The Indigenous Origins of Colonial Education:
Evidence from British Burma[*]

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Abstract

Given significant and chronic fiscal constraints throughout their rule, why did some colonial states pursue fiscally demanding expansions in education when they could rely on societal actors? I argue that two key factors explain variations in colonial educational involvement; only when **indigenous education levels** and **resistance against colonial control** were both sufficiently high, colonial states shifted from relying on indigenous providers to replacing them with schools under stronger state control. Using original panel data of 33 British Burma districts over two decades (1901-20), when a pivotal transformation from a traditional reliance on Buddhist monastic education to a secular school system occurred, I show that significant increases in female enrollment (a key measure of state involvement as Buddhist monastic schools excluded women) occurred in districts with high Buddhist male literacy *and* high numbers of riots. The findings highlight indigenous society's important role in the development of states under weak fiscal capacity.

Keywords: colonialism, state capacity, education, resistance, Burma (Myanmar)

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Colonial states are well-known for two things. First, the main purpose behind their establishment was to maximize the generation of economic resources for the colonizing state. To pursue this, they resorted to physical violence and exploitation of indigenous communities with persistent political and economic consequences among post-independence states (Dell 2010; Lechler and McNamee 2018; Lowes and Montero 2018). Second, given the inefficiencies in their administration, many states faced significant and chronic fiscal constraints throughout their periods of rule Booth 2007; Frankema 2011.

Despite this prevalent focus on resource extraction and chronic fiscal constraints, colonial states also display categorically different variations in education, a function of the state considered to be one of the most complex to implement (Dincecco 2017); in some cases they relied on societal actors such as local elites and missionary societies (Chaudhary 2009; Lankina and Getachew 2012), while in others, bureaucrats appointed by the state played a pivotal role (Hong and Paik 2018; Soifer 2013). This variation presents an important theoretical puzzle for the scholars of state development: why did states pursue fiscally expensive expansions in educational involvement instead of relying on societal actors, especially when their fiscal capacity was limited building a new education system involved high fiscal costs?

To address this puzzle, I introduce a new theory of state involvement in education that highlights two important factors that explain the variations in the state's educational involvement: existing societal organizations providing education and local resistance against state control. When local resistance is low, the state limits its involvement in the places where societal organizations already provide education. Instead, it supports and cooperates with these organizations to accumulate human capital and train bureaucrats without facing the costs of establishing a new system from the ground up. When local resistance is high, however, ideological conversion becomes the primary motive behind state involvement; this translates into the increased control or replacement of existing non-state providers so that the state can assert more control over educational content.

I provide empirical evidence from British Burma, given the extensive system of Buddhist monasteries there, where most Buddhist males received education under the pre-colonial state. I manually constructed panel data of British Burma districts between 1901 and 1920 from detailed district gazetteers and censuses. I measure my main dependent variable, colonial involvement in education, with the female enrollments,

exploiting the historical fact that indigenous monastic schools did not allow women to enroll. The measures for the two explanatory variables are the number of literate Buddhist males from decennial censuses, which proxies for indigenous education levels, and the cumulative number of convicted cases for riot and unlawful assembly since 1901 from district gazetteers, which proxies for anti-colonial resistance.

Using two-way fixed effects models that control for district-level characteristics and overall time trends, the empirical results support the argument that colonial educational involvement only expanded when indigenous education levels and anti-colonial resistance were sufficiently high. While greater rioting was correlated with lower levels of female enrollment when Buddhist male literacy was low, this correlation became significantly positive when Buddhist male literacy was high. Similarly, while Buddhist male literacy was not significantly correlated with female enrollment when rioting was low, this correlation became positive for high levels of rioting. Furthermore, I show that factor endowments or the presence of Christian missionary activity do not drive these results.

The findings reveal theoretical connections between the explanations that conceptualize education as an economic good for redistribution and bureaucratic training (Ansell and Lindvall 2013; Furnivall 1948) with those that emphasize education's potential for forming national identities (Testa 2018; Weber 1976). Rather than emphasizing either purpose, it suggests their relative importance in state education policy responds to societal factors. While economic incentives initially drive states to rely on societal providers as a cost-minimizing strategy, increasing resistance against the state necessitates government intervention in education provision by replacing societal providers with those under stronger state control. By specifically focusing on the colonial context, the paper investigates an underrepresented form of the state-building process in education where significant fiscal constraints were present, contrasting to the history of state-building in European cases, where the expansion of the state's role in education occurred along with expanding fiscal capacity (Dincecco 2017).

The findings also build on the growing research on the emergence of mass education under non-democratic states (Aghion et al. 2018; Paglayan 2020). Departing from the political economy literature that emphasizes democratic institutions as a key driving force behind education provision (Go and Lindert 2007; Harding and Stasavage 2014; Lindert 2004), these studies emphasize that early instances of

state involvement in education happened during non-democratic regimes and explain the phenomenon by factors such as military rivalry and internal conflict. In particular, this paper builds on Paglayan's work evaluating the relationship between internal conflict and state involvement in education after the 1859 Chilean Civil War (Paglayan 2022). While the Chilean case showed state cooperation with the Church in spreading education against local resistance, the Burmese case (1) shows how the theory travels in colonial contexts and (2) reveals certain conditions led to the changing relationships between the state and existing societal providers when the local providers themselves became perceived as sources of resistance. It also highlights the need to conceptualize state involvement in education not simply as a process of expansion but as one of interaction with, or even the replacement of, existing societal organizations.

By examining colonial education policy's response to pre-existing indigenous providers, the findings also contribute to the literature tracing the origins of colonial institutions to indigenous political history. Particularly, it contributes to the ongoing discussions about the origins and consequences of direct versus indirect rule in colonial states (Mamdani 1996; Lange, Mahoney, and Vom Hau 2006). Extending this concept, I show how a specific institution that existed for centuries before colonial rule (in this case, education) played a role in developing colonial institutions. This also connects the paper's findings with the new literature on the long-run consequences of pre-colonial political institutions and the literature on the development of colonial education in Asia and Africa (Hong and Paik 2018; Huillery 2009; Lankina and Getachew 2012; Ricart-Huguet 2020). Lastly, the paper adds to the existing research on the history of colonial state-building in Burma (Myanmar), an important yet underrepresented case in political science literature (Kim 2021; Mendoza 2020).

1 Origins and Development of Education

What can the existing education theories tell us about colonial educational involvement? I focus on four theories relevant to colonial contexts: social conflict, skills training, evangelization, and indoctrination.[1]

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[1]While acknowledging their existence, two sets of theories are irrelevant for colonial contexts: median-voter-based and world system theories. Median voter-based theories (Ansell and Lindvall 2013; Stasavage 2005) cannot explain its development in colonial states, where the government is not accountable to most of the population in its colony throughout most of the period of rule. World system theories (Meyer, Ramirez, and Soysal 1992) cannot explain the variations across and within states

Social Conflict: This set of theories emphasizes the local elites' role in implementing education policies and how their interests drive the level and type of education provided. They come from a larger set of social conflict theories that emphasize education as a product of interest group relations, for example, the ruling class versus the working class and the colonial government versus the indigenous elite. For example, Cantoni and Yuchtman (2013) model education as a strategic decision faced by political elites and argue that the elites provide education only when the cost of subsidies is low and the content is not threatening their political survival (Cantoni and Yuchtman 2013). Hauk and Ortega (2021) instead focus on cross-regional production opportunities as an important factor for the elites' education policy (Hauk and Ortega 2021). In colonial contexts, Hong and Paik (2018) empirically show that the extent of indigenous educated elites, measured by the Joseon civil exam passers, is positively associated with literacy rates during colonial rule due to the elites' investment in private education (Hong and Paik 2018). Elites were also an important determinant of education policy, contributing to economic inequality in the Americas (Engerman and Sokoloff 2012).

Skills Training: When governments faced a terrain where few were trained in administering the state, this could limit the economic potential for the state as well as its competitiveness when there were rivalrous states (Aghion et al. 2018). Therefore, the governments found it necessary to invest in education to create a cheap and skilled force of bureaucrats. This also applies to colonial contexts; in his discussions of colonial education in Southeast Asia, Furnivall (1948) points out the need for bureaucracy as the existential purpose of colonial education. Similarly, in West Africa, existing research argues that colonial education mainly produced local bureaucrats, and the districts that received education investments became the key skilled labor source in post-independence bureaucracies (Huillery 2009; Ricart-Huguet 2020).

Evangelization: This argument often appears in the discussion on educational development in colonial states. It emphasizes the role of Christian missionaries in spreading education across colonial states (Becker et al. 2022; Chaudhary 2009; Woodberry 2012). For example, Lankina and Gitachaw (2012) showed that missionary societies were key promoters of education in colonial India, and their influence

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in their education policies or how local conditions drive the development and implementation of education policies.

| Key Actor | Purpose of Education | |
	Economic Returns	Ideological Conversion
Non-state	**Social Conflict**	**Evangelization**
State	**Skills Training**	**Indoctrination**

Table 1: Four Theories to Explain State Involvement in Education

persisted in post-independence democratic development (Lankina and Getachew 2012). These theories come from the "Protestant work ethic" hypothesis, which strongly links Protestantism and investment in education and other downstream outcomes. However, recent work challenges the predominant missionary-development association, instead highlighting how missionary presence triggered nationalism in China (Mattingly and Chen 2022) or how the empirical association became weaker when the endogeneity of missionary placement was carefully accounted for (Jedwab, Meier zu Selhausen, and Moradi 2022).

Indoctrination: These theories argue that the key purpose of education is to create loyal subjects to the state and demobilize potential resistance (Bourguignon and Verdier 2005; Testa 2018). Pointing out that the rise of mass education in several non-democratic states across Europe occurred decades before the spread of electoral democracies, Paglayan (2022) argues that mass education's key purpose was to "instill values of order, obedience, and respect for the rule of law that, elites hoped, would help prevent future mass rebellions against the state's authority" (p.3) (Paglayan 2022).

We can organize these theories along two dimensions: the key actor behind education policy and the purpose of education (Table 1). Organizing the theories along the two dimensions also reveals two theoretical gaps in existing research. First, the theories do not discuss when colonial states started to provide education instead of solely focusing on physical coercion or when indigenous education systems were replaced, which happened across several colonial states in Southeast Asia. Second, the research remains divided on whether economic or ideological concerns drove colonial education. With a new theory developed in the following section, I will address both of these points by (i) showing the conditions under which the colonial state replaces indigenous education and (ii) showing how the two roles of education (economic and ideological) shifted in their relative importance over time.

2 Theory

I define colonization as a form of regime change where the state's distribution of political power shifts from an organization centered within the state (indigenous organization) to an organization centered outside the state (foreign organization). This differentiates colonization from other forms of regime change, such as domestic political transitions (indigenous to indigenous), colonial transitions (foreign to foreign), and independence (foreign to indigenous).

The definition implies that colonization provided a unique context for institutional change where the colonial government, controlled by a foreign organization, attempts to assume control over the indigenous organizations. However, indigenous organizations did not immediately fall under state control for two reasons: the limited extent of state-society interactions and the predecessor state's reliance on patron-client ties. First, in several early modern states, the ruler's infrastructural power is limited to the political core and declines with increasing distance from the core (Pierskalla, Schultz, Wibbels, et al. 2017). This meant most people outside the core had little interaction with the state, regardless of the ruler. Second, even in places that experienced some interaction with the state, most of this occurred through patron-client relationships between the ruler and the local bureaucrats or elites (Lieberman and Buckley 2012; Weber 1976). Since patron-client relationships were built on the actors' relationships, the advance of a new ruler necessitated a renewal of those personal ties for administration.

Facing limited control, the government's most direct approach to increasing control over indigenous society in non-democratic states was repression through physical violence. However, it did not satisfy the colonial government's key motivation behind control: to maximize economic resources for the government. While the government could use repression to coerce indigenous society to comply with its rule and protect its assets from destruction, this did not provide the necessary human resources to administer the state and implement infrastructural investments such as roads, train stations, and revenue offices, courts, hospitals, and schools. If there was sufficient interest in pursuing economic benefits, the government should move beyond physical violence toward approaches that yield economic benefits to the colonial state.

Investment in education allowed the government to increase its economic benefits through bureau-

cratic capacity and tax base. First, the colonial government needed a cheaply available and skilled labor force to strengthen its bureaucracy, which in turn was necessary to pursue numerous state activities in agriculture, tax collection, transport, forestry, and healthcare, among others. Therefore, to reap economic benefits through state activities, the government should take fundamental steps to ensure that a portion of the population is sufficiently educated to implement its activities successfully. Second, assuming positive private returns to education, a more educated population earned higher incomes, providing a larger tax base for the state. This channel would become even more economically important if education increased participation in the formal economic sector and tax compliance.

But, in a context where non-state organizations in indigenous society were already providing education, the government could either use to rely on indigenous schools or develop a new system on its own. What explained the government's choice over state involvement in education? Specifically, when did state education policy rely on existing indigenous schools, and when did the policy instead attempt to replace them with its system of schools? I address this question by proposing a theory of state involvement in education as a response to two key factors: the existing education level of indigenous society and local resistance against colonial rule. In Appendix Section A, I formalize this argument in a two-period model of strategic interactions between the colonial government and indigenous society. In this section, I lay out the two choices for government education policy and the society's choice over mobilization against colonial rule.

The theory focuses on two actors, the colonial government and indigenous society. Strategic interactions occurred over two periods; the government chose education policy in the first period, and the society chose whether to mobilize against the state or not when there was an external event setting the context for crisis (e.g., economic problems, political scandals) in the second period. Based on the previous argument that administering the state with sole reliance on physical coercion was not sufficient to meet its economic incentives and that there existed an uneven landscape of pre-existing education levels due to the presence of indigenous education providers, any involvement in education faced two choices: to rely on the existing system by supporting indigenous providers (indirect involvement) or replacing them by developing a system of its own (direct involvement). Each responded differently to the "cost-control

trade-off," that is, the negative relationship between the fiscal and political costs that come with state involvement and the government's control over the educational development of students.

Under indirect involvement, the government's role in education was mainly financial, supporting indigenous providers' work in educating society. This could come from financial grants, scholarships, and dedicated funds. At the same time, control over the education content was indirect; involvement was mainly in support and recommendations rather than direct administration. This was a more cost-efficient option than direct involvement because the government did not have to invest in building new schools and recruiting new teachers extensively but instead relied on the existing educational apparatus. This option, however, required a sufficient level of pre-existing providers that the government could employ; in other words, the choice between indirect versus direct involvement did not exist when there was a limited presence of indigenous education system.

The option also represented the government's focus on education's purpose to generate economic benefits rather than to create a loyal indigenous population and mitigate potential anti-colonial resistance. As mentioned, indirect involvement implies control over the provision but not the content. At the same time, financial support may encourage an increase in enrollment. Still, it does not necessarily allow the government to shape how its recipients are educated and how such education affects the students' opinions about the state. That was the key drawback of indirect involvement: the potential to create increasingly educated individuals, combined with indigenous control over education content, could fuel the strength of anti-colonial resistance.

Under direct involvement, however, the government's involvement went beyond financial support, actively developing policies that push the state as the key education provider above all else. This came in the form of building new channels of education provision that competed with existing organizations. While demanding more financial and human resources, this option had one important benefit that indirect involvement struggles to achieve: the ability to control content. Unlike its counterpart, direct involvement focused on education's purpose as a tool to address potential anti-colonial resistance from the indigenous society.

The theory identifies indigenous education levels and local resistance against colonial rule as the two

key factors driving the government's decisions over educational involvement. Only when indigenous education levels and local resistance were *both* sufficiently high, governments choose direct educational involvement to create a system with stronger control over schooling instead of relying on indigenous counterparts. This resulted from how each factor shaped the other's relationship with state education policy. While existing indigenous schools served as cheaper alternatives for education provision, increasing resistance against colonial rule strengthened the perceived associations between indigenous education and resistance, shifting education policy towards direct involvement. Similarly, while the colonial response to resistance was primarily through physical violence under low indigenous education levels, at increasing indigenous education levels, the same perceived association between indigenous education and motivated resistance governments to pursue direct involvement in education. The shift towards direct educational involvement occurred through ideological and substitution mechanisms. First, regarding ideological mechanism, colonial interest in direct involvement derived from its ability to control educational content to strengthen a sense of loyalty to the state. Second, in terms of substitution mechanism, direct involvement could potentially diminish the perceived role of indigenous schools in resistance against the state by replacing them with schools under stronger state control.

The two conditions also build on the theory of coercive distribution (Albertus, Fenner, and Slater 2018) by Albertus et al, which argues that governments strategically distribute goods and services within their territory to consolidate their rule in three stages: (1) displacing the organizations that provide the goods, (2) enmeshing the government-provided goods in such a way as to increase the society's dependence on the state, and (3) maintaining the newly reoriented state-society relations with regular upkeep. Here, the theory makes two key departures from the coercive distribution theory. First, it does not assume coercive displacement as a necessary stage. By pursuing an enmeshment process where choosing state-provided services over the societal alternative could yield economic benefits, states could manipulate societal demands for competing services, thereby indirectly displacing them. Second, it implied education's difference from other goods and services in that education could shape economic dependence on the state or legibility to the state and influence loyalty to the state via ideological change. Next section will detail the historical context behind education in British Burma in relation to this theory.

3 Historical Background

British Burma was established from the present-day territories of Burma (Myanmar) that the British Empire claimed from Konbaung Kingdom via three Anglo-Burmese wars between 1824 and 1886. The aftermath of the Third Anglo-Burmese War that resulted in the colonization of Upper Burma was far from a smooth transition to administration. Rebellions against the new imperial power broke out across the territory, followed by a decade of political repression known as the Pacification Campaign. This involved physical suppression of anti-colonial rebels with military police (often bringing troops from India), replacement of hereditary village headmen with appointed headmen, and reorganization of pre-colonial administrative units. The efforts were overall successful at suppressing resistance, with political order largely secured by 1895.

Since the establishment of Department of Public Instruction in 1864, colonial administrators quickly noticed the potential of Buddhist monastic schools that predated colonial rule as a basis for colonial education [This section will focus on education history after the Pacification of Burma (1886-1896), since this was the time colonial education policy was applicable to the entire colonized territory]. In an early report on public instruction, administrators noted a high literacy level thanks to monastic education. They focused on financially supporting these schools and increasing coordination between them and other schools, such as missionary schools and government schools. As Sir Arthur Phayre, the colony's first Director of Public Instruction, said:

> "As a general rule, it may be stated that all instruction among the Burmese people is carried on in the monasteries. There are a few private schools here and there, but they are exceptional. There is no other regular plan or system of schools which should be taken in hand and improved. I would not recommend that Government should set up schools in the villages as additional or in opposition to monasteries; such a scheme would be inevitably a failure."[2]

However, a policy shift occurred in the later stages of colonial rule with a transformation in the government recognition of schools, which required government financial assistance and therefore indirectly

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[2]Campbell, A. (1946). Education in Burma. Journal of the Royal Society of Arts, 94(4719), p. 441.
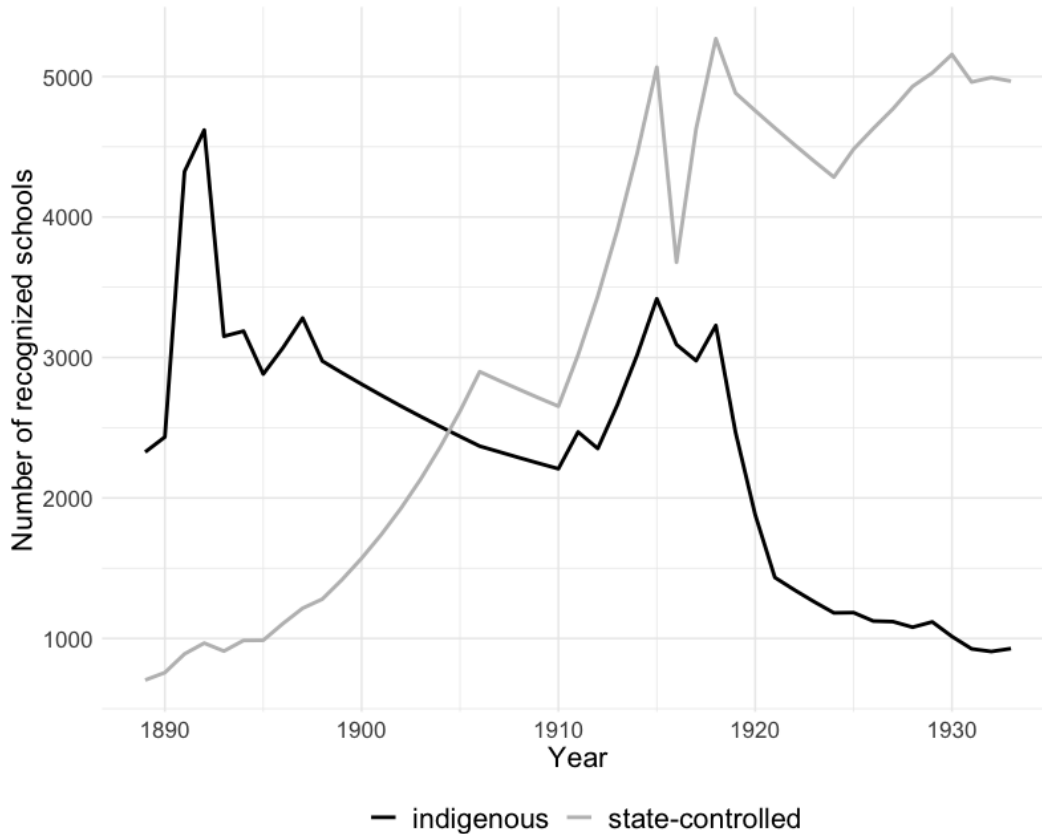
Figure 1: Number of monastic schools and lay vernacular schools in British Burma, 1890-1934. Note that the values for some years are interpolated. Data from *Report of the Vernacular and Vocational Education Reorganization Committee, 1936*, p. 137-138.

represented its policy changes. Specifically, while the number of monastic schools declined, the number of lay vernacular schools, which were village schools set up by lay vernaculars open to both male and female students, increased rapidly. At the former's peak in 1893, there were around 4,619 recognized monastic schools, against 967 recognized lay schools; by 1933, there were only 907 recognized monastic schools left, against 4,993 recognized lay vernacular schools, the latter becoming the government's preferred channel to provide secular education for all children, in contrast to the male-only religious education provided by monastic schools. Figure 1 shows a visualization of the changes in monastic and lay schools over time.

A quote from the 1936 report by the Vernacular and Vocational Education Reorganization Committee, which was created for the formulation of a new education policy for British Burma, provides some explanation for this shift:

"We believe that a sound and lasting system of vernacular education can be built upon these lines. It would have the merit of sweeping away the anomalies of the past while at the same time retaining all that at present honestly makes for progress and efficiency in the education of the country. Nor do we apprehend that the monkhood will be blind to the advantages that such a system will confer on those who devote themselves to the efficient teaching of the children of the country … It is undesirable to compete with the head of the village monastery and undermine his authority by the indiscriminate establishment of lay schools, but educational development cannot wait indefinitely that slow dissolution of ancient prejudice."[3]

Monastic schools, once treated as the colonial state's preferred medium for providing education to the masses, were now considered by the government to be an impediment to the progress of the colonial education project. By "these lines," the report referred to "putting the monastic and the lay school on equal footing, and according to them both the same treatment" (p.141). However, the situation was far from equal footing because the monastic schools had significantly declined in their importance to colonial education.

Did this shift also represent the colonial state's increasing interest in pursuing ideological change through education? I present here two pieces of evidence suggesting not only that the proposal for ideological change through state-controlled education was formulated among colonial government officials, but also that lay vernacular schools appeared as an institution of choice for implementing such a change. First, noticing the high levels of crime and riots against the state, a report explained the need to instill the "Imperial Idea" and create political order through loyalty to the state.

"[Imperial Idea] implies on the part of the Burman an active loyalty to the imperial connection which can only be produced on the basis of sentiment. It is, therefore, the duty of education to appeal to that sentiment and to teach him as an individual that fidelity to principles and right is the bedrock on which loyalty is founded, to teach him as a Burman that it is only out of love of his country and belief in its future that active loyalty to Empire can be developed, to teach him as a citizen of Empire that his liberty and prosperity depend upon the maintenance of the Imperial connection."[4]

In a separate report, lay vernacular schools were proposed as a promising platform, especially compared to other alternatives, to expand the education system and, at the same time, instill political order through schooling.

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[3]Vernacular and Vocational Education Reorganization Committee (1936), p. 141-143.
[4]Report of the Committee Appointed to Ascertain and Advise How the Imperial Idea May be Inculcated in Schools and Colleges in Burma (1917),p.2.

"An agency which is going to teach self-control, and build up a new resistance, must therefore be one which is represented in every village of any considerable size. The civil servant, the policeman, and the headman are alike unsuitable. They have their responsible duties, which cannot easily be combined with the new functions suggested. It is necessary to find the growing force in the village of the future and to harness that to the task of the prevention of crime. That growing force, now in its infancy but destined inevitably to grow in numbers and in value, is the lay vernacular school of the village. Already these schools exceed the monastery school both in number and attendance. It would seem that the educational policy of the Province was now so surely settled that the monastery school will not again be considered as a possible foundation for the educational system. It may therefore be regarded as certain that the lay schools will increase while the monastery schools decrease, both in number and effect."[5]

4 Data

I estimate the conditional relationship between indigenous education providers and state involvement in education using district-level panel data from British Burma, covering 33 districts and 20 years between 1901 and 1920. This data is constructed from various colonial government documents and contains district-year-level information on demographics, local economy, criminal cases, and education, among others. Due to limitations in data coverage, I limit the analyses to 33 districts, excluding the following six districts (all in Frontier Areas): Arakan Hills, Chin Hills, Kayah State, Salween, Shan State - North, and Shan State - South. The district-year is the main unit of analysis for two reasons. First, most information, particularly on education, is not available below the district. Second, the unit is substantively important because colonial administrative decisions are implemented at the district level by local administrators and district commissioners (Beckett 2019; Iwaki 2018; Kim 2021).

4.1 Indigenous Education Level

Data on indigenous literacy comes from the decennial censuses conducted throughout British Burma. The first 'modern' census, a complete and synchronous count of the population over the entire territory

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[5]Report on Prevention of Crime and the Treatment of the Criminal in Burma, 1926, p. 17.

(Baffour, King, and Valente 2013) was in 1891,[6] six years after the colonization of Upper Burma[7]. Altogether, five decennial censuses were completed before the Second World War and independence: in 1891, 1901, 1911, 1921, and 1931. This paper makes use of the first four censuses.

The censuses contain valuable information on numerous demographic and socioeconomic characteristics, such as age group, sex, birth origin, education, and occupation, among others. This information is aggregated at province, district, and township levels; granularity, however, varies; for example, the population is available down to the township level, while other characteristics, such as literacy, are only available at province and district levels (See Figure 2 for the patterns of literacy in 1901 and 1920).

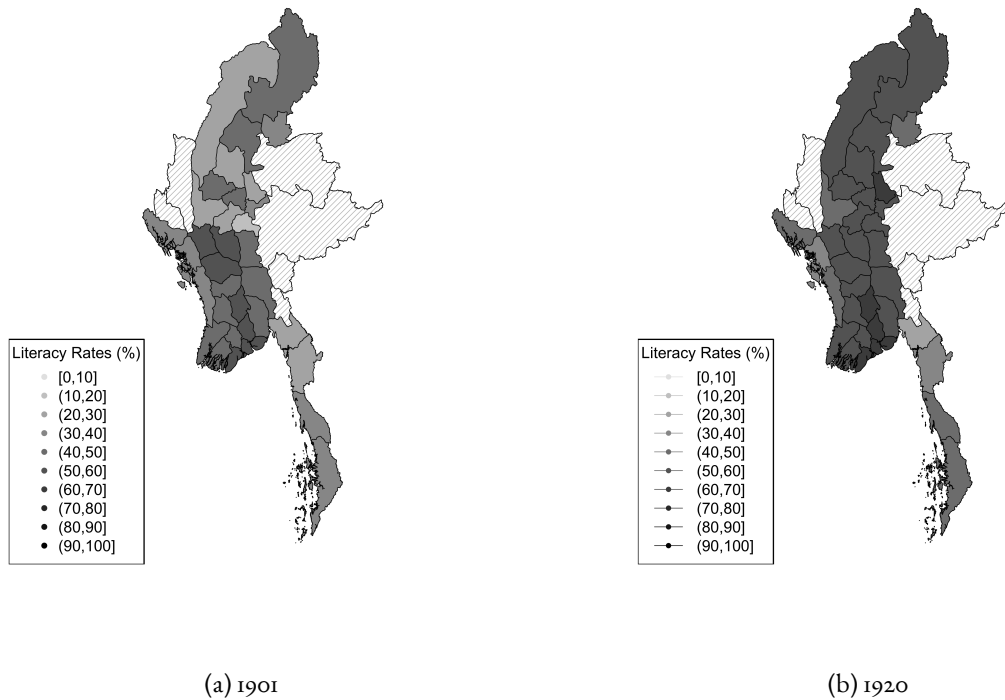

(a) 1901   (b) 1920

Figure 2: Buddhist male literacy rates by the district in 1901 and 1920. Darker colors represent higher levels of literacy. Data from British Burma Censuses in respective years. Shaded areas represent parts of the indirectly ruled Frontier Area for which colonial education data is not available.

To measure indigenous education level, I use Buddhist male literacy as the number of Buddhist males

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[6]Note that Lower Burma, which was fully colonized by 1852, saw two additional censuses, the first colonial census in 1872 and the first synchronous census in 1881.

[7]While definitions may vary, official classification by the colonial government includes territories annexed before 1886 as Lower Burma and those annexed after as Upper Burma. See Figure 1.

who can read or write in Burmese, which is available from census population counts by literacy, religion, gender, and age group; all five censuses provide this. Learning in monastic schools was traditionally limited to Buddhist males, and the practice continued even under colonial rule despite the government's push for women's access to indigenous schools. Therefore, literacy among Buddhist males can give us one of the best approximations of how widespread indigenous education providers were in a district.

For the missing data in intercensal years, I produce the estimates based on the United States Census Bureau's method for intercensal estimates, also known as the Das Gupta method.[8] It essentially assumes that the values from the earlier census move towards those from the later census in a geometric progression.

4.2 State Involvement in Education

District gazetteers are a type of archival document unique to former territories of British India, including British Burma. They were compiled at the district level and were representative of a colonial attempt to understand the local conditions and facilitate internal communications with local bureaucracy to form and implement policies. As such, they contained detailed information on numerous sectors of local development, such as population, cultivated area, type of crops grown, forestry, crime, education, health, and many others. There are four series in total, with the first series starting in 1833. However, only three were collected across districts in British Burma: 1904-1905, 1911-12, and 1924-1925. Here, I use data from two: 1911-12 and 1924-1925.

Another useful feature of the series is that data coverage goes beyond a single-year snapshot for several sectors, thereby providing an opportunity to analyze their temporal trends in the form of panel data. Under the section "Educational Statistics" for each district, there is a summary table that lays out thematically compiled information for ten preceding years: 1901 to 1911 for the first series and 1911 to 1920 for the second series (see Figure **??** for an example snapshot of a table).

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[8]See United States Census Bureau 2012.

4.3 Resistance Against Colonial Rule

The same district gazetteers also collected data on the number of criminal convictions categorized by the type of crime, from murder and cattle theft to offenses under specific acts such as the Opium Act (see Figure 3 for reference). For this paper, I focus on the number of persons convicted due to riot and unlawful assembly to measure the extent of resistance against the state. Figure **??** shows an example of how a typical riot, taken from a police administration report in 1922.

TABLE XVII.—CRIME, PROME DISTRICT.

	Persons convicted or bound over in respect of								Offences under the		
Year.	Rioting and unlawful assembly.	Offences affecting life.	Grievous hurt.	Cattle theft.	Robbery and dacoity.	House breaking and theft.	Coinage offences.	Bad livelihood.	Opium Act.	Excise Act.	Forest Law.
1	2	3	4	5	6	7	8	9	10	11	13
1901 ...	147	15	49	268	8	46	...	296	56	164	47
1902 ...	107	20	92	232	14	42	...	397	184	306	42
1903 ...	93	11	36	260	6	51	...	267	127	325	85
1904 ...	67	15	47	250	15	37	6	202	106	315	62
1905 ...	106	20	67	173	29	40	2	340	193	185	81
1906 ...	71	25	41	157	32	76	...	291	273	260	85
1907 ...	...	13	53	168	19	74	3	160	275	181	39
1908 ...	23	13	44	156	25	66	7	175	193	279	29
1909 ...	...	16	63	122	32	60	..	93	208	235	30
1910 ...	23	23	52	168	26	74	...	143	206	259	98
1911 ...											
1912 ...											
1913 ...											
1914 ...											
1915 ...											
1916 ...											
1917 ...											
1918 ...											
1919 ...											
1920 ...											
1921 ...											

Figure 3: "Crime" section extract from Gazetteer, Prome District, 1924 series.

5 Empirical Analysis

5.1 Estimation Strategy

I use a two-way fixed effects model to estimate the extent to which anti-colonial resistance conditions the relationship between indigenous education levels and colonial involvement. The basic regression model for empirical strategies is as follows.

$$coledu_{it} = \beta_0 + \beta_1 iedu\_lagged_{it} + \beta_2 resist_{it}$$

$$+ \beta_3 iedu_{it} \times resist_{it} + \beta_4 population\_lagged_{it} + \gamma_i + T_t + \epsilon_{it}$$

<div align="right">(1)</div>

where, $coledu_{it}$ represents colonial educational involvement in district i at time t. We have two sets of measures for this variable. First, we have education outcomes for both genders, including the number of schools and enrollment by level (primary, middle, and basic as the sum of primary and middle, and technical). Second, we have education outcomes only for females, including the same levels as enrollment outcomes for both genders.

$iedu\_lagged_{it}$ represents indigenous education level. I measure this with the number of literate Buddhist males, as the majority of indigenous education centered around Buddhist monastic schools. Instead of using the literacy rate, I use the number of literates along with population as a control variable, as the latter can potentially confound the relationship between other right-hand-side variables and dependent variables. To address concerns with reverse causation, both the literate population and total population are census-lagged, meaning they are from the latest-available census of a given district-year. $resist_{it}$ represents the level of anti-colonial resistance; here, to capture the long-run dynamic of the variable, I measure it as the stock variable, that is the total number of riot and unlawful assembly cases between 1901 and time t, as available from district gazetteers.

Our value of interest is β_3, the interaction coefficient between indigenous education level and anti-colonial resistance: $iedu\_lagged_{it}$ and $resist_{it}$. When the interaction is positive (negative), we can interpret that the indigenous education level additionally increases (decreases) colonial involvement in education upon the increase in anti-colonial resistance and vice versa. $population\_lagged_{it}$ represents the census-lagged population as a control variable. γ_i and T_t are district and time fixed effects, respectively. The former controls for district-level time-invariant characteristics as potential confounders, such as terrain ruggedness and distance from historical capitals and latter controls time trends in dependent and explanatory variables, such as the overall trends in educational involvement. ϵ_{it} is the error term.

5.2　Main Results

5.2.1　Female Education Outcomes

Compared to total numbers, female enrollment numbers are more valid measures of state involvement since monastic schools did not accept female students (Tipton 1981). Therefore, if we see estimated coefficients as expected by our hypotheses, we can more confidently claim the proposed relationships between indigenous education level, anti-colonial resistance, and colonial involvement.

Table 2 shows the OLS results for the second set of measured variables, including both genders, based on Equation (1). The four columns represent resulting involvement at the student level: female enrollment in primary, middle, basic (sum of primary and middle), and technical schools. All rules from the preceding results apply. Estimated coefficients for Buddhist male literacy are consistently positive for all variables. All of them contain the null estimate in their confidence intervals, except for technical enrollments. Interaction coefficients are also consistently positive across all variables, as seen from the table. Coefficient sizes range from 0.0088 (technical enrollment) to 0.6117 (middle enrollment), implying that, if the cumulative number of riots increased by one standard deviation, the correlation coefficient between Buddhist male literacy and enrollment increased by as much as closer to two-thirds of the standard deviation.

Finally, graphical evidence from marginal effects shows that the changing levels of anti-colonial resistance substantially change the relationship between indigenous education level and colonial education except for technical education (Figure 4). As the cumulative riots increase from sample minimum to sample maximum, it switches the linear marginal effects of Buddhist male literacy from negative to positive for primary (-0.55 to 0.41), middle (-1.65 to 0.14), and basic enrollment (-0.91 to 0.35), and only the bins with highest values of Buddhist male literacy are positive, while those with the lowest values are negative. Overall, the results here provide support to the empirical implication that both indigenous education and anti-colonial resistance had significant positive associations with educational involvement only when the other's value was sufficiently high.

The marginal effects of cumulative riots also change with the changing levels of Buddhist male literacy (Figure 5). As Buddhist male literacy increases from sample minimum to sample maximum, marginal

effects of cumulative riots switch from positive to negative for primary (-1.07 to 0.63), middle (-1.92 to 1.2), and basic enrollment (-1.37 to 0.83). In terms of binned estimates, the lowest quartile intervals are strictly negative for all outcomes, while the highest quartile intervals are strictly positive for primary and basic enrollment. Overall, as with those including all enrollments, the results here suggest the conditional relationships between indigenous education level, anti-colonial resistance, and colonial education.

	DV: Total female enrollment			
	Primary (1)	Middle (2)	Basic (3)	Technical (4)
Buddhist male literacy (count)	0.2451	0.4341	0.3114	**0.8022**
SE	(0.3626)	(0.389)	(0.3621)	(0.3451)
Bonferroni CI	[-0.528, 1.0182]	[-0.3952, 1.2634]	[-0.4606, 1.0834]	[0.0664, 1.538]
Riots since 1901 (count)	-0.2545	**-0.4825**	-0.3319	-0.2781
SE	(0.2044)	(0.1694)	(0.1889)	(0.1804)
Bonferroni CI	[-0.6903, 0.1813]	[-0.8437, -0.1213]	[-0.7346, 0.0708]	[-0.6627, 0.1065]
Buddhist male literacy × Riots since 1901	**0.3288**	**0.6117**	**0.4251**	0.0088
SE	(0.1249)	(0.1794)	(0.1348)	(0.1328)
Bonferroni CI	[0.0625, 0.5951]	[0.2292, 0.9942]	[0.1377, 0.7125]	[-0.2743, 0.2919]
Obs.	590	587	587	425
Adjusted R^2	0.7295	0.7619	0.7653	0.6067
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 2: Standardized two-way fixed effects estimates with various education outcomes for females as dependent variables. The unit of analysis is district-year. Cluster-robust standard errors (at district-level) with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. 98.75 percent CIs result from Bonferroni correction (four hypotheses).
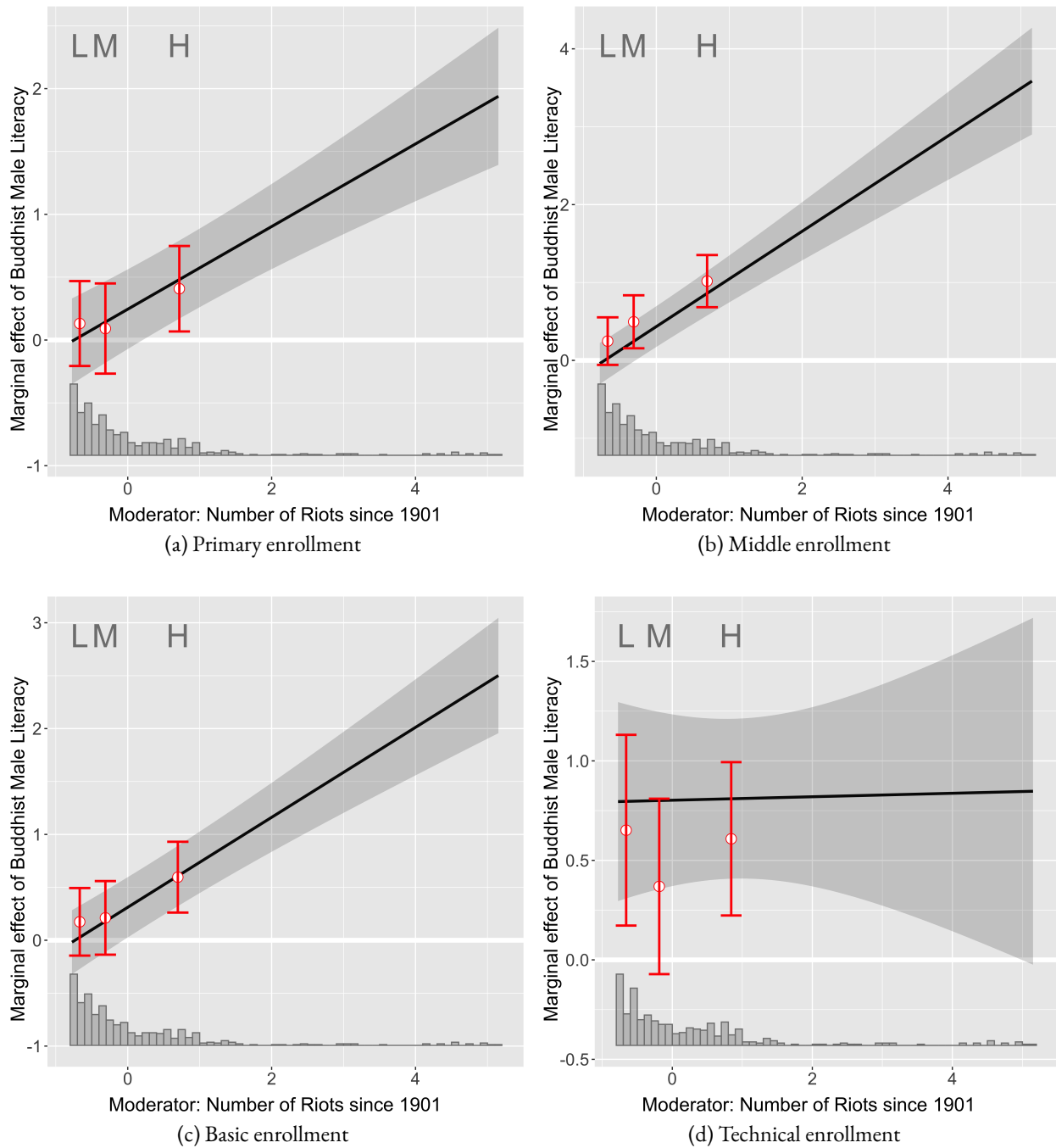
Figure 4: Marginal effects plot of Buddhist male literacy coefficient estimates for various female enrollment outcomes. Standardized two-way fixed effects coefficients. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. 98.75 percent CIs result from Bonferroni correction (four hypotheses).
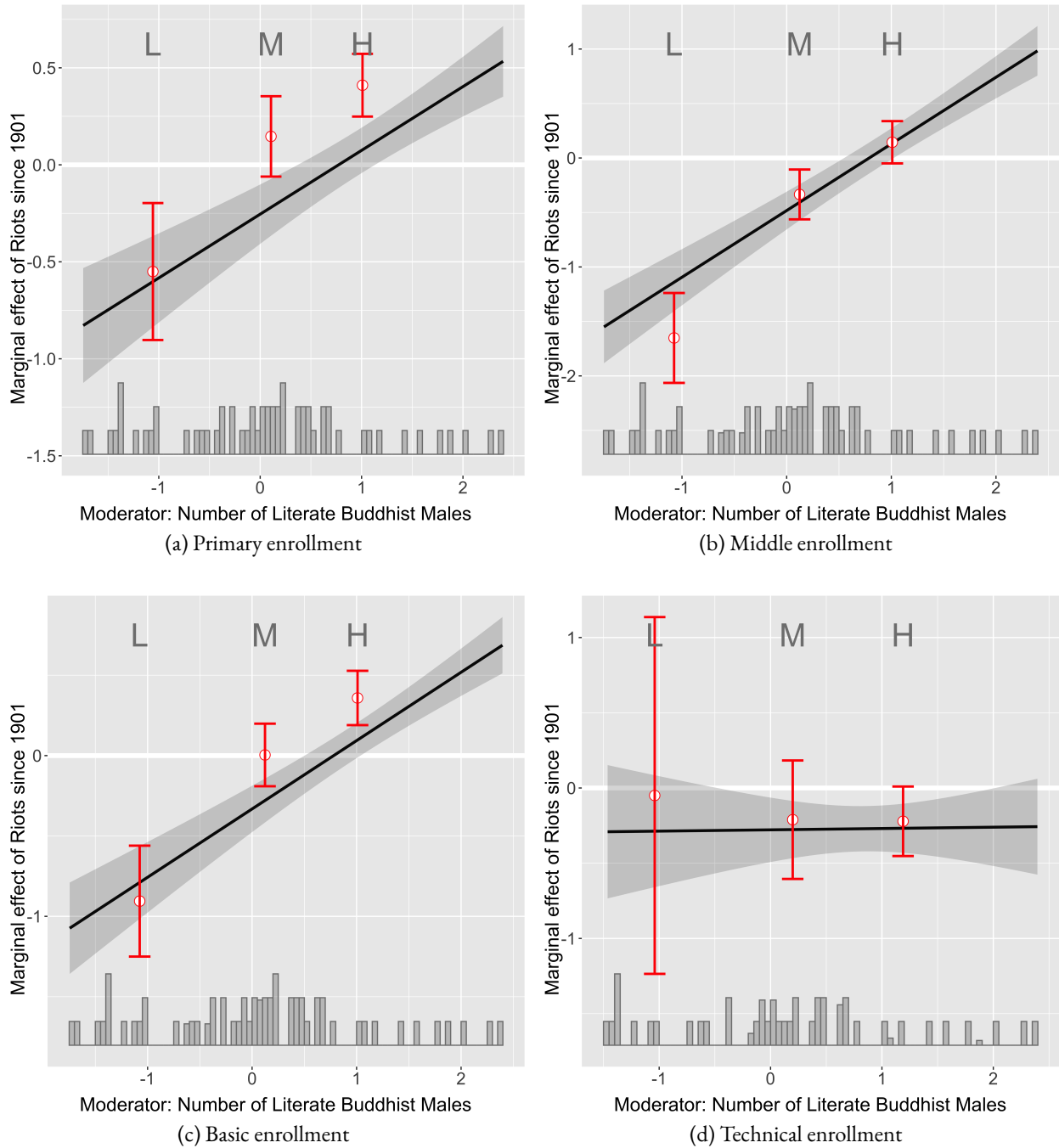
Figure 5: Marginal effects plot of Buddhist male literacy coefficient estimates for various female enroll-ment outcomes. Standardized two-way fixed effects coefficients. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coeffi-cients have 98.75 percent confidence intervals that do not contain null estimates. 98.75 percent CIs result from Bonferroni correction (four hypotheses).

5.2.2 Overall Education Outcomes

Table 3 shows the OLS results for the first set of measured variables, including both genders, based on Equation (1). The coefficient estimates for Buddhist male literacy are consistently positive across all variables. In terms of inference, all the confidence intervals contain the null estimate. In contrast, interaction coefficient estimates are consistently positive across all variables, with sizes ranging from 0.038 (technical enrollment) to 0.4804 (middle enrollment). In other words, one standard deviation in the number of riots since 1901 increases the positive correlation between Buddhist male literacy and colonial school enrollment as much as nearly half a standard deviation.

In terms of inference, the estimated coefficients show that only middle enrollment and the confidence intervals at 98.75 percent confidence do not contain the null estimate. All together, they provide some support the theoretical prediction that anti-colonial resistance conditions the relationship between indigenous education level and colonial involvement, increasing colonial educational investments in places with a strong presence of indigenous providers. However, to estimate how Buddhist male literacy and cumulative riots change each other in their relationship with colonial education, we will move on to observing the marginal effects.

Figure 6) show that, as the cumulative riots increase from sample minimum to sample maximum, it switches the linear marginal effects of Buddhist male literacy from negative to positive for primary (0.15 to 0.30), middle (0.30 to 0.98), and basic enrollment (0.21 to 0.53). This switch aligns with the expected role of anti-colonial resistance moderating the relationship between Buddhist male literacy and colonial involvement in education. In terms of inference, however, confidence intervals for the marginal effect do not contain the null estimate only at the highest end of Buddhist male literacy values for middle and basic enrollment.

How did indigenous literacy condition the relationship between anti-colonial resistance and colonial educational involvement? Marginal effects plots show that this relationship observes a similar switch (Figure 7). As Buddhist male literacy increases from sample minimum to sample maximum, marginal effects of cumulative riots switch from negative to positive for primary (-0.73 to 0.35), middle (-1.46 to 0.14), and basic enrollment (-1.02 to 0.30). In terms of binned estimates, the lowest quartile intervals are

strictly negative for all outcomes, while the highest quartile intervals are strictly positive for primary and basic enrollment. Overall, the results here suggest that anti-colonial resistance substantially changed the relationship between indigenous and colonial education providers, as the latter switched from indirect to direct involvement with rising resistance.

| | DV: Total enrollment | | | |
	Primary (1)	Middle (2)	Basic (3)	Technical (4)
Buddhist male literacy (count)	0.168	0.3468	0.23	0.7323
SE	(0.3701)	(0.4099)	(0.3622)	(0.7068)
Bonferroni CI	[-0.6211, 0.9571]	[-0.5271, 1.2207]	[-0.5422, 1.0022]	[-0.7746, 2.2392]
Riots since 1901 (count)	-0.119	-0.2568	-0.1689	-0.1611
SE	(0.2086)	(0.2055)	(0.1884)	(0.2489)
Bonferroni CI	[-0.5637, 0.3257]	[-0.6949, 0.1813]	[-0.5706, 0.2328]	[-0.6918, 0.3696]
Buddhist male literacy × Riots since 1901	0.1969	0.4804	0.2987	0.038
SE	(0.1752)	(0.208)	(0.1758)	(0.132)
Bonferroni CI	[-0.1766, 0.5704]	[0.0369, 0.9239]	[-0.0761, 0.6735]	[-0.2434, 0.3194]
Obs.	589	587	586	425
Adjusted R^2	0.7259	0.76	0.7607	0.727
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 3: Standardized two-way fixed effects estimates with various education outcomes as dependent variables. The unit of analysis is district-year. Cluster-robust standard errors (at district-level) with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. 98.75 percent CIs result from Bonferroni correction (four hypotheses).
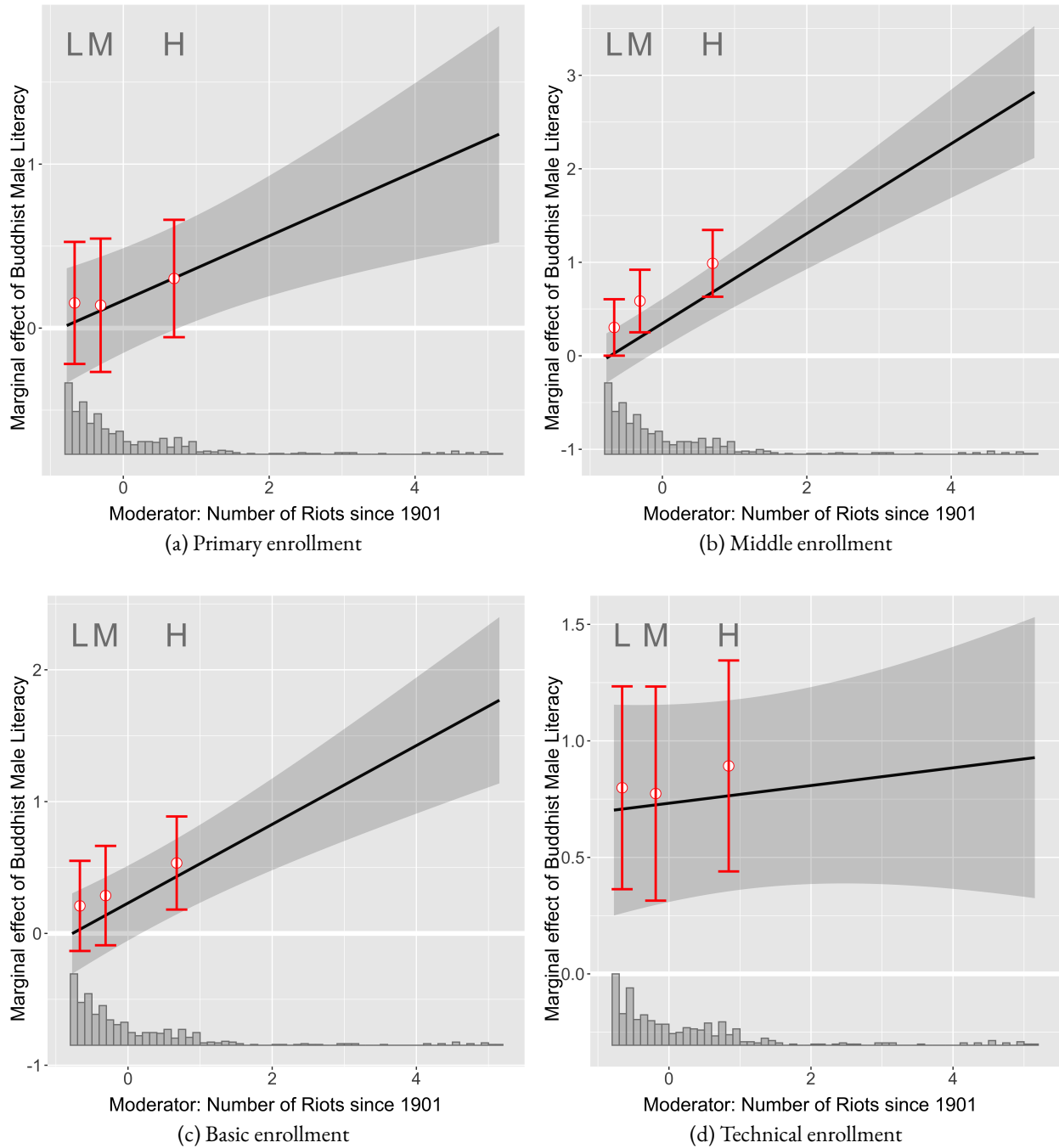
Figure 6: Marginal effects plot of various education outcomes. Standardized two-way fixed effects coefficients. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. 98.75 percent CIs result from Bonferroni correction (four hypotheses).
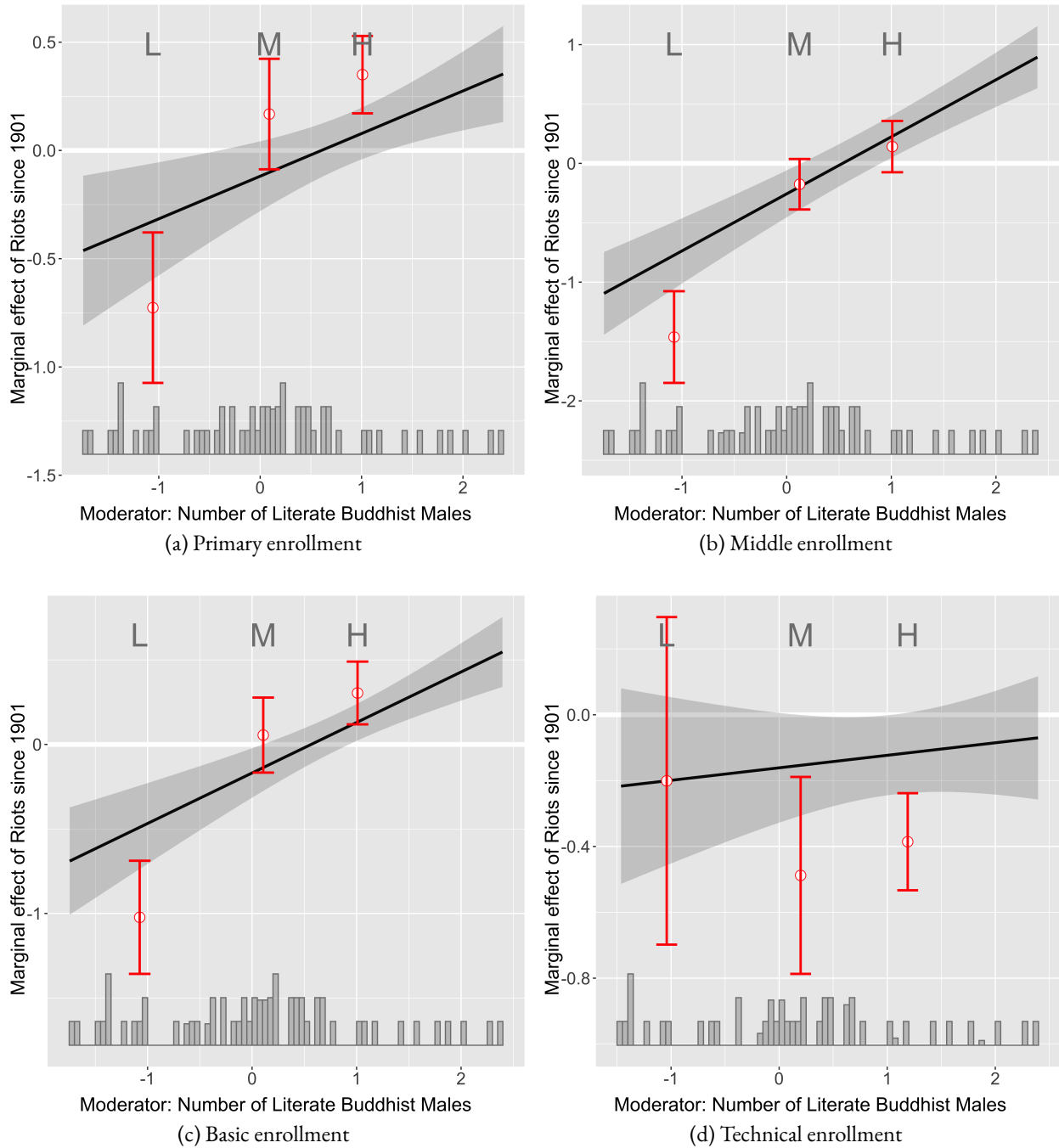
Figure 7: Marginal effects plot of various education outcomes. Standardized two-way fixed effects coefficients. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. 98.75 percent CIs result from Bonferroni correction (four hypotheses).

6   Alternative Explanations

6.1   Factor Endowment as Confounder

A potential confounder affecting indigenous education levels, anti-colonial resistance, and colonial education outcomes is factor endowment. The relationship between factor endowments and the colonial state-building process is the subject of a long-running discussion among the studies on colonial Latin America (Acemoglu, Garcia-Jimeno, and Robinson 2012; Dell 2010; Engerman and Sokoloff 2012), In terms of impact on education, recent studies have argued that factor endowments, such as historical trade networks and economic geography, played a critical role in shaping educational development in West Africa.(Huillery 2009; Ricart-Huguet 2020). If this is the case, our earlier inference could be affected by the systematically different levels of indigenous education, anti-colonial resistance, and colonial education outcomes between high-endowment places and low-endowment places.

To address this concern, I estimate coefficient estimates with two measures of factor endowment: area under rice cultivation and areas covered by forests, two resources that correspond to the prime export products of the colonial state: rice and teak. I then include the two measures as controls for the estimates using different female enrollments as dependent variables.

The estimated coefficients are generally similar to those without the controls (Table 4). For the coefficients of Buddhist male literacy, sizes range from -0.198 (technical enrollments) to 0.3637 (middle enrollment). Only primary and technical enrollments have 98.75 percent confidence intervals without the null estimate.

I do not observe substantial changes in interaction coefficient estimates. They are all consistently positive, and sizes range from 0.3456 in primary enrollments to 0.5574 in middle enrollments. Similar to earlier results, this means that one standard deviation in cumulative riots is associated with a one-third standard deviation decrease in the relationship between Buddhist male literacy and primary enrollments and half of a standard deviation decrease for middle enrollments. Therefore, controlling for factor endowments does not significantly affect the evidence from the preceding results.

	Dependent Variable:			
	enrollment			
	Primary	Middle	Basic	Technical
Buddhist male literacy (Count)	**-0.4348**	**0.3042**	**-0.2586**	-0.2532
SE	(0.1052)	(0.1217)	(0.1025)	(0.1777)
Riots since 1901 (Count)	**-0.235**	**-0.6611**	**-0.3683**	-0.1307
SE	(0.0845)	(0.098)	(0.0826)	(0.1548)
Buddhist male literacy × Riots since 1901	**0.2559**	**0.5148**	**0.3423**	-0.0125
SE	(0.0504)	(0.0585)	(0.0493)	(0.0946)
District FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
No. of Obs.	593	589	589	382
Adjusted R^2	0.8065	0.7549	0.8181	0.6235

Table 4: Standardized two-way fixed effects estimates with various female enrollment outcomes as dependent variables. Areas under rice cultivation and areas covered by forests are included as controls. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. 98.75 percent CIs result from Bonferroni correction (four hypotheses).

6.2   The Role of Christian Missionaries

Missionaries often appear in accounts of colonial education as the pivotal actors spreading education across the colonized territories. The bulk of discussions on colonial educational development has centered around the role of missionaries (Ananyev and Poyker 2021; Bolt and Bezemer 2009; Bouche 1991). This was also, especially the case in British India, under which Burma was a province until 1937. Lankina and Getachew, for example, showed how earlier colonial missionary activity influenced human capital development in Indian states even after independence from British rule (Lankina and Getachew 2012). Similarly, complementing this, missionary-driven educational investments affected the long-run development as far as 1971, a few years after the Indian government instituted the National Education Policy (Chaudhary 2009).

	Dependent Variable:			
	enrollment			
	Primary	Middle	Basic	Technical
Christian literacy (Count)	**0.7556**	**0.5468**	**0.7382**	-0.0685
SE	(0.1194)	(0.138)	(0.1137)	(0.1595)
Riots since 1901 (Count)	-0.0378	-0.2512	-0.0992	-0.1877
SE	(0.081)	(0.0931)	(0.0767)	(0.1054)
Christian literacy × Riots since 1901	**-0.2745**	-0.0797	**-0.2356**	-0.0984
SE	(0.0525)	(0.0605)	(0.0498)	(0.0669)
District FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
No. of Obs.	428	424	424	338
Adjusted R^2	0.7919	0.7395	0.8157	0.6048

Table 5: Standardized two-way fixed effects estimates with various female enrollment outcomes as dependent variables, and Christian literacy as a measure of non-indigenous education. enrollment outcomes are for both genders. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. 98.75 percent CIs result from Bonferroni correction (four hypotheses).

To observe the role of Christian missionaries in British Burma and whether we will see similar results with indigenous education, I use the census data and include the Christian population as a variable, along with its interaction, while using female enrollments as dependent variables (Table 5). In contrast with Buddhist male literacy, estimated coefficients are positive across all enrollments, with sizes ranging from 0.5468 (middle enrollments) to 0.7556 (primary enrollments). None of the 98.75 percent confidence intervals contains the null estimate except for technical education. We may interpret this as Christian literacy indicative of colonial involvement, with its values increasing as state involvement increases.

Contrary to the results for indigenous education, the interaction coefficients are consistently negative across enrollments. No null estimates are in the confidence intervals for primary enrollments and basic enrollments at all. They each suggest that one standard deviation increase in cumulative riots decreases the association between Christian literacy and female enrollments by around one-fifth of a standard deviation. The lack of enrollment increases driven by Christian literacy in high-riot districts coincide with the fact that colonial involvement occurred mainly through the establishment of Buddhist layperson schools

instead of missionary schools. Overall, the results suggest that theoretical predictions for indigenous education do not apply to the relationship between Christian literacy and state involvement.

7 Conclusion

Why did colonial states decide to involve themselves in educating the society within their territories? In this paper, I reframe the question by investigating the form of such involvement: why did colonial states limit their involvement and cooperate with existing indigenous providers in some instances but expand their involvement and replace them with schools under stronger state control? Findings from novel panel data of British Burma districts between 1901 and 1920 show that both indigenous education levels and anti-colonial resistance conditioned such decisions. When local resistance to the state was low, as measured by the cumulative number of riots and unlawful assemblies since 1901, colonial education outcomes were negatively correlated with indigenous education levels, as the states worked with existing non-state providers to achieve economic benefits at low fiscal costs. When resistance was high, however, the state attempted to replace indigenous providers with a system of its own.

While the historical and empirical findings come from British Burma, their implications have the potential for cross-sectional comparison across other colonial states with substantial indigenous-led education systems. For example, in 1919, right after a major anti-colonial uprising in Tonkin, the French colonial government introduced a series of education regulations (*Règlement Général de l'Instruction Publique en Indochine*), which centralized the colonial education system, introduced French as a language requirement, and effectively abolished the indigenous schools of character (Hoa 2009, 2013; Xuan 2018; Vu 2012). Similarly, the colonial government in the Dutch East Indies (present-day Indonesia) pursued an expansionary education policy with the construction of village schools; within eight years from 1910 to 1918, the total number of village schools grew four-fold (from 1,161 to 4,473) in Java and Madura, and two-fold (from 525 to 1,142) in the Outer Islands (Penders et al. 1968). Future research can evaluate this paper's implications in these diverse case contexts.

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Supporting Information
The Indigenous Origins of Colonial Education:
Evidence from British Burma

Contents

A Formalization of Argument

A.1 Game Setup

The game Γ captures the strategic interaction between two actors, Government, G, and Indigenous Society, I, over two periods, $t = 0, 1$. In the first period, the government can choose to spend its fiscal resources on one of the following three choices: sole involvement in coercion P, indirect involvement in indigenous education L, and direct involvement by replacing indigenous education S. In the second period, the state faces a probabilistic negative shock, and if there was a negative shock, the indigenous society can choose to rebel against the government or not. The discount rates δ is set at 1 for both actors for simplicity. The purpose of the model is to capture the decision-making process of the colonial governments over different aspects of state building process while facing political and economic instabilities.

In the first period, there incurs a cost on the government depending on its choice of the three options. First, the government can invest in physical coercion at the cost of 0. Set for simplicity, this also assumes physical coercion as the least expensive form of involvement. Second, it can make indirect involvement in education by funding indigenous schools at a cost of $-\Delta(e)$, a convex function that decreases with the level of education e such that $-\Delta'(e) > 0 \; -\Delta''(e) < 0$. The level of education of the society is the sum of years of schooling for all the individuals, $e \in [0, \infty)$. Third, it can choose direct involvement, which results in the same cost as investing in indigenous education when the level of education is 0 such that $-\Delta = -\Delta(0)$.

The indigenous society's first-period payoff depends on if the colonial government invested in coercion or not. If there was an investment in physical coercion, the society accrued a level of grievance $-g$ such that $g \in [0, \infty)$. If there was either indirect or direct involvement, the society receives a status-quo payoff 0.

The second period starts off with the Nature N assigns the economy a negative shock with probability λ. If there is no negative shock, the government and the society receive the status-quo payoffs of V_G and V_I respectively such that $V_G, V_I > 0$. If there is a negative economic shock, the society can choose to resist the government R or not $\neg R$, the latter of which results in status-quo payoffs. After choosing to resist,

it mobilizes at a cost that is a function of the society's level of education, $-m(e)$, if there was no direct involvement in education in the first period. This mobilization cost is a convex function that decreases with the level of education such that, $-m'(e) > 0$ and $-m''(e) < 0$. However, if the government invested in education in the first period, the level of education increased from e to $e' > e$, and only a portion of the new level of education is available for mobilization against the government such that $-m(\gamma_L e')$ after indirect involvement and $-m(\gamma_S e')$ after direct involvement. $\gamma_L \in [0,1]$ and $\gamma_S \in [0,1]$ therefore represents the extent to which the government was able to "demobilize" the indigenous society by investing in education. I also additionally assume that the extent of such demobilization is stronger after direct involvement than indirect involvement, such that $\gamma_L > \gamma_S$.

If the society chooses to resist, the two actors are engaged in a conflict that results in government winning with a probability that is dependent on its coercive resources. If there is no investment in co-ercion, the government wins the conflict with probability $\alpha(c)$ and loses with $1 - \alpha(c)$, where c is the level of coercive resources such that $e \in [0, \infty)$. $\alpha(c)$ is a convex function that increases with c such that $\alpha'(c) > 0$ and $\alpha''(c) < 0$. However, if there was an investment in coercion, the probability increases to $\alpha(c') > \alpha(c)$. If the government wins, both actors receives the status-quo payoffs of V_G and V_I. However, if the society wins, the payoffs are $V_G' < V_G$ for the government and $V_I' > V_I$ for the society.

In summary, in the first period, the government makes a decision over three possible types of invest-ment: coercion P, indigenous education L, and direct involvement S. Each of this decision affects the level of education e, associated costs, and the extent to which the society can mobilize against the govern-ment based on the level of education and the government control over education, γ_L and γ_S. The level of education and the investment in coercion in turn affects the cost of mobilization if the society chooses to resist m, and the winning probability of the government during a conflict α, respectively. Figure 1 also provides a visualization of the game setup.

The timing of the game is as follows:

1. The parameter values for $c, e, g, \lambda, V_I, V_G, \gamma_L$, and γ_S are given. The values for c', e', V_I', and V_G' are assigned based on the specified conditions. The functional forms for $\alpha(c)$ $\Delta(e)$, and $m(e)$ are specified.

2. Period 1 starts with the government G choosing one of the three possible actions: investment in physical coercion P, investment in education by funding indigenous schools L, and investment in education by expanding the direct involvement direct involvement S. Utility values for the government G and the indigenous society I are realized.

3. Period 2 starts with the nature N choosing a negative shock against the state with a probability λ. If there was no shock, the game ends with payoffs realized for the two actors.

4. If there was a negative shock, I chooses between two actions: resist against the state R and not resist against the state $\neg R$. Payoffs are realized for the two actors. The game ends.

A.2 Theoretical Assumptions

The purpose of the model is to explicitly map the link between education investment and political stability, and under what conditions non-democratic states will choose education over investing solely in physical coercion during periods of political instability. This is different from existing theories of goods provision under non-democratic states, which focus either on factor endowment and information collection. In the context of colonial regimes in Sub-Saharan Africa, Ricart-Huguet (2020) emphasize local economic geography as a key driver of colonial education investments. While acknowledging the specific channels through which the increase in goods provision occurred, this paper focuses on the channel where the logic of goods provision is driven by political instability and a possible alternative of a sole focus on coercion or no investment.

Previous research has already shown that authoritarian states do invest in education, or that there is some relationship between education and violent conflict. For example, Paglayan found in the case of Chile after the rebellion of 1859 that provinces that rebelled against the state tended to have larger investments in education. Similarly, Aghion et al (2018), for example, argue that military rivalry was an important factor for education expansion, and authoritarian states, in fact, had higher levels of such expansion, along with a formal model explaining their logic. This paper, however, improves upon the existing knowledge by providing a formal model that focuses on a domestic explanation for the relationship between

conflict and education, along with the conditions under which education may become a preferable investment over physical coercion.

In addition, the model assumes that government's decision problem between the three possible action is not convex; the government cannot focus on education investment and coercive investment at the same time. I argue this is a plausible assumption in the cases of colonial states and post-revolution states because serious fiscal constraints imply that allocation to education investment essentially comes at the expense of coercive investment (see Frankema (2011) and Frankema and Van Waijenburg (2014) for the details of fiscal constraints faced by colonial states). In addition, we assume that there exists a baseline level of investment in physical coercion, captured by the government's non-zero probability of winning during the war state ($\alpha(c') > \alpha(c)$). Therefore, the government's choice, in fact, is where to make an additional investment between physical coercion and education at a given level of coercive infrastructure.

What constitutes the negative shock to the economy is intentionally abstract in the game. This is to provide a generalized game that represent the numerous types of negative shocks that affected colonial states, such as economic depressions, the World Wars, disease outbreaks, or even rebellions led by charismatic personalities. Size of the shock is abstract as well, which limits the game's ability to analyze its relationship with the actors' equilibrium strategies.

Limits of the current game will be mentioned here. While the purpose of the model is to explain why colonial states may or may not invest in education, the framework may apply to the goods other than coercion that potentially serves as a social control, or in non-colonial authoritarian states. For example, land distribution programs in East Asia and Latin America can be another example where goods provision may potentially maintain peace and serve as an alternative to physical coercion (Albertus and Menaldo 2014; Doner, Ritchie, and Slater 2005).

A.3   Equilibrium

I use Subgame Perfect Nash Equlibrium (SPNE) as the solution concept and identify the equilibria using backward induction. Each SPNE is a strategy profiles of the two actors $\sigma = (\sigma_I, \sigma_G)$ that constitutes a Nash equilibrium in every subgame of Γ. In the first period, the government decides between three

possible actions (physical coercion, indirect involvement, direct involvement) the one that maximizes the two-period payoffs, whose functional forms depend on whether the society has the incentive to resist if there is a negative shock to an economy. In the second period, based on what the government invested in the first period, the society chooses between resisting against the government and not resisting.

The society's utility function in the first period depends on the government's action in the first period (a_G^1), as in following:

$$
U_I^1 = \begin{cases} -g & \text{if } a_G^1 = P \\ 0 & \text{if } a_G^1 = L \\ 0 & \text{if } a_G^1 = S \end{cases}
$$

The values of the function imply the assumption that the society assigns a negative value on only physical coercion, resulting in the payoff $-g$. However, it is relatively indifferent if the government provides funding for indigenous schools or builds directly controlled schools, resulting in the payoffs of 0. The society's expected utility function in the second period is:

$$
E[U_I^2] = \begin{cases} V_I & \text{if } a_I^2 = \neg R \\ (1-\lambda)V_I + \lambda[(1-\alpha(c'))V_I' + \alpha(c')V_I - m(e) + g] & \text{if } a_I^2 = R \text{ and } a_G^1 = P \\ (1-\lambda)V_I + \lambda[(1-\alpha(c))V_I' + \alpha(c)V_I - m(\gamma_L e')] & \text{if } a_I^2 = R \text{ and } a_G^1 = L \\ (1-\lambda)V_I + \lambda[(1-\alpha(c))V_I' + \alpha(c)V_I - m(\gamma_S e')] & \text{if } a_I^2 = R \text{ and } a_G^1 = S \end{cases}
$$

The values of the utility function depends on the government's investment decision in the first period, and also reflects the strategic trade-offs between the investments. If the government invested in physical coercion, the probability of government winning during a conflict increases; however, accrued grievances, and low costs of mobilization if the pre-existing level of education is high, increasing the society's incentives to fight. If the government invested in indirect or direct involvement, while the probability of winning during a conflict is lower, the society's willingness to fight is also lower because the grievances are lower and the state investment has already captured a portion of the educated population available for

mobilization, thereby increasing the cost.

The government's utility function in the first period is:

$$U_G^1 = \begin{cases} 0 & \text{if } a_G^1 = P \\ -\Delta(e) & \text{if } a_G^1 = L \\ -\Delta & \text{if } a_G^1 = S \end{cases}$$

This function captures the cost associated with each of the investment. One advantage of physical coercion is it bears the lowest cost. Therefore, all else equal, as in if the society pursues the same action regardless of the investment, the government will prefer to invest in physical coercion than education. Since this setup abstracts away the economic incentives for the government to invest in education, the only incentive for the government to invest in education is to increase the society's incentives for not resisting against the government during the times of negative shocks.

The government's expected payoff in the second period depends on the society's action in the second period (a_I^2), as in following:

$$E[U_G^2] = \begin{cases} V_G & \text{if } a_I^2 = \neg R \\ (1-\lambda)V_G + \lambda[(1-\alpha(c'))V_G' + \alpha(c')V_G] & \text{if } a_I^2 = R \text{ and } a_G^1 = P \\ (1-\lambda)V_G + \lambda[(1-\alpha(c))V_G' + \alpha(c)V_G] & \text{if } a_I^2 = R \text{ and } a_G^1 = L \\ (1-\lambda)V_G + \lambda[(1-\alpha(c))V_G' + \alpha(c)V_G] & \text{if } a_I^2 = R \text{ and } a_G^1 = S \end{cases}$$

This function reiterates the previous point. If there was no negative shock or the society chooses not to fight regardless of the type of investment, the government receives the same payoff regardless of its investment in the first period. Therefore, the government received the highest payoff by investing in coercion in the first period. Similarly, if the society chooses to fight after a negative shock regardless of the investment, the government received the highest payoff by investing in coercion in the first period.

Since the only advantage from investment in education in this game is its ability to prevent the society

from resisting against the government, investment in any education requires the government to prefer the riskless payoff from the status quo minus the cost to the risky payoff due to the potential resistance against the government. The following remarks captures this requirement.

Lemma 1 (Cost of Education). The government's equilibrium strategy is to invest in physical coercion P if the cost of education is sufficiently high such that $\Delta(e) > \lambda(1 - \alpha(c'))(V_G - V_G')$. *Proof:* See Appendix 7.1.

The requirement further implies how different parameters affects the conditions under which the government has the incentive to invest in education and prevent anti-government resistance. First, the probability of a negative shock λ should be sufficiently high enough so that the likelihood at which the government has to face off against the society justifies the cost. Second, the probability of the society winning in a conflict, even after investing in physical coercion, should be high enough so that there is a real risk of being defeated by the society and receiving the lower payoff.

If the above requirement is met, we can ensure that the costs of education are sufficiently low for the government to prefer the investment in education, receiving the payoffs without the risk of resistance, to the investment in coercion, receiving the payoff with the risk of resistance. Now we can determine the conditions under which the society still has the incentive to resist after the government's investment and a negative shock. For the society to prefer resisting over not resisting against the government after a negative shock, the following inequalities must hold:

$$
V_I < \begin{cases}
(1 - \alpha(c'))V_I' + \alpha(c')V_I - m(e) + g & \text{if } a_G^1 = P \\
(1 - \alpha(c))V_I' + \alpha(c)V_I - m(\gamma_L e') & \text{if } a_G^1 = L \\
(1 - \alpha(c))V_I' + \alpha(c)V_I - m(\gamma_S e') & \text{if } a_G^1 = S
\end{cases}
$$

Moving around the terms, we get the critical values of mobilization cost at which any larger value will

make the society prefer to resist:

$$m(e) < (1 - \alpha(c'))(V_I' - V_I) + g \qquad \text{if } a_G^1 = P$$

$$m(\gamma_L e') < (1 - \alpha(c))(V_I' - V_I) \qquad \text{if } a_G^1 = L$$

$$m(\gamma_S e') < (1 - \alpha(c))(V_I' - V_I) \qquad \text{if } a_G^1 = S$$

These conditions show a number of parameters that shapes the society's preference for resisting. First, there is a strategic trade-off between the level of education and the portion of educated and demobilized population after government investment. Higher levels of education reduces the mobilization costs and increases the society's preference to resist, *ceteris paribus*. However, after educational involvement, despite the higher levels of education ($e' > e$), the costs can be still high enough to deter resistance because only a portion of the educated population (γ_L for indirect involvement and γ_S for direct involvement) is available for mobilization. Second, there is a strategic trade-off between the government's winning probability and the level of grievances. While coercion increases the former, the latter increases the society's preference for resistance when given an opportunity.

Given the conditions, I propose four equilibria that describe the government's investment and the society choice over resistance after a negative shock.

Proposition 1 (Peace under Coercion). If $m(e) > (1 - \alpha(c'))(V_I' - V_I) + g$, the following equilibrium forms the unique SPNE of Γ:

1. In period 1, the government chooses P.

2. In period 2, a negative shock occurs at a probability of λ. In the event of a negative shock, the society chooses $\neg R$.

Proof: See Appendix 7.2.

In this equilibrium, the initial level of education is sufficiently low, resistance against the state is unlikely and the government does not need to be concerned with investment in education and instead rely

on coercion as the primary focus of state building. An example in British Burma are the Frontier Areas, where the British government was largely absent and indirect in its presence to occasional policing. This also largely corresponds to several territories of the colonial state under what Mamdani (1996) described as indirect rule, where the government primarily controlled the territory through "native" institutions, mobilizing coercive forces into the territories when needed.

Proposition 2 (Indirect involvement). If $m(e) > (1 - \alpha(c'))(V_I' - V_I) + g$ and $m(\gamma_S e') > m(\gamma_L e') > (1 - \alpha(c))(V_I' - V_I)$, the following equilibrium forms the unique SPNE of Γ:

1. In period 1, the government chooses L.

2. In period 2, a negative shock occurs at a probability of λ. In the event of a negative shock, the society chooses $\neg R$.

Proof: See Appendix 7.3.

In this equilibrium, the government's coercive capacity does not successfully thwart the risk of resistance when given an opportunity. Therefore, in order to demobilize potential resistance, the government decided to limit its involvement in education to funding. An example of this is the government's initial reliance and funding of Buddhist schools in British Burma. This equilibrium also resembles several cases of colonial education in sub-Saharan Africa, where missionary schools are the government's primary method of education provision.

Proposition 3 (Direct Involvement). If $m(e) > (1 - \alpha(c'))(V_I' - V_I) + g$ and $m(\gamma_S e') > (1 - \alpha(c))(V_I' - V_I) > m(\gamma_L e')$, the following equilibrium forms the unique SPNE of Γ:

1. In period 1, the government chooses S.

2. In period 2, a negative shock occurs at a probability of λ. In the event of a negative shock, the society chooses $\neg R$.

Proof: See Appendix 7.4.

In this equilibrium, the costs of mobilization are sufficiently low that the society has the incentive to resist both after investment in coercion and indirect involvement, meaning that the government can

prevent the risk of resistance only by investing in education, which it decides to do so in the first period. An observable difference of this equilibrium from the indirect involvement equilibrium is the development of directly controlled schools, and often outright banning on defunding of indigenous schools. The government's decreasing reliance on monastic schools in British Burma in the early 20th century resembles this equilibrium, so are the cases of education expansion in Tonkin after 1917 and education reform programs in Dutch East Indies as part of "Ethical Policy."

Proposition 4 (Coercion without Peace). If $m(e) > (1 - \alpha(c'))(V_I' - V_I) + g$ and $(1 - \alpha(c))(V_I' - V_I) > m(\gamma_S e') > m(\gamma_L e')$, the following equilibrium forms the unique SPNE of Γ:

1. In period 1, the government chooses S.

2. In period 2, a negative shock occurs at a probability of λ. In the event of a negative shock, the society chooses R.

Proof: See Appendix 7.5.

In this equilibrium, the costs of mobilization are sufficiently high such that the society will choose to resist after any type of investment. In this context, the government will choose to invest in coercion since it is the least expensive action and increases the likelihood of winning in a conflict. Descriptive cases of this equilibrium would be waves of anti-colonial conflicts that emerged after the Second World War.

Figure 2 summarizes the aforementioned equilibria, visualizing the government's expected payoffs as a function of the level of education in the second period, while still holding the assumptions from Remark 1. If the government chooses to invest in coercion while the society's education level is $e \leq e_1^* = m^{-1}((1 - \alpha(c'))(V_I' - V_I) + g)$, its payoff is the highest (dotted line), since there is no risk of resistance. However, once $e > e_1^* = m^{-1}((1 - \alpha(c'))(V_I' - V_I) + g)$, the risk-free payoff from indigenous education become the highest. Similarly, when $e' > e_2^* = \frac{m^{-1}((1 - \alpha(c))(V_I' - V_I))}{\gamma_L}$, the risk-free payoff from direct involvement become the highest. However, when the level of education becomes sufficiently high such that $e' > e_3^* = \frac{m^{-1}((1 - \alpha(c))(V_I' - V_I))}{\gamma_S}$, meaning no type of investment can deter the risk of resistance, the government goes back to repression as an equilibrium strategy.

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B Proofs

B.1 Proof of Lemma 1

For the government to prefer to choose indirect involvement or direct involvement, it should receive a higher payoff from an equilibrium where it invests in either type of education and the society chooses not to resist in the event of a negative shock, compared to the payoff from an equilibrium where it invests in physical coercion and society chooses to resist in the event of a negative shock. The sum of the two period payoffs are as follows:

$$E[U_G] = U_G^1 + E[U_G^2] = \begin{cases} V_G - \Delta(e) & \text{if } a_G^1 = L \text{ and } a_I^2 = \neg R \\ V_G - \Delta & \text{if } a_G^1 = S \text{ and } a_I^2 = \neg R \\ (1-\lambda)V_G + \lambda[(1-\alpha(c'))V_G' + \alpha(c')V_G] & \text{if } a_G^1 = P \text{ and } a_I^2 = R \end{cases}$$

The government will prefer the investment in physical coercion, risking anti-government resistance, to the investment in indigenous education and prevent resistance if the expected payoff from the former is higher than the expected payoff from the latter.

$$(1-\lambda)V_G + \lambda[(1-\alpha(c'))V_G' + \alpha(c')V_G] > V_G - \Delta(e)$$

$$\Delta(e) > \lambda(1-\alpha(c'))(V_G - V_G')$$

(1)

Since $\forall e, \Delta > \Delta(e)$, if $\Delta(e) > \lambda(1-\alpha(c'))(V_G - V_G')$, then $\Delta > \lambda(1-\alpha(c'))(V_G - V_G')$. QED.

B.2 Proof of Proposition 1

If $m(e) > (1-\alpha(c'))(V_I' - V_I) + g$, then the society's mobilization costs are already sufficiently high after investment in coercion that it chooses to not resist even after a negative shock; that is, its path-of-play equilibrium strategy is $\sigma_I^* = (a_I^2 = \neg R)$; Off-the-path play strategies are indeterminate because I do not make any assumption on the comparison between $m(e)$, $m(\gamma_L e')$, and $m(\gamma_S e')$.

As the result, the government enjoys the sum of the first period payoff of o and the second period payoff without risk of resistance V_G. The maximum payoffs after indirect involvement are their respective sums of the first-period costs of investment and the second period payoffs without risk of resistance V_G:

$$E[U_G] = U_G^1 + E[U_G^2] = \begin{cases} V_G - \Delta(e) < V_G & \text{if } a_G^1 = L \text{ and } a_I^2 = \neg R \\ V_G - \Delta < V_G & \text{if } a_G^1 = S \text{ and } a_I^2 = \neg R \end{cases}$$

Therefore, the government's equilibrium strategy is to invest in coercion in the first period $\sigma_G^* = (a_G^1 = P)$. QED.

B.3 Proof of Proposition 2

If $m(e) < (1 - \alpha(c'))(V_I' - V_I) + g$ and $m(\gamma_S e') > m(\gamma_L e') > (1 - \alpha(c))(V_I' - V_I)$, then the society's mobilization costs are already sufficiently low after investment in coercion to prefer resistance after a negative shock. However, its mobilization costs increases after investing in indigenous education to prefer no resistance; this is also true for direct educational involvement since the portion of educated population available for mobilization is lower in direct involvement than indirect involvement $\gamma_S < \gamma_L$. Therefore, the society's equilibrium strategy is as follows:

$$\sigma_I^* = \begin{cases} R & \text{if } a_G^1 = P \\ \neg R & \text{if } a_G^1 = L \\ \neg R & \text{if } a_G^1 = S \end{cases}$$

If the above is the case, the government strictly prefers indirect involvement to direct involvement because $\Delta(e) < \Delta$ and the second-period payoffs are the same. Since we assume (1) is false, the government's equilibrium strategy is to invest in indigenous education in the first period $\sigma_G^* = (a_G^1 = L)$. QED.

B.4 Proof of Proposition 3

If $m(e) > (1 - \alpha(c'))(V_I' - V_I) + g$ and $m(\gamma_S e') > (1 - \alpha(c))(V_I' - V_I) > m(\gamma_L e')$, then the society's mobilization costs are sufficiently low both after investment in coercion and after investment

in location, therefore prefer resistance after either of the investment and a negative shock. However, its mobilization costs increases after investing in indigenous education to prefer no resistance. Therefore, the society's equilibrium strategy is as follows:

$$
\sigma_I^* = \begin{cases} R & \text{if } a_G^1 = P \\ R & \text{if } a_G^1 = L \\ \neg R & \text{if } a_G^1 = S \end{cases}
$$

If the above is the case, in addition to assuming (1) is false, we have to additionally assume that $\Delta < \lambda(1 - \alpha(c'))(V_G - V_G')$. If it is true, then the government's equilibrium strategy is to choose direct involvement in the first period $\sigma_G^* = (a_G^1 = S)$. QED.

B.5   Proof of Proposition 4

If $m(e) > (1 - \alpha(c'))(V_I' - V_I) + g$ and $(1 - \alpha(c))(V_I' - V_I) > m(\gamma_S e') > m(\gamma_L e')$, it means the society has the incentive to resist after a negative shock, regardless of the type of investment. Therefore, the society's equilibrium strategy is as follows:

$$
\sigma_I^* = \begin{cases} R & \text{if } a_G^1 = P \\ R & \text{if } a_G^1 = L \\ R & \text{if } a_G^1 = S \end{cases}
$$

In the above is the case, we know that coercion yields the highest expected payoff because the cost is lowest and the second period payoff is the highest due to $\alpha(c') > \alpha(c)$. Therefore, the government's equilibrium strategy is to invest in coercion in the first period $\sigma_G^* = (a_G^1 = P)$. QED.
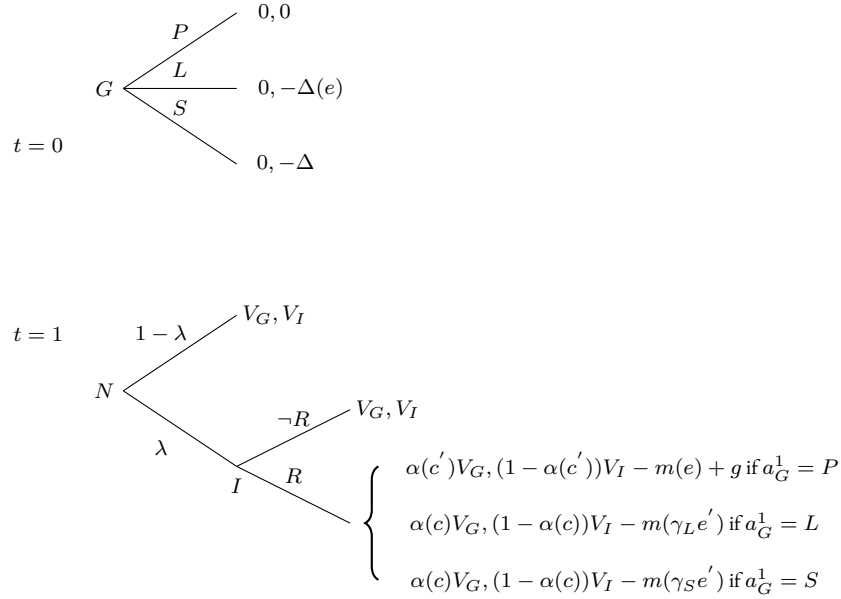
B.6 Additional Figures

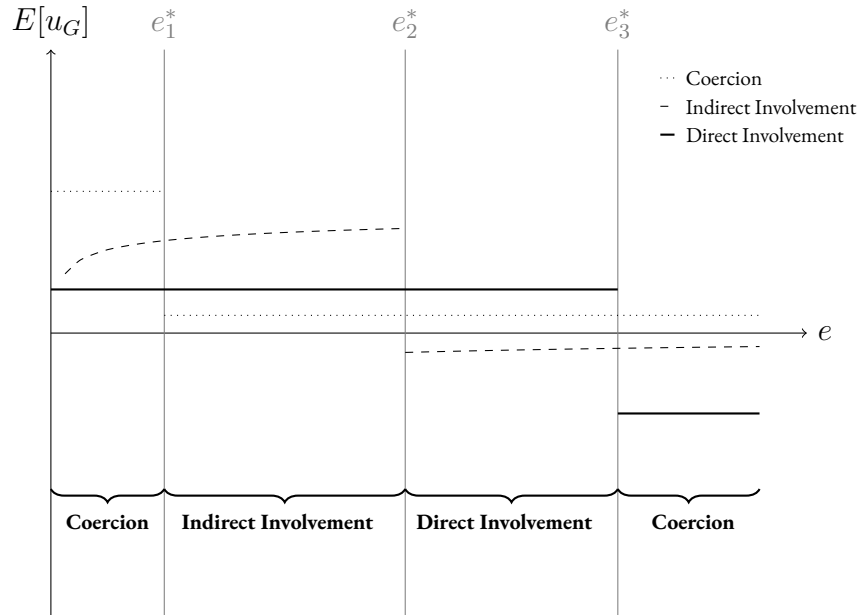Figure A1: Coercion, Indirect Involvement, and Direct Involvement in a Strategic Interaction

Figure A2: Equilibrium regions based on the relationship between the level of education in the second period e and the expected utility of the government $E[u_G]$. Value assumptions are $e = 1, c = 1, g = 1, V_I = 0, V_I' = 1, V_G = 1, V_G' = 0, \lambda = 0.5$. Function assumptions are $\alpha(c) = 1 - \frac{1}{x+1}, m = \frac{1}{e}, e' = 3e, c' = 3c$.

C Supplemental Figures

Figure A3: An example of monastic school in British Burma, showing Burmese school boys & Phoongyee [Burma], 1890s. Photograph from the Curzon Collection. Shelfmark: Photo 430/15(49).
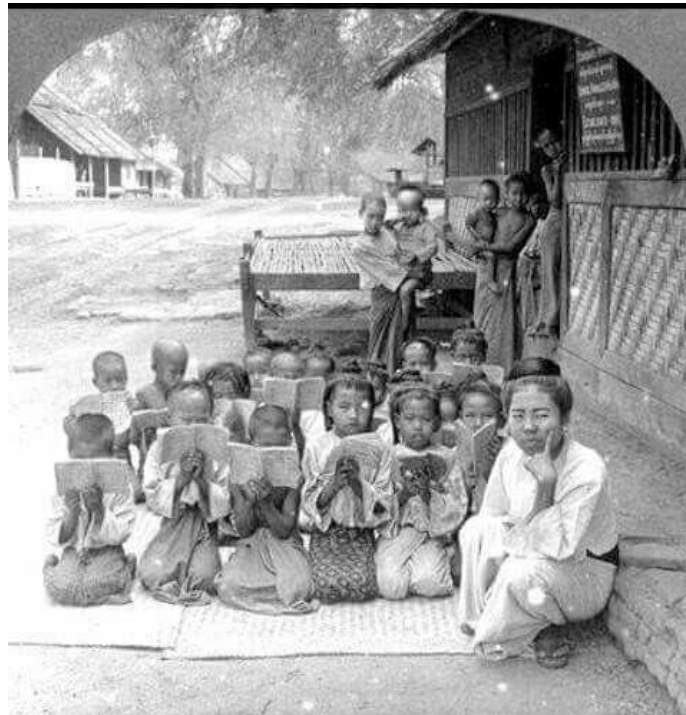

Figure A4: An example of lay school in British Burma, showing a village school and lady teacher, Amarapura, Burma, 1908. Shelfmark: Photo 1295(34).

D Additional Results

D.1 Only Census Years: Female Enrollment

	DV: Total enrollment			
	Primary (1)	Middle (2)	Basic (3)	Technical (4)
Buddhist male literacy (count)	0.6043	-0.6046	0.3031	1.3019
SE	(0.6709)	(0.4853)	(0.5866)	(0.7114)
Bonferroni CI	[-1.0998, 2.3084]	[-1.8373, 0.6281]	[-1.1869, 1.7931]	[-0.5051, 3.1089]
Riots since 1901 (count)	-0.2794	-0.6959	-0.4107	-0.5098
SE	(0.1676)	(0.2986)	(0.1728)	(0.3262)
Bonferroni CI	[-0.7051, 0.1463]	[-1.4543, 0.0625]	[-0.8496, 0.0282]	[-1.3383, 0.3187]
Buddhist male literacy × Riots since 1901	0.3008	0.7108	0.4315	0.092
SE	(0.1556)	(0.185)	(0.1472)	(0.219)
Bonferroni CI	[-0.0944, 0.696]	[0.2409, 1.1807]	[0.0576, 0.8054]	[-0.4643, 0.6483]
Obs.	86	86	86	62
Adjusted R^2	0.7172	0.6957	0.771	0.3847
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table A1: Standardized two-way fixed effects estimates with various education outcomes for females as dependent variables. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. Census years only. 98.75 percent CIs result from Bonferroni correction (four hypotheses).
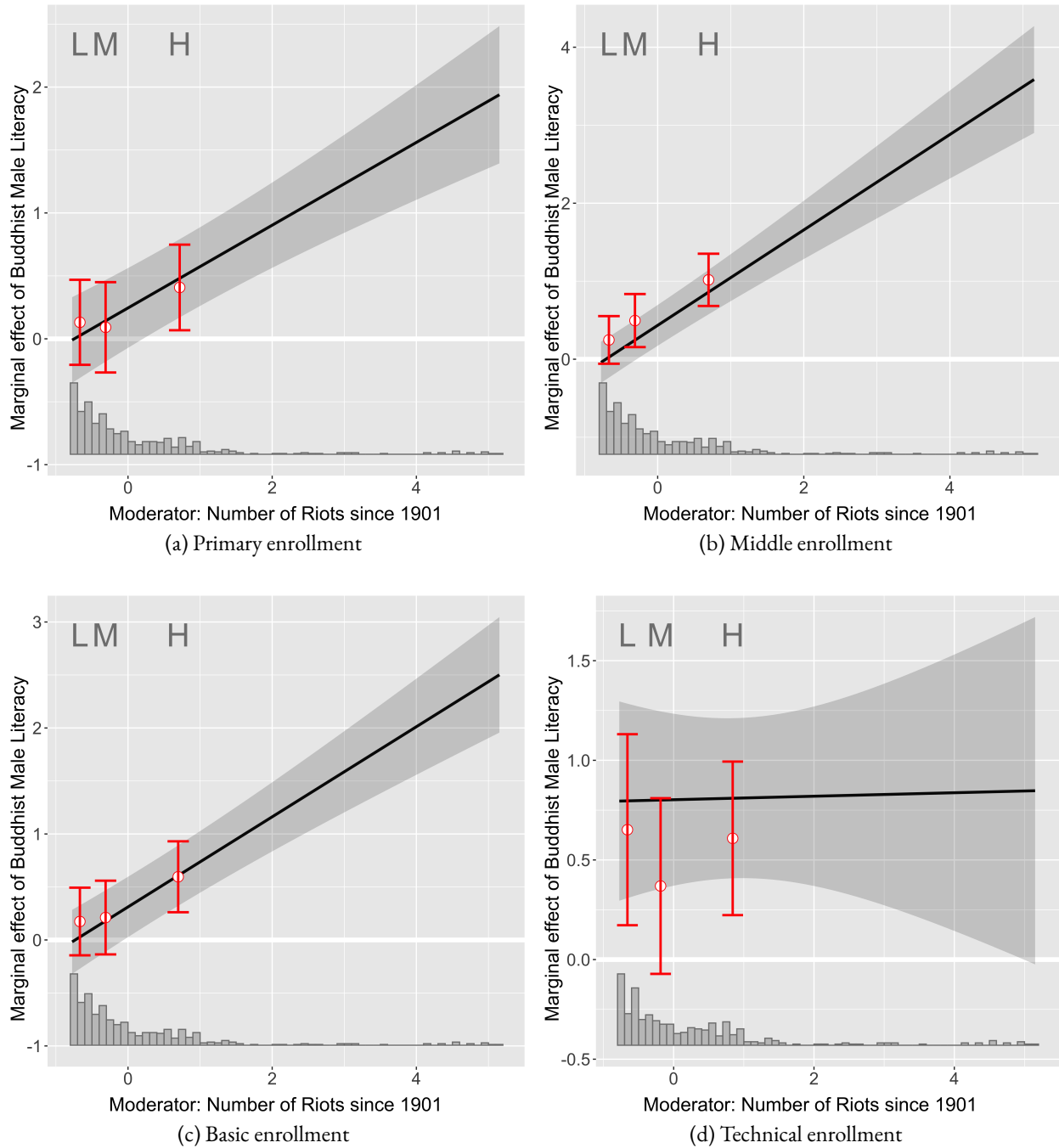
Figure A5: Marginal effects plot of Buddhist male literacy coefficient estimates for various female enrollment outcomes. Standardized two-way fixed effects coefficients. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. Census years only. 98.75 percent CIs result from Bonferroni correction (four hypotheses).
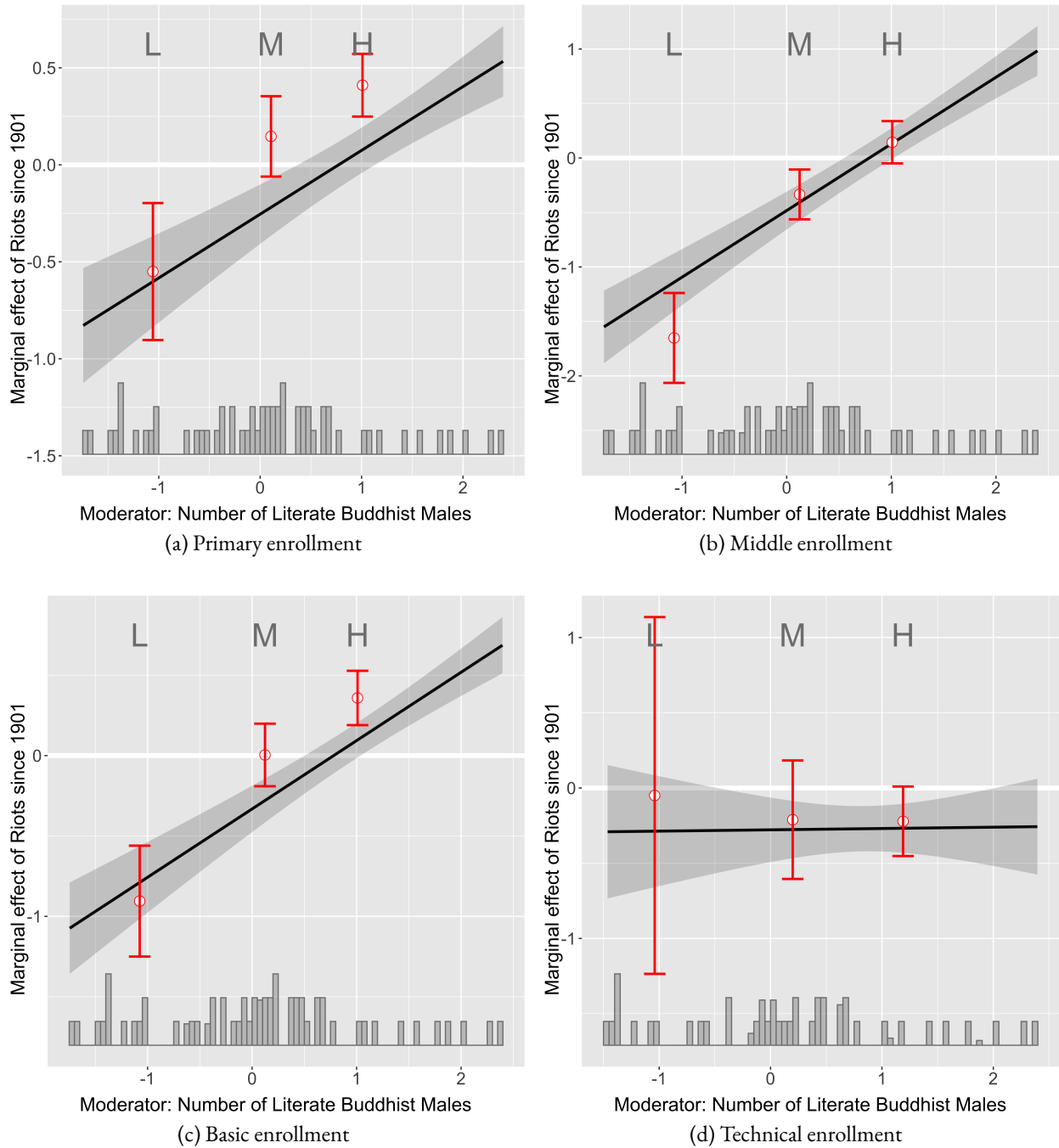
Figure A6: Marginal effects plot of Buddhist male literacy coefficient estimates for various female enrollment outcomes. Standardized two-way fixed effects coefficients. The unit of analysis is district-year. Cluster-robust standard errors with Bonferroni correction for multiple hypotheses testing. Bold coefficients have 98.75 percent confidence intervals that do not contain null estimates. Census years only. 98.75 percent CIs result from Bonferroni correction (four hypotheses).