The Impact of Protestantism on Women's Education in Japan

Ray Xi Cao

November 2025

School of Economics
University of Sydney

Thesis submitted in partial fulfilment of the award course requirements of the Master of Economic Analysis

Supervised by Marian Vidal-Fernandez and Jordi Vidal-Robert

STATEMENT OF ORIGINALITY

I hereby declare that this submission is my own work and to the best of my knowledge it contains no material previously published or written by another person. Nor does it contain any material which has been accepted for the award of any other degree or diploma at the University of Sydney or at any other educational institution, except where due acknowledgment is made in this thesis.

Any contributions made to the research by others with whom I have had the benefit of working at the University of Sydney is explicitly acknowledged.

I also declare that the intellectual content of this study is the product of my own work and research, except to the extent that assistance from others in the project's conception and design is acknowledged.

Ray Xi Cao

19 Nov 2025

Acknowledgement
I am deeply grateful to Marian Vidal-Fernandez, and Jordi Vidal-Robert, for their invaluable support throughout the writing of this proposal. Their guidance, insightful ideas, and thoughtful feedback have been instrumental in my learning journey.

I acknowledge the use of ChatGPT (https://chat.openai.com/) to assist with spelling and grammar checks of my writing. It has largely replaced Google as my primary search engine for academic materials. The tool also provided refinements to the academic language of my work. Additionally, ChatGPT was used to support the following tasks:

- Identifying relevant data
- Compiling historical background information
- Providing guidance on paper structure
- Locating archival materials related to women's education in pre–World War II Japan
- Searching for potentially relevant reference materials
- Translation (Japanese to English)
- Initial sample R codes for data manipulation, statistical modelling, and visualisation

A record of the questions raised, and the corresponding AI-generated responses are available upon request. While AI tools can be helpful for gathering preliminary information, and identifying potential reference materials, they are also prone to fabricated contents and errors. Therefore, all references cited in this proposal are peer-reviewed journal articles, academic papers, and books that have been checked and verified.

Abstract:

Gender gaps in education persist in many developing countries. Understanding how some nations narrowed these gaps in the past can provide insights into human-capital formation. This thesis examines whether Protestant missionary activity, particularly the work of single female missionaries, influenced women's educational attainment in Japan. Using historical and census data from 46 Japanese prefectures, I use a two-stage least squares (2SLS) approach, instrumenting on the number of missionaries to identify potential causal effects. The result shows the presence of Protestant missionaries in Japan, especially single female missionaries, is a strong predictor of the establishment of Protestant girls' high schools. These schools appear to have a positive impact on women's tertiary educational attainment. IV estimates indicate: using single Protestant female missionaries to instrument schools, one additional Protestant girls' high school per million people raised women's tertiary attainment by 0.584%, relative to a mean of 1.522% (a 0.81 standard-deviation increase). Comparable effects are observed for Catholic missions. Effects at the secondary level were primarily observed among women, though tertiary gains also extended to men. This study contributes to literature on religion, human capital formation, and female role models in shaping women's education.

Keywords: Protestantism; Missionaries; Japan; Gender; Human capital.

Table of Contents

1. Introduction

Modern compulsory schooling, first introduced in Prussia in the late eighteenth century (Schleunes, 1979), has played a key role in human-capital formation (Becker, 1993). Nevertheless, gender gaps in education remain prevalent in several developing countries, particularly in low-income countries (UNESCO, 2017). These gaps are often rooted in traditional socio-cultural norms that prioritise the education of boys over girls. The exclusion of girls and women from equal educational opportunities hinders the development of human capital and prevents economies from fully realising their productive potential (Klasen, 2002). Understanding how Japan narrowed gender gaps in educational attainment during its transition from a developing country to an industrialised powerhouse may provide valuable insights into the mechanism of human-capital formation.

Japan's distinctive trajectory as the first non-Western nation to achieve advanced economic status contrasts with the experiences of China and parts of Africa, which have not attained similar levels of development despite comparable exposure to Western influence and other modernisation efforts. In particular, shifts in the attitudes of Japanese elites in favour of Western culture during the late nineteenth century may have catalysed broader societal changes, including the acceptance of Western-style education for girls. Exploring how these shifts influenced Japan's human-capital accumulation in the past may offer importance guidance for contemporary policymaking in low- and middle-income countries.

This thesis asks whether the spread of Protestantism, through the establishment of missionary schools, positively impacted women's educational attainment in Japan during the late 19th and early 20th centuries. In particular, it examines the role of female missionaries that shaped women's education in Japan.

The analysis begins by examining the correlations between missionary schools and women's educational attainment. However, these correlations may be confounded by factors such as the degree of Western influence or attitudes toward modernization, which could simultaneously influence both the establishment of missionary schools and subsequent educational outcomes. To address these concerns, the study employs a two-stage least squares (2SLS) strategy. In the first stage, the number of missionaries is used as an instrument to predict the number of missionary schools established across prefectures. In the second stage, the estimated variation in missionary schools driven solely by missionary presence is used to explain women's educational attainment, thereby isolating the effect of missionary schooling from confounding influences.

The findings show a significant association between Protestant missionary presence, especially single female missionaries, and the establishment of Protestant girls' high schools. The IV estimates indicate a substantial effect: using single Protestant female missionaries to instrument schools, one additional Protestant missionary girls' high school per million people increases women's tertiary educational attainment by 0.584%, relative to a mean of 1.522% (a 0.81 standard deviation increase). Protestant influence is also associated with higher men's tertiary educational attainment: an additional Protestant missionary middle school for boys per million people increases men's tertiary attainment by 5.952-6.147%, relative to a mean of 8.89% (approximately a 2.1 standard-deviation increase). At the

secondary level, an additional Protestant missionary girls' high school raises women's attainment by 4.07–4.495% (mean of 44.95%, an approximately 0.55-0.61 standard-deviation increase), while no corresponding effect is found for men's secondary educational outcomes. Before WWII, public middle schools were accessible only to boys and offered a direct pathway to universities (Kariya, 2018). In contrast, girls had far fewer academic options, as public girls' high schools placed greater emphasis on domestic training rather than preparation for further studies (Seat, 2003). This institutional structure likely contributed, at least in part to the gender gap observed in 1950, when boys' secondary educational attainment was approximately 11.5% higher than that of girls. In this context, missionary schools may have expanded educational opportunities for girls more significantly than for boys, helping to narrow the gap in educational attainment.

This thesis contributes to two main strands of literature. First, it adds to research on the impact of Protestantism and religious institutions on human capital formation (e.g., Becker & Woessmann 2008; Nunn 2014; Becker & Won 2024; Bai and Kung, 2015) by examining female education in pre-WWII of Japan, an understudied Asian context despite substantial missionary activity. In doing so, it extends both the geographical and historical scope of existing research.

Second, this thesis contributes to the literature on the function of female role models in shaping educational aspirations, and outcomes (e.g., Carrell, Page, and West, 2010; Porter and Serra, 2020; Goulas, Gunawardena, Megalokonomou, & Zenou, 2024), by highlighting the often-overlooked influence of female missionaries in girls' schools during Japan's early modernisation. The findings challenge the prevailing view that progress in women's education was driven exclusively by male-led government institutions, demonstrating the significant role of women who initiated and led educational efforts, functioning not only as educators but also as visible role models who broadened Japanese girls' perceptions of their own educational possibilities in the early twentieth century.

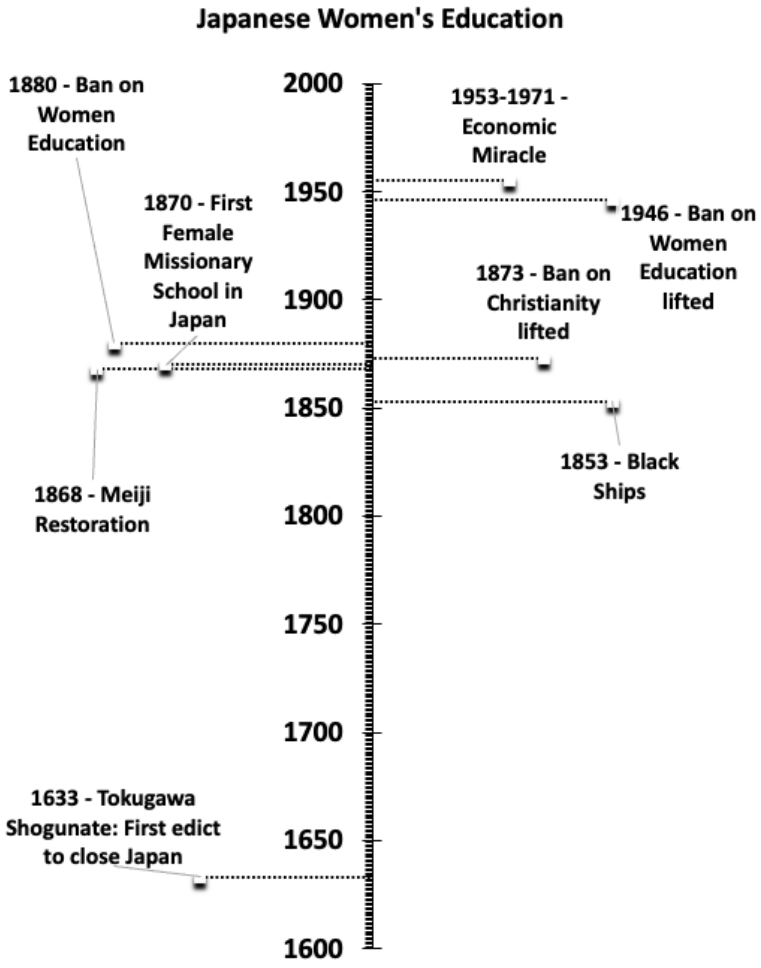
The remainder of the thesis is structured as follows: Section 2 provides the historical background from the Meiji restoration to Pre-WWII, Section 3 provides a review of relevant literature, Section 4 describes the data, Section 5 outlines an empirical strategy, Section 6 reports model results. Section 7 concludes.

2. Historical Background

Prior to the Meiji Restoration (1868), Shinto and Buddhism were the main religious traditions in Japan, while Confucianism provided an important ethical framework (Reader, 1993). In 1854, under the command of Commodore Matthew Perry, the United States Navy coerced Japan to open its ports to foreign trade through the Convention of Kanagawa. Prior to this, during the Tokugawa period (1603–1867), Japan maintained a policy of national seclusion or *sakoku*, restricting foreign contact and prohibiting Christianity. Following the Meiji Restoration in 1868, Japan's new leadership sought to modernise the nation in response to the threat of Western colonisation, aiming to adopt Western culture, science, and political institutions. The anxiety to westernise was famously captured by intellectual Yukichi Fukuzawa's 1885 article, 'Exit Asia' reflecting the aspirations of Japan's ruling elite (Gustafsson, 2022). Acknowledging that suppression of religious freedom, particularly

Christianity would undermine Japan's claim to equal status among modern nations, the government lifted the ban on Christianity in 1873 (Seat, 2003).

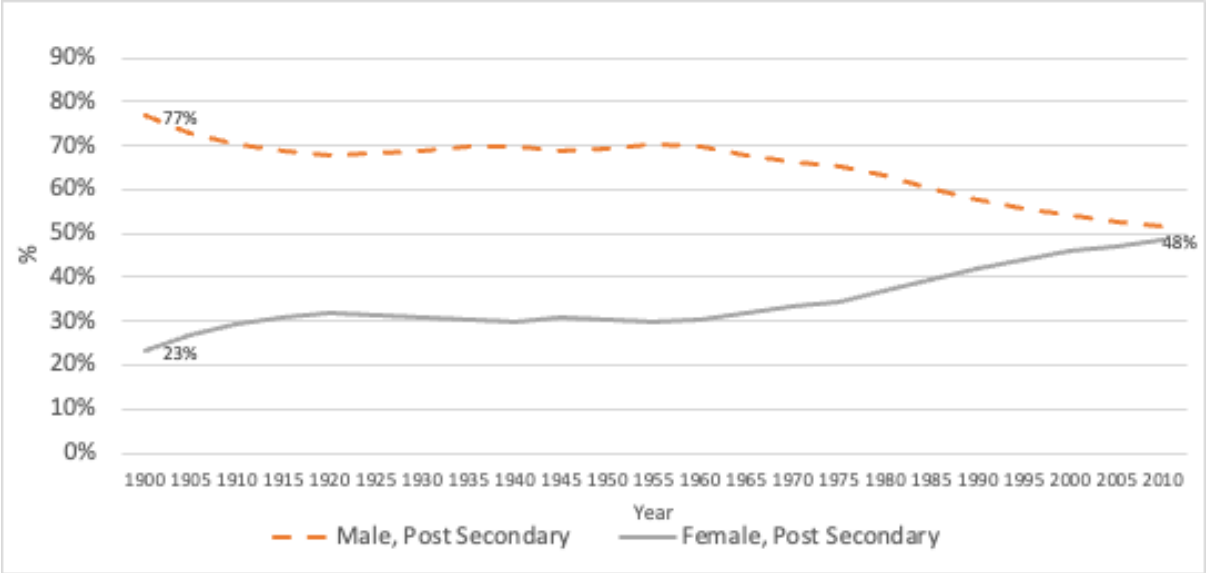
Figure 1.0
Timeline of the Development of Women's Education in Japan



Note. Dates come from Seat, 2003; Thomas, 1959; Nishimizu & Hulten, 1978.

However, from the Meiji period to the end of World War II (1868–1945), educational policies prioritised male education, whereas educational policies for women were explicitly designed to reinforce traditional Confucian gender roles and emphasise 'selfless service' within the household (Seat, 2003). It was not until 1946, following World War II, that the Meiji-era Civil Code was formally abolished, and women were admitted to public middle schools and prestigious universities that had previously been male-dominated (Seat, 2003).

Figure 2.0
Gender Distribution in Post-Secondary Education Attainment in Japan, 1900–2010 (% Male vs. Female)



Note. Adapted from data by Wittgenstein Centre for Demography and Global Human Capital (2017). In 1905, 23% of college or university graduates were female and 77% were male, compared to 48% female and 52% male in 2010.

The association of Christianity with advanced Western nations spurred a surge in preaching attendance from 1883 to 1889, as progressive Japanese elites viewed Christianity as an alternative to the stagnant Confucian code (Thomas, 1959). During the same period, the Meiji government constructed an extravagant Western-style pavilion, Rokumeikan to host frequent parties for foreign diplomats and other VIPs, as part of its efforts to renegotiate the unequal treaties, where Yasutake (2004) suggests that proficiency in English and ballroom dancing, necessary to attend these parties, became fashionable among upper- and middle-class Japanese women, thereby fuelling a growing demand for Western-style education. On the other hand, the 1880 Ministry of Education barred girls from public middle schools. Instead, the ministry provided only a limited number of secondary girls' schools before 1900, with curricula focused more on domestic skills (Seat, 2003).

With public schools unable to meet the growing demand for Western-style girls' education, missionary girls' schools expanded rapidly and became the primary providers of secondary education for Japanese girls and women before 1900 (Seat, 2003). These schools attracted families by offering curricula that differed markedly from those of government institutions, including instruction in Western music, English language education, and advanced post-secondary programs that often exceeded what public schools could provide at the time (Seat, 2003). Importantly, the advancement of women's education was achieved primarily through the curricula and programs established and maintained by these female missionaries at schools rather than through religious preaching.

The rise of the North American women's missionary movement in the late nineteenth century bolstered funding for American Protestant women, who established female

missionary schools, served as teachers and administrators with the backing of women's mission boards (Fujimoto, 2020; Seat, 2003). For examples, in 1870's, Mary Kidder of the Reformed Church in America established the first Protestant missionary girls' school, *Ferris Seminary* (Seat, 2003). Female missionaries from the Women's Union Missionary Society of America (WUMS) founded *Kyoritsu Girls' School* in 1871 (Fujimoto, 2020), and Methodist missionary Elizabeth Russell founded *Kwassui Girls' School* in 1879 (Fujimoto, 2020). Other examples include, Mary F. Denton served as a missionary at *Doshisha Girls' School* for sixty years, beginning in 1888 (Fujimoto, 2020).

Yasutake (2004) provides a detailed historical account of Mary Kidder, who first arrived in Japan in 1869 as a single female missionary. Around 1874, she married missionary Rev. Rothesay E. Miller and continued her work as a missionary's wife. The couple conducted classes in *Ferris Seminary* until 1879, when the Christian community pressured Mary to relinquish her educational leadership and focus instead on supporting her husband's evangelical activities in Tokyo. The operation of the school was subsequently handed over to a married male missionary and his wife, with continued support from the WUMS. A similar case is that Julia Carothers, a Presbyterian missionary wife who founded a girls' school in the 1870's with the support of the Philadelphia Woman's Society, but she had to give up her work at the school when her husband resigned from his mission post in Tokyo (Yasutake, 2004). In the late 19th century, Christian social norms generally did not permit married women to act independently from their husbands (Yasutake, 2004). However, these observations suggest that both single female missionaries and missionary wives, may have engaged directly in girls' education at missionary girls' schools.

Fujimoto (2020) also highlights another channel through which female missionaries shaped women's education: the presence of female medical missionaries in Protestant girls' schools. Serving not as teachers but as school doctors, these women not only provided medical care but may also acted as visible role models whose professional expertise may have inspired Japanese girls' own aspirations. For example, Adaline D. H. Kelsey, a medical missionary who served as a school doctor at *Kyoritsu Girls' School*, played a pivotal role in helping Abe Hana and Sudo Kaku, both students at the school, to complete their medical studies in the United States in 1896 (Fujimoto, 2020). Similarly, Mary Gault, a former missionary who worked as a school doctor at *Kwassui Girls' school*, encouraged Inouye Tomo, then a teacher at the school, to pursue medical training in the US, where Inouye later graduated from the *University of Michigan's Department of Medicine* in 1901 (Fujimoto, 2020).

By the mid-nineteenth century, the United States had produced a cohort of well-educated young women who were eager to work as teachers in female missionary schools abroad, and missions expect prospective female missionaries to have professional skills in teaching and medical care (Yasutake, 2004). These female missionaries through their own western cultural, educational background and courage to work in a foreign country may have served as role models for Japanese girls, expanding their perceptions of women's educational possibilities. Patessio (2020) notes that female missionary teachers at girls' schools tend to become role models for their students, for instance, Asada Mikako, a student in 1886, wrote in her school's history publication that when she was a student, she was aspired to be

independent and to establish a girls' school herself. Her ambitions were likely inspired by the example of independent, well-educated single female missionaries at her school.

3. Literature Review

Protestantism appears to have played a significant role in education, particularly in promoting female education across different historical contexts and regions. In 19th-century Prussia, Becker and Woessmann (2008) show that girls and women in Protestant regions consistently outperformed their counterparts in Catholic regions in both literacy rates and school attendance, suggesting a possible causal relationship between Protestantism and women's education. While not identical, Nunn (2014) finds that Protestant missionary educational activity during the colonial era had a substantial and statistically significant positive effect on female educational attainment in Africa, with no significant effect on male education. Yet, the analysis primarily identifies correlations and does not establish a causal relationship between missionary activity and female education outcomes. Becker and Won (2024) also argue that the widespread adoption of Protestantism during the colonial period significantly contributed to rising literacy rates for both men and women in Korea. They argue that reading and writing of the Korean language were disseminated through foreign Protestant missionary efforts to train local Christians, who in turn established churches that functioned as schools. Their study is closet to this thesis because it examines the relationship between Protestantism and literacy development within the Asian context. Together, these studies demonstrate that Protestant influence consistently shaped educational opportunities for women across diverse settings, providing a relevant starting point for examining similar effects in Japan.

On the other hand, Bai and Kung (2015) using data from 1840 to 1920, show that Protestant missionaries significantly contributed to the diffusion of knowledge by establishing institutions such as schools and hospitals. These efforts played an important role in promoting China's long-term transition toward modernity. Yet, the influence of Protestantism on education stemmed less from religious conversion and more from the intellectual infrastructure missionaries introduced. Both Chen et al. (2020) and Dong and Zhang (2024) also emphasized that historical institutions, such as the civil examination system, and cultural values surrounding education, have had a positive and persistent causal impact on educational outcomes in China, rather than attributing progress to Confucianism. Similarly, the identifying assumption in this study assumes that improvements in educational outcomes were driven not by religious beliefs themselves, but by the established missionary educational institutions.

The pre-WWII era laid important groundwork by aligning women's education more closely with the demands of a modern labour force. In Japan, the major industrial transformations, and the emergence of factory work for women since the Meiji era (1868-1912) encouraged many girls and their parents to invest in female education (Seat, 2003). Moreover, Goldin (2006) provided some theoretical insight and empirical analysis about this evolution in the U.S., highlighting how early 20th-century technological advancements and the gradual removal of barriers to female employment began to raise expectations of improved job prospects, thereby encouraging greater educational investment. In addition, Mead (2018) provides a historical analysis of how prominent American women in the late 19th century

and early 20th century organised societies and advocacy groups to improve conditions for other women, focusing on suffrage, and expanding access to education and employment in the US. Correspondingly, Seat (2003) also offers a similar historical account of how American Protestant women missionaries helped to improve the educational attainment of women and girls in pre-World War II Japan. While these studies offer valuable insights into women's agency, gender equality, evolution of female education, and the role of protestant female missionaries, they have not linked these themes together empirically.

Modern empirical research has examined the function of female role models in shaping girls' educational outcomes. Exposure to successful women can influence girls' aspirations, subject choices, and academic performance. Using administrative data from the U.S. Air Force Academy, Carrell et al. (2010) show that female professors have a strong positive effect on female students with high math ability in taking and completing STEM courses. Porter and Serra (2020) find that exposing undergraduates to charismatic, and successful female alumnae with economics majors increases female students' enrolment in economics subjects and ultimately their preference of majoring in economics.

More recently, Goulas et al. (2024), using administrative data from Greek schools, show that female role models do not necessarily need to teach, advise, or counsel female students to have an impact. Instead, simple exposure to top female students who signal confidence, and showing possibilities for high achievement in the classroom would improve girls' performance in science and increases their likelihood of pursuing STEM fields.

This mechanism provides a conceptual bridge between modern economic findings and the historical role played by female Protestant missionaries in Japan before World War II. Female missionaries can also be understood as role models: beyond serving as founders, teachers, doctors, and administrators, their visible presence may have introduced alternative aspirations for Japanese women in a male-dominated world, and possibly shaped, their perceptions of what educational and professional paths were attainable.

While the reviewed literature highlights the influence of Protestantism and female role models in shaping women's education across various contexts, this study focuses on Japan, examining the largely understudied empirical link between female missionaries and the expansion of educational opportunities for women.

4. Data

4.1 Data Source

The present study uses prefecture-level data for 46 Japanese prefectures[1] in 1950. The data sets are derived from:

- The Japan Christian Yearbook 1904 (Standing Committee of Co-operating Christian Missions [SCCCM], 1904), which provides a directory of all missionaries active at the time, including their names, denominations, titles, addresses, and years of arrival (Figure B1, Appendix B).

[1] According to the 1950 Japan Census (Statistics Bureau of Japan, 1950), the country comprised 46 prefectures, excluding Okinawa, which remained under U.S. administration following World War II.

- The Japan Christian Yearbook 1920 (Conference of Federated Missions [Japan], 1920; hereafter CFM [Japan], 1920). The Yearbook lists all Christian schools in Japan, including their year of establishment, location, type, and enrolment figures (Figure B2, Appendix B).
- The educational section of the Japan Census 1950 (Statistics Bureau of Japan, 1950), which provides information on individuals aged 25 and older disaggregated by gender and years of education. Educational attainment (Figure B3, Appendix B) is categorized into three groups: 0–6 years, 7–12 years, and 13 or more years.
- Demographic, religious, educational, and economic data are drawn from the 1904 and 1920 editions of the *Japan Statistical Yearbook* (Statistics Bureau, Imperial Cabinet, n.d.). Prefectural land area, measured in square kilometres, is taken from the 1930 edition, which is the first to adopt the metric system.

4.2 Sample Construction

Selected tables from each source were first extracted and then aggregated at the prefecture-level. For example, the missionary dataset contains 696 individual missionary records, which were grouped by prefecture to obtain the number of missionaries in each prefecture. Similar prefecture-level aggregates were constructed for missionary schools, educational attainment, and control variables. These aggregated tables were then merged using consistent prefecture identifiers. The final dataset is a cross-sectional prefecture-level file that combines missionary presence (1904), missionary schools (1920), educational attainment (1950), and socioeconomic characteristics in 1904 and 1920 across all 46 prefectures.

The present study uses missionary data from 1904 and school data from 1920, while educational attainment is measured in 1950 for individuals aged 25 and older. This temporal gap is deliberate, as it reflects the long-term influence of early missionary activity on the educational trajectories of cohorts who were school aged in the early 20th century. It also accounts for the time required for missionaries to establish schools, for students to complete their initial education, and for them to pursue and attain higher levels of study beyond missionary schools. By linking historical missionary presence and school establishment to later educational outcomes, the dataset provides a basis for examining the enduring effects of missionary educational initiatives across prefectures over time.

4.3 Key Variables

4.3.1 Missionaries (Instrumental Variables)

The number of missionaries by denomination and gender is derived from the Japan Christian Yearbook 1904 (SCCCM, 1904).

Two alternative instruments at prefecture-level are also constructed based on data from the same source:

- Earliest recorded arrival year of missionaries[2], and
- Cumulative missionary exposure[3].

Missionary exposure is calculated for individual missionary as the number of years from a missionary's recorded arrival in Japan until 1904, plus 0.5 years. The 0.5-year adjustment allows those arriving for the first time in 1904 to be included with an estimated half-year of exposure, assuming their arrivals occurred around mid-year on average.

Basic statistics for the instrumental variables are presented in Table A1 of Appendix A. On average, Protestant churches had a higher number of missionaries per million population (8.14) at the prefecture-level than Catholic missions (2.28). Similarly, the average aggregate presence (or missionary exposure) of Protestant missionaries is 92.11 years per prefecture, compared with 33.39 years for Catholic missionaries.

4.3.2 Missionary Schools (Endogenous Variables)

The number of missionary schools, classified as boys' middle schools, girls' high schools, and further subdivided into Protestant and Catholic institutions, is sourced from the Japan Christian Yearbook 1920 (CFM [Japan], 1920).

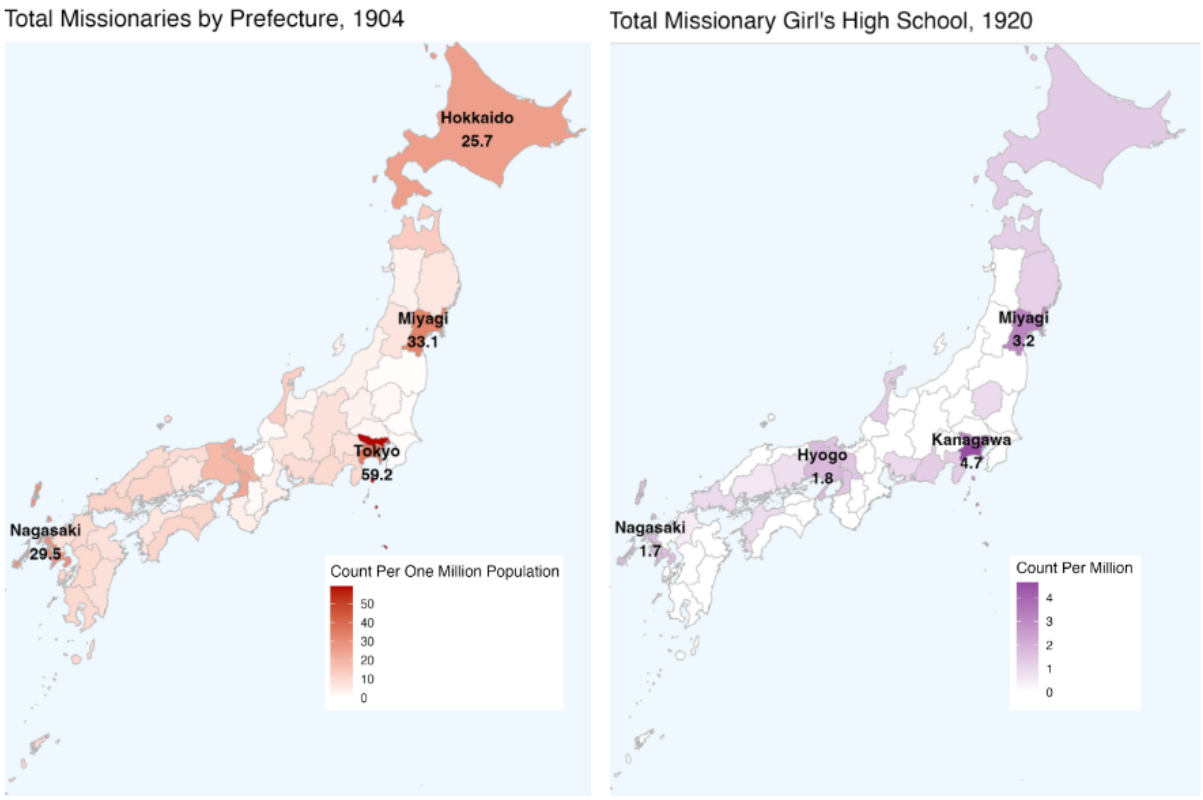
Basic statistics for the endogenous variables are presented in Table A2 of Appendix A. On average, Protestant missions established more missionary girls' high schools per million population at the prefecture level (0.44 schools) than Catholic missions (0.15 schools). A similar pattern is observed for boys' middle schools, with Protestant missions averaging 0.19 schools per million population compared to 0.05 for Catholic missions at the prefecture-level.

Figure 3.0 presents two prefecture-level maps of Japan. The left map shows the number of missionaries per million people, while the right map shows the number of missionary girls' high schools per million people. Figures 3.1 and 3.2 present maps for single Protestant female missionaries and married Protestant male missionaries, respectively. Figures A1.0 and A1.1 (Appendix A) show maps for single Protestant male missionaries and Catholic missionaries. These maps provide a visual overview of the distribution of missionaries and missionary schools across Japan.

[2] Forty-two of 696 missionaries lack recorded arrival years in the Japan Christian Yearbook (SCCCM, 1904), and earliest arrival data for Catholic missionaries are available for only 34 prefectures (Table A1, Appendix A), as Catholic missions had not yet been established in the remaining 32.

[3] Missionaries who left Japan prior to 1904 or had multiple residence periods are not adjusted for time spent abroad and living in other prefectures; those who permanently departed before 1904 are omitted entirely. As a result, the measure likely understates the true extent of historical missionary exposure by prefecture.

Figure 3.0
Missionaries (1904) vs. Missionary GHS (1920)



Note. Data for Figures 3.0, 3.1, and 3.2 are from the *Japan Christian Yearbook 1904* (SCCCM, 1904) for missionaries and the *Japan Christian Yearbook 1920* (CFM [Japan], 1920) for missionary schools. See main text for details.

Figure 3.1
Single Protestant female missionaries (1904) vs. Protestant Girls' High Schools (1920)

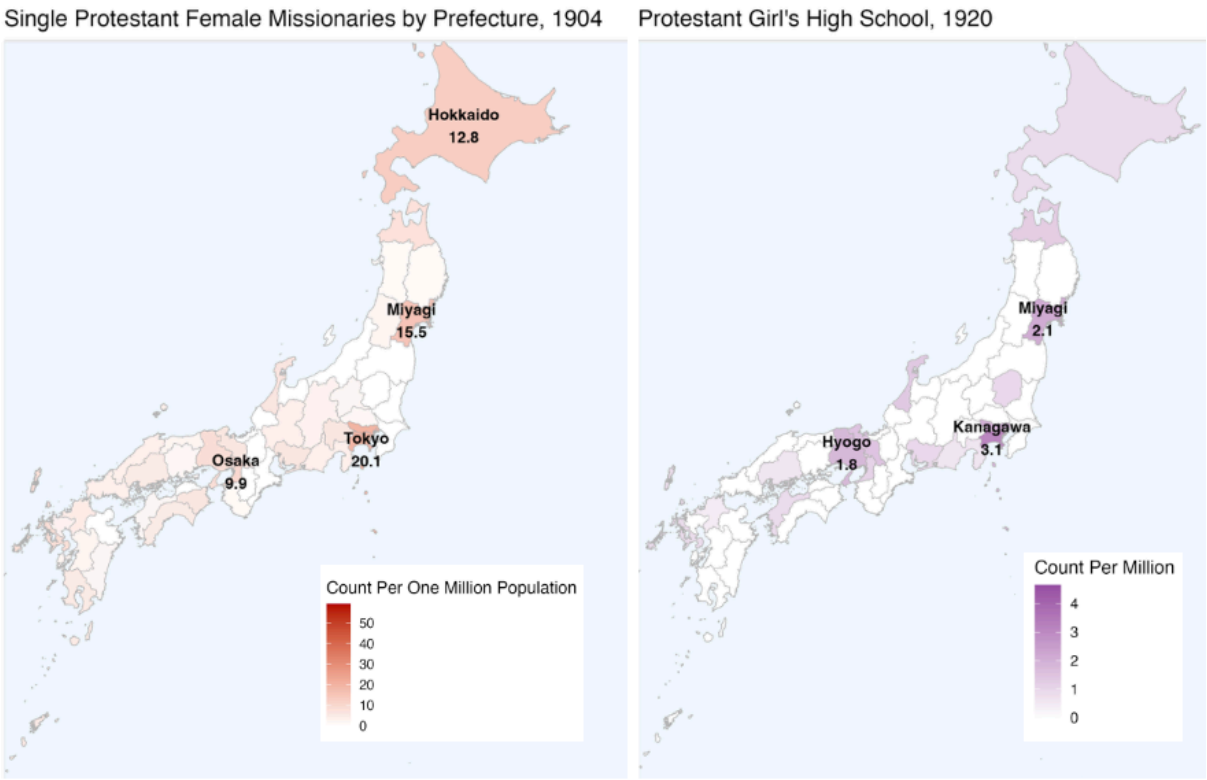
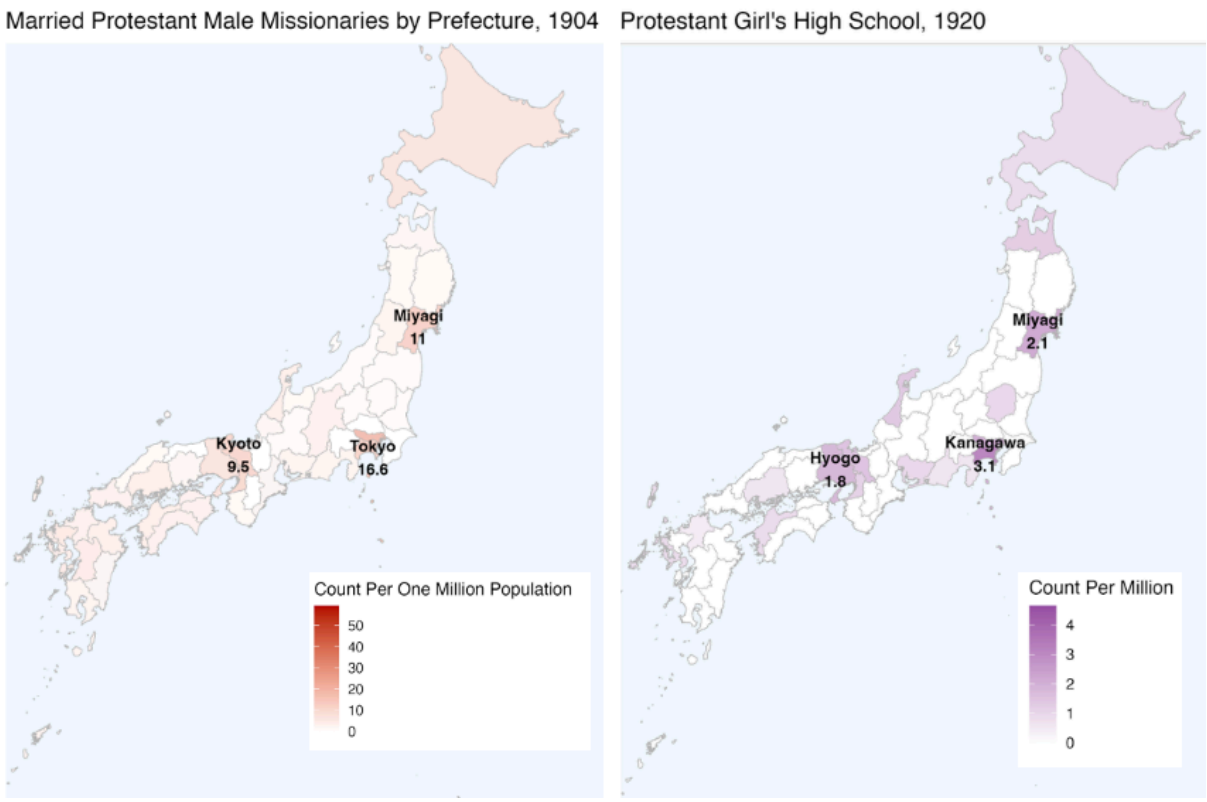


Figure 3.2
Married Protestant Male Missionaries (1904) vs. Protestant Girls' High Schools (1920)



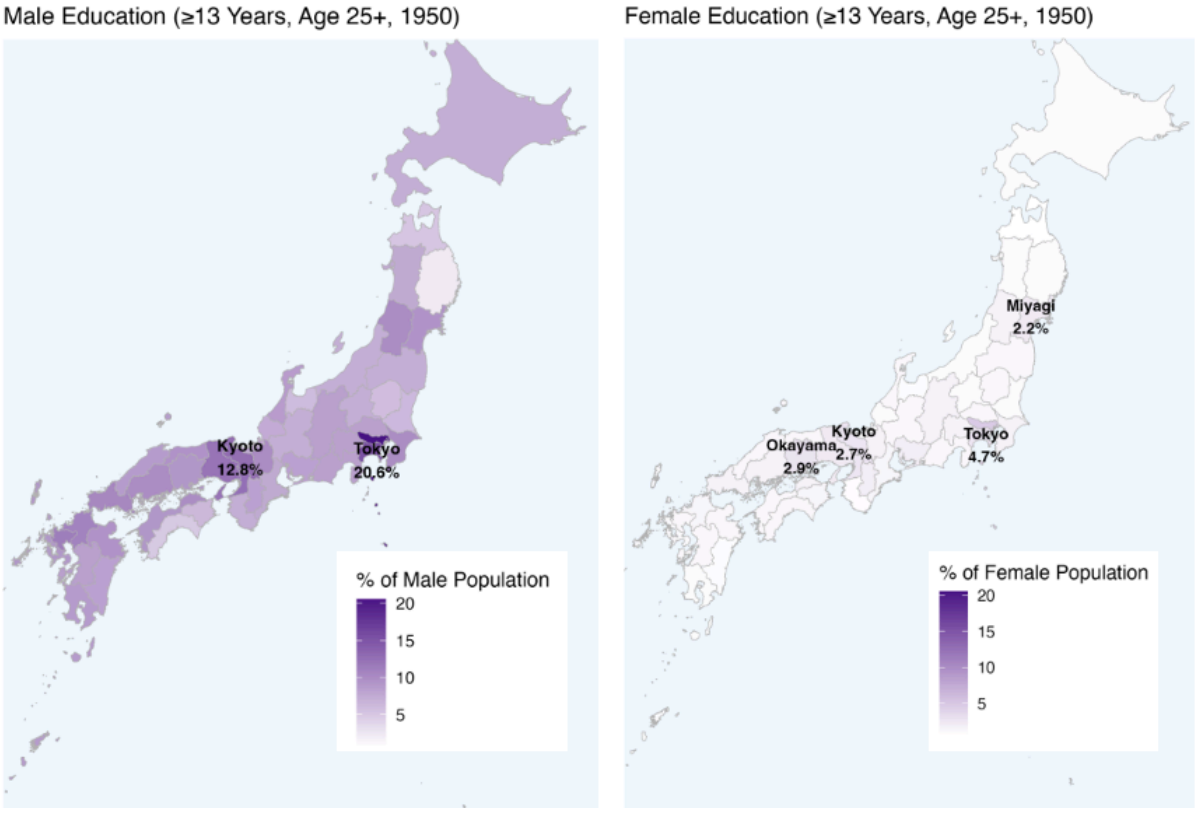
4.3.3 Educational Attainment (Outcome Variables)

Educational attainment is measured using the percentage of the population aged 25 and older who completed different levels of schooling in 1950. Specifically, attainment is categorized into three groups: 0–6 years (primary), 7–12 years (secondary), and 13+ years (tertiary). Separate measures are calculated for men and women.

Figure 4.0 maps the share of individuals aged 25 and older with 13+ years of education across Japan's 46 prefectures, with males shown on the left and females on the right. Figure 4.1 maps individuals with 7–12 years of education. These figures illustrate prefecture-level variation in educational attainment and highlight a pronounced gender gap, with averages of 8.89% for males and 1.52% for females attaining tertiary education (Table A3, Appendix A).

Figures 5.0 and 5.1 present histograms showing prefectures with and without missionary girls' high schools (GHS). Figure 5.0 depicts the distribution of female tertiary attainment (13+ years), while Figure 5.1 depicts female secondary attainment (7–12 years). The x-axis is divided into percentage bands showing the share of the female population aged 25 and older who attained 13 or more years of education (or 7-12 years), while the y-axis indicates the number of prefectures within each band.

Figure 4.0
Share (%) of the population aged 25 and over with 13+ years of education, by gender, across Japan's 46 prefectures



Note. Data for Figures 4.0, and 4.1 are from the *Japan Census 1950* (Statistics Bureau of Japan, 1950). See main text for details.

Figure 4.1

Share (%) of the population aged 25 and over with seven to 12 years of education, by gender, across Japan's 46 prefectures

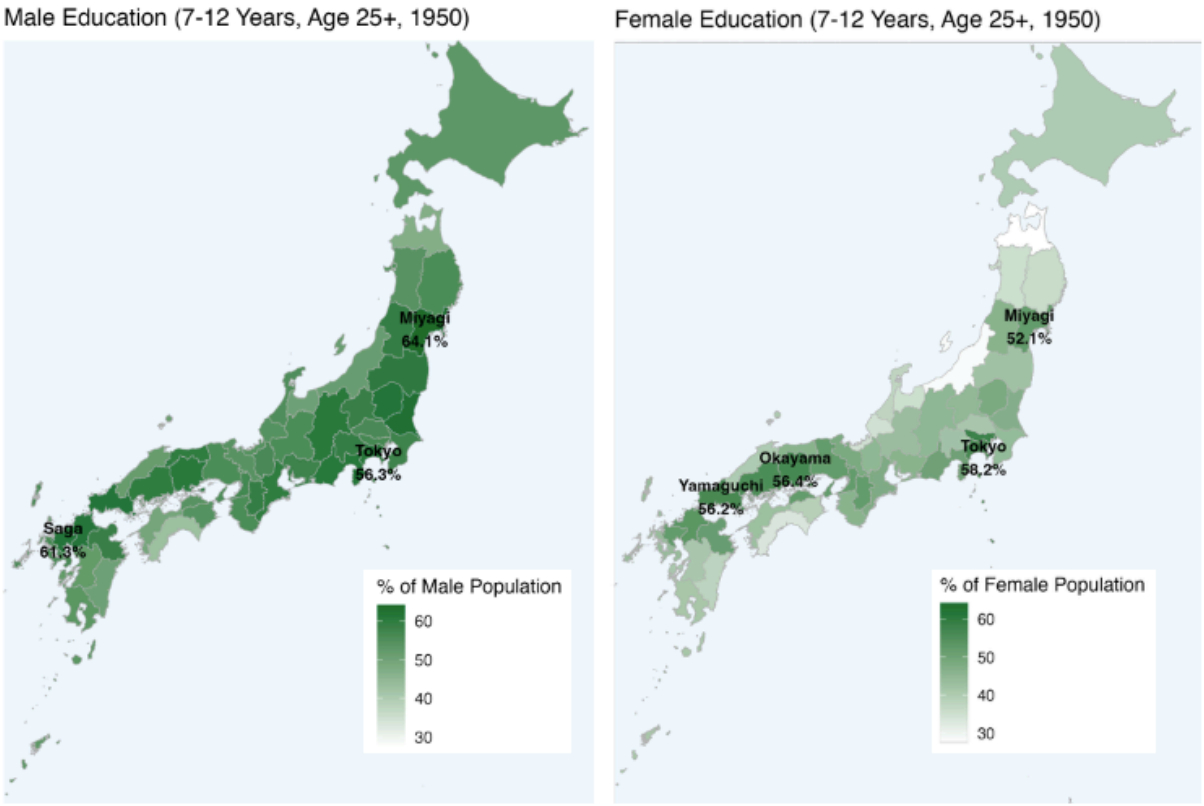
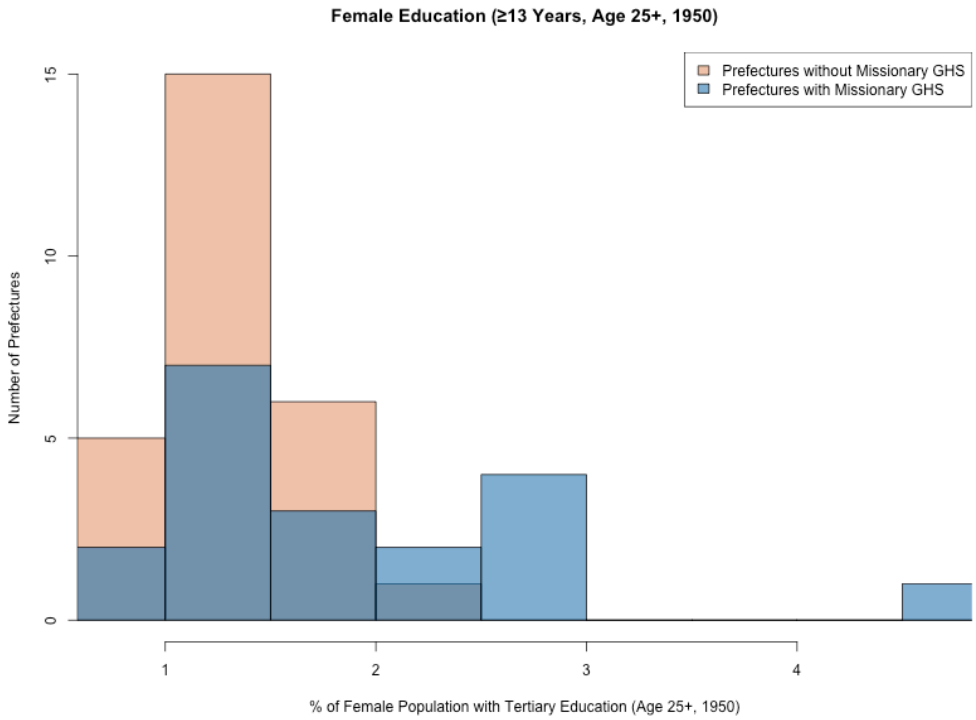
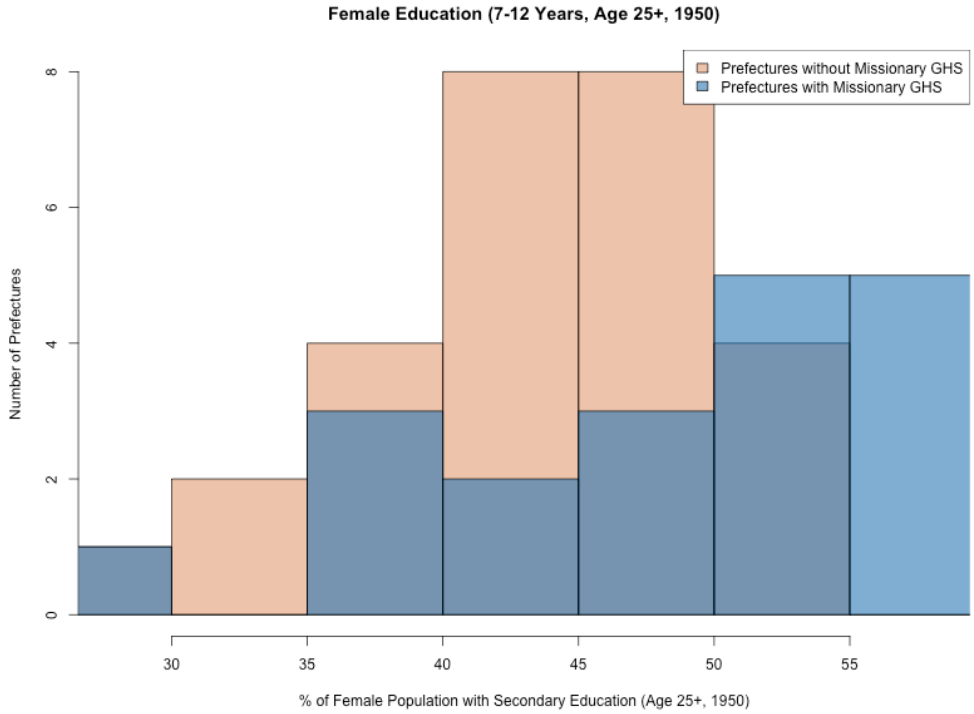


Figure 5.0
Prefectures with or without Missionary GHS on Female 13+ Years Educational attainment



Note. Data for Figures 5.0, and 5.1 are from the *Japan Census 1950* (Statistics Bureau of Japan, 1950) for educational attainments and the *Japan Christian Yearbook 1920* (CFM [Japan], 1920) for missionary schools. See main text for details.

Figure 5.1
Prefectures with or without Missionary GHS on Female Education (7-12 Years)



4.3.4 Socio-Economic data (Control Variables)

Two sets of prefecture-level control variables were collected from the Japan Statistical Yearbook (Statistics Bureau, Imperial Cabinet, n.d.) for the years 1904 and 1920. Each set includes demographic, educational, religious, and economic variables.

Tables A4a and A5a (Appendix A) report descriptive statistics for educational and religious controls. Variables include the number of public middle schools, public girls' high schools, and vocational schools. Buddhist temples are also included as a control due to their historical role in providing informal education (Nagata, 1995). Note that some variables differ across the two years: for example, the 1920 edition does not distinguish between public and private girls' high schools at the prefecture level, and vocational schools are further divided into Type A and Type B categories.

Tables A4b and A5b (Appendix A) report descriptive statistics for economic and demographic variables. Rice yield is expressed in koku per capita; population density is calculated using land area data from the 1930 edition, the first edition to record prefectural land area in square kilometres. Because prefectural boundaries and land areas have remained largely stable over time, the 1930 measurements are used to ensure comparability; and textile production (1920) is used as a proxy for industrial activity. The 1920 government staff salary variable includes a missing observation for Hokkaido. To retain this prefecture in the estimation sample, the missing value is replaced using the sample mean.

5. Empirical Strategy

5.1 OLS Specification

The empirical analysis begins by examining the relationship between missionary schools and educational attainment using simple OLS regressions. The OLS specification is equivalent to the second-stage equation of the 2SLS framework (section 5.2), except that it uses the observed number of missionary schools rather than their instrumented values. These estimates provide an initial benchmark, but the potential endogeneity of missionary school placement remains a worry in establishing causality, as unobserved factors may be jointly correlated with both missionary schools and educational attainments. For example, in establishing schools, mission boards may have preferentially selected prefectures whose local elites were more supportive of broader modernisation efforts. Such underlying characteristics would independently contribute to higher female educational attainment by 1950. OLS estimates would then be biased positively, overstating the true effect of missionary schools because the treatment is correlated with favourable pre-existing conditions rather than the mission school intervention itself.

To address this issue, an instrumental variables (IV) strategy is used to isolate variation in missionary school presence that is independent of other factors influencing educational attainment, thereby enabling a causal interpretation. In the first stage, the number of missionaries serves as an instrument for predicting the number of missionary girls' high schools established in each prefecture.

5.2 IV Specification

The potential causal effect is estimated using a two-stage least squares (2SLS) framework, specified as follows.

First Stage

$$MS_{p,1920} = \theta_0 + \theta_1 M_{p,1904} + \theta_2 X_{p,t} + \delta_p$$

Second Stage

$$EA_{p,1950} = \beta_0 + \beta_1 \widehat{MS}_{p,1920} + \beta_2 X_{p,t} + \varepsilon_p$$

The coefficient β_1 represents the potential causal effect of missionary schools on educational attainment, where:

- *p* indexes prefectures: *p* = 1, 2, 3, …, 46.
- $MS_{p,1920}$: Number of missionary girls' high schools in prefecture *p* in 1920.
- $M_{p,1904}$: Number of missionaries in prefecture *p* in 1904.

- $X_{p,t}$: Vector of prefecture-level control variables from 1904 or 1920, depending on the specification[4].
- δ_p : First-stage error term capturing unobserved prefecture-level factors affecting school establishment.
- $EA_{p,1950}$: Share of women aged 25+ in prefecture *p* with 7-12 years (secondary) or 13+ years (tertiary) in 1950, depending on the specification.
- ε_p: Second-stage error term capturing unobserved prefecture-level factors affecting educational attainment.

5.3 Instrumental Variable

This study adapts the instrumental variable (IV) strategy developed by Becker and Won (2024), who examined the relationship between missionary activity and literacy in colonial Korea using the predicted number of churches, derived from missionaries' cumulative years of service by town (1884–1930). In contrast, the present study employs the number of missionaries recorded in 1904 as the main instrument because historical data required to construct the missionary exposure directly are unavailable. To address this limitation, an ad hoc measure of missionary exposure is constructed to complement the analysis (See section 4). However, a comparison of the 1904 and 1920 data indicates that, over the 16-year interval, only about 25% of missionaries remained in Japan, with approximately 60% of those relocating to other prefectures. This suggests that the 1904 data captured only a fraction of those active in the late 1880s, raising concerns about interpreting partial exposure in the same way as the "complete" exposure adopted in Becker and Won (2024).

For these reasons, the present study does not use exposure as the main instrumental variable, but relying on the number of missionaries, which provides a simple snapshot of 1904. Exposure measures, however, remain a useful complement because raw counts can be misleading. For example, if a mission temporarily concentrated many missionaries in one prefecture, the resulting distribution would not reflect their longer-term presence. The exposure measures mitigate this by capturing total years of presence, down-weighting short-term surges. Hence, the exposure measures are incorporated only for robustness purposes.

The analysis primarily focuses on single female missionaries, other variables such male missionaries, particularly those accompanied by their wives, may also have contributed to the establishment and operation of girls' missionary high schools would also be analysed[5]. For robustness, additional specifications use the total number of missionaries and further disaggregate them by gender, marital status, and denomination.

[4] The 1920 controls include: Non-Missionary Middle Schools for boys, Non-Missionary Girls' High School, Buddhist Temples, Female Factory Workers, Textile Production, Ports, Government Staff Salary, and Population Density. The 1904 controls include: Public Middle Schools for Boys, Public Girls High Schools, Buddhist Temples, Female Textile Workers, Coal Industrial Consumption, Ports, Male Teacher Salary, Share of Nobility Class, and Population Density

[5] As reported in the Japan Christian Yearbook (SCCCM, 1904), female missionaries in 1904 were predominantly single Protestant women, while all married male missionaries were predominantly Protestant men.

5.4 Endogenous Variable and Instrumental Relevance

This study substitutes the number of missionary high schools for the number of churches used by Becker and Won (2024), reflecting contextual differences between Korea and Japan. In Korea, the colonial government was widely viewed as illegitimate, and its public schools primarily promoted Japanese language, leading many Koreans to turn to church-centred educations as alternatives. Whereas, in Japan, the government oversaw formal education, and missionary influence on education was exercised through officially recognised missionary schools. Seat (2003) explained that missionary schools in Japan strategically rebranded Bible studies as "moral education" to secure official accreditation because government restricted religious curricula in accredited schools from the 1890s. Accredited school status was, unlike in Korea, especially important to prospective Japanese students and their parents in pursuing formal education. Consequently, missionary-founded schools, rather than church centres, offer a more appropriate proxy for assessing the educational impact of missionary activity in Japan.

Figures 3.0–3.2 show strong spatial correspondence between missionary presence and missionary girls' high school locations, especially for single Protestant women and married Protestant men. These patterns support the assumption of instrument relevance.

In contrast, single Protestant male missionaries and Catholic missionaries do not show a similar pattern (Figures A1.0 and A1.1, Appendix A).

5.5 Outcome Variable

Becker and Won (2024) use literacy rates at the town level in colonial Korea (1910–1945) as the outcome variable. Comparable literacy data for Japan at the prefecture level or below, based on reading and writing assessments prior to 1945, are not available. Consequently, this study employs the percentage of women's (men's) population aged 25 and older who completed seven to twelve years, and thirteen plus years of schooling respectively in 1950 as measures of educational attainment across Japan's forty-six prefectures.

Figure 5.0 shows that the distribution for prefectures with missionary girls' high school (GHS) displays a 'fatter' tail than that for prefectures without them, suggesting that, on average, prefectures with missionary GHS had a higher proportion of women attaining tertiary education (13+ years). Similarly, Figure 5.1 shows that prefectures with missionary GHS exhibit a right-skewed distribution, whereas prefectures without such schools display a more bell-shaped distribution. This pattern suggests that, on average, prefectures with missionary GHS had a higher share of women aged 25 and older attaining secondary education (7–12 years).

These patterns provide preliminary evidence that missionary schools may have played a substantial role in improving female educational attainment, particularly at higher levels, motivating the IV strategy used in the analysis.

The main dependent variable is the proportion of women aged 25 and older who completed at least 13 years of schooling. This variable serves as a proxy for higher educational

attainment, given the absence of prefecture-level literacy data in the 1950 Japan Census (Statistics Bureau of Japan, 1950) and earlier censuses. The 13-year threshold is motivated by historical accounts suggesting that female missionary schools provided Japanese girls with a comparative advantage in educational quality relative to public schools for girls before WWII (Seat, 2003). For robustness, secondary educational attainment (7–12 years of schooling) and male educational attainments are also examined to capture broader patterns in educational outcomes. For men, the only modification is that girls' missionary high schools are replaced by boys' missionary middle schools.

5.5 Control Variables

The 1904 and 1920 control variables are used separately in the modelling process for two main reasons. First, using two sets of controls allows for robustness checks across different measurement years. Second, several variables appear exclusively in the 1904 edition (e.g., proportions of nobility and samurai classes), providing additional insight into the potential effects of socioeconomic status on educational outcomes.

Educational and religious controls are incorporated to account for the impact of non-missionary schooling, vocational education, and the historical role of Buddhist temples in shaping educational attainment. Economic and demographic controls, including rice yield, population density, industrial activity, and regional income proxies (e.g. teacher salaries), help capture heterogeneity across prefectures that could confound the relationship between missionary activity and educational attainment.

By explicitly including these controls, the empirical strategy aims to isolate the causal effect of missionary schools on educational outcomes while accounting for socioeconomic differences that may influence both school establishment and subsequent attainment.

5.6 Challenges to identification

5.6.1 Exogeneity of the Instrument

The validity of our instrumental variable (IV) strategy depends on the assumption that the instrument is exogenous, that is, uncorrelated with the error term in the second-stage equation. A potential concern is that missionaries may have preferentially settled in areas that were more urbanised or more receptive to Western ideas. Such areas could already have been on a distinct trajectory of educational advancement, independent of missionary presence, which would violate the exogeneity assumption.

To address this concern, the present study includes a comprehensive set of prefecture-level controls capturing key socioeconomic characteristics. These include population density (urbanisation), the share of the nobility class, indicators of industrial activity (per capita textile production and coal consumption), the number of public middle and high schools, the number of ports (Western influence), and average salaries of government officials or teachers (regional income variation). Together, these variables help account for regional development factors that could jointly shape both missionary settlement patterns and educational outcomes.

Although the analysis is conducted at the prefectural level, future research could benefit from more granular municipal-level data to better address within-prefecture heterogeneity in missionary count or exposure. Missionary placement in Japan was largely shaped by state restrictions, initially confined to treaty ports (1858), later expanding to major cities like Tokyo and Osaka in the 1890s, while rural access remained limited (Thomas, 1959). Furthermore, overseas mission boards assigned missionaries based on denominational priorities, not personal choice. As Yasutake (2004) notes, American boards strategically deployed single women as teachers in female missionary schools to meet rising demand for Western-style education, often overriding their preferences for evangelism. This constrained autonomy, especially among female missionaries, reduces concerns over endogenous placement and supports the validity of the IV strategy after controlling for prefecture-level socioeconomic factors.

As a robustness check, the earliest recorded year of missionary arrival is employed as an alternative instrument. Unlike the number of missionaries, which may partly reflect preferential settlement choices, the timing of the first missionary arrival was largely determined by external factors such as mission board assignments and government restrictions on foreign activity. This variable therefore introduces exogenous variation in missionary presence that is plausibly independent of local socioeconomic conditions, supporting the exogeneity of the instrument. Using it as an alternative instrument strengthens the main analysis and enhances the credibility of the causal identification.

Table C2.3 in Appendix C reports the 2SLS estimates using the earliest arrival year (by any denomination) as the instrumental variable. The F-statistics of the excluded instruments exceed 10 across all specifications, indicating strong instruments. The coefficients of the endogenous variable, total missionary girls' high schools are statistically significant, such that that an additional missionary school, increases tertiary educational attainment by approximately 0.372% to 0.576%, depending on specifications. These results are broadly consistent with those reported in Table C2.2 (Appendix C), which uses the number of missionaries (all denominations) as an instrument ($F > 10$) and produces estimated coefficients for missionary schools ranging from 0.365% to 0.681%, depending on specifications. The broad agreement between these two sets of estimates reinforces the robustness and credibility of the causal identification strategy based on the number of missionaries.

5.6.2 Exclusion Restriction

The validity of our IV strategy also relies on the assumption that, conditional on observed controls, missionaries affect female educational attainment only through the missionary schools, and not through any other means. A potential challenge to this exclusion restriction is that missionaries promoted religious conversion, which could have influenced societal attitudes toward girls' education independently of schools. However, Protestants comprised a very small proportion of the population[6], suggesting that any direct effect of conversion on educational outcomes was likely minimal. Future research could further investigate

[6] There were only about 50,000 local Protestants around 1910, increasing to approximately 250,000 by the 1950s (Bovenkerk, 1953). This represented a small minority against a total population of 83 million in 1950 (Statistics Bureau of Japan, 1950).

whether prominent converts contributed to female education and the extent of their influence.

5.6.3 Potential Instrument Mismeasurement

Another potential concern is that the instrument, whether measured as the number of missionaries, missionary exposure, or earliest year of arrival, may not fully capture the cumulative influence of missionaries on education, because early arriving missionaries likely had a greater long-term impact, as school-aged girls could benefit from sustained staffing and the establishment of new schools which require time. For instance, 100 missionaries serving for a single year in one prefecture in 1904 may have less influence on educational outcomes than 10 missionaries who served continuously for ten years up to 1904. Yet a simple count would record only 10 in the latter case, while an exposure measure would treat the 100 short-term missionaries on par with the ten long-term missionaries, potentially misrepresenting their true impact.

6. Results

6.1 OLS Results

6.1.1 OLS Results - Female Tertiary Educational Attainments

Columns 1–3 of Table 1.0 present baseline bivariate regressions of female tertiary educational attainment on total number of missionary girls' high schools, as well as separately for Protestant and Catholic schools. Both total and denominational missionary schools exhibit statistically and economically significant positive associations. For instance, an additional missionary girls' high school (per million population), roughly one standard deviation above the prefectural mean of 0.64 schools is associated with a 0.421% increase in female tertiary attainment, relative to a mean of 1.522% (a 0.58 standard-deviation increase).

In Table 1.0, columns 4–6, which include 1920 educational and religious controls, do not materially change the results. These controls account for public and other private schools, as well as Buddhist temples. Non-missionary boys' middle schools show a positive and significant association[7], whereas non-missionary girls' high schools do not. This likely reflects the government's education policies by which girls were channelled into a less academically oriented secondary track, limiting their opportunities for advancement within the public education system (Seat, 2003).

Columns 7–9 of Table 1.0 extend the baseline OLS models by including 1920 economic and demographic controls, which reduce the estimated coefficients for missionary schools by roughly 35–45% but do not change their significance or direction. Female factory workers

[7] The positive association between female tertiary educational attainment and the presence of middle schools may partly reflect the fact that the exclusion of girls from these institutions was formalised around 1880 (Seat, 2003); thus, it is possible that an earlier cohort of girls had been enrolled in middle schools before they became strictly boys-only.

proxy for regional attitudes toward women's labour force participation, whereas per capita textile production reflects regional industrial activity.

Columns 10–12 of Tables 1.0, and Table 1.1A (Appendix C) include all control variables (for 1904 and 1920 respectively), and it does not alter the significance or direction of the estimated coefficients for total, Protestant, or Catholic missionary schools (although magnitudes may vary), which indicate a robust positive association between missionary girls' high schools (whether total, Protestant, or Catholic) and women's tertiary educational attainment.

Table 1.0

OLS Results – Missionary Girls' High Schools and Female Tertiary Educational Attainment with 1920 Control Variables

Missionary Girls' High Schools and Female Education (≥13 Years, Age 25+, 1950), OLS Results at the prefecture-level

	Dependent variable:											
	Female Education (≥13 Years, % of Female Population Age 25+, 1950)											
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total Missionary Girls' High Schools (per million)	0.421***			0.480***			0.269***			0.322***		
	(0.088)			(0.085)			(0.074)			(0.058)		
Protestant Girls' High Schools (per million)		0.544***			0.646***			0.329***			0.436***	
		(0.125)			(0.123)			(0.104)			(0.083)	
Catholic Girls' High Schools (per million)			0.902***			0.974***			0.512**			0.546***
			(0.304)			(0.302)			(0.233)			(0.200)
Middle Schools for Boys (Non-Missionary, per million)				0.115**	0.125**	0.139**				0.132***	0.142***	0.139***
				(0.055)	(0.057)	(0.066)				(0.036)	(0.036)	(0.044)
Total Girls' High Schools (Non-Missionary, per million)				0.023	0.030	-0.022				0.002	0.005	-0.023
				(0.034)	(0.036)	(0.039)				(0.022)	(0.023)	(0.026)
Buddhist Temples (per million)				0.0002*	0.0002	0.0002*				0.0003***	0.0003***	0.0003***
				(0.0001)	(0.0001)	(0.0001)				(0.0001)	(0.0001)	(0.0001)
Female Factory Workers (per 1,000)							0.011	0.010	0.011	0.016***	0.016***	0.016**
							(0.007)	(0.008)	(0.008)	(0.006)	(0.006)	(0.007)
Textile Production Value (yen per capita)							-0.003	-0.004	-0.003	-0.008***	-0.009***	-0.008***
							(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Number of Ports (per million)							-0.168**	-0.161*	-0.152*	-0.103*	-0.097	-0.096
							(0.080)	(0.082)	(0.087)	(0.061)	(0.062)	(0.076)
Average Prefectural Government Staff Annual Salary (yen)							-0.001	-0.001	-0.001	-0.002**	-0.002**	-0.001
							(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Population Density (persons per km²)							0.001***	0.001***	0.002***	0.001***	0.001***	0.002***
							(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Constant	1.255***	1.282***	1.387***	0.140	0.093	0.460	1.421***	1.462***	1.264***	0.440	0.421	0.423
	(0.103)	(0.106)	(0.108)	(0.329)	(0.344)	(0.381)	(0.283)	(0.293)	(0.314)	(0.277)	(0.284)	(0.348)
Prefecture-level 1920 Controls	No	No	No	Edu&Rel	Edu&Rel	Edu&Rel	Econ&Demo	Econ&Demo	Econ&Demo	All	All	All
Mean of Dependent Variable %	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522
Observations	46	46	46	46	46	46	46	46	46	46	46	46
R^2	0.345	0.301	0.167	0.500	0.469	0.294	0.694	0.674	0.635	0.844	0.837	0.760
Adjusted R^2	0.330	0.285	0.148	0.452	0.417	0.225	0.647	0.624	0.578	0.805	0.796	0.700
F Statistic	23.143*** (df = 1; 44)	18.944*** (df = 1; 44)	8.812*** (df = 1; 44)	10.262*** (df = 4; 41)	9.059*** (df = 4; 41)	4.271*** (df = 4; 41)	14.748*** (df = 6; 39)	13.423*** (df = 6; 39)	11.292*** (df = 6; 39)	21.646*** (df = 9; 36)	20.506*** (df = 9; 36)	12.656*** (df = 9; 36)
Note:	*p<0.1; **p<0.05; ***p<0.01											

OLS estimates using prefecture-level data (n = 46). Models (4–12) include 1920 prefecture-level control variables. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Mean of dependent variable = 1.52%.

Note. Data for Table 1.0 are from the *Japan Census 1950* (Statistics Bureau of Japan, 1950) for educational attainments, the *Japan Christian Yearbook 1920* (CFM [Japan], 1920) for missionary schools, and *Japan Statistical Yearbook* (Statistics Bureau, Imperial Cabinet, n.d.) for control variables. See main text for details.

6.1.2 OLS Results - Female Secondary Educational Attainment

Table C1.2 in Appendix C, using all 1920 control variables in Columns 10–12, reports significant positive associations between the number of Protestant missionary girls' high schools and female secondary educational attainment, while Catholic schools show no statistically significant association[8]. Specifically, an additional Protestant girls' high school per million population is associated with a 4.1% increase in female secondary attainment, relative to a mean of 44.95% (a 0.55 standard-deviation increase).

Overall, the results show a robust positive association between missionary girls' high schools and female tertiary educational attainment for both Protestant and Catholic institutions. In addition, Protestant missionary girls' high schools also show positive associations with female secondary educational attainment using 1920 control variables.

For males, Protestant missionary boys' middle schools exhibit positive associations with tertiary educational attainment using 1920 control variables, but these relationships weaken when alternative 1904 specifications are applied[9].

6.2 IV Results

6.2.1 Protestant Girls' High Schools and Women's Tertiary Education

Tables 2.0, and 2.1A (Appendix C) present 2SLS estimates[10] of the effect of Protestant girls' high schools on tertiary educational attainment among women aged 25 and older, using the number of single female Protestant missionaries as an instrument for girls' high schools. Table 2.0 includes 1920 control variables, whereas Table 2.1A (Appendix C) includes 1904 control variables. Columns 1–4 in both tables report the first-stage coefficients (using OLS method), columns 5–8 report the second-stage coefficients (using IV method), and the final column reports the coefficients from the corresponding reduced-form regression (using OLS method) for comparison.

In both tables, the first-stage F-statistics for the excluded instruments (the first-stage F-test for weak instruments; Staiger and Stock, 1997) exceed the conventional threshold of 10,

---

[8] In contrast, Table C1.3 in Appendix C, which uses all 1904 controls in Columns 10–12, shows no statistically significant associations between Protestant, or Catholic missionary girls' high schools and Female Secondary Educational Attainment.

[9] OLS results for missionary boys' middle schools and male tertiary educational attainment are presented in Appendix C (Tables C1.0 and C1.1). In Table C1.0, which uses the full set of 1920 controls in Columns 10–12, both total and Protestant missionary boys' middle schools show significant positive associations with male tertiary educational attainment, whereas Catholic schools do not. By contrast, Table C1.1, using 1904 controls (Columns 10–12), shows no statistically significant associations between missionary schools and male tertiary attainment. For male secondary educational attainment, Tables C1.4 and C1.5 of Appendix C, using 1920 and 1904 controls respectively, show no statistically significant associations between missionary boys' middle schools and secondary educational attainment for men.

[10] Standard errors are automatically adjusted in the 2SLS estimation implemented by ivreg() in R, which accounts for the sampling variability introduced by instrumenting endogenous regressors.

indicating that the number of single female Protestant missionaries constitutes a strong instrument.

Depending on the first-stage specification (columns 1–4), each additional single Protestant female missionary per million people is associated with an increase of 0.126–0.138 schools in Table 2.0 (1920 controls) and 0.126–0.141 schools in Table 2.1A (1904 controls). The second-stage estimates (columns 5–8) indicate that, after accounting for potential endogeneity, the positive effect of Protestant girls' high schools on women's tertiary educational attainment remains statistically significant. An additional school per million people is associated with a 0.4–0.926% increase in women's tertiary educational attainment (Table 2.0 with 1920 controls) and a 0.317–0.704% increase according to Table 2.1A (1904 controls), relative to a mean of 1.522%.

The OLS coefficients in Table 1.0 (1920 controls) indicate that an additional school per million people is associated with a 0.329–0.646% increase in women's tertiary educational attainment, while Table 1.1A (1904 controls) shows a 0.280–0.544% increase. Although the ranges of OLS and IV estimates overlap, the IV estimates are generally larger, suggesting that OLS may underestimate the effect of Protestant girls' high schools on women's tertiary educational attainment.

Table 3.0 and Table 3.1A (Appendix C)[11] compare the OLS and IV estimates of women's tertiary educational attainment. Table 3.0 presents results that include the full set of 1920 control variables, with columns 4–9 using different missionary counts as instruments. The IV estimates, after accounting for potential endogeneity, suggest that increases in the number of Protestant or Catholic girls' high schools are positively linked with higher tertiary educational attainment. Specifically, one additional Protestant girls' high school per million people increases tertiary educational attainment by about 0.633% (column 5), and one additional Catholic girls' high school per million people increases it by about 0.792% (column 6), relative to a mean of 1.522% (a 0.88 and 1.1 standard-deviation increase, respectively). Catholic girls' high schools exhibit a slightly larger effect than Protestant ones.

The empirical literature directly comparing educational outcomes between Protestant and Roman Catholic girls' high schools before World War II remains limited. However, historical accounts provide valuable insights into this intriguing contrast. Catholic missions in Japan initially focused on elementary education before 1899, whereas their Protestant counterparts advanced earlier into post-elementary education for girls (Seat, 2003). At that time, most members of Japan's educated class were familiar with Christianity primarily through its American Protestant form, as Protestant missionaries were far more active in higher education (Nakai, 2017). For Catholics, there emerged a growing need to introduce an intellectually grounded Catholic version of Christianity to a modernised Japanese society by the turn of the twentieth century, as noted by the German Jesuit Joseph Dahlmann (Nakai, 2017). In response, Pope Pius X in 1906 instructed the Society of Jesus to establish a tertiary level learning institute for men and the Society of the Sacred Heart for women (RSCJ) in Japan (Miura, 2014). RSCJ subsequently established a girls' high school in 1910 and a women's college in 1916, which built a reputation of excellence in female education

[11] Table 3.1A in Appendix C presents results using all 1904 control variables and shows outcomes broadly consistent with those in Table 3.0.

Table 2.0

IV Results: Female Tertiary Education with Single Female Protestant Missionaries as the Instrument (1920 Controls)

IV Estimates: Single Protestant Female Missionaries, Protestant Missionary GHS, and Female Tertiary Education

	Dependent variable:								
	Protestant Missionary GHS (per millio, 1920)				Female Education (≥13 yrs, 1950)				
	OLS				*instrumental variable*				*OLS*
	First Stage				Second Stage				Reduced Form
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Instrument:									
Single Protestant Female missionaries (per million, 1904)	0.126***	0.129***	0.134***	0.138***					0.081***
	(0.013)	(0.015)	(0.017)	(0.020)					(0.015)
Endogenous Variable:									
Protestant Missionary Girls' High Schools (per million, 1920)					0.704***	0.926***	0.400***	0.584***	
					(0.153)	(0.163)	(0.132)	(0.114)	
Control Variables:									
Middle Schools for Boys (Non-Missionary, per million, 1920)		-0.012		-0.039		0.110*		0.140***	0.117***
		(0.044)		(0.048)		(0.061)		(0.038)	(0.036)
Total Girls' High Schools (Non-Missionary, per million, 1920)		-0.002		0.016		0.060		0.018	0.027
		(0.028)		(0.032)		(0.040)		(0.024)	(0.024)
Buddhist Temples (per million, 1920)		0.0001		0.00001		0.0002		0.0003***	0.0003***
		(0.0001)		(0.0001)		(0.0001)		(0.0001)	(0.0001)
Female Factory Workers (per 1,000, 1920)			-0.003	-0.004			0.010	0.016**	0.013**
			(0.007)	(0.008)			(0.008)	(0.006)	(0.006)
Textile Production Value (yen per capita, 1920)			0.004*	0.005			-0.004	-0.009***	-0.006***
			(0.002)	(0.003)			(0.003)	(0.002)	(0.002)
Number of Ports (per million, 1920)			-0.046	-0.042			-0.169**	-0.104	-0.129**
			(0.079)	(0.083)			(0.083)	(0.065)	(0.062)
Average Prefectural Government Staff Annual Salary (yen, 1920)			0.0003	0.0003			-0.001	-0.002***	-0.002**
			(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Population Density (per km², 1920)			-0.0001	-0.0001			0.001***	0.001***	0.001***
			(0.0003)	(0.0003)			(0.0003)	(0.0002)	(0.0002)
Constant	-0.082	-0.121	-0.208	-0.122	1.211***	-0.177	1.478***	0.367	0.295
	(0.080)	(0.275)	(0.275)	(0.379)	(0.114)	(0.377)	(0.295)	(0.298)	(0.284)
Prefecture-level 1920 Controls	No	Edu&R	Econ&D	All	No	Edu&R	Econ&D	All	All
Mean of Endogenous Variable	0.442	0.442	0.442	0.442					
Mean of Dependent Variable %					1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments	99.026	73.477	65.76	48.592					
Wald test F-stat (2nd Stage)					21.192	9.996	13.144	18.909	
Observations	46	46	46	46	46	46	46	46	46
R^2	0.692	0.701	0.716	0.722	0.275	0.402	0.670	0.822	0.841
Adjusted R^2	0.685	0.672	0.672	0.652	0.258	0.344	0.619	0.778	0.801
Note:	*p<0.1; **p<0.05; ***p<0.01								

Note. Data for Table 2.0, and 2.1A (Appendix C) are from the *Japan Census 1950* (Statistics Bureau of Japan, 1950) for educational attainments, the *Japan Christian Yearbook 1920* (CFM [Japan], 1920) for missionary schools, and *Japan Statistical Yearbook, 1904 & 1920* (Statistics Bureau, Imperial Cabinet, n.d.) for control variables, the Japan Christian Yearbook 1904 (SCCCM, 1904) for instruments. See main text for details. Columns 1, and 5 present the baseline two-stage least squares (2SLS) specifications. Column 1 shows the first-stage bivariate OLS regression, where the number of Protestant missionary girls' schools is regressed on the number of single female Protestant missionaries. Column 5 reports the second-stage results using the ivreg() function in R, where female tertiary attainment is regressed on the fitted values of Protestant missionary schools from the first stage. Columns 2, and 6 add educational and religious controls; Columns 3, and 7 include economic and demographic controls; and Columns 4, and 8 incorporate all available controls.

(Miura, 2014). This papal initiative to promote Catholic higher education for women may partly explain why Catholic girls' high schools matched or possibly surpassed their Protestant counterparts in fostering tertiary educational attainment for Japanese women in the early to mid-20th century.

Columns 7–9 (Table 3.0) report IV estimates after addressing the endogeneity of Protestant girls' high schools using different missionary counts as instruments. Using single female Protestant missionaries (column 9) as an instrument, the coefficient of Protestant girls' high schools is statistically significant, likely reflecting female missionaries' direct teaching and role-model influence on girls' educational attainment. In contrast, single Protestant male missionaries (columns 7) are less directly connected to girls' schooling, and therefore their presence may have a weaker effect on female educational outcomes. This pattern highlights the underlying mechanism: female missionaries specifically shaped educational opportunities for girls, whereas single male missionaries contributed less to this channel.

Moreover, the IV estimates are positive and larger than the OLS estimates in Table 3.0. This pattern suggests that OLS, which reflects the average effect across all prefectures (ATE), may understate the true impact. In contrast, IV captures the local effect (LATE), reflecting the impact in prefectures where missionary activities were most concentrated. Prefectures with more missionaries likely benefited more because additional missionary presence may enable the establishment of more schools and ensure sustained staffing and educational programs. At the same time, some of the difference between IV and OLS estimates may reflect systematic differences across prefectures. For instance, more economically developed areas may have more public schools, which can partially substitute for missionary schools, as children may attend these public schools instead, potentially causing OLS estimates to underestimate the effect of missionary schools. This mechanism, together with concentrated missionary activity, could amplify the educational impact captured by the IV estimates of missionary girls' high schools, explaining why IV estimates exceed OLS estimates.

Table 3.0

OLS vs. IV Results: Female Tertiary Education with Different Missionary Counts as the Instrument (1920 controls)

OLS vs. IV (2SLS) Estimates: Missionary Girls' High Schools and Female Education (≥13 Years, Age 25+, 1950)

	Dependent variable:								
	Female Education (≥13 Years, % of Female Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	Protestant GHS	Protestant GHS	Protestant GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1920 :									
Total Missionary Girls' High Schools (per million)	0.322***			0.443***					
	(0.058)			(0.079)					
Protestant Girls' High Schools (per million)		0.436***			0.633***		1.344	0.624***	0.584***
		(0.083)			(0.116)		(0.918)	(0.117)	(0.114)
Catholic Girls' High Schools (per million)			0.546***			0.792**			
			(0.200)			(0.297)			
Control Variables, 1920 :									
Middle Schools for Boys (Non-Missionary, per million)	0.132***	0.142***	0.139***	0.125***	0.139***	0.134***	0.128	0.139***	0.140***
	(0.036)	(0.036)	(0.044)	(0.038)	(0.039)	(0.045)	(0.077)	(0.039)	(0.038)
Total Girls' High Schools (Non-Missionary, per million)	0.002	0.005	-0.023	0.016	0.022	-0.019	0.084	0.021	0.018
	(0.022)	(0.023)	(0.026)	(0.024)	(0.025)	(0.027)	(0.092)	(0.025)	(0.024)
Buddhist Temples (per million)	0.0003***	0.0003***	0.0003***	0.0003***	0.0003***	0.0003***	0.0003*	0.0003***	0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Female Factory Workers (per 1,000)	0.016***	0.016***	0.016**	0.017***	0.016**	0.016**	0.017	0.016**	0.016**
	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.007)	(0.012)	(0.006)	(0.006)
Textile Production Value (yen per capita)	-0.008***	-0.009***	-0.008***	-0.008***	-0.009***	-0.007**	-0.009*	-0.009***	-0.009***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)	(0.002)	(0.002)
Number of Ports (per million)	-0.103*	-0.097	-0.096	-0.113*	-0.106	-0.106	-0.142	-0.106	-0.104
	(0.061)	(0.062)	(0.076)	(0.064)	(0.067)	(0.078)	(0.137)	(0.067)	(0.065)
Avg. Prefectural Government Staff Annual Salary (yen)	-0.002**	-0.002**	-0.001	-0.002**	-0.002***	-0.001	-0.003	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Population Density (per km²)	0.001***	0.001***	0.002***	0.001***	0.001***	0.001***	0.001	0.001***	0.001***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.001)	(0.0002)	(0.0002)
Constant	0.440	0.421	0.423	0.387	0.349	0.351	0.087	0.352	0.367
	(0.277)	(0.284)	(0.348)	(0.295)	(0.307)	(0.360)	(0.680)	(0.305)	(0.298)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1920 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionaries	Protestant M.	Catholic M.	Single Prot. Male M.	Married Prot. Male M.	Single Prot. Female M.
Mean of Dependent Variable %	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments				53.616	51.78	32.697	1.316	47.902	48.592
Wald test F-stat (2nd Stage)				19.72	18.354	12.148	4.23	18.376	18.909
Observations	46	46	46	46	46	46	46	46	46
R^2	0.844	0.837	0.760	0.825	0.811	0.750	0.288	0.813	0.822
Adjusted R^2	0.805	0.796	0.700	0.782	0.764	0.687	0.110	0.766	0.778
Note:	*p<0.1; **p<0.05; ***p<0.01								

Note. Data for Table 3.0 – 5.0 are from the *Japan Census 1950* (Statistics Bureau of Japan, 1950) for educational attainments, the *Japan Christian Yearbook 1920* (CFM [Japan], 1920) for missionary schools, and *Japan Statistical Yearbook* (Statistics Bureau, Imperial Cabinet, n.d.) for control variables, the Japan Christian Yearbook 1904 (SCCCM, 1904) for instruments. See main text for details.

Table C2.0 (with 1920 controls) in Appendix C reports statistically significant positive coefficients of Protestant girls' high schools using single Protestant female missionary exposure in years (instead of count) as the instrumental variable, although the estimated magnitudes vary. The F-statistics of the excluded instruments exceed the conventional threshold (F > 10), indicating a sufficiently strong instrument. In the first stage, an additional missionary year is associated with an increase of 0.011 Protestant missionary girls' high schools per million population (columns 1–4). In the second stage (columns 5–8), after accounting for potential endogeneity, an additional Protestant missionary girls' high school

per million population is associated with a 0.345%–0.959% increase (depending on specifications) in women's tertiary educational attainment, compared to a mean of 1.52%[12].

The IV coefficients represent different local average treatment effects (LATEs) because the instruments used in Tables C2.0 and C2.1 differ from those in the main analysis (Tables 2.0 and 2.1A, which use single Protestant female missionary counts as instruments). The exposure-based instrument captures prefectures where the number of girls' high schools expanded in response to sustained or longer-term missionary presence, whereas a cross-sectional snapshot of missionary counts captures a different dimension of variation. Because each instrument shifts the number of girls' high schools through a distinct mechanism, the corresponding IV estimates related to different complier groups. Differences in coefficient magnitudes across instruments should therefore be interpreted as reflecting different causal parameters rather than inconsistencies in the model. Nevertheless, the broad similarity across these sets of estimates supports the robustness and credibility of the causal identification strategy based on the number of missionaries.

Table C3.0 in Appendix C presents OLS and IV estimates using the full set of 1920 control variables. It adopts various measures of missionary exposure as instruments and shows results broadly consistent with Table 3.0 (which uses missionary counts). In contrast, Table C3.1 (missionary exposure, with 1904 controls) indicates that Catholic missionary exposure is a weak instrument ($F < 10$), and the coefficient for Catholic girls' high schools is statistically insignificant. One plausible explanation is data limitations: of 122 Catholic missionaries, 19 (16%) did not report an arrival year, compared with only 18 out of 549 Protestant missionaries (3%), making Catholic missionary exposure relatively less reliable as an instrument.

Another plausible explanation is that the 1904 specification includes the share of the nobility class, an important measure of elite social structure not available in the 1920 specification. However, because nobility levels vary systematically across prefectures, including this variable may have removed some of the geographic variation that the instrument based on Catholic missionary exposure relies on, especially if Catholic mission strategy depended more heavily on the elite class. As a result, the 1904 model may better reflect historical conditions but produces less precise IV estimates.

6.2.2 Protestant Girls' High Schools and Women's Secondary Educational Attainment

Table 4.0 and Table 4.1A[13] compare the OLS and IV estimates of women's secondary educational attainment, with column 4-9 using different missionary counts as instruments. Table 4.0 presents results using all 1920 control variables. Both the OLS and IV models in Table 4.0 show consistent, positive, and statistically significant effects of Protestant girls'

[12] Table C2.1 (with 1904 controls) using missionary exposure as the instrumental variable, reports results broadly consistent with Table C2.0, except for column 7, which shows a statistically insignificant effect. This may be due to the small sample size or potential noise in the data. The coefficient becomes marginally significant when evaluated at the 10% significance level.

[13] Table 4.1A in Appendix C which uses 1904 control variables, shows no statistically significant effects for missionary girls' high schools of any denomination.

high schools on women's secondary educational attainment (except when using single Protestant male missionaries as the instrument). The IV estimates indicate, after allowing for endogeneity, that adding one additional Protestant girls' high school increases secondary educational attainment by approximately 4.07–4.495% (depending on specifications), relative to a mean of 44.95% (an approximately 0.55-0.61 standard-deviation increase). While the OLS estimates capture only the association between Protestant schools and educational outcomes, arguably, the IV estimates identify a potential causal link, implying that the establishment of Protestant girls' high schools contributed to higher female secondary educational attainment across prefectures. In contrast, Catholic girls' high schools do not exhibit statistically significant effects by OLS or IV methods.

As discussed in Section 6.2.1 regarding Pope Pius X's 1906 intervention, the empirical results in the present study suggest that this reform may indeed have strengthened the impact of Catholic schools on women's tertiary educational attainment. However, Catholic schools still appear to lag behind their Protestant counterparts in influencing girls' secondary educational attainment in early- to mid-twentieth-century Japan.

Table 4.0

OLS vs. IV Results: Female Secondary Education with Different Missionary Counts as the Instrument (1920 controls)

OLS vs. IV (2SLS) Estimates: Missionary Girls' High Schools and Female Education (7-12 Years, Age 25+, 1950)

	Dependent variable:								
	Female Education (7-12 Years, % of Female Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	Protestant GHS	Protestant GHS	Protestant GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1920 : Total Missionary Girls' High Schools (per million)	3.142***			2.461*					
	(0.972)			(1.265)					
Protestant Girls' High Schools (per million)		4.106***			4.070**		-3.054	4.495**	4.316**
		(1.373)			(1.788)		(9.688)	(1.820)	(1.813)
Catholic Girls' High Schools (per million)			4.649			2.468			
			(2.972)			(4.341)			
Control Variables, 1920 : Middle Schools for Boys (Non-Missionary, per million)	1.317**	1.425**	1.398**	1.354**	1.425**	1.442**	1.540*	1.418**	1.421**
	(0.595)	(0.603)	(0.654)	(0.601)	(0.603)	(0.662)	(0.814)	(0.604)	(0.604)
Total Girls' High Schools (Non-Missionary, per million)	0.839**	0.851**	0.577	0.765*	0.848**	0.538	0.227	0.885**	0.869**
	(0.366)	(0.376)	(0.389)	(0.379)	(0.389)	(0.396)	(0.967)	(0.390)	(0.390)
Buddhist Temples (per million)	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Female Factory Workers (per 1,000)	0.178*	0.173*	0.173*	0.176*	0.173*	0.171	0.164	0.173*	0.173*
	(0.093)	(0.095)	(0.102)	(0.094)	(0.095)	(0.103)	(0.126)	(0.095)	(0.095)
Textile Production Value (yen per capita)	-0.074**	-0.083**	-0.073*	-0.076**	-0.083**	-0.078*	-0.083*	-0.083**	-0.083**
	(0.036)	(0.036)	(0.040)	(0.036)	(0.036)	(0.041)	(0.048)	(0.036)	(0.036)
Number of Ports (per million)	-0.236	-0.169	-0.145	-0.177	-0.167	-0.060	0.187	-0.188	-0.179
	(1.017)	(1.033)	(1.120)	(1.027)	(1.035)	(1.135)	(1.448)	(1.036)	(1.035)
Avg. Prefectural Government Staff Annual Salary (yen)	-0.002	-0.003	0.004	-0.001	-0.003	0.003	0.005	-0.003	-0.003
	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)	(0.012)	(0.018)	(0.011)	(0.011)
Population Density (per km^2)	0.006*	0.007**	0.009**	0.007*	0.007*	0.009**	0.013	0.006*	0.006*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.009)	(0.003)	(0.003)
Constant	26.099***	25.966***	26.127***	26.398***	25.979***	26.762***	28.606***	25.823***	25.889***
	(4.646)	(4.731)	(5.158)	(4.691)	(4.750)	(5.277)	(7.183)	(4.756)	(4.752)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1920 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionaries	Protestant M.	Catholic M.	Single Prot. Male M.	Married Prot. Male M.	Single Prot. Female M.
Mean of Dependent Variable %	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95
F of Excluded Instruments				53.616	51.78	32.697	1.316	47.902	48.592
Wald test F-stat (2nd Stage)				4.863	4.931	3.707	2.492	5.024	4.983
Observations	46	46	46	46	46	46	46	46	46
R^2	0.586	0.572	0.500	0.580	0.572	0.492	0.249	0.571	0.572
Adjusted R^2	0.483	0.465	0.375	0.476	0.465	0.365	0.061	0.464	0.465

Note: *p<0.1; **p<0.05; ***p<0.01

6.2.3 Missionary Boys' Middle Schools and Men's Tertiary Educational Attainment

Table 5.0 and Table 5.1A[14] compare the OLS and IV estimates of men's tertiary educational attainment, with column 4-9 using different missionary counts as instruments. Table 5.0 presents results using all 1920 control variables. Table 5.1A presents results using all 1904 control variables. In Table 5.0, both the OLS and IV coefficients for Protestant middle schools are positive and statistically significant (except when using single Protestant male missionaries as the instrument); however, the IV coefficients of Protestant middle schools are about three times larger than the OLS estimate, indicating a substantial downward bias in the OLS results. The IV estimates suggest that adding one additional Protestant middle school increases tertiary educational attainment by approximately 5.95% to 6.15%, relative to a mean of 8.89% (approximately a 2.1 standard-deviation increase). Both married male and single female Protestant missionaries estimates report F-statistics of the excluded instruments above 10, supporting their relevance.

In contrast, the results in Table 5.1A, which use 1904 control variables, are notable. Columns 7 and 9 report F-statistics for the excluded instruments below 10, indicating potential weak instrument. Nevertheless, the IV specification using married male Protestant missionaries as the instrument for Protestant middle schools continues to yield a statistically significant effect on men's tertiary educational attainment (estimated coefficient ≈ 5.87). By comparison, Catholic middle schools show no statistically significant relationship with men's tertiary attainment under either OLS or IV estimations in both tables. This null result may reflect the limited variation of Catholic schools, approximately 0.05 per million people, compared to 0.19 per million people for Protestant schools, potentially reducing the statistical power to detect an effect.

[14] See Appendix C for Table 5.1A

Table 5.0
OLS vs. IV Results: Male Tertiary Education with Different Missionary Counts as the Instrument (1920 controls)

OLS vs. IV (2SLS) Estimates: Missionary boys' Middle Schools and Male Education (≥13 Years, Age 25+, 1950)

	Dependent variable:								
	Male Education (≥13 Years, % of male Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary MS	Protestant MS	Catholic MS	All Missionary MS	Protestant MS	Catholic MS	Protestant MS	Protestant MS	Protestant MS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1920 :									
Total Missionary Boys' Middle Schools (per million, 1920)	1.576**			3.792***					
	(0.681)			(1.175)					
Protestant Missionary Boys' Middle Schools (per million, 1920)		1.900**			5.960***		5.310*	6.147***	5.952***
		(0.896)			(1.846)		(2.872)	(1.954)	(2.074)
Catholic Missionary Boys' Middle Schools (per million, 1920)			3.704*			3.467			
			(1.989)			(3.404)			
Control Variables, 1920 :									
Middle Schools for Boys (Non-Missionary, per million, 1920)	0.383*	0.381*	0.372*	0.414*	0.426	0.371*	0.419*	0.428	0.426
	(0.200)	(0.202)	(0.204)	(0.227)	(0.253)	(0.204)	(0.241)	(0.257)	(0.253)
Total Girls' High Schools (Non-Missionary, per million, 1920)	0.034	0.022	0.056	0.040	0.004	0.054	0.007	0.003	0.004
	(0.118)	(0.119)	(0.121)	(0.134)	(0.149)	(0.123)	(0.141)	(0.152)	(0.149)
Buddhist Temples (per million, 1920)	0.001**	0.001**	0.001**	0.001*	0.001*	0.001**	0.001*	0.001*	0.001*
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0004)	(0.0005)	(0.0005)	(0.0005)
Female Factory Workers (per 1,000, 1920)	0.026	0.026	0.026	0.023	0.023	0.026	0.023	0.023	0.023
	(0.031)	(0.032)	(0.032)	(0.036)	(0.040)	(0.032)	(0.038)	(0.040)	(0.040)
Textile Production Value (yen per capita, 1920)	-0.022*	-0.023*	-0.022*	-0.016	-0.016	-0.022*	-0.017	-0.016	-0.016
	(0.012)	(0.012)	(0.012)	(0.014)	(0.015)	(0.013)	(0.015)	(0.016)	(0.016)
Number of Ports (per million, 1920)	-0.017	0.061	0.080	-0.604	-0.663	0.100	-0.547	-0.696	-0.661
	(0.386)	(0.380)	(0.389)	(0.497)	(0.543)	(0.457)	(0.655)	(0.560)	(0.568)
Average Prefectural Government Staff Annual Salary (yen, 1920)	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)
Population Density (per km², 1920)	0.006***	0.006***	0.006***	0.004***	0.003*	0.006***	0.004*	0.003*	0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Constant	3.265**	3.208**	3.336**	3.360*	3.231	3.327**	3.227*	3.232	3.230
	(1.555)	(1.571)	(1.593)	(1.770)	(1.969)	(1.597)	(1.861)	(2.002)	(1.967)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1920 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionaries	Protestant M.	Catholic M.	Single Prot. Male M.	Married Prot. Male M.	Single Prot. Female M.
Mean of Dependent Variable %	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89
F of Excluded Instruments				27.691	21.149	18.655	5.696	18.679	14.917
Wald test F-stat (2nd Stage)				7.283	6.103	7.679	5.917	5.881	5.867
Observations	46	46	46	46	46	46	46	46	46
R^2	0.681	0.674	0.665	0.587	0.488	0.665	0.543	0.470	0.489
Adjusted R^2	0.601	0.592	0.582	0.483	0.360	0.582	0.428	0.338	0.361
Note:	*p<0.1; **p<0.05; ***p<0.01								

6.2.4 Missionary Boys' Middle Schools and Men's Secondary Educational Attainment

Table C4.0 and Table C4.1 in Appendix C report the OLS and IV estimates for men's secondary educational attainment. Table C4.0 includes 1920 control variables, while Table C4.1 applies 1904 controls. Across all specifications, there is no evidence of a statistically significant relationship between missionary boys' middle schools (any denomination) and men's secondary educational attainment.

By 1900, Japan had abolished tuition fees for primary education (Seat, 2003), ensuring that boys and girls had comparable access to basic schooling. However, educational trajectories began to diverge at the secondary level. Boys could attend public middle schools, which explicitly prepared them for entry into prestigious universities (Kariya, 2018). For girls, the institutional landscape was markedly different: government-run girls' secondary schools prioritised domestic skills and moral instruction over rigorous academic training, and most

elite universities remained closed to women prior to World War II (Seat, 2003). As a result, girls faced more limited formal pathways to advanced education compared to boys. In contrast, Protestant missionary girls' schools often offered advanced academic curricula, including English instruction, and in some cases post-secondary programs unavailable in the public system (Seat, 2003). Consequently, the impact of missionary schools as shown in the data and empirical results were particularly pronounced for women at both secondary and tertiary levels. For boys, by contrast, the influence at the secondary level was less pronounced, likely due to the widespread availability of public middle schools that already facilitated boys' pathway to tertiary education.

7. Discussion

This paper examines the relationship between Christian missionary activity and human capital formation among Japanese women in the first half of the twentieth century. The results show that a stronger presence of Protestant missionary girls' high schools in Japanese prefectures was linked to an increase in women's tertiary educational attainment and, to a lesser extent, their secondary educational attainment. A similar positive relationship is also observed between Catholic missionary girls' high schools and women's tertiary educational attainment.

In contrast, neither Protestant nor Catholic missionary boys' schools had a statistically significant impact on men's secondary education attainment. However, IV estimates indicate that a stronger presence of Protestant missionary boys' middle schools seem to increase men's tertiary educational attainment.

The findings also empirically support historians' claims that Protestant women missionaries played a pivotal role in advancing educational opportunities for Japanese women through their efforts in establishing and sustaining missionary girls' high schools.

Beyond providing formal instruction, Protestant women missionaries also served as role models, illustrating alternative forms of female agency in a male-dominated society. Modern empirical research highlights the importance of role models in shaping female aspirations and educational outcomes (Carrell et al., 2010; Porter & Serra, 2020; Goulas et al., 2024), which aligns closely with historical accounts of the influence these female missionaries had on their students. This study confirms empirically the link between female missionaries and Japanese women's educational attainment. Women likely supported the educational advancement of other women through their roles as instructors and role models during Japan's modernisation. The findings also indicate that the contributions of Protestant married male missionaries, often accompanied by their wives, and Catholic missions are integral to understanding the broader development of human capital and educational progress in Japan.

As the world faces growing uncertainty, deepening religious and racial divisions, and increasing geopolitical tensions, historical experience offers important lessons. The Japanese authorities' pragmatic tolerance of religious activity, by turning a blind eye to Bible instruction as moral education in classrooms enabled missionary schools to flourish and fostered progresses in women's higher education at a time when it was largely neglected by

the state. This case underscores the value of policy tolerance and openness: even seemingly unconventional or unpopular allowances in policymaking can yield transformative long-term benefits, often emerging from unexpected and unconventional sources.

References

Bai, Y., & Kung, J. K. (2015). Diffusing knowledge while spreading God's message: Protestantism and economic prosperity in China, 1840–1920. *Journal of the European Economic Association*, *13*(4), 669–698. https://doi.org/10.1111/jeea.12113

Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis, with special reference to education* (3rd ed.). University of Chicago Press.

Becker, S. O., & Woessmann, L. (2008). Luther and the girls: Religious denomination and the female education gap in nineteenth-century Prussia. *The Scandinavian Journal of Economics*, *110*(4), 777–805. https://doi.org/10.1111/j.1467-9442.2008.00561.x

Becker, S. O., & Won, C. (2024). Conquering Korea for Jesus: Protestant missionaries, local churches, and literacy in Colonial Korea. *Labour Economics*, *91*, 102618. https://doi.org/10.1016/j.labeco.2024.102618

Bovenkerk, H. G. (1953). A Century of Protestantism in Japan. *Far Eastern Survey*, *22*(13), 175–178. https://doi.org/10.2307/3023848

Carrell, S. E., Page, M. E., & West, J. E. (2010). Sex and science: how professor gender perpetuates the gender gap. *The Quarterly Journal of Economics*, *125*(3), 1101–1144. https://doi.org/10.1162/qjec.2010.125.3.1101

Chen, T., Kung, J. K., & Ma, C. (2020). Long Live Keju! The Persistent Effects of China's Civil Examination System. *The Economic Journal (London)*, *130*(631), 2030–2064. https://doi.org/10.1093/ej/ueaa043

Conference of Federated Missions [CFM] (Japan). (1920). *The Christian movement in the Japanese empire: Including Korea and Formosa, a yearbook for 1920* (18th ed.). Japan: Published for the Conference of Federated Missions. https://archive.org/details/christianmovemen18conf/page/n11/mode/2up

Dong, B., & Zhang, Y. (2024). Confucianism and science. *Explorations in Economic History*, *91*, 101517-. https://doi.org/10.1016/j.eeh.2023.101517

Fujimoto, H. (2020). Women, missionaries, and medical professions: the history of overseas female students in Meiji Japan. *Japan Forum (Oxford, England)*, *32*(2), 185–208. https://doi.org/10.1080/09555803.2018.1516688

Goldin, C. (2006). The Quiet Revolution That Transformed Women's Employment, Education, and Family. *The American Economic Review*, *96*(2), 1–21. https://doi.org/10.1257/000282806777212350

Goulas, S., Gunawardena, B. N., Megalokonomou, R., & Zenou, Y. (2024). *Gender role models in education* (IZA DP No. 17271). IZA Institute of Labor Economics. https://www.iza.org/publications/dp/17271/gender-role-models-in-education

Gustafsson, K. (2022). Identity Change, Anxiety and Creativity: How 19th Century Japan Sought to Leave Asia and Become Part of the West. *Uluslararası İlişkiler / International Relations*, *19*(73), 77–93. https://www.jstor.org/stable/27117456

Kariya, T. (2018). Education and Social Disparities in Japan. *Oxford Research Encyclopedia of Education*. https://doi.org/10.1093/acrefore/9780190264093.013.70

Klasen, S. (2002). Low Schooling for Girls, Slower Growth for All? Cross-Country Evidence on the Effect of Gender Inequality in Education on Economic Development. *The World Bank Economic Review*, *16*(3), 345–373. https://doi.org/10.1093/wber/lhf004

Mead, R. (2018, March 28). The woman suffrage movement in the United States. In *Oxford Research Encyclopedia of American History*. Oxford University Press. https://doi.org/10.1093/acrefore/9780199329175.013.17

Miura rscj, N. (2014). Religious Education in Japanese 'Mission Schools': A Case Study of Sacred Heart Schools in Japan. In M. J. Reiss, Y. Waghid, J. D. Chapman, & S. McNamara (Eds.), *International Handbook of Learning, Teaching and Leading in Faith-Based Schools* (pp. 619–638). Springer Netherlands. https://doi.org/10.1007/978-94-017-8972-1_36

Nagata, Y. (1995). Terakoya: Japan's endogenous learning institution and its implications for our developing world. *Educational Studies, 37*, 187–210. International Christian University.

Nakai, K. W. (2017). Between Secularity, Shrines, and Protestantism: Catholic Higher Education in Prewar Japan. *Japan Review*, *30*, 97–127.

Nishimizu, M., & Hulten, C. R. (1978). The Sources of Japanese Economic Growth: 1955-71. *The Review of Economics and Statistics*, *60*(3), 351–361. https://doi.org/10.2307/1924160

Nunn, N. (2014). Gender and Missionary Influence in Colonial Africa. In *Africa's Development in Historical Perspective* (pp. 489–512). https://doi.org/10.1017/CBO9781139644594.021

Patessio, M. (2020). *Foreign women missionaries and their Japanese female charges.* In *Women and public life in early Meiji Japan* (p. 71). University of Michigan Press.

Porter, C., & Serra, D. (2020). Gender Differences in the Choice of Major: The Importance of Female Role Models. *American Economic Journal. Applied Economics*, *12*(3), 226–254. https://doi.org/10.1257/app.20180426

Reader, I. (1993). *Japanese religions : past and present*. Routledge. https://doi.org/10.4324/9781315073088

Schleunes, K. A. (1979). Enlightenment, Reform, Reaction: The Schooling Revolution in Prussia. *Central European History*, *12*(4), 315–342. https://doi.org/10.1017/S0008938900022457

Seat, K. (2003). "Mission Schools and Education for Women". In *Handbook of Christianity in Japan*. Leiden, The Netherlands: Brill. https://doi.org/10.1163/9789047402374_016

Shimizu, H. (1985). Rise and fall of Japan as a principal supplier of cotton manufactures for Turkey: the inter-war period. *Middle Eastern Studies*, *21*(1), 15–32. https://doi.org/10.1080/00263208508700611

Staiger, D., & Stock, J. H. (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica*, *65*(3), 557–586. https://doi.org/10.2307/2171753

Standing Committee of Co-operating Christian Missions [SCCCM]. (1904). *The Christian movement in its relation to the new life in Japan* (Vol. 2). Published for the Standing Committee of Co-operating Christian Missions [SCCCM]. https://archive.org/details/christianmovemen0000unse_l3t4/page/n175/mode/2up

Statistics Bureau of Japan. (1950). *1950 Population Census of Japan.* e-Stat. https://www.e-stat.go.jp/en/stat-search/files?page=1&toukei=00200521&tstat=000001036869 (Accessed May 13, 2025)

Statistics Bureau, Imperial Cabinet. (n.d.). *Japan Statistical Yearbook*. Institute of Economic Research (IER), Hitotsubashi University. Retrieved from https://d-repo.ier.hit-u.ac.jp/statistical-yb

The World Bank. (2025, April 17). *Gender statistics dataset*. Retrieved May 29, 2025, from https://databank.worldbank.org/source/gender-statistics

Thomas, W. T. (1959). *Protestant beginnings in Japan: The first three decades, 1859–1889*. Tuttle Publishing.

UNESCO Institute for Statistics. (2017). *Reducing global poverty through universal primary and secondary education*. Retrieved May 26, 2025, from https://uis.unesco.org/sites/default/files/documents/reducing-global-poverty-through-universal-primary-secondary-education.pdf

Wittgenstein Centre for Demography and Global Human Capital. (2017, September 30). *Japan: Educational attainment for population aged 25 and over*. EDU20C. Retrieved May 29, 2025, from https://edu20c.org/japan/

Yasutake, R. (2004). “Tilling the Ground: American Protestant Foreign Missionary Women in Early Meiji Japan, 1859-1890”. In *Transnational Women’s Activism*. New York University Press

Appendix A

Table A1

Missionary Numbers, Years of Arrival, and Duration of Residence, 1904 (Instruments)

Missionary Variables (1904, Prefecture-Level)	N	Mean (Std)	Min	Max
Missionaries (per million population)	46	10.72 (11.21)	0	59.23
Protestant missionaries (per million population)	46	8.14 (8.78)	0	44.22
Catholic missionaries (per million population)	46	2.28 (2.57)	0	13.79
Single Protestant female missionaries (per million population)	46	4.16 (4.81)	0	20.14
Single Protestant male missionaries (per million population)	46	0.81 (1.39)	0	7.50
Married Protestant male missionaries (per million population)	46	3.17 (3.41)	0	16.58
Missionaries in 1904 who remained listed in 1920 (per million population)	46	2.87 (2.73)	0	11.85
Aggregate years of missionary presence in a prefecture until 1904 (per million population)	46	129.45 (146.38)	0	711.11
Aggregate years of Protestant missionary presence in a prefecture until 1904 (per million population)	46	92.11 (108.21)	0	513.29
Aggregate years of Catholic missionary presence in a prefecture until 1904 (per million population)	46	33.39 (51.16)	0	323.04
Aggregate years of Single Protestant female missionary presence in a prefecture until 1904 (per million population)	46	44.06 (51.19)	0	208.28
Aggregate years of Single Protestant male missionary presence in a prefecture until 1904 (per million population)	46	7.82 (18.36)	0	76.40
Aggregate years of Married Protestant male missionary presence in a prefecture until 1904 (per million population)	46	40.23 (52.00)	0	228.61
Earliest arrival year (any denomination)	45	1880.38 (11.77)	1,839	1,899.00
Earliest Protestant arrival year	43	1882.81 (12.17)	1,839	1,900.00
Earliest Catholic arrival year	34	1882.94 (9.34)	1,865	1,897.00
Earliest Protestant Single Female arrival year	34	1885.71 (8.01)	1,871	1,901.00

Missionary Variables (1904, Prefecture-Level)	N	Mean (Std)	Min	Max
Earliest Protestant Single Male arrival year	20	1893.30 (12.90)	1,859	1,903.00
Earliest Protestant Married Male arrival year	40	1886.50 (13.18)	1,839	1,903.00

Note. Data are from *Japan Christian Yearbook 1904* (SCCCM, 1904).

Table A2
Missionary Schools, 1920 (Endogenous Variables)

Missionary Schools (1920, Prefecture-Level)	N	Mean (Std)	Min	Max
Total Missionary Girls' High Schools (per million population)	46	0.64 (1.01)	0	4.65
Protestant Girls' High Schools (per million population)	46	0.44 (0.73)	0	3.10
Catholic Girls' High Schools (per million population)	46	0.15 (0.33)	0	1.17
Other Missionary Girls' High Schools (per million population)	46	0.04 (0.18)	0	0.93
Total Missionary Boy's Middle Schools (per million population)	46	0.24 (0.53)	0	2.50
Protestant Boy's Middle Schools (per million population)	46	0.19 (0.39)	0	1.67
Catholic Boy's Middle Schools (per million population)	46	0.05 (0.18)	0	0.83
Other Missionary Boy's Middle Schools (per million population)	46	0.00 (0.00)	0	0.00

Note. Data are from *Japan Christian Yearbook 1920* (CFM [Japan], 1920).

Table A3

Educational Attainment, 1950 (Outcome Variables)

Educational Attainment Variables (1950, Prefecture-Level)	N	Mean (SD)	Min	Max
Male population aged 25 and over (thousand)	46	384.61 (245.81)	127.00	1,445.00
Males aged 25+ with 7-12 years of schooling (%)	46	56.44 (4.37)	42.93	64.13
Males aged 25+ with ≥7 years of schooling (%)	46	65.33 (5.81)	47.98	76.89
Males aged 25+ with ≥13 years of schooling (%)	46	8.89 (2.84)	2.31	20.55
Female population aged 25 and over (thousand)	46	429.17 (255.13)	152.00	1,498.00
Females aged 25+ with 7-12 years of schooling (%)	46	44.95 (7.42)	27.78	58.21
Females aged 25+ with ≥7 years of schooling (%)	46	46.47 (7.92)	28.52	62.88
Females aged 25+ with ≥13 years of schooling (%)	46	1.52 (0.72)	0.74	4.67

Note. Data are from *Japan Census 1950* (Statistics Bureau of Japan, 1950).

Table A4a

Education and Religion, 1904

Control Variables (1904, Prefecture-Level)	N	Mean (Std)	Min	Max
Public Middle Schools for Boys (per million population)	46	4.89 (1.54)	1.97	8.85
Private Middle Schools for Boys (per million population)	46	0.47 (1.35)	0.00	8.69
Total Middle Schools for Boys (per million population)	46	5.36 (1.76)	2.75	10.66
Public Girl's High Schools (per million population)	46	1.59 (0.80)	0.55	4.55
Private Girl's High Schools (per million population)	46	0.09 (0.30)	0.00	1.55
Total Girls' High Schools (per Million Population)	46	1.68 (0.81)	0.55	4.55
All Vocational Schools (per million population)	46	4.06 (2.28)	0.00	11.04
Agricultural / Vocational Schools (per million population)	46	2.28 (1.85)	0.00	9.94
Commercial / Vocational Schools (per million population)	46	1.00 (0.92)	0.00	2.90
Industrial / Vocational Schools (per million population)	46	0.61 (0.82)	0.00	3.06
Shipping / Vocational Schools (per million population)	46	0.16 (0.40)	0.00	1.53
All Supplementary Vocational Schools (per million population)	46	13.82 (17.97)	0.00	91.21
Agricultural / Supplementary Vocational Schools (per million population)	46	10.78 (17.15)	0.00	83.05
Fishery / Supplementary Vocational Schools (per million population)	46	0.59 (1.25)	0.00	6.19
Industrial / Supplementary Vocational Schools (per million population)	46	0.88 (1.43)	0.00	6.19
Commercial / Supplementary Vocational Schools (per million population)	46	1.57 (1.70)	0.00	7.57
Apprentice Training Schools (per million population)	46	0.69 (0.90)	0.00	2.87
Shinto Shrines (per million population)	46	1275.18 (667.72)	262.51	3,049.49
Buddhist Temples (per million population)	46	1531.28 (893.95)	83.60	4,569.55
Protestant Churches (per million population)	46	14.99 (10.44)	0.00	60.58
Orthodox Churches (per million population)	46	2.34 (3.87)	0.00	20.03

Control Variables (1904, Prefecture-Level)	N	Mean (Std)	Min	Max
Catholic Churches (per million population)	46	3.24 (7.71)	0.00	53.18
Other Religious Sites (per million population)	46	0.84 (1.68)	0.00	8.83

Note. Data for Table A4a – A4b are from *Japan Statistical Yearbook, 1904* (Statistics Bureau, Imperial Cabinet, n.d.).

Table A4b

Economic, and Demographic Variables, 1904

Control Variables (1904, Prefecture-Level)	N	Mean (SD)	Min	Max
Male Elementary Teachers Fully Qualified Monthly Salary (yen)	46	14.54 (1.47)	12.33	19.48
Female Elementary Teachers Fully Qualified Monthly Salary (yen)	46	12.17 (1.67)	9.13	17.91
Rice Yield (koku per capita)	46	1.02 (0.40)	0.13	2.02
Female Textile Workers (per 1,000 population)	46	15.18 (14.15)	0.28	56.44
Textile Tanmono Production Value (yen per capita)	46	2.97 (4.30)	0.05	20.35
Coal Industrial Consumption (kg per capita)	46	93.79 (146.70)	0.00	627.37
Number of Ports (per million population)	46	0.60 (1.00)	0.00	4.92
Import Value (yen per capita)	46	4.98 (19.67)	0.00	105.46
Export Value (yen per capita)	46	4.94 (21.64)	0.00	139.41
Import/Export Value (yen per capita)	46	9.92 (40.70)	0.00	244.87
Share of Nobility Class (%)	46	0.01 (0.03)	0.00	0.18
Share of Former Samurai Class (%)	46	4.61 (4.18)	0.43	22.86
Population Density (persons per km^2)	46	211.38 (210.42)	12.32	1,180.85

Table A5a

Education and Religion, 1920

Control Variables (1920, Prefecture-Level)	N	Mean (SD)	Min	Max
Middle Schools for Boys (per million population)	46	5.90 (1.75)	2.96	10.06
Middle Schools for Boys (Non-Missionary, per million population)	46	5.67 (1.68)	2.96	8.84
Girls' High Schools (per million population)	46	4.28 (2.16)	1.04	10.32
Practical Girls' High Schools (per million population)	46	3.32 (2.44)	0.00	11.18
Total Girls' High Schools (Non-Missionary, per million population)	46	6.96 (2.91)	1.34	14.59
Industrial / Vocational Schools (per million population)	46	0.79 (0.64)	0.00	3.09
All Type-A Vocational Schools (per million population)	46	3.47 (1.40)	1.44	6.48
Agricultural / Type-A Vocational Schools (per million population)	46	1.65 (0.87)	0.37	3.74
Commercial / Type-A Vocational Schools (per million population)	46	1.46 (0.89)	0.00	3.35
Fishery / Type-A Vocational Schools (per million population)	46	0.14 (0.43)	0.00	2.12
Shipping / Type-A Vocational Schools (per million population)	46	0.22 (0.43)	0.00	1.54
All Type-B Vocational Schools (per million population)	46	4.79 (4.28)	0.00	17.33
Commercial / Type-B Vocational Schools (per million population)	46	0.82 (1.46)	0.00	7.63
Fishery / Type-B Vocational Schools (per million population)	46	0.08 (0.36)	0.00	2.21
Agricultural / Type-B Vocational Schools (per million population)	46	3.89 (3.42)	0.00	14.12
All Supplementary Vocational Schools (per million population)	46	244.60 (107.62)	59.64	494.08
Industrial / Supplementary Vocational Schools (per million population)	46	2.23 (3.60)	0.00	16.82
Agricultural / Supplementary Vocational Schools (per million population)	46	176.89 (95.49)	26.31	458.05
Fishery / Supplementary Vocational Schools (per million population)	46	3.15 (5.83)	0.00	31.15

Control Variables (1920, Prefecture-Level)	N	Mean (SD)	Min	Max
Commercial / Supplementary Vocational Schools (per million population)	46	4.70 (3.98)	0.00	17.16
Shipping / Supplementary Vocational Schools (per million population)	46	0.01 (0.08)	0.00	0.54
Other / Supplementary Vocational Schools (per million population)	46	57.61 (64.80)	3.66	252.84
Apprentice Training Schools (per million population)	46	2.63 (2.77)	0.00	12.01
Buddhist Temples (per million population)	46	1384.33 (866.20)	106.90	4,732.57
Shinto Shrines (per million population)	46	1016.23 (612.50)	118.35	2,858.78
Protestant Churches (per million population)	46	16.46 (5.66)	5.52	29.59
Orthodox Churches (per million population)	46	2.48 (3.86)	0.00	19.87
Catholic Churches (per million population)	46	3.56 (7.60)	0.00	52.53
Other Religious Sites (per million population)	46	2.07 (2.96)	0.00	10.90

Note. Data for Table A5a – A5b are from *Japan Statistical Yearbook, 1920* (Statistics Bureau, Imperial Cabinet, n.d.).

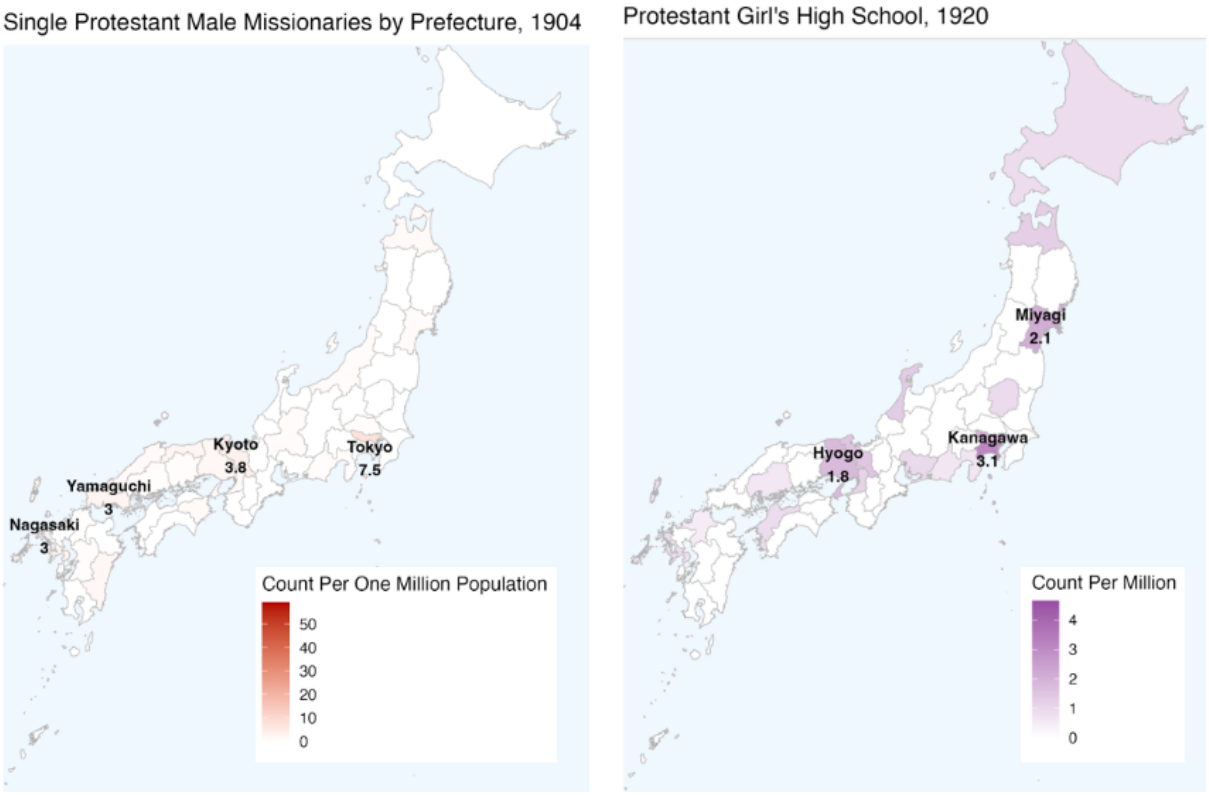
Table A5b

Economic, and Demographic Variables, 1920

Control Variables (1920, Prefecture-Level)	N	Mean (SD)	Min	Max
Average Prefectural Government Staff Annual Salary (yen)	45	336.06 (84.61)	122.87	478.54
Rice Yield (koku per capita)	46	1.21 (0.48)	0.10	2.21
Female Factory Workers (per 1,000 population)	46	12.27 (10.61)	0.45	52.98
Male Factory Workers (per 1,000 population)	46	8.26 (9.33)	0.63	40.32
Textile Production Value (yen per capita)	46	20.69 (31.39)	0.31	173.05
Factories Using Mechanical Power (per million population)	46	237.96 (195.41)	31.95	895.98
Number of Ports (per million population)	46	0.61 (0.86)	0.00	4.17
Export Value (yen per capita)	46	28.40 (120.95)	0.00	790.29
Import Value (yen per capita)	46	27.21 (102.14)	0.00	534.53
Import/Export Value (yen per capita)	46	55.60 (216.44)	0.00	1,324.81
Population Density (persons per km^2)	46	251.23 (306.57)	25.22	1,668.83

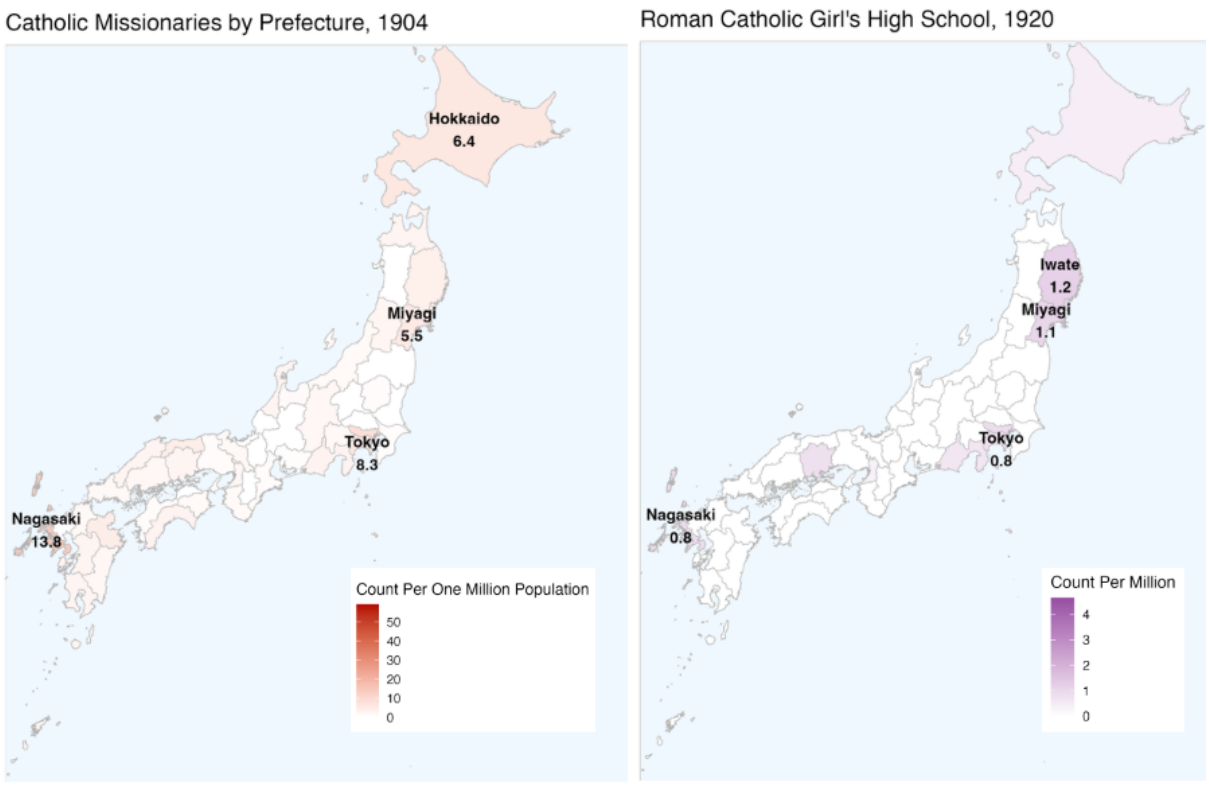
Figure A1.0

Single Protestant Male Missionaries (1904) vs. Protestant Girls' High Schools (1920)



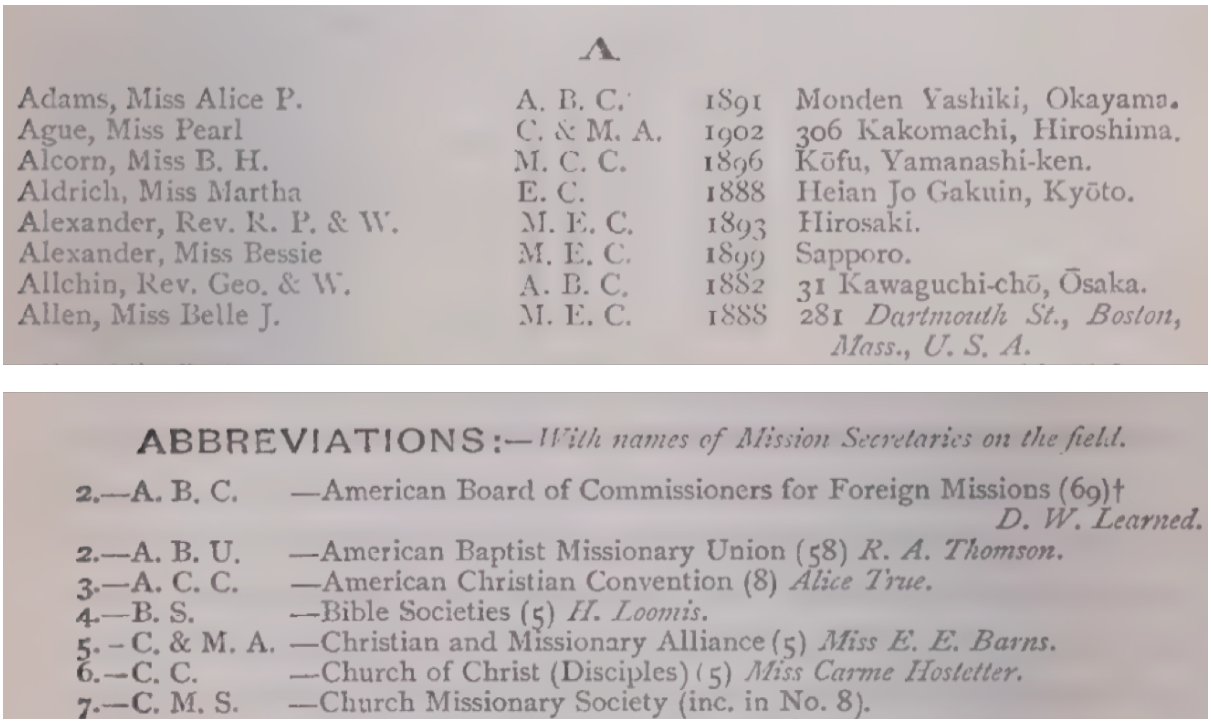
Note. Data for Figures A1.0, and A1.1 are from the *Japan Christian Yearbook 1904* (SCCCM, 1904) for missionaries and the *Japan Christian Yearbook 1920* (CFM [Japan], 1920) for missionary schools. See main text for details.

Figure A1.1
Catholic Missionaries (1904) vs. Catholic Girls' High Schools (1920)



Appendix B

Figure B1
A Snapshot of Missionary Directory from the Japan Christian Yearbook 1904 (SCCCM, 1904)



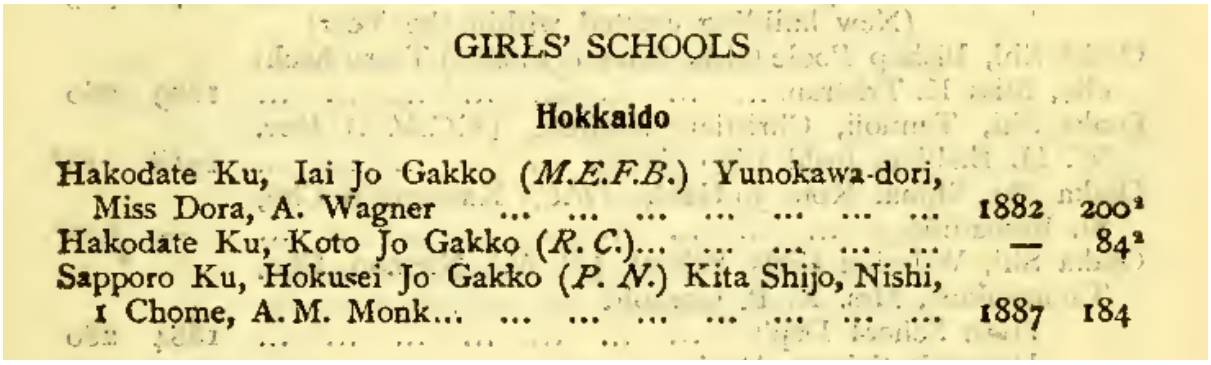
A.

Adams, Miss Alice P.	A. B. C.	1891	Monden Yashiki, Okayama.
Ague, Miss Pearl	C. & M. A.	1902	306 Kakomachi, Hiroshima.
Alcorn, Miss B. H.	M. C. C.	1896	Kōfu, Yamanashi-ken.
Aldrich, Miss Martha	E. C.	1888	Heian Jo Gakuin, Kyōto.
Alexander, Rev. R. P. & W.	M. E. C.	1893	Hirosaki.
Alexander, Miss Bessie	M. E. C.	1899	Sapporo.
Allchin, Rev. Geo. & W.	A. B. C.	1882	31 Kawaguchi-chō, Ōsaka.
Allen, Miss Belle J.	M. E. C.	1888	281 *Dartmouth St., Boston, Mass., U. S. A.*

ABBREVIATIONS:—*With names of Mission Secretaries on the field.*

2.—A. B. C. —American Board of Commissioners for Foreign Missions (69)† *D. W. Learned.*
2.—A. B. U. —American Baptist Missionary Union (58) *R. A. Thomson.*
3.—A. C. C. —American Christian Convention (8) *Alice True.*
4.—B. S. —Bible Societies (5) *H. Loomis.*
5.—C. & M. A. —Christian and Missionary Alliance (5) *Miss E. E. Barns.*
6.—C. C. —Church of Christ (Disciples) (5) *Miss Carme Hostetter.*
7.—C. M. S. —Church Missionary Society (inc. in No. 8).

Figure B2
A Snapshot of Christian Girls' School Statistics from the Japan Christian Yearbook 1920 (CFM [Japan], 1920)



GIRLS' SCHOOLS

Hokkaido

Hakodate Ku, Iai Jo Gakko (*M.E.F.B.*) Yunokawa-dori, Miss Dora, A. Wagner	1882	200[2]
Hakodate Ku, Koto Jo Gakko (*R. C.*)	—	84[2]
Sapporo Ku, Hokusei Jo Gakko (*P. N.*) Kita Shijo, Nishi, 1 Chome, A. M. Monk	1887	184

Figure B3
A Snapshot of Educational Attainment in 1950, Based on the Japan Census (Statistics Bureau of Japan, 1950)

地域及び在学年数 Area and years of school completed		25才以上人口 Persons 25 years old and over		
		総数 Total	男 Male	女 Female
全国	ALL JAPAN			
25才以上総数	Total, 25 years old and over	37 444	17 700	19 745
0～6年	0 to 6 years	16 033	5 864	10 169
7～12年	7 to 12 years	19 251	10 047	9 203
13年以上	13 years or more	2 124	1 771	352
不詳	School years not reported	37	17	20
北海道	Hokkaido			
25才以上総数	Total, 25 years old and over	1 767	883	883
0～6年	0 to 6 years	873	351	522
7～12年	7 to 12 years	820	468	353
13年以上	13 years or more	71	64	8
不詳	School years not reported	2	1	1

Appendix C

Table 1.1A

OLS Results – Missionary Girls' High Schools and Female Tertiary Educational Attainment with 1904 Control Variables

Missionary Girls' High Schools and Female Education (≥13 Years, Age 25+, 1950), OLS Results at the prefecture-level

	Dependent variable:											
	Female Education (≥13 Years, % of Female Population Age 25+, 1950)											
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total Missionary Girls' High Schools (per million, 1920)	0.421***			0.404***			0.245***			0.241***		
	(0.088)			(0.085)			(0.073)			(0.067)		
Protestant Girls' High Schools (per million, 1920)		0.544***			0.502***			0.284***			0.280***	
		(0.125)			(0.122)			(0.103)			(0.094)	
Catholic Girls' High Schools (per million, 1920)			0.902***			0.942***			0.563**			0.569**
			(0.304)			(0.291)			(0.228)			(0.212)
Public Middle Schools for Boys (per million, 1904)				-0.118**	-0.127**	-0.156**				-0.055	-0.053	-0.066
				(0.055)	(0.058)	(0.060)				(0.042)	(0.044)	(0.044)
Public Girl's High Schools (per million, 1904)				0.029	0.010	0.029				-0.035	-0.050	-0.030
				(0.104)	(0.109)	(0.117)				(0.073)	(0.076)	(0.078)
Buddhist Temples (per million, 1904)				0.0002*	0.0002	0.0002*				0.0002***	0.0002***	0.0002**
				(0.0001)	(0.0001)	(0.0001)				(0.0001)	(0.0001)	(0.0001)
Female Textile Workers (per 1,000, 1904)							0.003	0.001	0.003	-0.005	-0.006	-0.004
							(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Coal Industrial Consumption (kg per capita, 1904)							0.001	0.001	0.0004	0.001	0.001	0.001
							(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of Ports (per million, 1904)							-0.174**	-0.158**	-0.169**	-0.191***	-0.176**	-0.190**
							(0.071)	(0.073)	(0.075)	(0.066)	(0.068)	(0.071)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)							0.043	0.033	0.063	0.036	0.025	0.057
							(0.051)	(0.054)	(0.054)	(0.047)	(0.050)	(0.050)
Share of Nobility Class (%, 1904)							7.989**	8.556***	8.227**	7.979***	8.561***	8.080***
							(3.023)	(3.127)	(3.192)	(2.764)	(2.879)	(2.949)
Population Density (persons per km², 1904)							0.001	0.001	0.001**	0.001	0.001	0.001
							(0.001)	(0.001)	(0.001)	(0.0005)	(0.001)	(0.001)
Constant	1.255***	1.282***	1.387***	1.513***	1.656***	1.799***	0.502	0.673	0.217	0.751	0.939	0.512
	(0.103)	(0.106)	(0.108)	(0.372)	(0.381)	(0.400)	(0.708)	(0.745)	(0.745)	(0.678)	(0.716)	(0.723)
Prefecture-level 1904 Controls	No	No	No	Edu&Rel	Edu&Rel	Edu&Rel	Econ&Demo	Econ&Demo	Econ&Demo	All	All	All
Mean of Dependent Variable %	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522
Observations	46	46	46	46	46	46	46	46	46	46	46	46
R^2	0.345	0.301	0.167	0.473	0.423	0.350	0.726	0.704	0.694	0.793	0.774	0.765
Adjusted R^2	0.330	0.285	0.148	0.422	0.367	0.287	0.675	0.650	0.638	0.734	0.710	0.698
F Statistic	23.143*** (df = 1; 44)	18.944*** (df = 1; 44)	8.812*** (df = 1; 44)	9.214*** (df = 4; 41)	7.528*** (df = 4; 41)	5.528*** (df = 4; 41)	14.358*** (df = 7; 38)	12.919*** (df = 7; 38)	12.314*** (df = 7; 38)	13.440*** (df = 10; 35)	11.992*** (df = 10; 35)	11.425*** (df = 10; 35)
Note:	*p<0.1; **p<0.05; ***p<0.01											

OLS estimates using prefecture-level data (n = 46). Models (4–12) include 1904 prefecture-level control variables. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Mean of dependent variable = 1.52%.

Note. Data for Table 1.1A – 5.1A, C1.0 – C4.1 are from the *Japan Census 1950* (Statistics Bureau of Japan, 1950) for educational attainments, the *Japan Christian Yearbook 1920* (CFM [Japan], 1920) for missionary schools, and *Japan Statistical Yearbook* (Statistics Bureau, Imperial Cabinet, n.d.) for control variables, the *Japan Christian Yearbook 1904* (SCCCM, 1904) for instruments. See main text for details.

Table C1.0

OLS Results – Missionary Boys' Middle Schools and Male Tertiary Educational Attainment with 1920 Control Variables

Missionary Boys' Middle Schools and Male Education (≥13 Years, Age 25+, 1950), OLS Results at the prefecture-level

	Dependent variable:											
	Male Education (≥13 Years, % of Male Population Age 25+, 1950)											
	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total Missionary Boys' Middle Schools (per million)	2.804***			3.043***			1.447*			1.576**		
	(0.725)			(0.710)			(0.749)			(0.681)		
Protestant Boys' Middle Schools (per million)		3.772***			3.998***			1.791*			1.900**	
		(0.971)			(0.955)			(0.981)			(0.896)	
Catholic Boys' Middle Schools (per million)			6.390***			7.309***			3.132			3.704*
			(2.330)			(2.318)			(2.155)			(1.989)
Middle Schools for Boys (Non-Missionary, per million)				0.454*	0.444*	0.482*				0.383*	0.381*	0.372*
				(0.244)	(0.246)	(0.263)				(0.200)	(0.202)	(0.204)
Total Girls' High Schools (Non-Missionary, per million)				0.021	-0.001	0.034				0.034	0.022	0.056
				(0.146)	(0.146)	(0.158)				(0.118)	(0.119)	(0.121)
Buddhist Temples (per million)				0.001	0.001	0.0005				0.001**	0.001**	0.001**
				(0.0004)	(0.0004)	(0.0005)				(0.0004)	(0.0004)	(0.0004)
Female Factory Workers (per 1,000)							0.009	0.010	0.009	0.026	0.026	0.026
							(0.034)	(0.034)	(0.035)	(0.031)	(0.032)	(0.032)
Textile Production Value (yen per capita)							-0.006	-0.007	-0.007	-0.022*	-0.023*	-0.022*
							(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Number of Ports (per million)							-0.229	-0.161	-0.120	-0.017	0.061	0.080
							(0.415)	(0.404)	(0.417)	(0.386)	(0.380)	(0.389)
Average Prefectural Government Staff Annual Salary (yen)							0.003	0.003	0.003	0.001	0.002	0.001
							(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Population Density (persons per km²)							0.005***	0.005***	0.006***	0.006***	0.006***	0.006***
							(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	8.254***	8.190***	8.628***	4.658***	4.817***	4.954***	6.384***	6.257***	6.484***	3.265**	3.208**	3.336**
	(0.401)	(0.407)	(0.403)	(1.430)	(1.433)	(1.542)	(1.307)	(1.310)	(1.345)	(1.555)	(1.571)	(1.593)
Prefecture-level 1920 Controls	No	No	No	Edu&Rel	Edu&Rel	Edu&Rel	Econ&Demo	Econ&Demo	Econ&Demo	All	All	All
Mean of Dependent Variable %	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89
Observations	46	46	46	46	46	46	46	46	46	46	46	46
R^2	0.254	0.255	0.146	0.362	0.352	0.256	0.580	0.576	0.563	0.681	0.674	0.665
Adjusted R^2	0.237	0.239	0.127	0.299	0.289	0.184	0.515	0.510	0.496	0.601	0.592	0.582
F Statistic	14.977*** (df = 1; 44)	15.095*** (df = 1; 44)	7.520*** (df = 1; 44)	5.804*** (df = 4; 41)	5.579*** (df = 4; 41)	3.531** (df = 4; 41)	8.963*** (df = 6; 39)	8.819*** (df = 6; 39)	8.376*** (df = 6; 39)	8.522*** (df = 9; 36)	8.262*** (df = 9; 36)	7.952*** (df = 9; 36)
Note:	*p<0.1; **p<0.05; ***p<0.01											

OLS estimates using prefecture-level data (n = 46). Models (4–12) include 1920 prefecture-level control variables. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Mean of dependent variable = 8.89%.

Table C1.1

OLS Results – Missionary Boys' Middle Schools and Male Tertiary Educational Attainment with 1904 Control Variables

Missionary Boys's Middle Schools and Male Education (≥13 Years, Age 25+, 1950), OLS Results at the prefecture-level

	Dependent variable:											
	Male Education (≥13 Years, % of Male Population Age 25+, 1950)											
	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total Missionary Boys' Middle Schools (per million, 1920)	2.804***			2.704***			1.083			1.127		
	(0.725)			(0.718)			(0.738)			(0.711)		
Protestant Boys' Middle Schools (per million, 1920)		3.772***			3.655***			1.124			1.193	
		(0.971)			(0.954)			(0.968)			(0.942)	
Catholic Boys' Middle Schools (per million, 1920)			6.390***			5.774**			3.425			3.425*
			(2.330)			(2.304)			(2.109)			(1.996)
Public Middle Schools for Boys (per million, 1904)				-0.536**	-0.554**	-0.586**				-0.151	-0.153	-0.118
				(0.234)	(0.232)	(0.253)				(0.196)	(0.199)	(0.193)
Public Girl's High Schools (per million, 1904)				0.392	0.409	0.224				0.121	0.114	0.060
				(0.448)	(0.447)	(0.480)				(0.342)	(0.348)	(0.335)
Buddhist Temples (per million, 1904)				0.001	0.0005	0.0005				0.001**	0.001**	0.001**
				(0.0004)	(0.0004)	(0.0004)				(0.0004)	(0.0004)	(0.0004)
Female Textile Workers (per 1,000, 1904)							-0.005	-0.007	-0.004	-0.034	-0.036	-0.033
							(0.020)	(0.021)	(0.020)	(0.022)	(0.023)	(0.022)
Coal Industrial Consumption (kg per capita, 1904)							0.002	0.002	0.003	0.003	0.003	0.004
							(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Number of Ports (per million, 1904)							-0.139	-0.038	-0.209	-0.164	-0.063	-0.218
							(0.363)	(0.348)	(0.375)	(0.352)	(0.340)	(0.360)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)							0.150	0.138	0.207	0.122	0.110	0.174
							(0.229)	(0.233)	(0.228)	(0.218)	(0.222)	(0.217)
Share of Nobility Class (%, 1904)							28.530**	28.487**	31.593**	28.937**	28.805**	32.469**
							(13.640)	(13.892)	(13.370)	(13.071)	(13.371)	(12.778)
Population Density (persons per km², 1904)							0.005**	0.005**	0.005*	0.004*	0.004*	0.004
							(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	8.254***	8.190***	8.628***	9.490***	9.521***	10.433***	5.155	5.264	4.463	5.308	5.457	4.572
	(0.401)	(0.407)	(0.403)	(1.554)	(1.541)	(1.635)	(3.167)	(3.217)	(3.140)	(3.173)	(3.230)	(3.154)
Prefecture-level 1904 Controls	No	No	No	Edu&Rel	Edu&Rel	Edu&Rel	Econ&Demo	Econ&Demo	Econ&Demo	All	All	All
Mean of Dependent Variable %	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89
Observations	46	46	46	46	46	46	46	46	46	46	46	46
R^2	0.254	0.255	0.146	0.383	0.388	0.279	0.645	0.638	0.649	0.708	0.701	0.712
Adjusted R^2	0.237	0.239	0.127	0.322	0.328	0.209	0.579	0.571	0.584	0.625	0.616	0.629
F Statistic	14.977*** (df = 1; 44)	15.095*** (df = 1; 44)	7.520*** (df = 1; 44)	6.353*** (df = 4; 41)	6.497*** (df = 4; 41)	3.972*** (df = 4; 41)	9.853*** (df = 7; 38)	9.549*** (df = 7; 38)	10.038*** (df = 7; 38)	8.497*** (df = 10; 35)	8.207*** (df = 10; 35)	8.635*** (df = 10; 35)

Note: *p<0.1; **p<0.05; ***p<0.01

OLS estimates using prefecture-level data (n = 46). Models (4–12) include 1904 prefecture-level control variables. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Mean of dependent variable = 8.89%.

Table C1.2

OLS Results – Missionary Girls' High Schools and Female Secondary Educational Attainment with 1920 Control Variables

Missionary Girls' High Schools and Female Education (7-12 Years, Age 25+, 1950), OLS Results at the prefecture-level

	Dependent variable:											
	Female Education (7-12 Years, % of Female Population Age 25+, 1950)											
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total Missionary Girls' High Schools (per million)	2.924***			4.064***			1.899			3.142***		
	(1.020)			(0.911)			(1.158)			(0.972)		
Protestant Girls' High Schools (per million)		3.404**			5.372***			1.877			4.106***	
		(1.448)			(1.311)			(1.605)			(1.373)	
Catholic Girls' High Schools (per million)			6.058*			7.224**			3.635			4.649
			(3.299)			(3.104)			(3.422)			(2.972)
Middle Schools for Boys (Non-Missionary, per million)				1.017*	1.109*	1.240*				1.317**	1.425**	1.398**
				(0.591)	(0.605)	(0.674)				(0.595)	(0.603)	(0.654)
Total Girls' High Schools (Non-Missionary, per million)				1.011***	1.065***	0.618				0.839**	0.851**	0.577
				(0.367)	(0.384)	(0.402)				(0.366)	(0.376)	(0.389)
Buddhist Temples (per million)				0.001	0.001	0.001				0.002	0.002	0.002
				(0.001)	(0.001)	(0.001)				(0.001)	(0.001)	(0.001)
Female Factory Workers (per 1,000)							0.089	0.084	0.092	0.178*	0.173*	0.173*
							(0.115)	(0.117)	(0.118)	(0.093)	(0.095)	(0.102)
Textile Production Value (yen per capita)							-0.038	-0.043	-0.035	-0.074**	-0.083**	-0.073*
							(0.039)	(0.040)	(0.040)	(0.036)	(0.036)	(0.040)
Number of Ports (per million)							-1.082	-0.982	-0.970	-0.236	-0.169	-0.145
							(1.251)	(1.269)	(1.274)	(1.017)	(1.033)	(1.120)
Average Prefectural Government Staff Annual Salary (yen)							0.004	0.004	0.008	-0.002	-0.003	0.004
							(0.013)	(0.014)	(0.014)	(0.011)	(0.011)	(0.012)
Population Density (persons per km²)							0.007*	0.008**	0.009**	0.006*	0.007**	0.009**
							(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Constant	43.092***	43.446***	44.040***	28.273***	27.953***	31.238***	41.012***	41.196***	39.900***	26.099***	25.966***	26.127***
	(1.205)	(1.224)	(1.176)	(3.514)	(3.654)	(3.912)	(4.446)	(4.531)	(4.603)	(4.646)	(4.731)	(5.158)
Prefecture-level 1920 Controls	No	No	No	Edu&Rel	Edu&Rel	Edu&Rel	Econ&Demo	Econ&Demo	Econ&Demo	All	All	All
Mean of Dependent Variable %	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95
Observations	46	46	46	46	46	46	46	46	46	46	46	46
R^2	0.157	0.112	0.071	0.462	0.433	0.294	0.284	0.261	0.256	0.586	0.572	0.500
Adjusted R^2	0.138	0.091	0.050	0.409	0.378	0.225	0.174	0.147	0.142	0.483	0.465	0.375
F Statistic	8.217*** (df = 1; 44)	5.529** (df = 1; 44)	3.373* (df = 1; 44)	8.801*** (df = 4; 41)	7.829*** (df = 4; 41)	4.270*** (df = 4; 41)	2.578** (df = 6; 39)	2.290* (df = 6; 39)	2.238* (df = 6; 39)	5.664*** (df = 9; 36)	5.349*** (df = 9; 36)	3.998*** (df = 9; 36)
Note:	*p<0.1; **p<0.05; ***p<0.01											

OLS estimates using prefecture-level data (n = 46). Models (4–12) include 1920 prefecture-level control variables. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Mean of dependent variable = 44.95%.

Table C1.3

OLS Results – Missionary Girls' High Schools and Female Secondary Educational Attainment with 1904 Control Variables

Missionary Girls' High Schools and Female Education (7-12 Years, Age 25+, 1950), OLS Results at the prefecture-level

	Dependent variable:											
	Female Education (7-12 Years, % of Female Population Age 25+, 1950)											
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total Missionary Girls' High Schools (per million, 1920)	2.924***			2.795**			2.060*			1.962*		
	(1.020)			(1.066)			(1.152)			(1.143)		
Protestant Girls' High Schools (per million, 1920)		3.404**			3.074**			1.971			1.915	
		(1.448)			(1.499)			(1.592)			(1.571)	
Catholic Girls' High Schools (per million, 1920)			6.058*			6.258*			4.308			3.939
			(3.299)			(3.407)			(3.460)			(3.468)
Public Middle Schools for Boys (per million, 1904)				-0.776	-0.875	-1.041				-0.114	-0.101	-0.196
				(0.692)	(0.710)	(0.704)				(0.711)	(0.725)	(0.728)
Public Girl's High Schools (per million, 1904)				-0.103	-0.275	-0.122				-0.997	-1.144	-1.006
				(1.307)	(1.340)	(1.367)				(1.239)	(1.257)	(1.278)
Buddhist Temples (per million, 1904)				0.001	0.001	0.001				0.003*	0.003*	0.003*
				(0.001)	(0.001)	(0.001)				(0.001)	(0.001)	(0.001)
Female Textile Workers (per 1,000, 1904)							0.025	0.009	0.027	-0.054	-0.069	-0.053
							(0.072)	(0.073)	(0.076)	(0.082)	(0.082)	(0.086)
Coal Industrial Consumption (kg per capita, 1904)							0.023**	0.024**	0.022**	0.029**	0.030**	0.028**
							(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Number of Ports (per million, 1904)							-1.488	-1.323	-1.422	-1.571	-1.430	-1.528
							(1.112)	(1.127)	(1.139)	(1.123)	(1.139)	(1.155)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)							0.199	0.159	0.371	0.050	-0.00004	0.223
							(0.807)	(0.836)	(0.817)	(0.801)	(0.829)	(0.813)
Share of Nobility Class (%, 1904)							-13.630	-8.133	-11.010	-9.093	-3.780	-7.150
							(47.471)	(48.269)	(48.446)	(47.168)	(47.917)	(48.303)
Population Density (persons per km², 1904)							0.001	0.002	0.003	-0.003	-0.002	-0.0003
							(0.008)	(0.009)	(0.008)	(0.008)	(0.009)	(0.008)
Constant	43.092***	43.446***	44.040***	44.922***	46.390***	47.028***	39.052***	39.918***	36.712***	40.799***	41.926***	38.993***
	(1.205)	(1.224)	(1.176)	(4.652)	(4.696)	(4.683)	(11.115)	(11.503)	(11.306)	(11.571)	(11.913)	(11.840)
Prefecture-level 1904 Controls	No	No	No	Edu&Rel	Edu&Rel	Edu&Rel	Econ&Demo	Econ&Demo	Econ&Demo	All	All	All
Mean of Dependent Variable %	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95
Observations	46	46	46	46	46	46	46	46	46	46	46	46
R^2	0.157	0.112	0.071	0.219	0.173	0.157	0.360	0.333	0.333	0.431	0.408	0.405
Adjusted R^2	0.138	0.091	0.050	0.143	0.092	0.075	0.242	0.210	0.210	0.268	0.238	0.234
F Statistic	8.217*** (df = 1; 44)	5.529** (df = 1; 44)	3.373* (df = 1; 44)	2.871** (df = 4; 41)	2.140* (df = 4; 41)	1.912 (df = 4; 41)	3.047** (df = 7; 38)	2.705** (df = 7; 38)	2.709** (df = 7; 38)	2.646** (df = 10; 35)	2.409** (df = 10; 35)	2.378** (df = 10; 35)

Note: *p<0.1; **p<0.05; ***p<0.01

OLS estimates using prefecture-level data (n = 46). Models (4–12) include 1904 prefecture-level control variables. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Mean of dependent variable = 44.95%.

Table C1.4

OLS Results – Missionary Boys' Middle Schools and Male Secondary Educational Attainment with 1920 Control Variables

Missionary Boys' Middle Schools and Male Education (7-12 Years, Age 25+, 1950), OLS Results at the prefecture-level

	Dependent variable:											
	Male Education (7-12 Years, % of Male Population Age 25+, 1950)											
	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total Missionary Boys' Middle Schools (per million)	1.250			1.658			1.745			2.003		
	(1.277)			(1.269)			(1.698)			(1.617)		
Protestant Boys' Middle Schools (per million)		1.777			2.202			2.373			2.625	
		(1.711)			(1.694)			(2.210)			(2.106)	
Catholic Boys' Middle Schools (per million)			2.367			3.860			2.782			3.702
			(3.865)			(3.867)			(4.836)			(4.670)
Middle Schools for Boys (Non-Missionary, per million)				0.721	0.715	0.736				0.993**	0.994**	0.976**
				(0.436)	(0.436)	(0.439)				(0.474)	(0.474)	(0.479)
Total Girls' High Schools (Non-Missionary, per million)				-0.004	-0.015	0.002				-0.096	-0.112	-0.075
				(0.260)	(0.260)	(0.264)				(0.280)	(0.280)	(0.285)
Buddhist Temples (per million)				0.001	0.001	0.001				0.001	0.001	0.001
				(0.001)	(0.001)	(0.001)				(0.001)	(0.001)	(0.001)
Female Factory Workers (per 1,000)							0.089	0.089	0.090	0.124	0.124	0.125
							(0.077)	(0.077)	(0.077)	(0.074)	(0.074)	(0.075)
Textile Production Value (yen per capita)							-0.009	-0.010	-0.012	-0.040	-0.041	-0.041
							(0.026)	(0.026)	(0.027)	(0.029)	(0.029)	(0.029)
Number of Ports (per million)							-0.672	-0.628	-0.451	-0.390	-0.328	-0.180
							(0.940)	(0.912)	(0.935)	(0.916)	(0.892)	(0.913)
Average Prefectural Government Staff Annual Salary (yen)							0.005	0.005	0.005	0.002	0.002	0.002
							(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Population Density (persons per km²)							-0.001	-0.001	0.0001	-0.001	-0.001	0.00000
							(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Constant	56.156***	56.110***	56.343***	50.436***	50.516***	50.616***	54.134***	53.991***	54.156***	48.116***	48.044***	48.168***
	(0.707)	(0.718)	(0.668)	(2.553)	(2.541)	(2.573)	(2.963)	(2.951)	(3.018)	(3.693)	(3.691)	(3.742)
Prefecture-level 1920 Controls	No	No	No	Edu&Rel	Edu&Rel	Edu&Rel	Econ&Demo	Econ&Demo	Econ&Demo	All	All	All
Mean of Dependent Variable %	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44
Observations	46	46	46	46	46	46	46	46	46	46	46	46
R^2	0.021	0.024	0.008	0.141	0.140	0.126	0.088	0.090	0.071	0.240	0.240	0.221
Adjusted R^2	-0.001	0.002	-0.014	0.057	0.057	0.041	-0.052	-0.050	-0.072	0.050	0.050	0.026
F Statistic	0.957 (df = 1; 44)	1.078 (df = 1; 44)	0.375 (df = 1; 44)	1.679 (df = 4; 41)	1.674 (df = 4; 41)	1.480 (df = 4; 41)	0.629 (df = 6; 39)	0.645 (df = 6; 39)	0.499 (df = 6; 39)	1.261 (df = 9; 36)	1.264 (df = 9; 36)	1.134 (df = 9; 36)
Note:	*p<0.1; **p<0.05; ***p<0.01											

OLS estimates using prefecture-level data (n = 46). Models (4–12) include 1920 prefecture-level control variables. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Mean of dependent variable = 56.44%.

Table C1.5

OLS Results – Missionary Boys' Middle Schools and Male Secondary Educational Attainment with 1904 Control Variables

Missionary Boys's Middle Schools and Male Education (7-12 Years, Age 25+, 1950), OLS Results at the prefecture-level

	Dependent variable:											
	Male Education (7-12 Years, % of Male Population Age 25+, 1950)											
	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total Missionary Boys' Middle Schools (per million, 1920)	1.250			1.333			2.246			2.056		
	(1.277)			(1.347)			(1.820)			(1.864)		
Protestant Boys' Middle Schools (per million, 1920)		1.777			1.858			2.793			2.526	
		(1.711)			(1.797)			(2.365)			(2.443)	
Catholic Boys' Middle Schools (per million, 1920)			2.367			2.567			4.848			4.611
			(3.865)			(4.030)			(5.275)			(5.296)
Public Middle Schools for Boys (per million, 1904)				-0.093	-0.099	-0.123				-0.072	-0.087	-0.013
				(0.439)	(0.437)	(0.442)				(0.513)	(0.516)	(0.513)
Public Girl's High Schools (per million, 1904)				-0.239	-0.226	-0.329				-0.419	-0.406	-0.548
				(0.842)	(0.842)	(0.839)				(0.897)	(0.903)	(0.889)
Buddhist Temples (per million, 1904)				0.001	0.001	0.001				0.001	0.001	0.002
				(0.001)	(0.001)	(0.001)				(0.001)	(0.001)	(0.001)
Female Textile Workers (per 1,000, 1904)							0.029	0.026	0.026	-0.018	-0.020	-0.020
							(0.051)	(0.050)	(0.051)	(0.059)	(0.058)	(0.059)
Coal Industrial Consumption (kg per capita, 1904)							0.006	0.006	0.007	0.009	0.009	0.010
							(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
Number of Ports (per million, 1904)							-0.919	-0.778	-0.840	-0.911	-0.780	-0.850
							(0.894)	(0.849)	(0.937)	(0.923)	(0.881)	(0.956)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)							0.188	0.150	0.287	0.109	0.077	0.188
							(0.564)	(0.569)	(0.569)	(0.572)	(0.576)	(0.577)
Share of Nobility Class (%, 1904)							-33.670	-35.138	-27.143	-30.729	-32.121	-24.168
							(33.617)	(33.951)	(33.441)	(34.254)	(34.686)	(33.895)
Population Density (persons per km², 1904)							-0.001	-0.0002	-0.001	-0.003	-0.002	-0.003
							(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	56.156***	56.110***	56.343***	55.164***	55.146***	55.692***	53.180***	53.617***	51.929***	53.859***	54.282***	52.691***
	(0.707)	(0.718)	(0.668)	(2.917)	(2.903)	(2.860)	(7.805)	(7.863)	(7.854)	(8.317)	(8.379)	(8.366)
Prefecture-level 1904 Controls	No	No	No	Edu&Rel	Edu&Rel	Edu&Rel	Econ&Demo	Econ&Demo	Econ&Demo	All	All	All
Mean of Dependent Variable %	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44
Observations	46	46	46	46	46	46	46	46	46	46	46	46
R^2	0.021	0.024	0.008	0.082	0.084	0.069	0.089	0.086	0.073	0.154	0.151	0.143
Adjusted R^2	-0.001	0.002	-0.014	-0.008	-0.006	-0.022	-0.079	-0.082	-0.098	-0.088	-0.092	-0.102
F Statistic	0.957 (df = 1; 44)	1.078 (df = 1; 44)	0.375 (df = 1; 44)	0.911 (df = 4; 41)	0.935 (df = 4; 41)	0.758 (df = 4; 41)	0.531 (df = 7; 38)	0.511 (df = 7; 38)	0.428 (df = 7; 38)	0.638 (df = 10; 35)	0.621 (df = 10; 35)	0.585 (df = 10; 35)

Note: *p<0.1; **p<0.05; ***p<0.01

OLS estimates using prefecture-level data (n = 46). Models (4–12) include 1904 prefecture-level control variables. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Mean of dependent variable = 56.44%.

Table 2.1A

IV Results: Female Tertiary Education with Single Female Protestant Missionaries as the Instrument (1904 Controls)

IV Estimates: Single Protestant Female Missionaries, Protestant Missionary GHS, and Female Tertiary Education

	Dependent variable:								
	Protestant Missionary GHS (per million, 1920)				Female Education (≥13 Years)				
	OLS				*instrumental variable*				*OLS*
	First Stage				Second Stage				Reduced Form
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Instrument:									
Single Protestant Female missionaries (per million, 1904)	0.126***	0.130***	0.139***	0.141***					0.050***
	(0.013)	(0.014)	(0.018)	(0.019)					(0.017)
Endogenous Variable:									
Protestant Missionary Girls' High Schools (per million, 1920)					0.704***	0.694***	0.317**	0.356***	
					(0.153)	(0.151)	(0.132)	(0.121)	
Control Variables:									
Public Middle Schools for Boys (per million, 1904)		0.013		-0.001		-0.108*		-0.051	-0.052
		(0.042)		(0.048)		(0.060)		(0.044)	(0.044)
Public Girl's High Schools (per million, 1904)		-0.054		-0.048		0.029		-0.045	-0.062
		(0.078)		(0.084)		(0.112)		(0.076)	(0.075)
Buddhist Temples (per million, 1904)		0.0001		0.0001		0.0002*		0.0002***	0.0003***
		(0.0001)		(0.0001)		(0.0001)		(0.0001)	(0.0001)
Female Textile Workers (per 1,000, 1904)			0.004	0.002			0.001	-0.006	-0.005
			(0.005)	(0.006)			(0.005)	(0.005)	(0.005)
Coal Industrial Consumption (kg per capita, 1904)			-0.0005	-0.0003			0.001	0.001	0.001
			(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Number of Ports (per million, 1904)			-0.015	-0.021			-0.161**	-0.181**	-0.189***
			(0.072)	(0.077)			(0.073)	(0.069)	(0.069)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)			-0.015	-0.022			0.029	0.016	0.009
			(0.055)	(0.057)			(0.055)	(0.051)	(0.051)
Share of Nobility Class (%, 1904)			-4.302	-4.239			8.498**	8.446***	6.939**
			(3.167)	(3.283)			(3.134)	(2.907)	(2.962)
Population Density (persons per km², 1904)			0.001	0.0004			0.001	0.001	0.001
			(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Constant	-0.082	-0.232	0.001	0.101	1.211***	1.428***	0.716	1.022	1.058
	(0.080)	(0.294)	(0.740)	(0.802)	(0.114)	(0.405)	(0.754)	(0.727)	(0.724)
Prefecture-level 1904 Controls	No	Edu&R	Econ&D	All	No	Edu&R	Econ&D	All	All
Mean of Endogenous Variable	0.442	0.442	0.442	0.442					
Mean of Dependent Variable %					1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments	99.026	90.285	59.355	56.032					
Wald test F-stat (2nd Stage)					21.192	8.358	12.622	11.77	
Observations	46	46	46	46	46	46	46	46	46
R^2	0.692	0.709	0.719	0.726	0.275	0.388	0.703	0.770	0.774
Adjusted R^2	0.685	0.680	0.667	0.648	0.258	0.329	0.649	0.704	0.709
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table C2.0

IV Results: Female Tertiary Education with Single Female Protestant Missionary Exposure as the Instrument (1920 Controls)

IV Estimates: Single Protestant Female Missionary Exposure, Protestant Missionary GHS, and Female Tertiary Education

	Dependent variable:								
	Protestant Missionary GHS (per million, 1920)				Female Education (≥13 Years)				
	OLS				*instrumental variable*				*OLS*
	First Stage				Second Stage				Reduced Form
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Instrument:									
Single Protestant Female Missionary Years (per million, 1904)	0.011***	0.011***	0.011***	0.011***					0.006***
	(0.001)	(0.002)	(0.002)	(0.002)					(0.002)
Endogenous Variable:									
Protestant Missionary Girls' High Schools (per million, 1920)					0.684***	0.959***	0.345**	0.579***	
					(0.165)	(0.184)	(0.147)	(0.132)	
Control Variables:									
Middle Schools for Boys (Non-Missionary, per million, 1920)		-0.007		-0.032		0.108*		0.140***	0.122***
		(0.050)		(0.056)		(0.062)		(0.038)	(0.040)
Total Girls' High Schools (Non-Missionary, per million, 1920)		-0.007		0.004		0.064		0.017	0.020
		(0.033)		(0.037)		(0.041)		(0.025)	(0.027)
Buddhist Temples (per million, 1920)		0.0001		0.00004		0.0002		0.0003***	0.0003***
		(0.0001)		(0.0001)		(0.0001)		(0.0001)	(0.0001)
Female Factory Workers (per 1,000, 1920)			-0.002	-0.003			0.010	0.016**	0.014**
			(0.008)	(0.009)			(0.008)	(0.006)	(0.006)
Textile Production Value (yen per capita, 1920)			0.004	0.004			-0.004	-0.009***	-0.007***
			(0.003)	(0.003)			(0.003)	(0.002)	(0.002)
Number of Ports (per million, 1920)			-0.016	-0.010			-0.162*	-0.104	-0.110
			(0.091)	(0.096)			(0.083)	(0.065)	(0.068)
Average Prefectural Government Staff Annual Salary (yen, 1920)			0.001	0.001			-0.001	-0.002***	-0.001*
			(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Population Density (per km², 1920)			0.00003	0.0001			0.001***	0.001***	0.001***
			(0.0003)	(0.0003)			(0.0003)	(0.0002)	(0.0002)
Constant	-0.038	-0.112	-0.388	-0.286	1.220***	-0.209	1.465***	0.368	0.203
	(0.093)	(0.325)	(0.320)	(0.451)	(0.117)	(0.390)	(0.294)	(0.298)	(0.322)
Prefecture-level 1920 Controls	No	Edu&R	Econ&D	All	No	Edu&R	Econ&D	All	All
Mean of Endogenous Variable	0.442	0.442	0.442	0.442					
Mean of Dependent Variable %					1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments	62.519	44.88	38.687	26.561					
Wald test F-stat (2nd Stage)					17.109	8.736	12.655	18.206	
Observations	46	46	46	46	46	46	46	46	46
R^2	0.587	0.601	0.617	0.624	0.281	0.385	0.674	0.823	0.805
Adjusted R^2	0.578	0.562	0.558	0.529	0.265	0.325	0.623	0.779	0.756
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table C2.1

IV Results: Female Tertiary Education with Single Female Protestant Missionary Exposure as the Instrument (1904 Controls)

IV Estimates: Single Protestant Female Missionary Exposure, Protestant Missionary GHS, and Female Tertiary Education

	Dependent variable:								
	Protestant Missionary GHS (per million, 1920)				Female Education (≥13 Years)				
	OLS				*instrumental variable*				*OLS*
	First Stage				Second Stage				Reduced Form
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Instrument:									
Single Protestant Female Missionary Years (per million, 1904)	0.011***	0.011***	0.011***	0.011***					0.004**
	(0.001)	(0.002)	(0.002)	(0.002)					(0.002)
Endogenous Variable:									
Protestant Missionary Girls' High Schools (per million, 1920)					0.684***	0.696***	0.269*	0.343**	
					(0.165)	(0.164)	(0.151)	(0.137)	
Control Variables:									
Public Middle Schools for Boys (per million, 1904)		0.003		0.003		-0.108*		-0.051	-0.050
		(0.048)		(0.056)		(0.060)		(0.044)	(0.045)
Public Girl's High Schools (per million, 1904)		-0.056		-0.049		0.029		-0.045	-0.062
		(0.090)		(0.097)		(0.113)		(0.076)	(0.078)
Buddhist Temples (per million, 1904)		0.0001		0.0001		0.0002*		0.0002***	0.0003***
		(0.0001)		(0.0001)		(0.0001)		(0.0001)	(0.0001)
Female Textile Workers (per 1,000, 1904)			0.003	-0.0001			0.001	-0.006	-0.006
			(0.006)	(0.006)			(0.005)	(0.005)	(0.005)
Coal Industrial Consumption (kg per capita, 1904)			-0.001	-0.0003			0.001	0.001	0.001
			(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Number of Ports (per million, 1904)			0.013	0.009			-0.157**	-0.181**	-0.178**
			(0.084)	(0.089)			(0.074)	(0.069)	(0.071)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)			0.0003	-0.012			0.035	0.018	0.014
			(0.064)	(0.067)			(0.056)	(0.051)	(0.053)
Share of Nobility Class (%, 1904)			-3.701	-3.654			8.583***	8.465***	7.212**
			(3.713)	(3.825)			(3.134)	(2.901)	(3.065)
Population Density (persons per km², 1904)			0.001	0.001			0.001	0.001	0.001
			(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Constant	-0.038	-0.192	-0.199	-0.101	1.220***	1.426***	0.652	1.008	0.974
	(0.093)	(0.343)	(0.865)	(0.932)	(0.117)	(0.413)	(0.760)	(0.729)	(0.747)
Prefecture-level 1904 Controls	No	Edu&Rel	Econ&Demo	All	No	Edu&Rel	Econ&Demo	All	
Mean of Endogenous Variable	0.442	0.442	0.442	0.442					
Mean of Dependent Variable %					1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments	62.519	57.856	33.123	32.222					
Wald test F-stat (2nd Stage)					17.109	7.587	12.278	11.597	
Observations	46	46	46	46	46	46	46	46	46
R^2	0.587	0.613	0.616	0.630	0.281	0.388	0.704	0.771	0.758
Adjusted R^2	0.578	0.575	0.545	0.524	0.265	0.328	0.649	0.706	0.689
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table C2.2

IV Results: Female Tertiary Education with Missionaries as the Instrument (1920 Controls)

IV Estimates: Missionaries, Missionary GHS, and Female Tertiary Education

	Dependent variable:								
	Total Missionary GHS (per million, 1920)				Female Education (≥13 Years)				
	OLS				*instrumental variable*				*OLS*
	First Stage				Second Stage				Reduced Form
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Instrument:									
Missionaries (per million, 1904)	0.075***	0.076***	0.088***	0.089***					0.039***
	(0.007)	(0.008)	(0.011)	(0.012)					(0.006)
Endogenous Variable:									
Total Missionary Girls' High Schools (per million, 1920)					0.572***	0.681***	0.365***	0.443***	
					(0.108)	(0.112)	(0.095)	(0.079)	
Control Variables:									
Middle Schools for Boys (Non-Missionary, per million, 1920)		-0.027		-0.044		0.096		0.125***	0.105***
		(0.060)		(0.066)		(0.059)		(0.038)	(0.034)
Total Girls' High Schools (Non-Missionary, per million, 1920)		-0.027		-0.015		0.048		0.016	0.009
		(0.036)		(0.040)		(0.038)		(0.024)	(0.021)
Buddhist Temples (per million, 1920)		0.0001		0.0001		0.0002**		0.0003***	0.0003***
		(0.0001)		(0.0001)		(0.0001)		(0.0001)	(0.0001)
Female Factory Workers (per 1,000, 1920)			-0.001	-0.004			0.011	0.017***	0.015***
			(0.010)	(0.010)			(0.007)	(0.006)	(0.005)
Textile Production Value (yen per capita, 1920)			0.004	0.004			-0.003	-0.008***	-0.006***
			(0.003)	(0.004)			(0.003)	(0.002)	(0.002)
Number of Ports (per million, 1920)			-0.131	-0.133			-0.183**	-0.113*	-0.172***
			(0.111)	(0.114)			(0.082)	(0.064)	(0.059)
Average Prefectural Government Staff Annual Salary (yen, 1920)			0.001	0.0005			-0.001	-0.002**	-0.002**
			(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
Population Density (per km², 1920)			-0.001	-0.001			0.001***	0.001***	0.001***
			(0.0004)	(0.0004)			(0.0003)	(0.0002)	(0.0002)
Constant	-0.168	0.018	-0.319	-0.022	1.158***	-0.098	1.433***	0.387	0.377
	(0.115)	(0.356)	(0.376)	(0.507)	(0.113)	(0.359)	(0.289)	(0.295)	(0.262)
Prefecture-level 1920 Controls	No	Edu&Rel	Econ&Demo	All	No	Edu&Rel	Econ&Demo	All	All
Mean of Endogenous Variable	0.635	0.635	0.635	0.635					
Mean of Dependent Variable %					1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments	100.788	81.496	65.553	53.616					
Wald test F-stat (2nd Stage)					27.884	11.397	14.462	19.72	
Observations	46	46	46	46	46	46	46	46	46
R^2	0.696	0.713	0.722	0.734	0.300	0.433	0.681	0.825	0.861
Adjusted R^2	0.689	0.684	0.680	0.668	0.284	0.378	0.631	0.782	0.827
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table C2.3

IV Results: Female Tertiary Education with Earliest Arrival Year as the Instrument (1920 Controls)

IV Estimates: Earliest Arrival, Missionary GHS, and Female Tertiary Education

	Dependent variable:								
	Total Missionary GHS (per million, 1920)				Female Education (≥13 Years)				
	OLS				*instrumental variable*				*OLS*
	First Stage				Second Stage				Reduced Form
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Instrument: Earliest arrival year (any denomination, 1904)	-0.044***	-0.041***	-0.039***	-0.038***					-0.016***
	(0.011)	(0.011)	(0.011)	(0.011)					(0.005)
Endogenous Variable: Total Missionary Girls' High Schools (per million, 1920)					0.511***	0.576***	0.372**	0.429***	
					(0.173)	(0.174)	(0.155)	(0.123)	
Control Variables: Middle Schools for Boys (Non-Missionary, per million, 1920)		0.121		0.087		0.111		0.126***	0.163***
		(0.095)		(0.096)		(0.066)		(0.042)	(0.047)
Total Girls' High Schools (Non-Missionary, per million, 1920)		-0.138**		-0.121**		0.032		0.014	-0.038
		(0.055)		(0.055)		(0.044)		(0.028)	(0.027)
Buddhist Temples (per million, 1920)		-0.0001		-0.0001		0.0002		0.0003***	0.0002**
		(0.0002)		(0.0002)		(0.0001)		(0.0001)	(0.0001)
Female Factory Workers (per 1,000, 1920)			0.002	0.001			0.011	0.017***	0.017**
			(0.014)	(0.014)			(0.007)	(0.006)	(0.007)
Textile Production Value (yen per capita, 1920)			-0.001	-0.002			-0.003	-0.008***	-0.008***
			(0.005)	(0.005)			(0.003)	(0.002)	(0.003)
Number of Ports (per million, 1920)			0.063	0.004			-0.172**	-0.112*	-0.111
			(0.155)	(0.154)			(0.084)	(0.065)	(0.075)
Average Prefectural Government Staff Annual Salary (yen, 1920)			0.002	0.002			-0.001	-0.002**	-0.001
			(0.002)	(0.002)			(0.001)	(0.001)	(0.001)
Population Density (per km², 1920)			0.001**	0.001*			0.001***	0.001***	0.002***
			(0.0005)	(0.0005)			(0.0003)	(0.0002)	(0.0002)
Constant	83.951***	78.598***	72.599***	71.640***	1.184***	0.030	1.424***	0.393	31.159***
	(21.167)	(20.646)	(21.372)	(20.809)	(0.143)	(0.386)	(0.288)	(0.298)	(10.180)
Prefecture-level 1920 Controls	No	Edu&R	Econ&D	All	No	Edu&R	Econ&D	All	All
Mean of Endogenous Variable	0.65	0.65	0.65	0.65					
Mean of Dependent Variable %					1.516	1.516	1.516	1.516	1.516
F of Excluded Instruments	15.488	14.057	11.585	11.719					
Wald test F-stat (2nd Stage)					8.742	5.263	13.118	17.488	
Observations	45	45	45	45	45	45	45	45	45
R^2	0.265	0.374	0.428	0.504	0.343	0.484	0.690	0.829	0.770
Adjusted R^2	0.248	0.311	0.337	0.377	0.328	0.432	0.641	0.785	0.711
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table 3.1A

OLS vs. IV Results: Female Tertiary Education with Different Missionary Counts as the Instrument (1904 controls)

OLS vs. IV (2SLS) Estimates: Missionary Girls' High Schools and Female Education (≥13 Years, Age 25+, 1950)

	Dependent variable:								
	Female Education (≥13 Years, % of Female Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	Protestant GHS	Protestant GHS	Protestant GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1904 :									
Total Missionary Girls' High Schools (per million, 1920)	0.241***			0.297***					
	(0.067)			(0.079)					
Protestant Girls' High Schools (per million, 1920)		0.280***			0.395***		0.811	0.429***	0.356***
		(0.094)			(0.116)		(0.705)	(0.128)	(0.121)
Catholic Girls' High Schools (per million, 1920)			0.569**			0.771**			
			(0.212)			(0.324)			
Control Variables, 1904 :									
Public Middle Schools for Boys (per million, 1904)	-0.055	-0.053	-0.066	-0.054	-0.050	-0.069	-0.042	-0.050	-0.051
	(0.042)	(0.044)	(0.044)	(0.042)	(0.045)	(0.045)	(0.062)	(0.045)	(0.044)
Public Girl's High Schools (per million, 1904)	-0.035	-0.050	-0.030	-0.027	-0.042	-0.016	-0.014	-0.040	-0.045
	(0.073)	(0.076)	(0.078)	(0.074)	(0.077)	(0.081)	(0.114)	(0.078)	(0.076)
Buddhist Temples (per million, 1904)	0.0002***	0.0002***	0.0002**	0.0002***	0.0002**	0.0002**	0.0002**	0.0002**	0.0002***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Female Textile Workers (per 1,000, 1904)	-0.005	-0.006	-0.004	-0.004	-0.005	-0.002	-0.003	-0.005	-0.006
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.008)	(0.005)	(0.005)
Coal Industrial Consumption (kg per capita, 1904)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of Ports (per million, 1904)	-0.191***	-0.176**	-0.190**	-0.198***	-0.184**	-0.202***	-0.212*	-0.186**	-0.181**
	(0.066)	(0.068)	(0.071)	(0.067)	(0.070)	(0.073)	(0.105)	(0.071)	(0.069)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)	0.036	0.025	0.057	0.031	0.012	0.058	-0.034	0.008	0.016
	(0.047)	(0.050)	(0.050)	(0.048)	(0.051)	(0.050)	(0.103)	(0.052)	(0.051)
Share of Nobility Class (%, 1904)	7.979***	8.561***	8.080***	7.742***	8.385***	7.756**	7.750*	8.333***	8.446***
	(2.764)	(2.879)	(2.949)	(2.797)	(2.941)	(3.013)	(4.110)	(2.982)	(2.907)
Population Density (persons per km², 1904)	0.001	0.001	0.001	0.0005	0.0004	0.001	-0.0002	0.0004	0.001
	(0.0005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.751	0.939	0.512	0.779	1.066	0.469	1.525	1.104	1.022
	(0.678)	(0.716)	(0.723)	(0.685)	(0.734)	(0.734)	(1.248)	(0.746)	(0.727)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1904 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionaries	Protestant M.	Catholic M.	Single Prot. Male M.	Married Prot. Male M.	Single Prot. Female M.
Mean of Dependent Variable %	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments				97.745	77.562	27.229	1.238	49.109	56.032
Wald test F-stat (2nd Stage)				13.327	11.817	10.996	5.972	11.5	11.77
Observations	46	46	46	46	46	46	46	46	46
R^2	0.793	0.774	0.765	0.789	0.764	0.759	0.570	0.758	0.770
Adjusted R^2	0.734	0.710	0.698	0.729	0.697	0.691	0.447	0.689	0.704
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table C3.0

OLS vs. IV Results: Female Tertiary Education with Different Missionary Exposures as the Instrument (1920 controls)

OLS vs. IV (2SLS) Estimates: Missionary Girls' High Schools and Female Education (≥13 Years, Age 25+, 1950)

	Dependent variable:								
	Female Education (≥13 Years, % of Female Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	Protestant GHS	Protestant GHS	Protestant GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1920 :									
Total Missionary Girls' High Schools (per million)	0.322***			0.443***					
	(0.058)			(0.084)					
Protestant Girls' High Schools (per million)		0.436***			0.632***		1.237*	0.611***	0.579***
		(0.083)			(0.119)		(0.730)	(0.117)	(0.132)
Catholic Girls' High Schools (per million)			0.546***			0.833**			
			(0.200)			(0.377)			
Control Variables, 1920 :									
Middle Schools for Boys (Non-Missionary, per million)	0.132***	0.142***	0.139***	0.125***	0.139***	0.133***	0.130*	0.140***	0.140***
	(0.036)	(0.036)	(0.044)	(0.038)	(0.039)	(0.046)	(0.070)	(0.038)	(0.038)
Total Girls' High Schools (Non-Missionary, per million)	0.002	0.005	-0.023	0.016	0.022	-0.018	0.075	0.020	0.017
	(0.022)	(0.023)	(0.026)	(0.024)	(0.025)	(0.028)	(0.076)	(0.025)	(0.025)
Buddhist Temples (per million)	0.0003***	0.0003***	0.0003***	0.0003***	0.0003***	0.0003***	0.0003**	0.0003***	0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Female Factory Workers (per 1,000)	0.016***	0.016***	0.016**	0.017***	0.016**	0.016**	0.017	0.016**	0.016**
	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.007)	(0.011)	(0.006)	(0.006)
Textile Production Value (yen per capita)	-0.008***	-0.009***	-0.008***	-0.008***	-0.009***	-0.007**	-0.009**	-0.009***	-0.009***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)
Number of Ports (per million)	-0.103*	-0.097	-0.096	-0.113*	-0.106	-0.107	-0.137	-0.105	-0.104
	(0.061)	(0.062)	(0.076)	(0.065)	(0.067)	(0.079)	(0.123)	(0.066)	(0.065)
Avg. Prefectural Government Staff Annual Salary (yen)	-0.002**	-0.002**	-0.001	-0.002**	-0.002***	-0.001	-0.003*	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Population Density (per km^2)	0.001***	0.001***	0.002***	0.001***	0.001***	0.001***	0.001	0.001***	0.001***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.001)	(0.0002)	(0.0002)
Constant	0.440	0.421	0.423	0.387	0.349	0.339	0.126	0.357	0.368
	(0.277)	(0.284)	(0.348)	(0.295)	(0.307)	(0.369)	(0.601)	(0.303)	(0.298)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1920 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionary Years	Protestant M. Years	Catholic M. Years	Single Prot. Male M. Years	Married Prot. Male M. Years	Single Prot. Female M. Years
Mean of Dependent Variable %	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments				41.993	46.035	15.31	1.743	46.56	26.561
Wald test F-stat (2nd Stage)				19.371	18.205	11.735	5.131	18.525	18.206
Observations	46	46	46	46	46	46	46	46	46
R^2	0.844	0.837	0.760	0.825	0.811	0.746	0.410	0.816	0.823
Adjusted R^2	0.805	0.796	0.700	0.782	0.764	0.683	0.262	0.770	0.779
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table C3.1

OLS vs. IV Results: Female Tertiary Education with Different Missionary Exposures as the Instrument (1904 controls)

OLS vs. IV (2SLS) Estimates: Missionary Girls' High Schools and Female Education (≥13 Years, Age 25+, 1950)

	Dependent variable:								
	Female Education (≥13 Years, % of Female Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	Protestant GHS	Protestant GHS	Protestant GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1904 :									
Total Missionary Girls' High Schools (per million, 1920)	0.241***			0.294***					
	(0.067)			(0.085)					
Protestant Girls' High Schools (per million, 1920)		0.280***			0.399***		1.053	0.427***	0.343**
		(0.094)			(0.121)		(1.658)	(0.132)	(0.137)
Catholic Girls' High Schools (per million, 1920)			0.569**			0.640			
			(0.212)			(0.451)			
Control Variables, 1904 :									
Public Middle Schools for Boys (per million, 1904)	-0.055	-0.053	-0.066	-0.054	-0.050	-0.067	-0.036	-0.050	-0.051
	(0.042)	(0.044)	(0.044)	(0.042)	(0.045)	(0.045)	(0.082)	(0.045)	(0.044)
Public Girl's High Schools (per million, 1904)	-0.035	-0.050	-0.030	-0.027	-0.042	-0.025	0.002	-0.040	-0.045
	(0.073)	(0.076)	(0.078)	(0.074)	(0.077)	(0.083)	(0.169)	(0.078)	(0.076)
Buddhist Temples (per million, 1904)	0.0002***	0.0002***	0.0002**	0.0002***	0.0002**	0.0002**	0.0002	0.0002**	0.0002***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Female Textile Workers (per 1,000, 1904)	-0.005	-0.006	-0.004	-0.004	-0.005	-0.003	-0.001	-0.005	-0.006
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.014)	(0.005)	(0.005)
Coal Industrial Consumption (kg per capita, 1904)	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Number of Ports (per million, 1904)	-0.191***	-0.176**	-0.190**	-0.198***	-0.184**	-0.194**	-0.228	-0.186**	-0.181**
	(0.066)	(0.068)	(0.071)	(0.067)	(0.070)	(0.074)	(0.161)	(0.071)	(0.069)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)	0.036	0.025	0.057	0.032	0.012	0.058	-0.061	0.008	0.018
	(0.047)	(0.050)	(0.050)	(0.048)	(0.052)	(0.050)	(0.201)	(0.052)	(0.051)
Share of Nobility Class (%, 1904)	7.979***	8.561***	8.080***	7.756***	8.380***	7.966**	7.381	8.336***	8.465***
	(2.764)	(2.879)	(2.949)	(2.797)	(2.945)	(3.022)	(5.523)	(2.980)	(2.901)
Population Density (persons per km², 1904)	0.001	0.001	0.001	0.0005	0.0004	0.001	-0.001	0.0004	0.001
	(0.0005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)
Constant	0.751	0.939	0.512	0.777	1.070	0.497	1.791	1.101	1.008
	(0.678)	(0.716)	(0.723)	(0.685)	(0.736)	(0.729)	(2.191)	(0.747)	(0.729)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1904 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionary Years	Protestant M. Years	Catholic M. Years	Single Prot. Male M. Years	Married Prot. Male M. Years	Single Prot. Female M. Years
Mean of Dependent Variable %	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522	1.522
F of Excluded Instruments				61.831	60.06	9.942	0.334	42.632	32.222
Wald test F-stat (2nd Stage)				13.141	11.711	10.871	3.854	11.444	11.597
Observations	46	46	46	46	46	46	46	46	46
R^2	0.793	0.774	0.765	0.790	0.764	0.765	0.342	0.758	0.771
Adjusted R^2	0.734	0.710	0.698	0.730	0.696	0.698	0.154	0.689	0.706
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table 4.1A

OLS vs. IV Results: Female Secondary Education with Different Missionary Counts as the Instrument (1904 controls)

OLS vs. IV (2SLS) Estimates: Missionary Girls' High Schools and Female Education (7-12 Years, Age 25+, 1950)

	Dependent variable:								
	Female Education (7-12 Years, % of Female Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary GHS	Protestant GHS	Roman Catholic GHS	All Missionary GHS	Protestant GHS	Roman Catholic GHS	Protestant GHS	Protestant GHS	Protestant GHS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1904 :									
Total Missionary Girls' High Schools (per million, 1920)	1.962*			1.737					
	(1.143)			(1.332)					
Protestant Girls' High Schools (per million, 1920)		1.915			2.223		-0.111	3.686*	1.520
		(1.571)			(1.894)		(8.701)	(2.094)	(2.005)
Catholic Girls' High Schools (per million, 1920)			3.939			5.333			
			(3.468)			(5.254)			
Control Variables, 1904 :									
Public Middle Schools for Boys (per million, 1904)	-0.114	-0.101	-0.196	-0.117	-0.095	-0.215	-0.144	-0.064	-0.110
	(0.711)	(0.725)	(0.728)	(0.711)	(0.726)	(0.732)	(0.764)	(0.739)	(0.727)
Public Girl's High Schools (per million, 1904)	-0.997	-1.144	-1.006	-1.028	-1.124	-0.911	-1.279	-1.026	-1.171
	(1.239)	(1.257)	(1.278)	(1.243)	(1.260)	(1.308)	(1.407)	(1.283)	(1.261)
Buddhist Temples (per million, 1904)	0.003*	0.003*	0.003*	0.003*	0.003*	0.003*	0.003*	0.003*	0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female Textile Workers (per 1,000, 1904)	-0.054	-0.069	-0.053	-0.057	-0.067	-0.042	-0.082	-0.057	-0.072
	(0.082)	(0.082)	(0.086)	(0.082)	(0.083)	(0.091)	(0.102)	(0.084)	(0.083)
Coal Industrial Consumption (kg per capita, 1904)	0.029**	0.030**	0.028**	0.029**	0.030**	0.028**	0.028**	0.031***	0.029**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.014)	(0.011)	(0.011)
Number of Ports (per million, 1904)	-1.571	-1.430	-1.528	-1.540	-1.451	-1.608	-1.294	-1.548	-1.403
	(1.123)	(1.139)	(1.155)	(1.128)	(1.142)	(1.179)	(1.299)	(1.163)	(1.143)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)	0.050	-0.00004	0.223	0.069	-0.034	0.227	0.223	-0.195	0.044
	(0.801)	(0.829)	(0.813)	(0.803)	(0.838)	(0.815)	(1.269)	(0.857)	(0.841)
Share of Nobility Class (%, 1904)	-9.093	-3.780	-7.150	-8.147	-4.251	-9.378	-0.687	-6.485	-3.176
	(47.168)	(47.917)	(48.303)	(47.282)	(47.970)	(48.823)	(50.750)	(48.822)	(47.997)
Population Density (persons per km², 1904)	-0.003	-0.002	-0.0003	-0.002	-0.002	-0.001	0.001	-0.004	-0.001
	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)	(0.009)	(0.015)	(0.009)	(0.009)
Constant	40.799***	41.926***	38.993***	40.686***	42.266***	38.703***	39.693**	43.879***	41.491***
	(11.571)	(11.913)	(11.840)	(11.582)	(11.976)	(11.896)	(15.413)	(12.218)	(12.002)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1904 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionaries	Protestant M.	Catholic M.	Single Prot. Male M.	Married Prot. Male M.	Single Prot. Female M.
Mean of Dependent Variable %	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95	44.95
F of Excluded Instruments				97.745	77.562	27.229	1.238	49.109	56.032
Wald test F-stat (2nd Stage)				2.519	2.396	2.341	2.158	2.491	2.314
Observations	46	46	46	46	46	46	46	46	46
R^2	0.431	0.408	0.405	0.430	0.407	0.402	0.380	0.386	0.407
Adjusted R^2	0.268	0.238	0.234	0.267	0.238	0.231	0.202	0.211	0.237
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table C4.0

OLS vs. IV Results: Male Secondary Education with Different Missionary Counts as the Instrument (1920 controls)

OLS vs. IV (2SLS) Estimates: Missionary boys' Middle Schools and Male Education (7-12 Years, Age 25+, 1950)

	Dependent variable:								
	Male Education (7-12 Years, % of male Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary MS	Protestant MS	Catholic MS	All Missionary MS	Protestant MS	Catholic MS	Protestant MS	Protestant MS	Protestant MS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1920 :									
Total Missionary Boys' Middle Schools (per million, 1920)	2.003			-0.011					
	(1.617)			(2.505)					
Protestant Missionary Boys' Middle Schools (per million, 1920)		2.625			0.235		-7.006	0.863	1.291
		(2.106)			(3.523)		(7.164)	(3.637)	(3.912)
Catholic Missionary Boys' Middle Schools (per million, 1920)			3.702			0.624			
			(4.670)			(8.041)			
Control Variables, 1920 :									
Middle Schools for Boys (Non-Missionary, per million, 1920)	0.993**	0.994**	0.976**	0.965*	0.967*	0.967*	0.888	0.974**	0.979**
	(0.474)	(0.474)	(0.479)	(0.485)	(0.483)	(0.483)	(0.600)	(0.479)	(0.478)
Total Girls' High Schools (Non-Missionary, per million, 1920)	-0.096	-0.112	-0.075	-0.101	-0.102	-0.096	-0.070	-0.104	-0.106
	(0.280)	(0.280)	(0.285)	(0.286)	(0.285)	(0.290)	(0.353)	(0.283)	(0.282)
Buddhist Temples (per million, 1920)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female Factory Workers (per 1,000, 1920)	0.124	0.124	0.125	0.126	0.126	0.126	0.133	0.125	0.125
	(0.074)	(0.074)	(0.075)	(0.076)	(0.076)	(0.076)	(0.094)	(0.075)	(0.075)
Textile Production Value (yen per capita, 1920)	-0.040	-0.041	-0.041	-0.046	-0.045	-0.045	-0.057	-0.044	-0.044
	(0.029)	(0.029)	(0.029)	(0.030)	(0.030)	(0.030)	(0.038)	(0.029)	(0.029)
Number of Ports (per million, 1920)	-0.390	-0.328	-0.180	0.143	0.098	0.086	1.390	-0.014	-0.090
	(0.916)	(0.892)	(0.913)	(1.060)	(1.036)	(1.079)	(1.633)	(1.043)	(1.072)
Average Prefectural Government Staff Annual Salary (yen, 1920)	0.002	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.002
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.009)	(0.009)
Population Density (per km², 1920)	-0.001	-0.001	0.00000	0.001	0.0005	0.0005	0.005	0.0001	-0.0002
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)
Constant	48.116***	48.044***	48.168***	48.029***	48.031***	48.053***	47.990***	48.034***	48.037***
	(3.693)	(3.691)	(3.742)	(3.772)	(3.757)	(3.772)	(4.641)	(3.727)	(3.712)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1920 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionaries	Protestant M.	Catholic M.	Single Prot. Male M.	Married Prot. Male M.	Single Prot. Female M.
Mean of Dependent Variable %	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44
F of Excluded Instruments				27.691	21.149	18.655	5.696	18.679	14.917
Wald test F-stat (2nd Stage)				1.046	1.054	1.052	0.796	1.077	1.091
Observations	46	46	46	46	46	46	46	46	46
R^2	0.240	0.240	0.221	0.207	0.213	0.212	-0.201	0.225	0.232
Adjusted R^2	0.050	0.050	0.026	0.009	0.016	0.014	-0.502	0.032	0.040
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table C4.1

OLS vs. IV Results: Male Secondary Education with Different Missionary Counts as the Instrument (1904 controls)

OLS vs. IV (2SLS) Estimates: Missionary boys' Middle Schools and Male Education (7-12 Years, Age 25+, 1950)

	Dependent variable:								
	Male Education (7-12 Years, % of Male Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	Protestant MS	Protestant MS	Protestant MS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1920 :									
Total Missionary Boys' Middle Schools (per million, 1920)	2.056			1.632					
	(1.864)			(3.105)					
Protestant Missionary Boys' Middle Schools (per million, 1920)		2.526			1.747		-3.638	2.194	2.467
		(2.443)			(5.046)		(7.550)	(5.437)	(6.046)
Catholic Missionary Boys' Middle Schools (per million, 1920)			4.611			6.352			
			(5.296)			(8.808)			
Control Variables, 1904 :									
Public Middle Schools for Boys (per million, 1904)	-0.072	-0.087	-0.013	-0.060	-0.064	-0.012	0.090	-0.077	-0.085
	(0.513)	(0.516)	(0.513)	(0.518)	(0.532)	(0.514)	(0.596)	(0.534)	(0.540)
Public Girl's High Schools (per million, 1904)	-0.419	-0.406	-0.548	-0.456	-0.465	-0.529	-0.878	-0.431	-0.410
	(0.897)	(0.903)	(0.889)	(0.923)	(0.966)	(0.894)	(1.121)	(0.977)	(0.998)
Buddhist Temples (per million, 1904)	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female Textile Workers (per 1,000, 1904)	-0.018	-0.020	-0.020	-0.020	-0.023	-0.017	-0.044	-0.021	-0.020
	(0.059)	(0.058)	(0.059)	(0.061)	(0.061)	(0.061)	(0.069)	(0.062)	(0.062)
Coal Industrial Consumption (kg per capita, 1904)	0.009	0.009	0.010	0.009	0.009	0.011	0.009	0.009	0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)
Number of Ports (per million, 1904)	-0.911	-0.780	-0.850	-0.805	-0.663	-1.020	0.151	-0.730	-0.772
	(0.923)	(0.881)	(0.956)	(1.112)	(1.106)	(1.179)	(1.435)	(1.147)	(1.215)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)	0.109	0.077	0.188	0.116	0.097	0.204	0.240	0.086	0.078
	(0.572)	(0.576)	(0.577)	(0.574)	(0.588)	(0.581)	(0.653)	(0.590)	(0.594)
Share of Nobility Class (%, 1904)	-30.729	-32.121	-24.168	-29.305	-29.564	-24.297	-11.883	-31.032	-31.927
	(34.254)	(34.686)	(33.895)	(35.278)	(37.639)	(33.951)	(44.278)	(38.186)	(39.153)
Population Density (persons per km², 1904)	-0.003	-0.002	-0.003	-0.002	-0.001	-0.003	0.001	-0.002	-0.002
	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.008)	(0.007)	(0.007)
Constant	53.859***	54.282***	52.691***	53.719***	53.944***	52.506***	51.600***	54.138***	54.257***
	(8.317)	(8.379)	(8.366)	(8.363)	(8.608)	(8.413)	(9.614)	(8.644)	(8.718)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1904 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionaries	Protestant M.	Catholic M.	Single Prot. Male M.	Married Prot. Male M.	Single Prot. Female M.
Mean of Dependent Variable %	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44	56.44
F of Excluded Instruments				19.781	10.752	19.913	4.942	8.856	6.828
Wald test F-stat (2nd Stage)				0.543	0.524	0.56	0.458	0.53	0.531
Observations	46	46	46	46	46	46	46	46	46
R^2	0.154	0.151	0.143	0.153	0.148	0.141	-0.004	0.150	0.151
Adjusted R^2	-0.088	-0.092	-0.102	-0.089	-0.095	-0.105	-0.291	-0.093	-0.092
Note:	*p<0.1; **p<0.05; ***p<0.01								

Table 5.1A

OLS vs. IV Results: Male Tertiary Education with Different Missionary Counts as the Instrument (1904 controls)

OLS vs. IV (2SLS) Estimates: Missionary boys' Middle Schools and Male Education (≥13 Years, Age 25+, 1950)

	Dependent variable:								
	Male Education (≥13 Years, % of Male Population Age 25+, 1950)								
	OLS			*instrumental variable*					
	All Missionary MS	Protestant MS	Roman Catholic MS	All Missionary MS	Protestant MS	Roman Catholic MS	Protestant MS	Protestant MS	Protestant MS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Endogenous Variables, 1920 :									
Total Missionary Boys' Middle Schools (per million, 1920)	1.127			2.586**					
	(0.711)			(1.253)					
Protestant Missionary Boys' Middle Schools (per million, 1920)		1.193			4.825**		2.843	5.871**	4.525
		(0.942)			(2.319)		(2.792)	(2.736)	(2.716)
Catholic Missionary Boys' Middle Schools (per million, 1920)			3.425*			1.044			
			(1.996)			(3.382)			
Control Variables, 1904 :									
Public Middle Schools for Boys (per million, 1904)	-0.151	-0.153	-0.118	-0.192	-0.257	-0.119	-0.200	-0.287	-0.249
	(0.196)	(0.199)	(0.193)	(0.209)	(0.244)	(0.197)	(0.220)	(0.269)	(0.242)
Public Girl's High Schools (per million, 1904)	0.121	0.114	0.060	0.249	0.393	0.034	0.241	0.473	0.370
	(0.342)	(0.348)	(0.335)	(0.373)	(0.444)	(0.343)	(0.415)	(0.492)	(0.448)
Buddhist Temples (per million, 1904)	0.001**	0.001**	0.001**	0.001**	0.001	0.001**	0.001**	0.001	0.001*
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0004)
Female Textile Workers (per 1,000, 1904)	-0.034	-0.036	-0.033	-0.025	-0.022	-0.038	-0.029	-0.017	-0.023
	(0.022)	(0.023)	(0.022)	(0.024)	(0.028)	(0.023)	(0.026)	(0.031)	(0.028)
Coal Industrial Consumption (kg per capita, 1904)	0.003	0.003	0.004	0.004	0.003	0.003	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Number of Ports (per million, 1904)	-0.164	-0.063	-0.218	-0.527	-0.612	0.015	-0.313	-0.770	-0.567
	(0.352)	(0.340)	(0.360)	(0.449)	(0.508)	(0.453)	(0.531)	(0.577)	(0.546)
Male Elementary Teachers Fully Qualified Monthly Salary (yen, 1904)	0.122	0.110	0.174	0.098	0.014	0.151	0.066	-0.014	0.022
	(0.218)	(0.222)	(0.217)	(0.231)	(0.270)	(0.223)	(0.242)	(0.297)	(0.267)
Share of Nobility Class (%, 1904)	28.937**	28.805**	32.469**	24.040	16.878	32.645**	23.385	13.445	17.863
	(13.071)	(13.371)	(12.778)	(14.236)	(17.296)	(13.037)	(16.375)	(19.217)	(17.587)
Population Density (persons per km², 1904)	0.004*	0.004*	0.004	0.003	0.003	0.005*	0.004	0.002	0.003
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	5.308	5.457	4.572	5.787*	7.038*	4.826	6.175*	7.493*	6.907*
	(3.173)	(3.230)	(3.154)	(3.375)	(3.956)	(3.230)	(3.556)	(4.350)	(3.916)
Estimation Method	OLS	OLS	OLS	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)	IV(2SLS)
Prefecture-level 1904 Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument				All Missionaries	Protestant M.	Catholic M.	Single Prot. Male M.	Married Prot. Male M.	Single Prot. Female M.
Mean of Dependent Variable %	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89	8.89
F of Excluded Instruments				19.781	10.752	19.913	4.942	8.856	6.828
Wald test F-stat (2nd Stage)				7.788	6.079	8.024	7.501	5.179	6.204
Observations	46	46	46	46	46	46	46	46	46
R^2	0.708	0.701	0.712	0.673	0.574	0.700	0.675	0.490	0.594
Adjusted R^2	0.625	0.616	0.629	0.580	0.452	0.614	0.582	0.345	0.478

Note: *p<0.1; **p<0.05; ***p<0.01