Protestantism, Human Capital, and Female Empowerment: Evidence from South Korea's Past Century*

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Abstract

By combining historical data on religious institutions and contemporary population census and social survey data in South Korea, we examine the short- and long-run effects of historical Protestant churches on human capital and female empowerment. In the short run, we find a positive and significant effect of Protestant churches on women's literacy and employment but not on men's. After almost a century, we find no strong relationship between historical Protestant churches and women's education attainment or economic and political empowerment.

Keywords: Protestantism, Human Capital, Female Empowerment
JELcodes: N35, Z12, J16, O15

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1 Introduction

A large volume of literature documents evidence on the persistent impacts of religious missions on human capital and economic development.[1] While some scholars have examined its impact on women's education, there is little evidence on how historical religious missions affect women's participation in economic and political activities and social norms on women's role.[2] In this paper, we examine whether historical Protestant churches spread by Protestant missions had any impact on female's economic and social empowerment in South Korea.

Similarly to many Asian countries, Korean society was heavily influenced by Confucianism when the first wave of Protestant missionaries arrived in the peninsula in 1884. Confucianism in Korea lasted for at least 500 years as the state ideology of the Joseon dynasty (1392-1910). According to the ideals of Confucianism, women's economic and social roles were strictly limited to within the household. Moreover, most women lacked basic literacy skills and had no access to formal education institutions or informal village schools, which were intended mostly for the education of men. As literacy skills were necessary for reading the Korean-translated Bible, early Protestant missionary work, mostly led by foreign female missionaries, devoted a significant amount of effort toward educating women through local church Bible groups and missionary schools.

We construct a novel historical dataset which contains information on religious institutions, demographics, and geographic variables covering all towns in Korea from the past century. Specifically, we digitized and georeferenced archival maps and records on historical Protestant missions and churches in Korea during 1884-1915. This data is combined with fine-grained information on human capital and socioeconomic characteristics collected from population censuses in 1930 and 2010. We also exploit detailed information on economic and political

[1] For instance, see Becker, Rubin and Woessmann (2020); Caicedo (2018); Iyer (2016); Nunn (2014).

[2] In the African context, Nunn (2014) shows that Protestant missions had a large positive impact on the long-run education of women's while only a small impact on that of males. Calvi, Hoehn-Velasco and Mantovanelli (2020) find persistent impacts of Protestant missions on gender equality in literacy in India.

empowerment from social surveys collected between 2000 and 2018. Before gaining access to restricted datasets for long-term analyses, we carefully designed and preregistered a pre-analysis plan for examining long-run outcomes.[3]

Our identification strategy relies on the variation in early exposure to Protestantism, measured by the number of Protestant churches in 1915 across 1,534 townships in South Korea. In our regression equations, we control for county fixed effects, which account for any differences across counties. Therefore, the identification assumption is that the spread of Protestantism is as good as random across townships within counties.[4] Exploiting a rich set of geographic and socioeconomic characteristics of townships, we corroborate this assumption by showing that, within counties, the establishment of early Protestant churches is indeed unrelated to a series of observable predetermined township characteristics. In addition, to support our causal interpretation we conduct robustness tests by utilizing a wide-range of historical controls that cover the demographic, spatial, and economic characteristics of townships.

The estimation results on the short-run impact show that the female illiteracy rate in 1930 is significantly lower in townships with more Protestant churches, while there is no such relationship for the male illiteracy rate.[5] This is consistent with prior studies that have shown positive impacts of Protestantism on human capital accumulation in different contexts, especially for females (Gallegoa and Woodberry, 2010; Nunn, 2014). Examining the channels, we also find that while the female illiteracy rate is lower in townships with more missionary schools, these schools do not fully account for the relationship between Protestant churches and the illiteracy rate. This suggests that Protestant church activities outside missionary schools, such as informal Bible study groups arranged by bible women, could have been important factors in improving female literacy.

[3]The pre-analysis plan, was registered at OSF Registries (osf.io/2jg58).

[4]The township is the lowest administrative unit in South Korea. An average county consists of approximately a dozen townships.

[5]Hong and Paik (2017) report a positive association between pre-colonial educated elites and literacy in colonial Korea and show that higher presence of elites in a region led to higher number of Korean teachers and private schools.

Turning to short-run impacts on economic activities, we find a significantly higher employment rate for females, but not for males, in townships with more Protestant churches. The increase in the female employment rate is sizable: one additional Protestant church is associated with a 2.6 percent increase in female employment in an economy in which only 28.3 percent of females have a job. Not surprisingly, we also find a significantly lower marriage rate in townships with more Protestant churches. However, we find no such effects from other religions, such as Catholic churches or Japanese Shinto shrines, suggesting that the increase in literacy and economic activities are unique to activities conducted at Protestant churches. This set of results indicates that Protestant churches may have played a crucial role in facilitating the empowerment of Korean women during the early 20th century.

Despite the positive empowering impact of Protestantism for females in the short run, we find no significant relationship between historical Protestantism and females' education attainment and economic and political outcomes today. First, using the 2010 population census, we find a precisely estimated zero effect on educational attainment, measured by years of education, for both females and males. Second, we use social survey data to estimate the impact of historical Protestantism on economic and political activities and find no significant impact for females.[6] However, we find that females in regions with more historical Protestant churches are more likely to possess gender-equal norms than females in regions with fewer historical Protestant churches. In contrast, male gender norms do not show a significant relationship with historical Protestant churches.

We contribute to the literature on the economic effects of religion (Iyer, 2016), particularly in history (Becker et al., 2020). A number of studies highlight the importance of Protestantism in human capital accumulation (Becker and Woessmann 2008a,0; Boppart, Falkinger, Grossmann, Woitek and Wüthrich 2013), and demographic transition and economic development (Becker, Hornung and Woessmann 2011; Becker, Cinnirella and Woessmann 2010). Furthermore,

[6] Hong and Paik (2021) examine the relationship between Protestant churches and political party support in the context of contemporary South Korea.

studies on the missions have shown that the religious missionaries spread schooling and literacy, contributing to long-term economic and political development outside Europe (Bai and Kung 2015; Caicedo 2018; Calvi et al. 2020; Gallegoa and Woodberry 2010; Nunn 2014; Waldinger 2017; Woodberry 2012).

We investigate a setting in which the arrival of religious missions closely coincides with the Japanese colonization of Korea – a historical background shared with many previous studies on religious missions (e.g., Spanish colonizers and Catholic missions in the Americas). However, in our context, the colonizer's institution (Japan) was distinct from the institution of the origin of religious missions (Protestant mission groups from the US and Canada). This provides a unique setting for studying the persistent effects of religion on economic outcomes. Moreover, by incorporating a pre-analysis plan as part of the research design, we contribute to recent developments on credible research designs in studies of persistence in economic history (Voth, 2021). Finally, our paper complements existing studies on the gender differential impact of Protestantism on outcomes beyond educational achievement (Becker and Woessmann 2008a,0; Boppart et al. 2013) by investigating female's economic and political participation, both in the short- and long-runs.

The study closest to ours is Becker and Won (2021), which finds that counties with a higher share of Christian priests were associated with a higher literacy rate in 1930. Our paper differs from their study in several aspects. First, we examine not only the literacy rate but also economic and demographic outcomes in 1930. Second, we examine the effects of Protestantism not only in the short term but also in the long term by exploiting contemporary census data. Third, our empirical strategy exploits variation at a geographically granular level and includes an extensive sets of controls from a newly digitized map in 1918. Finally, we measure the exposure to different Christian denominations (Catholic and Protestant churches) by digitizing information, obtained from the Japanese colonial gazette, on the number of churches by denomination.[7]

[7] Becker and Won (2021) impute the share of Protestant and Catholic priests at the county-level, assuming

This paper also relates to the literature on female empowerment, particularly in less developed economies, where there are large gender gaps in many domains (Doepke, Tertilt and Voena 2012; Duflo 2012). Studies have shown that, while economic growth can itself promote women's empowerment, gender-biased cultural norms can be a hindrance (Jayachandran, 2015); thus, there is ample scope for gender-focused interventions to help close the gender gaps, such as political quotas (Beaman, Chattopadhyay, Duflo, Pande and Topalova, 2009), property rights (Roy, 2015), and the media (Jensen and Oster, 2009). This paper adds to this literature by examining the role of religion along this line. Another strand of the literature on gender gaps studies its historical roots, and has shown that historical conditions, such as technology adoption (Alesina, Giuliano and Nunn 2013; Hansen, Jensen and Skovsgaard 2015; Xue 2020), sex ratio (Grosjean and Khattar 2019; Teso 2019), and state regimes (Campa and Serafinell 2019), are important in shaping today's gender roles. We join this line of research by studying the long-term impact of Protestant missionary work for women on female empowerment.

The rest of the paper is organized as follows. Section 2 describes the historical background on women's status in Korea and Protestant missions. Section 3 describes the key data sources that we use for our main analysis. Section 4 presents the results of our empirical analysis on the short- and long-term impacts of Protestant churches on human capital and female empowerment. Section 5 concludes.

2 Historical Background

2.1 Women's Societal Status in the Late Joseon Dynasty

Religious and ideological beliefs are part of the culture that evolves over time. Such beliefs beget principles and norms that govern the behavior of individuals, families, and societies. The significance of Confucian ideology in shaping Korea's culture and norms dates back to

that the share of Protestant and Catholic priests is constant within provinces.

at least the dawn of the Joseon dynasty (1392-1910), which adopted neo-Confucianism as the state ideology.[8] Neo-Confucian ideals of gender roles accord a public role to males and a domestic role to females. According to *Three Obediences and Four Virtues*, which provide the most fundamental set of moral principles for women, a moral woman is one who is obedient to three men—her father, husband, and son. An important characteristic of the Confucian patriarchy in Korea is that married women are expected to sever ties with their own family to be accepted as true members of their husbands' families (Cho, 1994).

During the Joseon dynasty, women had extremely limited access to any type of education involving literacy skills. The state education system was largely focused on preparing for the imperial civil service examination (*Gwageo*), which persisted throughout the Goryeo (918-1392) and Joseon (1392-1897) dynasties in Korea.[9] According to the law of the Joseon dynasty, candidates from various social backgrounds, except slaves, were eligible to take the civil service examination. However, this law only applied to men. Women, regardless of their social status, were ineligible to take the exam. Outside the formal education system, young girls (typically less than the age of seven) could attain a basic level of education by attending village schools, *Seodang*, where they were taught basic literacy and Confucian classics. Nonetheless, even such informal education was restricted to girls from *yangban* families, the elite social class.

The societal and cultural biases that most women in 19th century Korea had to face are well represented in the term "nameless women" coined upon her arrival in 1890 by Rosetta Hall, a female Protestant medical missionary, to portray Korean women's status (Hall, 2016). Most Korean women were nameless because only the names of boys were required to observe genealogical customs, in contrast to those of girls, who were not given a formal name. Accordingly, married women were simply called someone's daughter-in-law, someone's wife

[8]Neo-Confucianism is a Chinese philosophy that is heavily influenced by classical Confucianism which dominated East-Asian culture between the 13th and 19th centuries.

[9]The *Gwageo* was born out of the *keju* exam of imperial China, which was established in the Song dynasty (c. 960–1276) with the main purpose of recruiting talent for the national bureaucracy (Chen, Kung and Ma, 2020; Ko, 2017).

or someone's mother. Notably, Confucian virtues and principles extended beyond the class system and became even more prominent in the late Chosun dynasty (Park and Cho 1995).

2.2 Development of Protestantism in Korea from the late-19th century

Arrival of Protestantism Unlike other Asian countries, such as India, China, and Japan, Korea did not witness the beginning of foreign Protestant mission work until the 1890s. Protestantism was introduced to Korea when the first wave of U.S. Protestant missionaries, composed of the Foreign Mission Societies of the Presbyterian Church and Methodist Episcopal Church in the United States, started entering the country through treaty ports in 1884 (Paik, 1929). However, early Protestant missionary work was limited to providing education and medical services through missionary schools and hospitals in the nation's capital. Evangelizing Koreans and teaching the Christian religion were legally prohibited. In 1890, the Korean government eased its regulations on direct evangelization, which created opportunities for mission work outside the capital.

In Korea, there were six major Protestant missionary groups, which consisted of four Presbyterian groups – the Northern Presbyterian Church (USA), the Southern Presbyterian Church (USA), the Canadian Presbyterian Church and the Australian Presbyterian Church – and two Methodist groups – the Northern Methodist Episcopal Church and the Southern Episcopal Church. In March 1888, Henry Appenzeller delivered an address in Seoul on a comity agreement and called for Methodist and Presbyterian missions to demarcate specific regions throughout Korea for each mission group's work (Yoo, 2016). Missionaries from the Methodist Episcopal Church and Presbyterian Churches signed a comity agreement on February 3, 1893. Figure 1 provides the map of the comity agreement. The comity agreement stated that only one denominational mission would be permitted in areas with populations of less than 5,000 Koreans, and that existing Korean Protestants in these areas were to become members of the approved denominational mission. The assignment of mission groups to regions was based on the location of existing mission stations established by each

denomination. In large cities, there were no limits on denominational missions.

Missionary work for women Female missionaries played a significant role in early Protestant missionary work in Korea. From 1884 to 1910, 575 Protestant missionaries arrived in Korea, among which 324 (56.3%) were women (Oak, 2002). In particular, the Woman's Foreign Missionary Society (WFMS) of the Methodist Episcopal Church, founded in Boston, Massachusetts in 1869, was one of the main Protestant woman's missionary organizations that sent female missionaries to Korea, India, China and Japan to carry out education and medical missions for women (Howe, Graves, Elliott, Stimpson and Hoyt, 1904). According to the statistics on missionaries in Korea in 1911, 61 percent of Methodist missionaries were females involved in missionary work for women. The high interest among female missionaries coming to Korea was partly driven by earlier missionary reports on the poor conditions of women in Korea. In one prominent report by Underwood (1905), the life of the ordinary Korean woman is described as "one long, unvaried story of weary toil, sickness, anxiety, and sorrow... there are no schools for girls outside of those established by the missionaries", and urging other females to join, the report states that "if any woman doubts whether life is worth living, let her enter the work for women in Korea."

Female missionaries led mission work to empower Korean women by providing education, medical services, and employment opportunities in mission activities (Choi, 2009). Interacting with a female missionary instead of a male missionary allowed Korean women to avoid the conflict with the Confucian principle, which was written in the *Book of Rites*, and prohibited boys and girls aged 7 or above from being in the same space. Missionaries were well aware of the fact that most Korean women were denied any form of education that provided literacy skills. Accordingly, female missionaries directed considerable effort toward educating women through establishing missionary schools and serving as a role model by leading Bible study groups and missionary work for women and children. For example, in 1912, among 590 Protestant missionary schools, 515 were coeducational and 66 were female-only, while

just 9 missionary schools were male-only.[10] These numbers reflect not only the lack of public education for Korean girls but also the extent of missionary work dedicated to female education. Protestant missionaries also stressed the importance of spreading God's messages through the Korean-translated bible. Female protestant missionaries believed that it was their work to help Korean women read the bible and through the words of the bible they would perceive God's glory by themselves.

The Spread of Protestant Churches Protestant mission work in Korea was based on the Nevius-Ross method, which was developed through earlier missions in China and revised and adapted to the Korean context (Oak, 2004). The Nevius-Ross method emphasized the self-support of local Christians, including buying their own books, building their own churches, and paying their own preachers, the teaching of the Korean language in mission schools and the use of Korean in all literary mission work. Accordingly, foreign missionaries partnered with Korean pastors to build Protestant churches and train helpers and Bible women to disseminate the Christian message especially to women. During the colonial period, among Christian churches, including Catholic and Protestant churches, Presbyterians formed the largest group, followed by Methodists. In 1920, 48 percent of the 3,279 Christian churches and 58 percent of the 323,574 Christians were Presbyterian, while 25 percent of the churches and 15 percent of the Christians were Methodists (Government-General of Chosun, 1920). By 1989, approximately one out of four of South Korea's 40 million population was Protestant Christian, with 29,820 churches and 55,989 pastors (Kim, 2000). This is despite the fact that Korea experienced 35 years of colonial rule (1910-1945) under Japan, where Christians comprised less than one percent of the population.

[10]In terms of denomination, Presbyterian operated 451 missionary schools (408 coed, 35 female-only, 8 male-only) and Methodist operated 139 missionary schools (107 coed, 31 female-only, 1 male-only).

3 Data Sources

We collected, digitized and compiled a vast amount of historical data in South Korea, such as maps, surveys, and censuses from various sources. Furthermore, to link with modern datasets, we tracked administrative boundary changes and created a township-level panel dataset spanning 100 years. To our knowledge, we are the first to create a panel micro dataset covering all administrative units in South Korea from 1918 to the present. In the Online Data Appendix, we explain the detailed procedure of our township-level geographical crosswalks.

Here, we provide a list and brief description of each dataset that we utilize in this paper. Summary statistics at the township are provided in Table 1. More details can be found in the Data Appendix.

3.1 Historical Data

Protestant churches in 1915 We obtained data on historical Protestant churches from the Japanese colonial gazette. As per the government regulation enacted in 1915, the gazette recorded all the Christian churches that existed as of 1915, and all the subsequent entries and exits until 1945 (Figure 2). For each church, we observe the name, denomination, and address. We downloaded and digitized all the available gazette data from the website of the National Library of Korea[11]. The church-level information was aggregated at the township level to calculate the number of Protestant churches at the relevant administrative divisions (Figure 3).

Missionary schools in 1912 and public schools in 1929 The information on public primary schools in 1929 is from the Korean School Registry (Government-General of Chosun, 1929). We also digitized the list of missionary schools in 1912, which is contained in the Survey of the Westerners residing in Korea published by the colonial government (Government-General of Chosun, 1912)

[11] https://www.nl.go.kr/

Population census of colonial Korea (1930) We digitized Korea's 1930 population census records (Government-General of Chosun, 1930). The census reports township-level (*myeon*) statistics on population, age, marital status, nationality, literacy, occupation (nine coarse-grained and 469 fine-grained categories), and size of households.

Historical maps of colonial Korea in 1918 We created a georeferenced map of Korea by digitizing the "Chosun omanbunil chihyungdo", which is a collection of topographic maps of Korea at the 1:50000 scale (1 cm on the map equals 500 m) in 1918 (Government-General of Chosun, 1918). The map provides comprehensive information on various buildings and offices, including but not limited to schools, hospitals, markets, rice mills, police stations, courts, telegram and post offices, as well as all road and railroad networks.

3.2 Modern Data

Education We utilize the restricted-access individual-level population census in 2010, provided by the Statistics Korea. This dataset consists of 100% sample (i.e., every individual in a census) of a population census in South Korea and contains information on gender, marital status, current residence at the township-level, and education level. We calculated the years of education based on the level of educational attainment. To examine long-run effects, we use individual-level data as well as aggregated township-level data as a robustness check.

Economic and political activities Korean General Social Survey (KGSS) is a South Korean version of the US's General Social Survey that provides subjective measures of individuals' gender roles as well as religion between 2003 and 2018 (Kim, Smith, Park and Koch, 2006).[12] We use this data to examine persistent effects on economic and political activity, and gender norms. Although the data are provided to the public, the public version does not provide information about administrative regions, such as the name of the town.

[12]Information on KGSS can be found at: http://kgss.skku.edu/?page_id=39.

Consequently, we obtained the restricted-access version, which contains town information and matched with our panel data.

Gender norms We constructed gender equality indices using the KGSS following the pre-analysis plan. First, we recoded the data so that larger values reflected gender equality and female empowerment. The normalized response subtracts the average response from the entire population in 2003 from each individual's response to the same question and is divided by the standard deviation in the first year that the question is asked. The composite index for each individual is computed by taking the average of the normalized responses in each year. A higher index indicates more equitable gender views. For the sake of transparency, the complete list of the KGSS survey questions we use in the analysis is provided in the Data Appendix.

4 Main Results

In this section, we first investigate the determinants of historical Protestant churches. Then, we provide the results for the short-term impact of Protestant churches. Finally, we present findings on the long-term impact.

4.1 Determinants of Protestant Church Establishment

The key assumption to identify the impact of Protestantism is that the townships are similar except for the number of Protestant churches established by 1915. However, the distribution of Protestant churches may not be randomly determined. In fact, Jedwab, Selhausen and Moradi (2018) have shown that Christian missionaries in sub-Saharan Africa favored safer, more accessible and developed areas first. To the extent that this is the case in Korea, our estimate is likely to overestimate the true impact of Protestant churches on socioeconomic development.

To have a better sense of the selection of the Protestant churches, we examine the determinants

of the early Protestant church establishment by regressing the number of churches in 1915 on observable township characteristics, taking full advantage of the rich dataset that we have collected through digitizing historical archives. This includes geographic characteristics such as ruggedness, caloric suitability, distance to waterways, distance to coasts, logged area size, logged elevation, and latitude and longitude. Our second set of variables includes socioeconomic characteristics and public infrastructure information, such as the number of periodic markets, post offices, and police offices, the distance to railway stations and roads, and the population share of Japanese and other foreigners.

Table 2 presents the estimation results. In Column (1), we include province fixed effects along with observable township characteristics. Therefore, the estimates capture the within-province determinants of the early Protestant churches. Some of the estimates are consistent with the idea that Protestantism spreads in more accessible and convenient areas first: the number of Protestant churches is significantly negatively correlated with elevation, distance to waterways, and distance to train stations and positively correlated with the number of post offices and police offices. Furthermore, the joint F-tests rejected that all geographic and historical characteristics are not associated with the number of Protestant churches (p=0.004 and 0.000, respectively).[13]

In column (2), we replace province fixed effects with county fixed effects to examine within-county determinants of church establishment. In this specification, we find no evidence that townships with more churches are systematically different from those with fewer churches, except for the population. In particular, with county fixed effects, while the number of post offices is still marginally correlated with the number of churches, we cannot reject the null hypothesis that geographic and historical characteristics have no association with the number of churches (p=0.48 and 0.25, respectively). We interpret these results as evidence that the

[13]Interestingly, the correlation between the number of Protestant churches and Confucian temples is negative and statistically significant. This may be because the presence of strong Confucian influences deterred the entry of Protestantism. However, the correlation becomes weaker and insignificant within counties (column 2).

spread of early Protestantism was selective within provinces but that it is close to random within counties.

The analysis here underscores the importance of controlling for county fixed effects, and thus in the following analysis, we always include them and exploit within-county variation to study the effect of Protestantism.

4.2 Short-term Impact of Protestant Churches

We begin our analysis by examining the short-term impact of early Protestant churches on the human capital and socioeconomic outcomes of females in 1930. For this purpose, we utilize the township-level data obtained from the 1930 colonial census and compare townships with more Protestant churches to those with less of them within counties. More specifically, we estimate the regression equation below.

$$Y_{ij} = \alpha + \beta \text{Protestant churches}_{ij} + Z_{ij}^{'}\gamma + \xi_j + \epsilon_{ij} \tag{1}$$

where Y_{ij} denotes the outcome of interest for township i in county j. Protestant churches$_{ij}$ is the number of Protestant churches in 1915 in township i in county j. Z_{ij} is a set of observable characteristics of township i in county j. In the absence of instruments, it is crucial to control for potential determinants of the mission. We add an extensive set of socioeconomic controls from the georeferenced maps in 1918 and also add geographic controls, including terrain ruggedness, caloric suitability, distance to waterways, distance to coasts, area size, elevation, latitude and longitude, distance to railroad stations, distance to major roads, and the number of markets. Finally, ξ_j is county fixed effects that control for time-invariant factors affecting the outcome across counties. Including county fixed effects is particularly important because as we have shown in Section 4.1, townships appear to be more homogeneous except for the number of Protestant churches within counties. The standard errors are clustered at the county level to account for spatial correlation within the county. We estimate equation (1)

using ordinary least squares (OLS), where the observations are weighted by the population in 1930.

Table 3 presents the estimation results separately for females (Columns 1-2) and for males (Columns 3-4). In Columns 1 and 3, we control for the logged population in 1925 and geographic characteristics, and in Columns 2 and 4, we add townships' socioeconomic characteristics as additional controls. Panel A reports estimates on the impact of early Protestant churches on the illiteracy rate. Column 1 shows that the point estimate of the coefficient on the number of Protestant churches is negative and statistically significant, indicating that one additional Protestant church is associated with a decline in the female illiteracy rate by 0.3 percentage points. Including socioeconomic characteristics as controls reduces the magnitude of the estimate by one third to -0.209, yet the estimate is still statistically significant at the 5 percent level. In terms of the literacy rate (derived as 100 − the illiteracy rate), the estimate corresponds to an increase in female literacy by 2.5 percent relative to the mean township's literacy rate (8.35 percent of female population). In contrast, the estimates for males in Columns 3-4 are imprecise. Moreover, although the magnitude of estimates is similar to that for females, males have a much lower mean illiteracy rate (68.34) than females, suggesting that Protestant churches were of less economic significance for male literacy.

Panel B presents estimates on the short-term impact of early Protestant churches on the employment rate. Given the improvements in literacy and, more generally, human capital, one might conjecture that Protestant churches might have also impacted females' economic activities.[14] The estimate in Column 2 shows that Protestant churches are positively related to female's employment rate. In particular, the estimate indicates that one additional church is associated with an increase in the female employment rate by 0.747 percentage points from a baseline of 28.3 percent employment rate for females (equivalent to a 2.6 percent

[14]Female participation in economic activities outside the household may increase for several reasons, including a change in gender norms on females' economic participation or a rise in females' human capital. In our analysis, we do not differentiate between these different channels.

increase in female employment). In contrast, the estimates for males in Columns 3 and 4 are close to zero and statistically insignificant despite having much smaller standard errors than the estimates for females. In Appendix Table B1, we present estimates of Protestant churches on the employment rate by industry. Panel A shows that among the nine broadly classified industries, Protestant churches are associated with statistically significant increases in female employment in transportation (by 6 percent) and public services (by 12 percent). The increase in public services is in line with the estimates in Panel A of Table 3 since more females are taking jobs in occupations requiring literacy, such as clerks in government offices. In Panel B, male employment in manufacturing and commercial industries are shown to have positive relationships with Protestant churches, although marginally significant statistically and economically.

Finally, Panel C examines the effect of Protestant churches on the marriage rate. The positive findings on female literacy and employment imply that the marriage rate could potentially fall, as females find more opportunities for economic activities while delaying their marriages. The estimates in Columns 1 and 2 support this view, suggesting that an increase in Protestant churches is associated with a lower marriage rate for females. We also find similar decreases in males' marriage rate, which is not surprising given the drop in the female marriage rate. Overall, the estimates in Table 3 indicate that Protestant churches are associated with improved literacy and employment for females but not for males. This is in line with the idea that Protestant churches generally promoted female education (Becker and Woessmann, 2008b), and is particularly consistent with the findings from the county-level analysis by Becker and Won (2021).

Our identification strategy relies on the assumption that within counties, after controlling for various geographic and socioeconomic characteristics, the difference in outcomes across townships is due to the difference in Protestant churches and not because of other unobserved confounding factors. A potential concern is that even though we show that observed township

characteristics are largely balanced within counties, some unobserved characteristics may confound our result. Accordingly, we conduct robustness checks by sequentially adding a rigorous set of control variables. The estimation results are reported in Appendix Table B2. In Columns 1 and 4, we first add demographic controls available from the 1930 census, which include the population share of ages 0-13 and the female population ratio. Next, in Columns 2 and 5, we also include distances to Seoul (the capital of Korea at that time), to Pyongyang (the capital of modern-day North Korea) and to the nearest treaty port. The distance to ports and that to major cities are likely important predictors of Protestant churches across the country, as early missionaries entered through treaty ports and resided in major cities. However, because we include county fixed effects in our baseline regression, we are less concerned about such factors. In Columns 3 and 6, to capture any differences in modernization or economic development, we include in the regression the number of modern companies owned by Japanese and Koreans separately. Reassuringly, the estimates for females (Columns 1-3) are all statistically significant and close to the estimates in Table 3.

Next, we shed light on the potential channels through which Protestant churches improved the female literacy rate. Early Protestant missions in Korea promoted female education in several ways. On the one hand, they established missionary schools at which modern education was provided to Korean children. On the other hand, they also provided females with instruction in Korean literacy through Bible study groups and activities at local Protestant churches. To examine these competing channels, we include the number of missionary schools in our regression specification (1), and show the result in Column 1 of Table 4.[15] We find that including missionary schools does not substantially change the estimate on Protestant churches. Furthermore, the estimate on missionary schools is negative but statistically insignificant (although the magnitude is twice the size of the estimate on Protestant churches). This suggests that while missionary schools played some role in improving the female literacy

[15] Although the method has been widely used in the literature (Alesina and Zhuravskaya, 2011), the Baron and Kenny (1986) causal steps approach may be biased, especially when there are omitted confounding factors or when the mechanism variable (i.e., number of missionary schools) is measured with errors.

rate, they did not fully explain the positive relationship between Protestant churches and the female literacy rate.

An alternative channel is that the spread of Protestantism may have increased the demand for formal education in which females may benefit more than males since informal education at traditional schools (known as *Seodang*) was mostly offered to only males. We include the number of public primary schools in 1929 and report the estimates in Column 2. While the estimate on public primary schools does suggest that public schools are associated with lower female illiteracy, we also find that the estimate on Protestant churches is almost unchanged. Note that the estimates on missionary schools and public primary schools for males (Column 5) are twice as large as those for females, which may reflect parents' preferential choice to send boys rather than girls to school. In Column 3, we compare the estimates on Protestant churches to those on two other major religious institutions in colonial-period Korea, namely, Catholic churches and Japanese Shinto shrines. While we still find a negative and statistically significant relationship between the illiteracy rate and Protestant churches, there is no evidence that Catholic churches or Japanese Shinto shrines had a similar association with the female literacy rate. The point estimates for both institutions are negative but imprecisely estimated. The contrast between Protestant and Catholic churches is consistent with the fact that Protestants placed a greater importance on female education than Catholics and is similar to findings in other contexts (Nunn, 2014).

4.3 Long-term Impact of Protestant Churches

Thus far, we have shown that early Protestant churches positively impacted human capital formation and economic participation for females in the short term. We turn to our next question, which is whether these effects persisted in South Korea. To examine this question, we utilize modern individual-level South Korean population census and social survey data and estimate the effects of historical Protestant churches on contemporary human capital formation, economic and political participation and gender norms. Accordingly, we estimate

the following equation:

$$Y_{kij} = \alpha + \beta \text{Protestant churches}_{ij} + X_{kij}^{'}\delta + Z_{ij}^{'}\gamma + \xi_j + \epsilon_{kij}, \tag{2}$$

where Y_{kij} is the outcome of interest for individual k residing in township i, county j. Protestant churches$_{ij}$ is the number of Protestant churches in 1915 in township i in county j. $X_{kij}^{'}$ is a vector of individual-level characteristics, including age and year of survey fixed effects, and Z_{ij} is a set of observable characteristics at the township level, which includes the control variables from equation (1) and contemporary controls, such as population measured in 1995, the length and density of roads in 2006, and nighttime light intensity in 2010. The inclusion of contemporary variables controls for the level of economic development. ξ_j is county fixed effects that control for time-invariant differences across counties. We estimate specification (2) using ordinary least squares.

We emphasize that our empirical analysis on long-term impacts follows our preanalysis plan, both in the variables that we use and the empirical specification. To the best of our knowledge, preanalysis plans are not widely used in empirical studies in economic history. However, designing an analysis plan prior to data collection is feasible in studies that exploit restricted population census data, especially if it can be proven that researchers have no access to such data. More importantly, the benefits of using a prespecified dataset and econometric specification are well known and can potentially contribute to raising the credibility of findings in the literature on persistent effects (Voth, 2021).

4.3.1 Educational attainment

First, we analyze the persistent impact of early Protestant churches on years of education in 2010 by using the individual-level population census. We use the restricted-access population census, which contains every individual in South Korea as of 2010. Therefore, the analysis in this subsection does not have a sampling error. Table 5 shows the regression results using

the years of schooling as the dependent variable. In Columns 1-2, we restrict the sample to females who are 30 years old or older.[16] Columns 3-4 use male samples with the same age restriction as the female sample. Similarly to our short-term analysis, we include geographic and socioeconomic variables as controls as well as county fixed effects. The main difference from the short-term analysis is that we use individual-level observations. Across Columns 1-4, we fail to find evidence of the long-term impact of historical Protestant churches on education attainment. For both male and female samples, regardless of the set of controls, the estimates of the number of Protestant churches in 1915 are close to zero and not statistically significant. For robustness and consistency with the short-term analysis, we also report estimates using township-level outcomes, obtained by aggregating individual-level observations, in Appendix Table B3. We find no evidence of long-term impacts of Protestant churches on average educational attainment.

A plausible explanation for the lack of a long-term effect of Protestantism on human capital is migration. According to the Harris-Todaro model of rural-urban migration, there will be more rural to urban migration when the expected payoff of urban jobs is greater than that of traditional rural jobs (Harris and Todaro, 1970). If the Protestant mission increased the local human capital and if more human capital increases the expected payoff of urban jobs, educated males and females were more likely to migrate from Protestant church towns to urban centers. This may bias our estimate toward zero if urban centers are associated with fewer Protestant churches. We indirectly test this possibility using migration data from 2001 and examining whether there is a significant relationship between towns and historical Protestant churches and migration patterns.[17] The results are reported in Appendix Table B4. Columns 1-2 report the estimates of Protestant churches on the net migration of females and males, respectively; Columns 3-4 report the in-migration rate, and Columns 5-6 report the

[16] We set the restriction on age to 30 years old or older to exclude individuals who might be still undergoing postgraduate education (e.g. studying for Masters or PhD degree). The results are robust to alternative age restrictions.

[17] Migration data at the township level do not exist for earlier years.

out-migration rate. Overall, we find no significant relationship between historical Protestant churches and migrating in or out of those places. Although our data do not allow us to explore whether individuals with higher human capital were more likely to migrate out from Protestant church towns, the results suggest that at least at the aggregate level, no such migration pattern existed.

4.3.2 Economic and political empowerment

Next, we turn to investigating the long-term effects of Protestant churches on several major economic and political activities. For this analysis, we utilize the KGSS dataset, which provides detailed responses to various survey questions using a nationally representative sample of individuals in South Korea in the past two decades. We estimate equation (2) using sampling weights provided by the KGSS dataset. The results are reported in Table 6. Panel A restricts the sample for female respondents only, whereas Panel B is for male respondents. For economic activities, we use the information on an individual's job status, i.e., whether an individual has a job (Column 1), an individual's job position, i.e., whether an individual is currently in a managerial position (Column 2), and the individual's income level (Column 3). We also use political outcome variables, such as voting in elections (Column 4), attending protest activity (Column 5), and attending political rallies (Column 6).

Similarly to the findings with educational outcomes, we do not find a persistent impact of Protestant churches on females' economic and political activities. In all columns in Panel A, the estimated coefficients for Protestant churches are close to zero and statistically insignificant, indicating the lack of long-term impacts. The male sample results, which are presented in Panel B, broadly follow the results from the female sample (Panel A). However, we document historical Protestant churches having a negative association with a male's probability of having a job (statistically significant at the 5% level) and a positive association with a male being in a managerial position (and statistically significant at the 10% level). We also explore the long-term relationship between historical Protestant churches and occupations

of females and males. Appendix Table B5 reports the estimates by occupation (each column) and gender (females in Panel A and males in Panel B). The results suggest no evidence of a persistent systematic relationship between historical Protestant churches and modern occupational outcomes.

4.3.3 Gender norms

Our final set of results examines whether Protestant churches have a long-term impact on gender norms. The KGSS asks an extensive list of survey questions related to gender norms, such as "Do you agree with the statement: A man's job is to earn money; a woman's job is to look after the home and family?" This allows us to explore the relationship between historical Protestant churches and the respondent's belief on gender norms. Table 7 presents the regression results using gender equality indices we created from the survey responses related to gender norms. Columns 1 and 2 use the full list of 15 gender norm questions in KGSS to construct the index. The estimation results suggest that the historical Protestant church is positively correlated with more equal gender norms among females. Based on this gender equality index, we find that an increase in one Protestant church in 1915 is associated with a 0.026 unit increase in the gender equality index. The estimate is statistically significant at the 1% level. Since the mean of the index is 0.09 and the standard deviation is 0.07, the magnitude of the estimate corresponds to 0.37 standard deviation. On the other hand, the estimate with the male respondents sample is smaller and statistically insignificant.

In Columns 3-4, we present the results using the five gender norm questions that we specified in our preanalysis plan to construct the gender equality index. The estimate using the gender equality index constructed as specified in the preanalysis plan is 0.022 and statistically significant at the 10% level. Thus, despite a fall in precision, the magnitude is similar to that found with the full question list. Across Columns 5-8, we present the results on two specific questions that we think of as particularly pertinent to gender norms in Korean society. Columns 5 and 6 use the following question as a dummy dependent variable: "Disagree: It is

more important for a wife to help her husband's career than to pursue her own career." The coefficient estimate is insignificant for both female and male samples. Columns 7 and 8 use the answer to the following question, "Disagree: A man's job is to earn money; a woman's job is to look after the home and family." We find that for females, an additional Protestant church in 1915 is associated with an increase in the probability that a female respondent disagrees with the specific gender norm question by 4.4%, an increase of 44 percent relative to the sample mean. However, we find no such relationship for males.

5 Conclusion

In this paper, we investigate the short- and long-run effects of historical Protestant churches on female's human capital and empowerment. Using novel datasets we compiled and digitized for this study, we empirically show that there was a substantial short-run impact of Protestant churches on improving female's human capital in South Korea. In addition, we find some suggestive evidence that historical Protestant churches had a long-run impact on females' gender norms. However, our analysis indicates that early Protestant churches did not have persistent impacts on the education, employment, and political activities of modern-day women.

Our results suggest a nuanced view of religious institutions' persistence in improving human capital. The existing literature documents the persistent impacts of missions on human capital in countries with weak institutions today. In contrast, South Korea escaped poverty and vastly improved public education over time through rapid economic growth, perhaps diminishing the impact of the education provided by Protestant churches along the way. A systematic investigation of the interactive role between religious and secular institutions may help provide a better understanding of the persistence in human capital formation.

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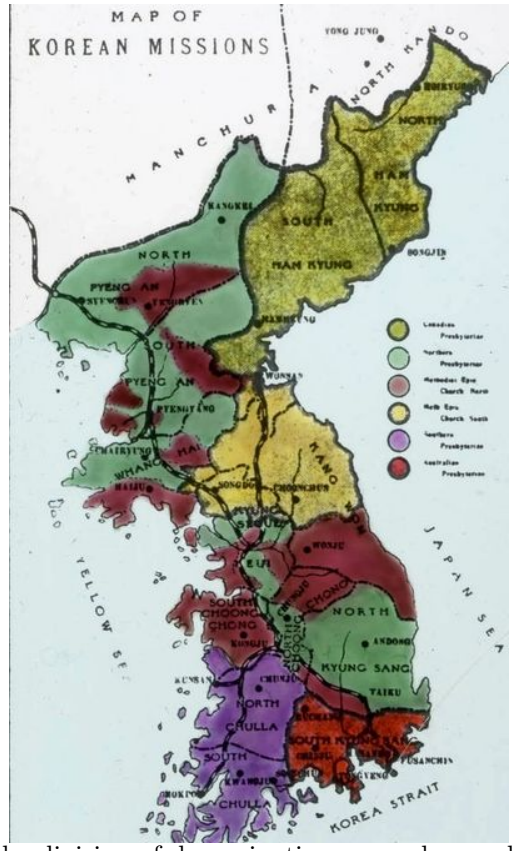
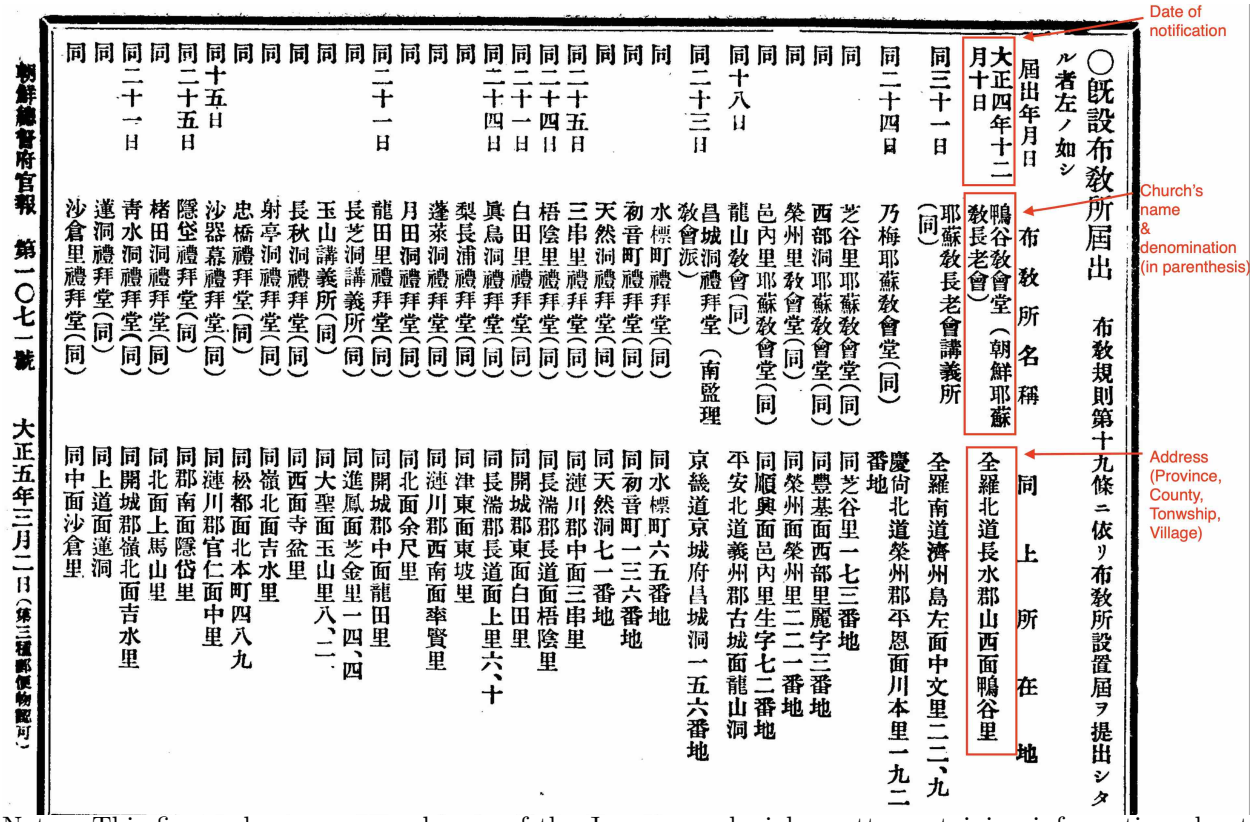
Figure 1: Map of Protestant Missions by Denomination



Notes: This map shows the division of denominations agreed upon by the comity of six major Protestant mission societies in Korea. The order from top to bottom in the legend is as follows: Canadian Presbyterian Church, Northern Presbyterian Church, Northern Methodist Episcopal Church, Southern Methodist Episcopal Church, Southern Presbyterian Church, and Australian Presbyterian Church.

Figure 2: Raw data containing information on Protestant churches in 1915



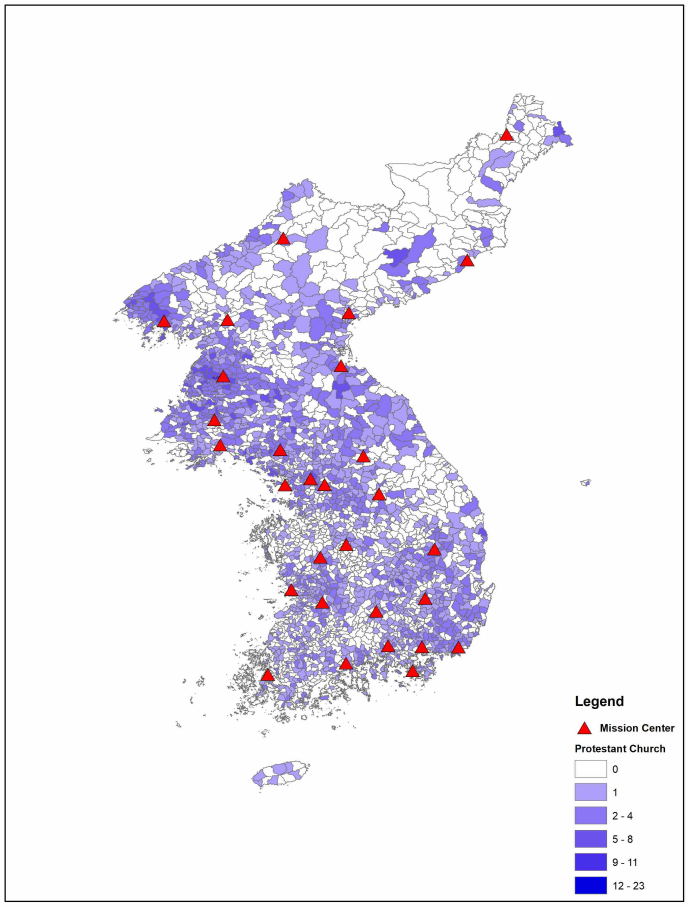
朝鮮總督府官報　第一〇七一號　大正五年三月二日（第三種郵便物認可）

○既設布教所届出　布教規則第十九條ニ依リ布教所設置届ヲ提出シタル者左ノ如シ

届出年月日	布教所名稱	同上所在地
大正四年十二月十日	鴨谷教會堂（朝鮮耶蘇教長老會）	全羅北道長水郡山西面鴨谷里
同三十一日	耶蘇教長老會講義所（同）	全羅南道濟州島左面中文里二二、九
同二十四日	乃梅耶蘇教會堂（同）	慶尚北道榮州郡平恩面川本里一九二番地
同	芝谷里耶蘇教會堂（同）	同芝谷里一七三番地
同	西部洞耶蘇教會堂（同）	同豊基面西部里麗字三番地
同	榮州里教會堂（同）	同榮州面榮州里二二一番地
同	邑内里耶蘇教會堂（同）	同順興面邑内里生字七二番地
同十八日	龍山教會（同）	平安北道義州郡古城面龍山洞
同二十三日	昌城洞禮拜堂（南監理教會派）	京畿道京城府昌城洞一五六番地
同	水標町禮拜堂（同）	同水標町六五番地
同	初音町禮拜堂（同）	同初音町一三六番地
同	天然洞禮拜堂（同）	同天然洞七一番地
同二十五日	三串里禮拜堂（同）	同蓮川郡中面三串里
同二十四日	梧陰里禮拜堂（同）	同長湍郡長道面梧陰里
同二十一日	白田里禮拜堂（同）	同開城郡東面白田里
同二十四日	眞烏洞禮拜堂（同）	同長湍郡長道面上里六、十
同	梨長浦禮拜堂（同）	同津東面東坡里
同	蓬萊洞禮拜堂（同）	同蓮川郡西南面率賢里
同	月田洞禮拜堂（同）	同北面余尺里
同二十一日	龍田里禮拜堂（同）	同開城郡中面龍田里
同	長芝洞講義所（同）	同進鳳面芝金里一四、四
同	玉山講義所（同）	同大聖面玉山里八、二
同	長秋洞禮拜堂（同）	同西面寺盆里
同	射亭洞禮拜堂（同）	同嶺北面吉水里
同	忠橋禮拜堂（同）	同松都面北本町四八九
同十五日	沙器幕禮拜堂（同）	同蓮川郡官仁面中里
同二十五日	隱垈禮拜堂（同）	同郡南面隱岱里
同	楮田洞禮拜堂（同）	同北面上馬山里
同二十一日	青水洞禮拜堂（同）	同開城郡嶺北面吉水里
同	蓮洞禮拜堂（同）	同上道面蓮洞
同	沙倉里禮拜堂（同）	同中面沙倉里

Notes: This figure shows a scanned copy of the Japanese colonial gazette containing information about religious institutions in Korea in 1915.

Figure 3: Protestant churches and mission centers in 1915



Source: Church data collected from digitizing the 1915 Japanese colonial gazette. Mission center data were collected from the Directory of Protestant Missions in China, Japan and Korea for the year 1916.

Table 1: Summary Statistics of Main Variables

	Obs.	Mean	Median	S.D.	Min	Max
Panel A. Historical Data (1930)						
Demographics						
Population in 1925	1,534	7,925.97	6,967.00	9,684.53	3,110.0	342,626.0
Age 0 to 13 population (%)	1,534	37.78	37.85	1.49	29.6	42.3
Female population (%)	1,534	49.00	49.04	1.15	44.5	53.9
Illiteracy rate (%)						
Female	1,534	92.65	93.32	4.26	68.7	99.9
Male	1,534	70.02	70.29	7.70	20.6	91.1
Employment rate (%)						
Female	1,534	29.43	25.95	17.93	1.9	95.1
Male	1,534	60.49	60.55	2.78	50.2	68.9
Marriage rate (%)						
Female	1,534	47.67	47.71	2.24	39.8	53.5
Male	1,534	43.34	43.41	2.09	36.8	50.6
Religious and Educational Institutions						
Number of Protestant churches in 1915	1,534	0.85	1.00	1.11	0.0	23.0
Number of Catholic churches in 1915	1,534	0.07	0.00	0.30	0.0	5.0
Number of Confucian temples in 1924	1,534	0.15	0.00	0.36	0.0	1.0
Missionary schools in 1912	1,534	0.09	0.00	0.71	0.0	25.0
Public primary schools in 1929	1,534	0.65	1.00	0.68	0.0	18.0
Panel B. Contemporary Data						
Years of Education (2010 Population Census)						
Female	15,346,126	10.59	12	4.76	0	23
Male	14,301,464	12.45	12	4.13	0	23
Has a Job (KGSS)						
Female	7,252	0.50	1.00	0.50	0.0	1.0
Male	6,124	0.85	1.00	0.35	0.0	1.0
Manager Position (KGSS)						
Female	7,252	0.00	0.00	0.06	0.0	1.0
Male	6,124	0.02	0.00	0.15	0.0	1.0
Log(Income) (KGSS)						
Female	3,265	14.22	14.38	0.74	12.4	16.3
Male	5,096	14.80	14.83	0.66	12.4	16.3
Voted in Election (KGSS)						
Female	7,461	0.65	1.00	0.45	0.0	1.0
Male	6,375	0.70	1.00	0.43	0.0	1.0
Attended Protest (KGSS)						
Female	3,256	0.12	0.00	0.32	0.0	1.0
Male	2,860	0.20	0.00	0.40	0.0	1.0
Attended Rally (KGSS)						
Female	3,244	0.08	0.00	0.27	0.0	1.0
Male	2,851	0.14	0.00	0.34	0.0	1.0
Gender Equality Index of Full List (KGSS)						
Female	4,192	0.06	0.07	0.69	-2.3	2.1
Male	3,408	0.01	0.00	0.67	-2.6	2.1
Gender Equality Index of Pre-analysis Plan List (KGSS)						
Female	4,192	0.10	0.15	0.83	-1.8	2.2
Male	3,407	0.09	0.11	0.82	-1.8	2.1

Notes: This table provides summary statistics on selected variables that we collected from historical maps and records, and contemporary surveys.

Table 2: Determinants of Protestant Churches

	Num. of Protestant churches	
	(1)	(2)
The logarithm of population in 1925	0.677*	0.746***
	(0.348)	(0.192)
Terrain ruggedness index	0.000	-0.000
	(0.000)	(0.000)
Average caloric suitability index	-0.000	0.001
	(0.001)	(0.001)
Distance to nearest waterway	-0.006	-0.008
	(0.008)	(0.007)
Distance to nearest coast	0.001	0.007
	(0.002)	(0.005)
The logarithm of area	0.258	0.037
	(0.191)	(0.100)
The logarithm of elevation	-0.149	-0.013
	(0.096)	(0.092)
Latitude	0.310*	0.119
	(0.164)	(0.399)
Longitude	0.432***	0.378
	(0.117)	(0.422)
The number of markets in 1918	0.121	-0.044
	(0.169)	(0.074)
The distance to nearest train station	-0.005***	-0.005
	(0.001)	(0.004)
The distance to nearest main road	0.043	0.006
	(0.039)	(0.020)
Japanese population share	-0.024	-0.018
	(0.033)	(0.020)
Other foreign population share	-0.530	-0.074
	(0.373)	(0.092)
The number of post offices in 1918	1.669***	0.222*
	(0.226)	(0.116)
The number of police offices in 1918	0.204*	0.102
	(0.108)	(0.069)
Catholic churches in 1915	0.301	-0.026
	(0.416)	(0.120)
Confucian temples in 1924	-1.400***	-0.148
	(0.246)	(0.134)
Province FE	✓	
County FE		✓
Mean of dep.	1.646	1.646
Obs.	1534	1534
R-squared	0.918	0.959
p-value: Geographic characteristics=0	0.003	0.502
p-value: Historical characteristics=0	0.000	0.348

Notes: Standard errors are clustered by county and reported in parentheses. Weights (population in 1930) added. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table 3: Relationship Between Protestant Churches and Short-term Outcomes

	Short-term outcomes (1930 Census)			
	Female		Male	
	(1)	(2)	(3)	(4)
Panel A. Illiteracy rate (%)				
Protestant churches	-0.300***	-0.209**	-0.364	-0.213
	(0.098)	(0.093)	(0.259)	(0.265)
Mean of dep.	91.65	91.65	68.34	68.34
R-squared	0.81	0.82	0.77	0.78
Panel B. Employment rate (%)				
Protestant churches	0.588	0.747**	-0.099	-0.045
	(0.385)	(0.377)	(0.094)	(0.085)
Mean of dep.	28.30	28.30	59.89	59.89
R-squared	0.66	0.67	0.64	0.66
Panel C. Marriage rate (%)				
Protestant churches	-0.101***	-0.078**	-0.102**	-0.092**
	(0.035)	(0.032)	(0.051)	(0.046)
Mean of dep.	47.25	47.25	43.23	43.23
R-squared	0.85	0.87	0.73	0.76
Historical control		✓		✓
Obs.	1534	1534	1534	1534

Notes: Standard errors are clustered by county and reported in parentheses. Weights (population in 1930) added. All specifications include population and geographic variables as control variables and county fixed effects. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table 4: Protestant Churches, Schools, and Other religions on Literacy

	Illiteracy Rate (%)					
	Female			Male		
	(1)	(2)	(3)	(4)	(5)	(6)
Protestant churches	-0.207**	-0.199**	-0.202**	-0.209	-0.192	-0.194
	(0.092)	(0.093)	(0.092)	(0.263)	(0.264)	(0.268)
Missionary schools	-0.430	-0.453	-0.407	-0.910	-0.963*	-0.935
	(0.296)	(0.297)	(0.281)	(0.564)	(0.565)	(0.567)
Public primary schools		-0.431*	-0.428*		-0.993**	-1.022**
		(0.242)	(0.241)		(0.393)	(0.394)
Catholic churches			-0.637			-0.347
			(0.403)			(0.678)
Japanese Shinto shrines			-0.350			3.228
			(1.331)			(3.197)
Mean of dep.	91.65	91.65	91.65	68.34	68.34	68.34
R-squared	0.82	0.82	0.82	0.78	0.79	0.79
Historical control	✓	✓	✓	✓	✓	✓
Obs.	1534	1534	1534	1534	1534	1534

Notes: Standard errors are clustered by county and reported in parentheses. Weights (population in 1930) added. All specifications include population and geographic variables as control variables and county fixed effects. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table 5: Long-term Impact of Protestant Churches on Years of Education

	Female years of education		Male years of education	
	(1)	(2)	(3)	(4)
Protestant churches	0.009	-0.008	0.004	-0.019
	(0.024)	(0.023)	(0.028)	(0.03)
Mean of dep.	10.608	10.608	12.457	12.457
Obs.	14,989,587	14,989,587	13,975,622	13,975,622
R-squared	0.547	0.547	0.272	0.273
Individual-level control	✓	✓	✓	✓
Historical control		✓		✓

Notes: Dependent variables are from the 2010 Population Census. Standard errors are clustered by county level and reported in parentheses. All specifications include population and geographic controls and county fixed effects. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table 6: Long-term Impacts of Protestant Churches on Economic and Political Empowerment

	Economic Activity			Political Activity		
	Have job	Manager position	Log(Income)	Voted in Election	Attended Protest	Attended Rally
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A. Female Sample			
Protestant churches	0.004	0.001	-0.009	-0.004	-0.012	-0.008
	(0.010)	(0.001)	(0.019)	(0.008)	(0.009)	(0.009)
Mean of dep.	0.50	0.00	14.23	0.65	0.12	0.08
Obs.	7252	7252	3265	7461	3256	3244
R-squared	0.08	0.06	0.22	0.20	0.10	0.09
			Panel B. Male Sample			
Protestant churches	-0.008**	0.004*	-0.021	-0.013	-0.002	-0.002
	(0.004)	(0.002)	(0.014)	(0.008)	(0.009)	(0.007)
Mean of dep.	0.86	0.02	14.80	0.71	0.20	0.14
Obs.	6124	6124	5096	6375	2860	2851
R-squared	0.19	0.30	0.28	0.24	0.13	0.10

Notes: Standard errors are clustered by county and reported in parentheses. All specifications include individual-level age fixed effects, population in 1925 and 1995, geographic, historical socioeconomic variables, and contemporary road length, density, and nightlight intensity measures in 2010 as control variables as well as county fixed effects and survey year fixed effects. Towns on islands are excluded, and sample weights are added into the analysis. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table 7: Long-term Impacts of Protestant Churches on Gender Norms

	Gender Equality Index							
	Full list (15 questions)		Pre-analysis plan (5 questions)		Disagree: Wife has to help husband's career than own		Disagree: Husband makes money and wife looks after home and famliy	
	Female	Male	Female	Male	Female	Male	Female	Male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Protestant churches	0.026***	0.017	0.022*	0.027	0.006	-0.028	0.044***	0.013
	(0.010)	(0.012)	(0.012)	(0.018)	(0.019)	(0.023)	(0.015)	(0.023)
Mean of dep.	0.09	0.03	0.13	0.11	0.04	0.06	0.10	-0.04
Obs.	4192	3408	4192	3407	2426	2001	4182	3397
R-squared	0.29	0.24	0.29	0.26	0.35	0.30	0.26	0.20

Notes: Standard errors are clustered by county and reported in parentheses. All specifications include individual-level age fixed effects, population in 1925 and 1995, geographic, historical socioeconomic variables, and contemporary road length, density, and nightlight intensity measures in 2010 as control variables as well as county fixed effects and survey year fixed effects. Towns on islands are excluded, and sample weights are added into the analysis. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

For Online Appendix

A Data Appendix

We construct historical and modern variables from a variety of sources for analysis. This Appendix lists information on the datasets we use that are not covered in the main text.

Crop suitability index. The crop suitability index by Galor and Özak (2015,1) and Galor, Özak and Sarid (2016) captures the degree of land suitability for crops in the region. Similarly to the TRI, we aggregate the grid-level crop suitability index at the township level by averaging the values of grid cells that fall into the same township boundary.[18]

Distance from coast and waterway. The National Geographic Information Institute (NGII) in Korea provides GIS datasets (shapefiles) of waterways. Using these, we computed the linear distance from the central point of each township to the nearest waterway and coast using ArcGIS.[19]

Elevation. Elevation data are from the Global Digital Elevation Model Version 3, jointly created by The Ministry of Economy, Trade, and Industry (METI) of Japan and the United States National Aeronautics and Space Administration (NASA). This dataset is available in RASTER format for the whole earth. We averaged the elevation values from the cells within the same township by using ArcGIS.[20]

GIS maps of colonial Korea (1918). We created a geospatial map of Korea by digitizing the "Chosun omanbunil chihyungdo", which is a collection of topographic maps of Korea at the 1:50000 scale (1 cm on the map equals 500 m) (Government-General of Chosun, 1918). The map provides comprehensive geo-referenced information on various buildings and offices, including but not limited to schools, hospitals, markets, rice mills, police stations, courts, telegram and post offices, as well as all road and railroad networks. We calculated the distance from each town to Seoul, Pyongyang, and the nearest train station based on our digitized road network. The county-level distance was calculated as an arithmetic mean of town-level distances within the county.

Administrative boundaries (1918) and area calculation. Using the georeferenced maps of Korea by digitizing the "Chosun omanbunil chihyungdo", we created township- and county-level administrative boundaries as of 1918 in GIS format (shapefiles). The areas of administrative boundaries are generated using ArcGIS software.

[18] Data can be downloaded from https://ozak.github.io/Caloric-Suitability-Index/.
[19] The NGII data are available at http://map.ngii.go.kr/ms/map/NlipMap.do.
[20] Data are available at https://lpdaac.usgs.gov/tools/data-pool/.

Township-level geographical crosswalks since 1918. We developed an algorithm that systematically matches administrative boundary that varies over time. Using the algorithm, we created a time-invariant regional unit of analysis at the township level since 1918. First, we collect polygon vector shapefiles of the historical (i.e., 1918) and contemporary township boundaries which require matching. Then, the algorithm identifies contemporary townships (e.g., a list of $region_j$s in 2015) which overlap with each township in 1918 ($region_i$). In the third step, using a GIS software and the following equation, we calculate a matching rate ($match\_rate_{ij}$) of the geographically overlapping areas of two townships, i and j, in different time periods ($region_i$, and $region_j$):

$$match\_rate_{ij} = \frac{area(region_i \bigcap region_j)}{area(region_i)},$$

where $area(x)$ is the area (in square meters) of region x, and $region_i \bigcap region_j$ denotes the geographically overlapping areas of two townships, i and j, in different time periods, $region_i$, and $region_j$, respectively. If region i completely lies within region j, then $match\_rate_{ij}$ equals one. Finally, using the matching rates calculated for each historical township, choose the contemporary township which has the highest matching rate with the historical one. When a township in 1918 splits into multiple districts now, we aggregate them to maintain constant geography.

Korean General Social Survey (2003-2018). This is a South Korean version of the World Value Survey that provides subjective measures of individuals' gender roles as well as religion (http://kgss.skku.edu/?page_id=39). We used these data to examine persistent effects on gender norms and religious beliefs. Although the data are provided to the public, the public version does not provide information about administrative regions, such as the name of the town. Following is the list of KGSS survey question IDs (in parentheses) for different sets of outcomes:

- Economic activity

- Employment status: KGSS (INCMR)
- Occupation: KGSS (OCC)
- Workplace position: KGSS (WGPOSTN)
- Categorical value on monthly income: KGSS (RINCOME)

- Political participation

- KGSS (VOTE02-VOTE18): voted or not for presidential / National Assembly / local government election
- KGSS (JOINDEM, ATTRALLY): political actions: attending the protest / political rallies

- Gender norms

- KGSS (HUBBYWRK, HBBYWK08, SEXROLE2): agree or disagree: a man's job is to earn money; a woman's job is to look after the home and family
- KGSS (KIDSUFFR, KIDSUFFR16): opinion on women's employment : a preschool child is likely to suffer if his or her mother works
- KGSS (FAMSUFFR): agree or disagree: family life suffers when the woman takes a full-time job
- KGSS (SEXROLE1): opinions on gender roles: it is more important for a wife to help her husband's career than to pursue her own career
- KGSS (MAWRKWRM): agree or disagree: working mothers can have warm and secure relations with her children just like mothers who do not work

Mission Schools (1912). Information about the list of mission schools is from the "Survey of the Westerners residing in Korea," published by the Government-General of Chosun in 1912 (Government-General of Chosun, 1912).

Population census of colonial Korea (1930). We digitized Korea's 1930 population census records (Government-General of Chosun, 1930,3). The census reports town-level (*myeon*) statistics on population, age, marital status, nationality, literacy, occupation (nine coarse-grained and 469 fine-grained categories), and size of households.

School registry (1929). We collected a list of the universe of schools under the colonial education system from the 1929 School Registry (Government-General of Chosun, 1929). For each school, the registry provides information on its name, type, physical address, number of classes, length of study, numbers of teachers, and students by ethnicity and gender, and budget.

Terrain rugged index (TRI). We use TRI, which captures the terrain ruggedness, based on the grid-level data by Nunn and Puga (2012).[21] Using the 1918 township boundaries, we compute the average TRI values within the same township using the Zonal Statistics command in ArcGIS software.

Religious facilities Information on the churches is from the Japanese colonial gazette. The gazette contains records of all the Christian churches, including Protestant, Methodist, and Catholic churches, that existed in 1915 and 1945 (Figure 2). We downloaded and digitized all the available gazette data from the website of the National Library of Korea[22]. We also collected the list of Confucian temples in 1924 from the "List of Local Confucian Temples" (Government-General of Chosun, 1924). For each religious facility, We aggregate the number of the facilities at the township level.

[21] Data can be downloaded from https://diegopuga.org/data/rugged/.
[22] https://www.nl.go.kr/

Restricted-access Population Census Data (2010). The National Statistical Office of Korea offers samples of the population census to researchers on a request and approval basis. The census data provide information on demographic and socioeconomic characteristics, including birthplace, education, marital status, and employment.

B Appendix Tables

Table B1: Relationship Between Protestant Churches and Short-term Occupation Outcomes

	Agriculture	Fishery	Mining	Manufacturing	Commercial	Transportation	Public	Domestic	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Panel A. Female Sample					
Protestant churches	-0.855	0.130	0.008	0.491	0.131	0.011**	0.149*	-0.005	-0.061
	(0.689)	(0.084)	(0.010)	(0.480)	(0.253)	(0.005)	(0.090)	(0.149)	(0.106)
Mean of dep.	65.11	0.66	0.01	10.93	12.18	0.18	1.24	6.61	3.08
R-squared	0.76	0.37	0.18	0.56	0.74	0.94	0.82	0.82	0.42
				Panel B. Male Sample					
Protestant churches	-0.658	-0.026	-0.000	0.183*	0.207*	0.011	0.048	0.000	0.234
	(0.398)	(0.088)	(0.026)	(0.104)	(0.115)	(0.049)	(0.043)	(0.011)	(0.215)
Mean of dep.	79.73	0.91	0.16	4.57	5.39	1.33	2.50	0.50	4.90
R-squared	0.94	0.43	0.28	0.89	0.94	0.89	0.95	0.69	0.77
Obs.	1534	1534	1534	1534	1534	1534	1534	1534	1534
Historical control	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Standard errors are clustered by county and reported in parentheses. Weights (population in 1930) added. All specifications include population and geographic variables as control variables and county fixed effects. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table B2: Robustness Check - Protestant Churches and Short-term Literacy Outcomes

	Illiteracy Rate (%)					
	Female			Male		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A. Illiteracy rate (%)					
Protestant churches	-0.211**	-0.199**	-0.197**	-0.214	-0.229	-0.220
	(0.090)	(0.093)	(0.090)	(0.260)	(0.251)	(0.248)
Mean of dep.	91.65	91.66	91.66	68.34	68.36	68.36
Obs.	1534	1530	1530	1534	1530	1530
R-squared	0.83	0.83	0.83	0.79	0.79	0.79
	Panel B. Employment rate (%)					
Protestant churches	0.738*	0.847**	0.855**	-0.035	-0.015	-0.016
	(0.378)	(0.378)	(0.380)	(0.073)	(0.069)	(0.069)
Mean of dep.	28.30	28.31	28.31	59.89	59.89	59.89
Obs.	1534	1530	1530	1534	1530	1530
R-squared	0.67	0.67	0.67	0.73	0.73	0.73
	Panel C. Marriage rate (%)					
Protestant churches	-0.073**	-0.071**	-0.069**	-0.088**	-0.086**	-0.086**
	(0.033)	(0.033)	(0.031)	(0.042)	(0.042)	(0.041)
Mean of dep.	47.25	47.25	47.25	43.23	43.23	43.23
Obs.	1534	1530	1530	1534	1530	1530
R-squared	0.89	0.89	0.89	0.80	0.80	0.80
Historical controls	✓	✓	✓	✓	✓	✓
Demographics controls	✓	✓	✓	✓	✓	✓
Distance controls		✓	✓		✓	✓
Modern firm controls			✓			✓

Notes: Standard errors are clustered by county and reported in parentheses. Weights (population in 1930) added. All specifications include population and geographic variables as control variables and county fixed effects. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table B3: Long-term Impact of Protestant Churches on Township-level Years of Education

	Female years of education		Male years of education	
	(1)	(2)	(3)	(4)
Protestant churches in 1915	-0.025	-0.024	-0.017	-0.017
	(0.043)	(0.041)	(0.034)	(0.032)
Mean of dep.	7.161	7.161	9.795	9.795
Obs.	1,502	1,502	1,502	1,502
R-squared	0.628	0.655	0.566	0.595
Individual-level control	✓	✓	✓	✓
Historical control		✓		✓

Notes: The dependent variable is the average years of education based on the 2010 Population Census. Samples are restricted to individuals aged 30 years or above. Standard errors are clustered by county level and reported in parentheses. All specifications include population and geographic controls as well as county fixed effects. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table B4: Relationship Between Protestant Churches and Long-term Migration Outcomes

	Net Total Migration		Ratio of in-migration		Ratio of out-migration	
	Female	Male	Female	Male	Female	Male
	(1)	(2)	(3)	(4)	(5)	(6)
Protestant churches	112.771	70.629	-0.319	-0.303	-0.249	-0.241
	(92.115)	(99.619)	(0.249)	(0.231)	(0.205)	(0.208)
Mean of dep.	-339.890	-384.895	15.379	14.999	15.587	15.219
Obs.	1305	1305	1305	1305	1305	1305
R-squared	0.674	0.687	0.328	0.343	0.443	0.450
Historical control	✓	✓	✓	✓	✓	✓
Additional historical control	✓	✓	✓	✓	✓	✓

Notes: Standard errors are clustered by county and reported in parentheses. Weights (population in 2001) added. All specifications include population and geographic variables as control variables and county fixed effects. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.

Table B5: Long-term Impact of Protestant Churches on Occupation

	managers	professionals	clerks	service	sales	agriculture	craft	equipment	elementary
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					Panel A: Female Sample				
Protestant churches	-0.001	-0.009	-0.001	0.011	-0.013	0.008	-0.001	0.002	0.005
	(0.001)	(0.007)	(0.007)	(0.008)	(0.009)	(0.005)	(0.002)	(0.006)	(0.005)
Mean of dep.	0.006	0.220	0.207	0.155	0.146	0.064	0.040	0.061	0.100
Obs.	6200	6200	6200	6200	6200	6200	6200	6200	6200
R-squared	0.042	0.112	0.093	0.069	0.049	0.354	0.049	0.069	0.074
					Panel B: Male Sample				
Protestant churches	-0.003	-0.001	0.001	0.003	-0.005	0.005	0.008*	-0.004	-0.002
	(0.003)	(0.006)	(0.009)	(0.004)	(0.005)	(0.006)	(0.005)	(0.008)	(0.005)
Mean of dep.	0.04	0.18	0.23	0.05	0.10	0.08	0.10	0.13	0.09
Obs.	5882	5882	5882	5882	5882	5882	5882	5882	5882
R-squared	0.07	0.08	0.06	0.04	0.04	0.33	0.04	0.06	0.07

Notes: Standard errors are clustered by county and reported in parentheses. All specifications include individual-level age fixed effects, population in 1925 and 1995, geographic, historical socioeconomic variables, and contemporary road length, density, and nightlight intensity measures in 2010 as control variables as well as county fixed effects and survey year fixed effects. Towns on islands are excluded, and sample weights are added into the analysis. * denotes statistical significance at 0.10, ** at 0.05, and *** at 0.01.