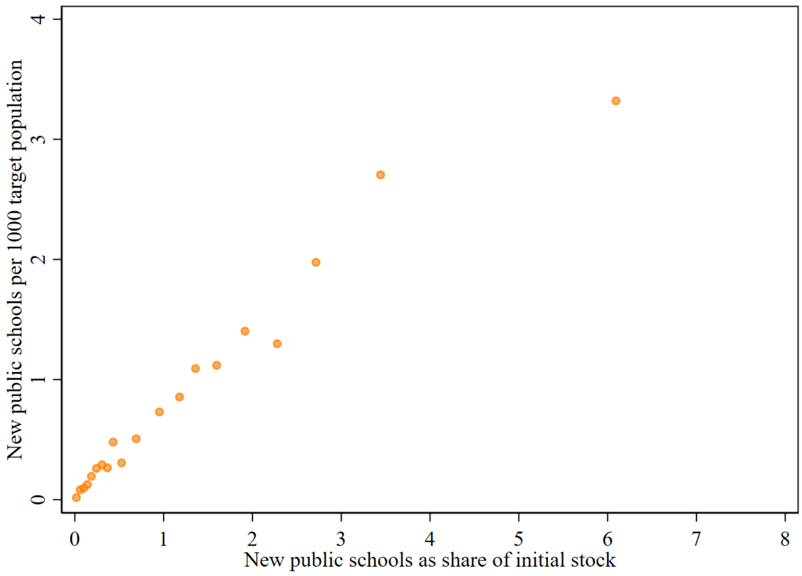


(d) Public High School Stock by Track



Notes: The figure shows the total high school stock by level and track. Panel (a) shows the total number of schools by track. Panel (b) the number of high schools per 1000 people in high school age (16-18), separately by track. Panel (c) shows the high school stock by ownership (public/private), and panel (c) shows the public high school by track. Panels (a), (c), and (d) show totals in thousands. Data from the Education Master Dataset and SUSENAS 2001-2018.

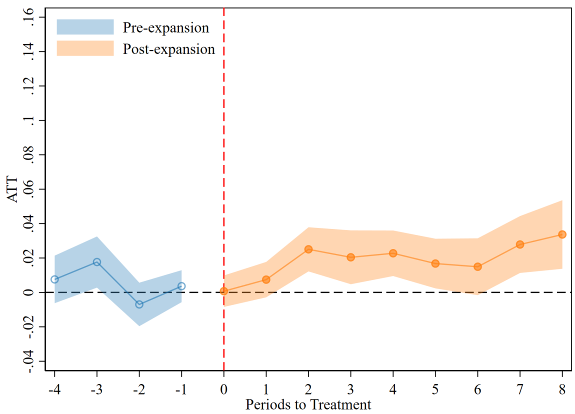
Figure A2: Measures of Public High School Building Intensity are Strongly Correlated



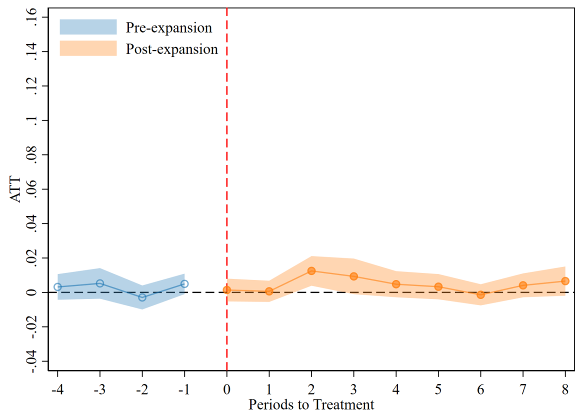
Notes: The figure shows a binned scatter plot describing the relationship between our preferred measure of building intensity – number of new high schools built as a share of the 2001 stock– and the number of new high schools built per 1000 high-school-age people. The plot uses the total number of schools built between 2001 and 2025. Each dot represents a fifth of the districts. Data from the Education Master Dataset.

Figure A3: ATT Estimates on Private School Construction Without Controls

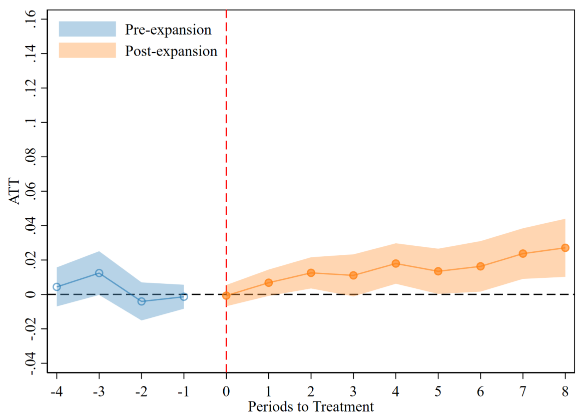
(a) All Private High Schools



(b) Private General High Schools



(c) Private Vocational High Schools



Notes: The figure shows event study estimates of the effect of public high school expansion on several district-level outcomes. These are estimates of the Average Treatment Effect on the Treated (ATT) estimated using Doubly-Robust Difference in Difference Estimators (Callaway and Sant'Anna, 2021). Each panel shows the ATT on the number of private schools for the type indicated in the panel title as a share of the 2001 high school stock –including both public and private–. The figure shows 95% confidence intervals. Data from SUSENAS 2001-2018 and the Education Master Dataset.

B Tables

Table B1: Characteristics of Public and Private High Schools

A. High Schools by Ownership	(1) All	(2) Public	(3) Private
Private school	0.58	0.00	1.00
Share Vocational	0.48	0.33	0.58
Private school	0.58	0.00	1.00
Number of classrooms	13.49	18.11	10.17
Number of labs	2.32	2.97	1.85
Number of libraries	0.90	0.96	0.85
Number of sinks	5.15	6.75	4.01
Has sitting toilet	0.91	0.91	0.91
Number of usable toilets	8.63	10.22	7.49
Has internet	0.66	0.66	0.67
Has grid electricity	0.97	0.95	0.99
Total students	394.27	569.50	268.35
Number of male students	199.89	270.92	148.85
Number of female students	194.38	298.58	119.50
Female student share	0.48	0.51	0.46
Total teachers	24.53	36.55	15.89
Number of male teachers	10.77	15.37	7.46
Number of female teachers	13.76	21.18	8.43
Female teacher share	0.55	0.58	0.54
Teachers per student	0.09	0.09	0.09
Number of classes	13.69	18.86	9.97
Average class size	25.49	27.83	23.80
Observations	19,975	8,352	11,623

Notes: The table shows average high school characteristics by ownership. The table restricts the sample to schools with valid data in all the characteristics shown in the table. Data from the 2018 and 2025 Education Master Datasets.

Table B2: ATT Estimates of the Public High School Expansion on District-Level Outcomes Without Controls

A. Private School Construction	(1) All High Schools	(2) General High Schools	(3) Vocational High Schools	(4) Middle Schools
3 to 5	0.020***	0.006*	0.014***	0.005
	(0.006)	(0.003)	(0.005)	(0.003)
0 to 2	0.011***	0.005*	0.006**	0.003
	(0.004)	(0.003)	(0.003)	(0.002)
Pre-treatment average	0.005**	0.003*	0.003	-0.001
	(0.002)	(0.001)	(0.002)	(0.002)
B. Enrollment Rates	**High School (16-18)**	**General HS (16-18)**	**Vocational HS (16-18)**	**Middle School (13-15)**
3 to 5	0.047***	0.039***	0.008*	0.048***
	(0.007)	(0.007)	(0.005)	(0.007)
0 to 2	0.016***	0.012***	0.005	0.016***
	(0.005)	(0.004)	(0.003)	(0.005)
Pre-treatment average	-0.000	-0.000	0.000	0.002
	(0.004)	(0.004)	(0.002)	(0.003)
C. Ever Attended	**High School (19-22)**	**General HS (19-22)**	**Vocational HS (19-22)**	**Middle School (19-22)**
3 to 5	0.036***	0.027***	-0.002	0.030***
	(0.007)	(0.005)	(0.004)	(0.007)
0 to 2	0.010**	0.007	0.000	0.007
	(0.005)	(0.004)	(0.003)	(0.005)
Pre-treatment average	-0.003	-0.003	0.002	0.000
	(0.003)	(0.002)	(0.002)	(0.003)
D. Graduation Rates	**High School (19-22)**	**General HS (19-22)**	**Vocational HS (19-22)**	**Middle School (16-18)**
3 to 5	0.023***	0.029***	-0.006	0.042***
	(0.006)	(0.006)	(0.004)	(0.007)
0 to 2	0.008*	0.011***	-0.001	0.006
	(0.005)	(0.004)	(0.002)	(0.005)
Pre-treatment average	-0.006**	-0.007**	0.001	-0.002
	(0.003)	(0.003)	(0.002)	(0.003)
E. Teenage Employment Outcomes	**Employed (16-18)**	**In Paid Employment (16-18)**		
3 to 5	-0.021***	-0.009*		
	(0.008)	(0.005)		
0 to 2	-0.011**	-0.005		
	(0.005)	(0.004)		
Pre-treatment average	-0.002	0.005**		
	(0.003)	(0.003)		
Observations	5218	5218		
Number of districts	293	293		

Notes: The table shows estimates of the effect of public high school expansion on several district-level outcomes. The table shows event study estimates of the Average Treatment Effect on the Treated (ATT) estimated using Doubly-Robust Difference in Difference Estimators (Callaway and Sant'Anna, 2021). The table shows average effects at three time horizons: the average effect up to four years before the start of the expansion (pre-treatment), 0 to 2 years after the start of the expansion, and 3 to 5 years after the start of the expansion. Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table B3: ATT Estimates of the Public High School Expansion on District-Level Outcomes by Gender and Parental Background

	In High School (16-18) (1)	In General HS (16-18) (2)	In Vocational HS (16-18) (3)	In middle school (13-15) (4)
A. Gender				
Women	0.001	0.004	-0.004	0.002
	(0.004)	(0.005)	(0.002)	(0.004)
Men	-0.004	-0.005	0.001	-0.004
	(0.005)	(0.005)	(0.003)	(0.004)
B. Father's education				
Attended secondary	-0.003	-0.000	-0.003	0.004
	(0.008)	(0.008)	(0.004)	(0.005)
No secondary	-0.001	0.002	-0.003	-0.004
	(0.004)	(0.004)	(0.003)	(0.005)
C. Father's sector				
Agriculture	0.002	0.007	-0.004	0.001
	(0.006)	(0.007)	(0.006)	(0.009)
Not agriculture	-0.004	0.001	-0.006*	-0.003
	(0.006)	(0.005)	(0.003)	(0.005)
D. Mother in paid employment				
Employed	-0.001	0.002	-0.003	-0.004
	(0.006)	(0.006)	(0.004)	(0.005)
Not employed	-0.001	-0.001	0.000	-0.002
	(0.004)	(0.005)	(0.003)	(0.004)
Observations	5218	5218	5218	5218
Number of districts	293	293	293	293

Notes: The table presents estimates of the impact of public high school expansion on different demographic groups three to five years after its initiation. Each table cell presents Average Treatment Effect on the Treated (ATT) on the outcome indicated in the column header for the group indicated in the row header. Each cell presents results from a separate regression, estimated using Doubly-Robust Difference in Difference Estimators (Callaway and Sant'Anna, 2021). We control the same set of pre-expansion district characteristics for both the inverse probability weighting and the outcome regression adjustment, all measured in 2001: the log of the district population, the shares of population aged 13-15 and 16-18, the employment shares in agriculture and, manufacturing and construction, and the share of people aged 13-15 enrolled in middle school. Appendix Tables and B5 and B6 show analogous estimates that do not include any controls. Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** , $p < .01$.

Table B4: ATT Estimates of the Public High School Expansion on District-Level Outcomes by Parental Background for Men and Women

	In High School (16-18)		In General HS (16-18)		In Vocational HS (16-18)		In Middle School (13-15)	
	Women	Men	Women	Men	Women	Men	Women	Men
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Father's education								
Attended secondary	0.010	-0.009	0.013	-0.007	-0.004	-0.002	0.007	0.005
	(0.010)	(0.008)	(0.009)	(0.009)	(0.004)	(0.007)	(0.007)	(0.008)
No secondary	-0.000	-0.003	0.007	-0.004	-0.007*	0.001	0.000	-0.007
	(0.006)	(0.006)	(0.005)	(0.006)	(0.004)	(0.004)	(0.006)	(0.007)
B. Mother's education								
Attended secondary	-0.008	-0.015	-0.000	-0.011	-0.008*	-0.003	0.017	-0.001
	(0.010)	(0.013)	(0.011)	(0.012)	(0.005)	(0.007)	(0.013)	(0.009)
No secondary	0.001	-0.002	0.005	-0.007	-0.004	0.005	0.001	-0.003
	(0.005)	(0.006)	(0.005)	(0.007)	(0.003)	(0.004)	(0.005)	(0.006)
C. Father's sector								
Agriculture	0.002	0.002	0.015	-0.005	-0.012	0.007	0.007	-0.005
	(0.010)	(0.009)	(0.010)	(0.009)	(0.008)	(0.006)	(0.013)	(0.012)
Not agriculture	0.004	-0.011*	0.009	-0.006	-0.005	-0.005	-0.000	-0.006
	(0.007)	(0.007)	(0.007)	(0.007)	(0.004)	(0.006)	(0.006)	(0.006)
D. Mother in paid employment								
Employed	0.002	-0.004	0.010	-0.007	-0.008*	0.003	0.006	-0.014*
	(0.009)	(0.008)	(0.010)	(0.007)	(0.005)	(0.005)	(0.006)	(0.007)
Not employed	0.002	-0.001	0.002	-0.003	-0.000	0.002	-0.001	-0.003
	(0.006)	(0.006)	(0.005)	(0.006)	(0.003)	(0.003)	(0.005)	(0.005)
Observations	5218	5218	5218	5218	5218	5218	5218	5218
Number of districts	293	293	293	293	293	293	293	293

Notes: The table presents estimates of the impact of public high school expansion on different demographic groups three to five years after its initiation. Each table cell presents Average Treatment Effect on the Treated (ATT) on the outcome indicated in the column header for the group indicated in the row header. Each cell presents results from a separate regression, estimated using Doubly Robust Difference-in-Difference Estimators (Callaway and Sant'Anna, 2021). We control the same set of pre-expansion district characteristics for both the inverse probability weighting and the outcome regression adjustment, all measured in 2001: the log of the district population, the shares of population aged 13-15 and 16-18, the employment shares in agriculture and, manufacturing and construction, the share of people aged 13-15 enrolled in middle school. In addition, Appendix Tables B7 and B8 show analogous estimates that do not include any controls. Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table B5: ATT Estimates of the Public High School Expansion on District-Level Outcomes by Gender and Parental Background Without Controls

	In High School (16-18) (1)	In General HS (16-18) (2)	In Vocational HS (16-18) (3)	In middle school (13-15) (4)
A. Gender				
Women	0.049***	0.037***	0.013**	0.051***
	(0.009)	(0.008)	(0.005)	(0.009)
Men	0.044***	0.040***	0.003	0.045***
	(0.009)	(0.009)	(0.006)	(0.009)
B. Father's education				
Attended secondary	0.030***	0.027***	0.003	0.014*
	(0.010)	(0.010)	(0.007)	(0.008)
No secondary	0.038***	0.031***	0.007	0.051***
	(0.008)	(0.008)	(0.005)	(0.009)
C. Father's sector				
Agriculture	0.016	0.020	-0.004	0.038***
	(0.013)	(0.013)	(0.010)	(0.014)
Not agriculture	0.027***	0.019**	0.008	0.020**
	(0.009)	(0.009)	(0.006)	(0.008)
D. Mother in paid employment				
Employed	0.046***	0.040***	0.006	0.041***
	(0.009)	(0.009)	(0.006)	(0.010)
Not employed	0.047***	0.041***	0.006	0.049***
	(0.008)	(0.008)	(0.005)	(0.008)
Observations	5218	5218	5218	5218
Number of districts	293	293	293	293

Notes: The table presents estimates of the impact of public high school expansion on different demographic groups three to five years after its initiation. Each table cell presents Average Treatment Effect on the Treated (ATT) on the outcome indicated in the column header for the group indicated in the row header. Each cell presents results from a separate regression, estimated using Doubly-Robust Difference in Difference Estimators (Callaway and Sant'Anna, 2021). Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** , $p < .01$.

Table B6: Placebo ATT Estimates of the Public High School Expansion on District-Level Outcomes by Gender and Parental Background Without Controls

	In High School (16-18) (1)	In General HS (16-18) (2)	In Vocational HS (16-18) (3)	In middle school (13-15) (4)
A. Gender				
Women	0.004	0.007*	-0.003	0.004
	(0.004)	(0.004)	(0.003)	(0.004)
Men	-0.003	-0.006	0.003	0.001
	(0.005)	(0.005)	(0.003)	(0.003)
B. Father's education				
Attended secondary	0.004	0.003	0.001	0.000
	(0.006)	(0.006)	(0.004)	(0.004)
No secondary	-0.000	0.000	-0.000	-0.001
	(0.004)	(0.004)	(0.003)	(0.004)
C. Father's sector				
Agriculture	-0.001	0.004	-0.004	0.001
	(0.007)	(0.008)	(0.006)	(0.009)
Not agriculture	0.000	0.002	-0.002	-0.002
	(0.004)	(0.005)	(0.004)	(0.004)
D. Mother in paid employment				
Employed	0.000	-0.001	0.001	0.002
	(0.005)	(0.005)	(0.004)	(0.005)
Not employed	0.001	-0.000	0.001	0.001
	(0.004)	(0.004)	(0.003)	(0.004)
Observations	5218	5218	5218	5218
Number of districts	293	293	293	293

Notes: The table presents estimates of the impact of public high school expansion on different demographic groups three to five years after its initiation. Each table cell presents Average Treatment Effect on the Treated (ATT) on the outcome indicated in the column header for the group indicated in the row header. Each cell presents results from a separate regression, estimated using Doubly-Robust Difference in Difference Estimators (Callaway and Sant'Anna, 2021). Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** , $p < .01$.

Table B7: ATT Estimates of the Public High School Expansion on District-Level Outcomes by Parental Background for Men and Women, no Controls

	In High School (16-18)		In General HS (16-18)		In Vocational HS (16-18)		In Middle School (13-15)	
	Women (1)	Men (2)	Women (3)	Men (4)	Women (5)	Men (6)	Women (7)	Men (8)
A. Father's education								
Attended secondary	0.022	0.030**	0.018	0.029**	0.004	0.001	0.011	0.017*
	(0.013)	(0.013)	(0.013)	(0.013)	(0.009)	(0.009)	(0.011)	(0.010)
No secondary	0.046***	0.027***	0.029***	0.030***	0.018**	-0.003	0.063***	0.038***
	(0.011)	(0.010)	(0.010)	(0.010)	(0.007)	(0.006)	(0.011)	(0.011)
B. Mother's education								
Attended secondary	0.020	0.024*	0.009	0.035**	0.011	-0.011	-0.003	-0.002
	(0.014)	(0.014)	(0.014)	(0.015)	(0.009)	(0.011)	(0.012)	(0.011)
No secondary	0.047***	0.035***	0.036***	0.043***	0.011*	-0.008	0.058***	0.043***
	(0.010)	(0.009)	(0.009)	(0.009)	(0.006)	(0.006)	(0.011)	(0.011)
C. Father's sector								
Agriculture	0.024	0.026	0.011	0.035**	0.013	-0.009	0.032*	0.038**
	(0.016)	(0.018)	(0.016)	(0.017)	(0.011)	(0.013)	(0.017)	(0.016)
Not agriculture	0.024**	0.031***	0.015	0.023**	0.010	0.008	0.026**	0.014
	(0.011)	(0.011)	(0.011)	(0.012)	(0.007)	(0.007)	(0.011)	(0.011)
D. Mother in paid employment								
Employed	0.040***	0.042***	0.031***	0.043***	0.009	-0.000	0.043***	0.043***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.008)	(0.008)	(0.013)	(0.013)
Not employed	0.049***	0.043***	0.038***	0.043***	0.011**	0.000	0.048***	0.048***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.006)	(0.007)	(0.010)	(0.010)
Observations	5218	5218	5218	5218	5218	5218	5218	5218
Number of districts	293	293	293	293	293	293	293	293

Notes: The table presents estimates of the impact of public high school expansion on different demographic groups three to five years after its initiation. Each table cell presents Average Treatment Effect on the Treated (ATT) on the outcome indicated in the column header for the group indicated in the row header. Each cell presents results from a separate regression, estimated using Doubly Robust Difference-in-Differences Estimators (Callaway and Sant'Anna, 2021). Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table B8: ATT Estimates of the Public High School Expansion on District-Level Outcomes by Parental Background for Men and Women, no Controls

	In High School (16-18)		In General HS (16-18)		In Vocational HS (16-18)		In Middle School (13-15)	
	Women (1)	Men (2)	Women (3)	Men (4)	Women (5)	Men (6)	Women (7)	Men (8)
A. Father's education								
Attended secondary	0.016**	-0.004	0.021***	-0.011	-0.005	0.008	0.004	-0.002
	(0.007)	(0.007)	(0.007)	(0.008)	(0.004)	(0.006)	(0.006)	(0.006)
No secondary	0.004	-0.006	0.006	-0.007	-0.002	0.002	0.001	-0.001
	(0.005)	(0.005)	(0.005)	(0.006)	(0.004)	(0.004)	(0.006)	(0.006)
B. Mother's education								
Attended secondary	0.005	-0.007	0.017**	-0.013	-0.012***	0.006	0.007	-0.001
	(0.008)	(0.009)	(0.008)	(0.008)	(0.005)	(0.006)	(0.007)	(0.007)
No secondary	0.006	-0.002	0.004	-0.005	0.002	0.004	0.003	0.002
	(0.005)	(0.005)	(0.004)	(0.006)	(0.003)	(0.003)	(0.005)	(0.006)
C. Father's sector								
Agriculture	0.005	-0.005	0.016	-0.005	-0.010	-0.000	0.001	-0.007
	(0.011)	(0.009)	(0.011)	(0.009)	(0.008)	(0.005)	(0.012)	(0.011)
Not agriculture	0.009	-0.007	0.013**	-0.008	-0.005	0.000	-0.001	-0.004
	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)	(0.005)	(0.005)	(0.005)
D. Mother in paid employment								
Employed	0.003	0.000	0.011	-0.009	-0.008	0.010**	0.009	-0.004
	(0.007)	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.007)	(0.006)
Not employed	0.005	-0.002	0.003	-0.003	0.002	0.002	-0.000	0.002
	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.003)	(0.005)	(0.004)
Observations	5218	5218	5218	5218	5218	5218	5218	5218
Number of districts	293	293	293	293	293	293	293	293

Notes: The table presents estimates of the impact of public high school expansion on different demographic groups three to five years after its initiation. Each table cell presents Average Treatment Effect on the Treated (ATT) on the outcome indicated in the column header for the group indicated in the row header. Each cell presents results from a separate regression, estimated using Doubly Robust Difference-in-Difference Estimators (Callaway and Sant'Anna, 2021). Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.