Is the Protestant Ethic Alive in Latin America? an Empirical Assessment of the Economic Impacts of Religion and Missionaries in Guatemala

Acknowledgements

1   Introduction

"The truth is that since I accepted the Gospel I felt a change in my life. I felt more responsible, more dedicated to my work, my home. I stopped all traditions and fiestas because most of what you see there is liquor."
    – a Protestant convert in Almolonga, Guatemala, quoted in Goldin and Metz (1991), p. 331.

Though little-known in the Western world, since the latter half of the twentieth century there has been a Protestant explosion in Latin America. The region has transformed from being virtually entirely Catholic to having a sizable Protestant population of 19%, with larger populations of about 40% in Guatemala, Honduras, and Nicaragua (Pew research Center; see Table 1). As implied by the quotation from one Guatemalan Protestant above, adherents to the new faith often claim that their religious conversion had a direct, positive effect on their work ethic and values, which in turn improved their economic situation. Moreover, several contemporary sociologists and anthropologists have, based on their observations, concluded that these claims to economic transformation are real. It is widely believed among these scholars that with Protestantism comes a new disciplined lifestyle, sobriety, empowerment, a commitment to literacy through Bible-reading, and decreased participation in costly traditional rituals, all of which lead to income growth.

Yet despite volumes of studies on Latin American Protestantism and its potential economic implications, few scholars have attempted a broad empirical assessment of the consequences of Protestantism. This is not without cause, since investigating the subject is daunted by two significant challenges. First, Latin American countries often lack detailed data on religion and economic outcomes at the individual level. Second, religious affiliation is often the result of individual, endogenous decisions, and so Protestantism and income could be linked because the individuals who became Protestant were different *ex ante* from those who did not, rather than being linked because of the effects of religious belief itself.

To counter the first challenge, I make use of the 1995 and 1998 Demographic and Health Surveys of Guatemala, which provide information on religion and a host of demographic and

economic characteristics of 18,424 women and their family members. To address the second challenge, I adopt two strategies. First, I use satellite data on light density at night to proxy for average income at the municipality level in both 1995 and 2013 and examine the relationship between 1995 Protestantism and 1995-2013 income growth. I perform a cross-validation using 1995 DHS data to demonstrate that lights are a good proxy for income. By controlling for 1995 observable characteristics and focusing on income growth, I mitigate the concern that the decision to convert to Protestantism was correlated with initial wealth.

Second, I draw upon historical research done by Rachel McCleary to construct datasets of the locations of Catholic parishes in 1925 and the locations of Protestant missionaries in 1903-40. I find that historical Catholic presence predicts a lower likelihood of an individual being Protestant today. This finding agrees with historical literature that suggests that the success of Protestantism in an area is related to the pre-existing strength of Catholic institutions (Martin 1990).

These Catholic parish data thus provide a source of plausibly exogenous variation in the religious character of an area. While conversion to Protestantism might relate to one's economic class or one's motivation to engage in income-generating activities, Catholic parish presence, conditional on pre-existing municipality characteristics, should not have such an effect. Thus, the decision of the Catholic hierarchy to locate a parish in a particular area had long-term effects on Protestantism that could impact individual wealth. Because of this, I use Catholic presence as an instrument for Protestantism today to perform an instrumental variables regression that estimates the effects of Protestantism on income and other economic variables.

The results of these analyses do not support the theory that Protestantism causes income growth. While I do find that Protestants have a slightly higher literacy rate and are slightly less likely to work in agriculture, I cannot verify large effects on income generally. For example, in the preferred specification of the IV with the DHS wealth index as an outcome variable, the 95% confidence interval excludes effects of Protestantism larger than 0.75 SD. This is still a large effect, however, and thus the IV alone cannot rule out some significant effects.

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I do find some connection between Protestantism and income, however, through the persistent effects of Evangelical and Presbyterian missionaries. This finding agrees with recent studies that have found positive impacts of such missionaries on literacy and education (Nunn 2014; Bai and Kung 2015). I find that Evangelicals have a significant positive impact on the wealth and education of regions within 25 km of their locations, with the effect on education 0.21 SD and the effect on wealth 0.26 SD. While Presbyterians have a similar effect on wealth, Pentecostal missionaries have no lasting economic effects. These results are in line with historical accounts that discuss Presbyterian and Evangelical missionaries stressing education and social change while Pentecostals emphasized conversion.

This paper thus finds *indirect* effects of religion, but not *direct* effects. That is, missionaries were motivated by religious beliefs to engage in missionary work that had lasting economic impacts, but there is no evidence that religious beliefs themselves led individuals to have greater wealth. The lack of support for such new Protestant Ethic theory, however, does not necessarily mean the theory is incorrect in every context. While most accounts of Protestantism causing income growth focused on lower-class Latin Americans when Protestantism was a relatively small minority, by the mid-1990s in Guatemala, Protestants were 27% of the population. Moreover, as some observers have noted (Goldin and Metz 1991; Sherman 1997; Annis 1987), with the growth of Protestantism, some non-Protestants begin to accept some of the economic characteristics of Protestantism. This process could have meant that a Protestant economic attitude diffused outside of Protestantism.

This paper proceeds as follows. Section 2 discusses theories that link economic change and Latin American Protestantism and describes Protestant history in Guatemala. Section 3 discusses data, Section 4 describes the empirical strategy, Section 5 presents results, and Section 6 concludes.

2 Background

2.1 Protestantism and Economic Change

"The magical and religious forces, and the ethical ideas of duty based upon them," wrote Max Weber, "have in the past always been among the most important formative influences on conduct" (Weber 1905, p. 27). Weber's argument, that Protestantism and the rise of capitalism were linked, has received mixed empirical support (Becker and Woessmann 2009; Cantoni 2009; Delacroix and Nielsen 2001). Yet Weber's broad contention was that religion can be a key influence on economic outcomes, and recent studies have provided evidence that this view is correct (Campante and Yanagizawa-Drott 2015; Guiso, Sapienza, and Zingales 2003; Barro and McCleary 2003).

Moreover, the Weberian Protestant Ethic has been given new life in discussion of Latin American Protestantism, leading sociologist Peter Berger to argue that "Max Weber is Alive and Well, and Living in Guatemala" (2010) . Berger points out that Protestants in Guatemala restrict alcohol, gambling, and extramarital sex. They also promote discipline and honesty, all to a greater extent than do non-Protestants. In a similar vein, sociologist David Martin's synthesis of numerous anthropological studies on Latin American Protestantism and economic culture concludes that Protestantism and economic improvement reinforce one another (Martin 1990, chapter 11).

As the country in Latin America with the highest proportion of Protestants (along with Honduras, see Table 1), Guatemala represents a natural context in which to test this theory. Moreover, it has received significant attention from advocates of this new Protestant Ethic theory. For example, in his study of the town of San Antonio Aguas Calientes, Annis (1987) argues that "there is a Protestant ethic" that is due to the Protestants' rejection of costly traditional rituals and practices (p. 85). Protestants tend to reject *milpa*, a pattern of agricultural production that focuses on subsistence rather than on trade, and instead grow trade crops. Additionally, Protestants do not participate in *fiestas* or *confradia* rituals, as they consider this antithetical to their faith. This

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rejection could potentially save money, as Annis estimates that expenses on traditional *confradia* rituals cost a family $159.50, which at the time was a quarter of the family's yearly income. In fact, according to Annis, Guatemalans *perceive* that it is cheaper to be Protestant, to the point that some Catholics accuse new Protestants of having converted "for the money." Protestants also connect their faith to economic advancement through stories about how their economic situations went "*suelo al cielo*" ("from a dirt floor to heaven").

Similarly, in Goldin and Metz's (1991) study of the town of Almolonga, Guatemala, the authors report that of the individuals who described beneficial economic changes in their lives, most had also converted to Protestantism, which had growth tenfold in the town during two generations. Goldin and Metz observe that many Protestants stop participating in traditional rituals, such as *fiestas*, and instead emphasize constant work. One of their Protestant interviewees argues that since *fiestas* are costly, Protestants invest their money better following conversion. The authors suggest that Protestants tend to understand their religious change as acceptance of a moral system that leads to significant economic changes. In related work, Goldin and Sanez de Tejada (1993) noted that more-Protestant Almolonga grew faster than neighboring, less-Protestant Zunil partially because of a shift to nontraditional crops.

Outside Guatemala, similar effects have been observed. Focusing on Pentecostalism, a form of Protestantism that characterizes the faiths of most Latin American Protestants, Brusco (1995) argues that her study of Colombian women finds the same picture as that found by "virtually every other analyst of Latin American Pentecostalism," i.e., that conversion of a couple improves the economic situation of the family (p. 5). Brusco highlights Protestantism's "domestication of men" and argues that the movement can be seen as a "strategic women's movement" because it leads men to stop spending 20-40% of the family budget on alcohol. Additionally, Brusco notes that the Protestants place a high value on Bible reading and the consideration of moral issues in ways that foster education in general and encourage future educational pursuits.

Latin America is not the only place where researchers have argued for a connection between

Table 1: Protestantism in Latin America (2014)

Country	%Protestant
Guatemala	41
Honduras	41
Nicaragua	40
El Salvador	36
Puerto Rico	33
Brazil	26
Costa Rica	25
Domincan Rep.	23
Panama	19
Chile	17
Peru	17
Total for Latin America	19

Source: Pew Research Center, 2014

contemporary Protestantism and economic change in the context of low- and middle-income countries. Focusing on Lagos, Nigera, Marshall (1991) notes that the "spiritual power" of Protestants is related to a "practical power to transform his/her social and economic world" (p. 36). Freeman (2012) argues that Pentecostal churches in Africa are able to focus on personal moral transformation in ways that NGOs can never reach because Pentecostalism motivates wealth-seeking activities, liberates people from wealth-and-time-sapping traditional activities, and encourages them to take capitalistic risks. Maxwell (1998) similarly argues that Protestantism has "engendered social mobility" among members of one Zimbabwe denomination. More recently, McClendon and Riedl (2015a) survey Kenyan Pentecostal church preaching and find consistent messages that encourage self-confidence and individual achievement. Moreover, in a Kenyan lab experiment, they find that these religious self-affirmation messages are more powerful at engendering participation in a political text-messaging campaign than were secular messages (McClendon and Riedl 2015b). Meyer (1998) similarly notes that in Ghana, pastors encourage the purging of indiscipline, inferiority, and poverty. And in India, Shah and Shah (2013) focus on

the way that Pentecostalism empowers women from the Dalit "untouchable castes."

There is a consistent message throughout the works of these scholars that Protestantism fosters economic advancement. According to the theory, if an individual becomes Protestant, he or she is more likely to decrease alcohol consumption, gambling, and drug use, which frees up time, money, and energy for saving and working. In addition, individuals are more likely to seek a disciplined life in which they value hard work. And the particular religious nature of this change, especially among the Pentecostal churches, may lead to a sense of spiritual power to bring about changes that could be more difficult to achieve through non-religious means. We might also add in the potential of social networks forming in these churches that would lead to social capital (Putnam 1993), and favor among employers if Protestants get a reputation for being good workers, as some evidence has suggested (Goldin and Metz 1991; Garrard-Burnet 1998). There is thus strong motivation to search for empirical evidence of these effects, which would testify to the importance of cultural, religious, and moral change as key to economic transformation.

As I will show, there is reason to doubt that these effects are as widespread as might be assumed from these authors' work. In addition, there are *a priori* reasons to doubt that we would see large effects in my particular study. First, the intensity of Latin American Protestantism means that many individuals spend a good deal of time in church. As I show, Protestants have much higher attendance rates than do Catholics, and this might mean that individuals do not have as much time and energy to devote to secular employment. Second, much of the analysis of Protestantism has focused on recent converts from lower-class backgrounds, while many Guatemalan Protestants in the 1990s were the children of Protestants and came from middle- and upper-classes. I discuss the particular nature of Guatemalan Protestantism in the following section.

2.2 Protestantism in Guatemala

According to Garrard-Burnett's *History of Protestantism in Guatemala* (1998), Protestant activity began in the country in 1884, when Guatemalan president Justo Rufino Barrios invited the American Presbyterian church to send a missionary to the country. Barrios and others in the Liberal party of late nineteenth century Guatemalan politics thought that Protestant missionaries might be a "civilizing agent," particularly through their schools, and would create more productive citizens.

Other American Protestant groups began to send missionaries in the first years of the twentieth century. Though these groups had significant theological and practical differences, they all sought to spread a Protestant message throughout the country to see Guatemalans accept the Protestant faith. Many missionaries also promoted education and other social changes by founding schools, medical clinics, literacy programs, publishing houses, and Bible translation projects. Presbyterian missionaries, in particular, were influenced by the Social Gospel, a theological emphasis on the Christian's duty to provide physical assistance to those in need. By the late 1940s, these missionaries had organized into a group called the Evangelical Synod and created a *Comité de Alfabetización* (Literacy Committee) that taught four hundred people how to read every six months. Protestant education was well-respected enough that Guatemalan government officials continued to send their children to Protestant schools.

In addition to these Presbyterian and Evangelical missionaries, Pentecostal missionaries, inspired by events such as the Asusa Street Revival in Los Angeles in 1906, also arrived in Guatemala in the early twentieth century. These missionaries stressed a return to the practices of faith healing, speaking in other tongues, and of "signs and wonders" that are described in the New Testament. In addition, they tended to emphasize religious conversion, not physical assistance, as their aim in mission work.

Despite this missionary activity, the number of Protestants in Guatemala did not increase until the 1950s and 1960s. At the same time as guerrilla violence was increasing in the country,

Protestant churches, now more controlled by native Guatemalans than by Americans, organized large meetings that led to mass conversions starting in 1962. Much of the growth came through the Pentecostal churches, which claimed 80% of all Guatemalan Protestants in 1980. This period was also marked by diminished presence of Catholic authorities due to anti-clerical measures from Liberal governments and by the Green Revolution-inspired agricultural and economic growth. In 1976, Protestantism grew even more following a devastating earthquake that killed nearly 20,000 and provoked a rush of aid from Christian relief groups. New Pentecostal churches grew in the 1980s and 1990s and drew more members from the middle and upper classes, while earlier Protestants had tended to be from the lower class.

While the growth of Guatemalan Protestantism certainly required the presence of Protestant missionaries to make people aware of the faith, it seems to have grown because of several historically contingent factors, namely economic change, political turmoil, and the 1976 earthquake. As David Martin has written, Protestantism in Latin America has been characterized by growth in the mega-cities, as people move to urban areas and are un-anchored from traditional authority structures (Martin 1990). However, Latin America on the whole had some susceptibility to Protestantism because of the presence of a historically religious culture contrasted with the absence of religious authorities. In Guatemala, as in other countries, Liberal governments desiring to remove the control of the Catholic Church placed restrictions on priests in the country, with the result that many areas that had been Catholicized at some historical point were rarely visited by a priest. Under the right circumstances, this became a fertile ground for Protestantism, in which pastors took the roles of religious authority that had been formerly performed by priests (Martin 1990).

In the context of my research questions, this history suggests that we might expect Protestants to have had initially lower incomes early in Protestant history, when conversion was mostly from the lower classes. These initial differences could have persisted to the time of my DHS data in 1995 and 1998, when many Protestants were second- or even third-generation. However, the conversion

of members in other classes in the 1980s and 1990s means that some individuals could have had initially higher incomes. This motivates the IV and income growth regressions I perform following the initial inspection of differences between groups.

3   Data

3.1   DHS Survey Data

To investigate the relationship between individual economic outcomes and religion, I use data from the 1995 and 1998 rounds of the Guatemalan Demographic and Health Survey (DHS). This survey was administered by the DHS Program, which is primarily funded by the United States Agency for International Development (USAID) and has conducted over 300 surveys to gain understanding of health and population trends in developing countries (The DHS Program 2015). These two surveys were executed by Guatemala's Instituto Nacional de Estadística (National Institute of Statistics), and covered every Guatemalan department (except Petén in 1995).[1] They surveyed women aged 15-49, covering 12,403 women in 1995 and 6021 women in 1998-99, for a total of 18,424 women. The survey focused on health, medicine, child anthropometry, contraception, and fertility, but also asked about religion, education, and various economic characteristics. In particular, a composite wealth index was created using principal component analysis on characteristics such as household assets (e.g., televisions and bicycles), house construction materials, water access, and sanitation (USAID 2013).

While more recent data would have been desirable, these were the only years available that would suit the purposes of this study. Though 1989 and 1997 DHS waves exist for Guatemala, the data were missing a composite wealth index and were difficult to interpret because of missing

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[1]Guatemala is organized into 22 departments, which are larger administrative districts, and 330 smaller municipalities, which have mean area of a 330 km^2, equivalent to a circle of radius 10.25 km. There are 220 unique municipalities in the DHS data, thus providing a decent representation of the population.

manuals, idiosyncratic variable names, and/or Spanish-language labeling. DHS data are commonly used in academic research, and the data on Guatemala have been used in Hotchkiss, Rous, Seiber, and Berruti (2005) and Pörtner (2010) to analyze the effects of Maternal and Child Health Service utilization on contraception use and of natural hazards on child health, respectively.

Summary Statistics for the DHS data are reported in Table 2. Several characteristics of these data merit comment. First, the fraction of the population that is Protestant is only 27%, which is 14 percentage points lower than in the Pew data from 2014.[2] This suggests that Protestantism has continued to gain adherents since the 1990s. Second, the religious attendance variable ranges from "never" (1) to "daily" (7), and so the median religious attendance in the sample is "weekly" (5), signifying that the typical Guatemalan woman attended church quite frequently by American standards. Third, while I here report the religion of the individual, the DHS also asked a separate question about the religion of the household. I find that these variables are almost always the same, with 98.3% of self-identified Catholics saying their household religion is Catholic and 95.5% of Protestants saying their household religion is Protestant. Thus the analysis uses individual religion as the key predictor variable.

Fourth, the DHS wealth index ranges from -1.59 to 3.16, with a median near 0, and a standard deviation near 1, suggesting that it was constructed to follow a standard normal distribution. Fifth, the category "husband occupation" represents (a) the fraction of women reporting that their husband works in a professional, technical, or management capacity; (b) in agriculture; or (c) in skilled manual labor. These categories are chosen for analysis to investigate the relationship between religion and occupation, and the numbers of observations are limited to married women. Sixth, the units for the women's earnings variables are unknown, but because their distribution is right-skewed, I take logs of the variables for analysis.

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[2]Most of the Protestants were coded as "Evangelic" in the DHS dataset, which follows the typical Latin American pattern of Spanish-speaking Protestants identifying themselves as "*evangélicos*" ("evangelicals") (Garrard-Burnet 1998; Brusco 1995).

Table 2: Summary Statistics: Guatemala DHS

Panel A: Demographic	Obs	Mean	St. Dev.	Median	Min	Max
Protestant	18,413	0.27	0.44	0.00	0.00	1.00
Catholic	18,413	0.57	0.50	1.00	0.00	1.00
No Religion	18,413	0.14	0.34	0.00	0.00	1.00
Religious Attendance	18,380	4.41	1.77	5.00	1.00	7.00
Indigenous	18,368	0.41	0.49	0.00	0.00	1.00
Age	18,424	28.58	9.89	27.00	15.00	49.00
Urban	18,424	0.32	0.46	0.00	0.00	1.00
Panel B: Education	Obs	Mean	St. Dev.	Median	Min	Max
Literacy	18,360	0.62	0.48	1.00	0.00	1.00
Education	18,424	3.39	3.88	2.00	0.00	20.00
Husband Education	12,235	3.67	4.02	3.00	0.00	19.00
Panel C: Economic	Obs	Mean	St. Dev.	Median	Min	Max
Wealth Index	18,424	0.02	1.02	-0.26	-1.59	3.16
Daily Earnings	5,311	222.72	378.95	100.00	0.00	2500.00
Log Daily Earnings	5,311	4.51	1.40	4.62	0.00	7.82
Yearly Earnings	5,307	38755.69	60764.62	15000.00	8.00	3.6e+05
Log Yearly Earnings	5,307	9.48	1.71	9.62	2.20	12.79
Worked in 12 Months	18,422	0.33	0.47	0.00	0.00	1.00
Husband is Prof/Tech/Man	12,462	0.08	0.27	0.00	0.00	1.00
Husband Works in Ag.	12,462	0.57	0.50	1.00	0.00	1.00
Husband Works in Sk. Man.	12,462	0.21	0.41	0.00	0.00	1.00

Source: DHS

3.2   Satellite Images of Light Density at Night

To proxy for average incomes at the municipality level, I use data on the density of lights at night. The data were collected by satellites operated by the National Oceanic and Atmospheric Association's Operational Linescan Program.[3]   These satellites detect lights from human settlements and from natural events such as fires and gas flares. The data available are a raster dataset of the entire earth, available at a yearly, averaged level, with pixels every 30-second by 30-second square, or approximately every square kilometer. The data are annualized by removing images blocked by clouds or by ephemeral images (such as fires and gas flares) and by averaging over each daily observation.[4] These data are displayed in Figure 1.

Night light data have recently begun to be used by economists, particularly for areas where reliable data on income are hard to gather (Michalopoulos and Papaioannou 2013; Henderson, Storeygard, and Weil 2011). Summary statistics for the lights data in 1995 and 2013 are presented in Table 3. These show that only 11% of the pixels in 1995 were lit, while in 2013 the percentage increased to 26%. The lit pixels ranged from a score of 1 to 63, the highest possible code. While top-coding can be a problem in very well-lit areas, in Guatemala only 0.10% of all pixels were top-coded in 1995 and only 0.21% in 2013. At the municipality level, log light density had a wide range in 1995, from 1.78-9.98. It increased on average by 2013 and also had a tighter distribution in 2013.

The goal is to proxy for income *per capita*, so it is natural to try adjusting lights by population. To this end, I use Guatemalan population data from 1994, which are available from the Guatemalan national census of that year.[5] To see how both population-adjusted and non-population-adjusted luminosity proxy for income per capita, I follow Michalopoulos and Papaioannou (2013) and perform a cross-validation of the 1995 lights data. I aggregate the 1995 DHS wealth index to

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[3]Available at http://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html.
[4]Lowe (2014) provides helpful instructions for using these data.
[5]I thank Rachel McCleary for sharing these digitized data with me.

Figure 1: Night Lights in Guatemala

(a) 1995

(b) 2013

Table 3: Summary Statistics: Luminosity

Panel A: Pixel-Level	Obs	Mean	St. Dev.	Median	Min	Max
Pixel-Level Light Density (1995)	131,470	1.02	4.51	0.00	0.00	63.00
Lit Pixel (1995)	131,470	0.11	0.31	0.00	0.00	1.00
Pixel-Level Light Density (2013)	131,470	2.62	6.88	0.00	0.00	63.00
Lit Pixel (2013)	131,470	0.26	0.44	0.00	0.00	1.00
Panel B: Municipality-Level	Obs	Mean	St. Dev.	Median	Min	Max
Log(Light Density + 1) (1995)	174	6.22	1.63	6.49	1.78	9.98
Log(Light Density + 1) (2013)	174	11.11	1.20	11.21	8.02	13.69
Pct Gr. Log Light Density (1995-2013)	174	0.90	0.50	0.74	0.37	3.79

Source: NOAA Operational Linescan Program

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the municipality level and correlate this with luminosity. To adjust for population, I divide each municipality's total light by its population, thus creating "lights per capita." Results are displayed in Table 4 and Figure 2.

Table 4: Correlations: Wealth Index and Light Density in Guatemala, 1995

	Wealth Index
Light Density (1995)	0.547***
Log(Light Density + 1) (1995)	0.597***
(Total Light + 1) / Population	0.360***
Log((Total Light + 1) / Population)	0.365***
Observations	174

Source: Guatemala DHS (1995), Guatemalan Census (1994), and NOAA Operational Linescan Program
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I restrict my use of the lights data to the 174 municipalities that were both included in the 1995 DHS survey and had at least one lit pixel. I find that the non-population adjusted log(light density + 1) has the strongest correlation with the mean wealth index, with a correlation coefficient of 0.597 (Table 4). This result is visualized in Figure 2. This correlation is slightly weaker than that of Michalopoulos and Papaioannou (2013), who, looking at several African countries in 2000, find a correlation coefficient of 0.70. I also check for correlations controlling for population and population density but find weaker correlations (not shown).

3.3   Exposure to Protestant Missionaries and Catholic Parishes

To construct measures of Protestant missionary influence, I use new datasets created by Rachel McCleary (McCleary 2016a, McCleary 2016b). As part of a historical research project on Guatemalan religion, McCleary has searched missionary biographies, church records, and missionary periodicals to construct a record of the locations of Protestant missionaries during the early twentieth century. This information was compiled into a dataset in which each observation

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Figure 2: Cross-Validation: Log Light Density and Wealth Index
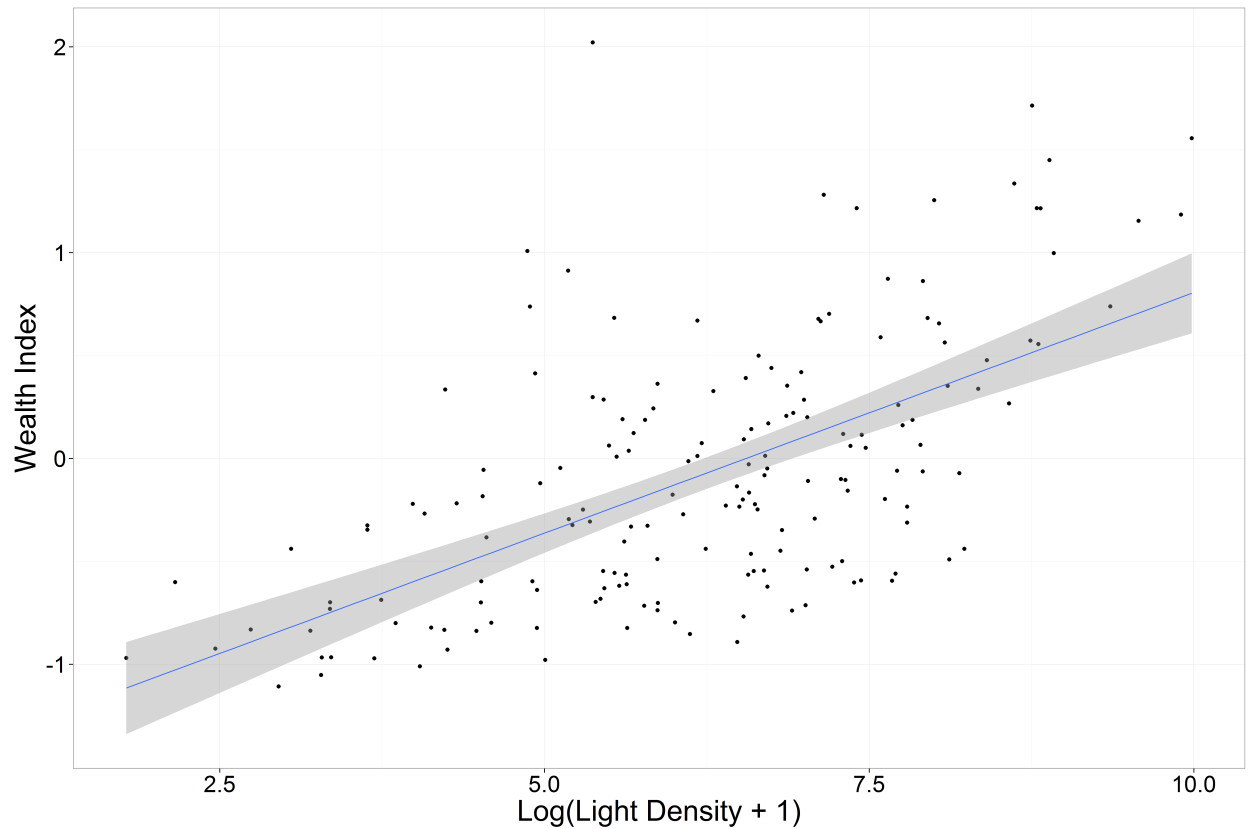
corresponds to a permanent mission station or stop on an itinerant missionary traveling route. Each observation includes a municipality or address, latitude and longitude,[6] and missionary class (Presbyterian, Evangelical, or Pentecostal). The locations of these missionaries are shown in Figure 3(a). Using GIS software, I projected these data onto a map of Guatemalan municipalities and, for each municipality, calculated various measures of exposure to each of the groups separately and to all the Protestants generally.[7] Previous research into the effects of missionaries has used the presence of missionaries within a specific region as a measure of missionary exposure in the region, while sometimes also looking at the stock of missionaries in the region as well (Nunn 2014; Bai and Kung 2015; Castello-Climent, Chaudhary, and Mukhopadhyay 2015). I follow these

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[6]These were computed using geocoding software at `http://www.findlatitudeandlongitude.com/batch-geocode/#.Vk6NdnarTIU`.

[7]GIS shapefiles for Guatemalan municipalities come from DIVA-GIAS at `http://www.diva-gis.org/gdata`.

Figure 3: Protestant Missionaries (1904-40) and Catholic Parishes (1925)

(a) Protestant
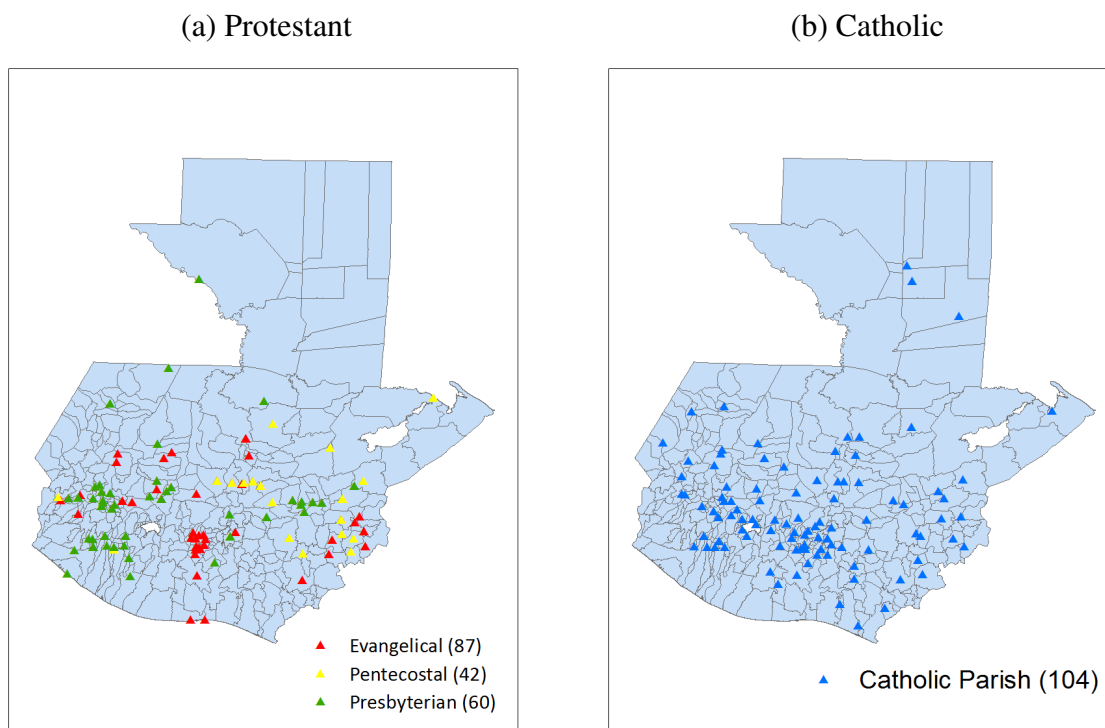
(b) Catholic

authors in using missionaries within 25 km of the municipality as my main predictor variable.

In addition to the Protestant data, McCleary has digitized records from multiple sources to construct a dataset of the locations of Catholic parishes in Guatemala at various points in Guatemalan history. I chose to use the parishes from 1925 to give a year close to the time of the Protestant missionaries. While not missionaries *per se*, these Catholic parish locations designate where institutional Catholic presence was strongest. A map of these data are plotted in Figure 3(b), and summary statistics for Catholic and Protestant missionary exposure are shown in Table 5.

3.4   Historical and Geographic Information

Missionaries and parishes may have located in areas that were *ex ante* different from areas in which they did not locate. Therefore, I use data from the 1893 Guatemalan Census to control for

population density, fraction indigenous, and literacy rates before Protestants arrived. I also control for distance to the coast and elevation in case missionaries located based on these geographic factors and these factors also affected later economic outcomes. Unfortunately, I was unable to match 65 current municipalities with their historical data, so these municipalities will be excluded from regressions that use these data.

The elevation data come from the CGIAR Consortium for Spatial Information[8] but have been aggregated to 30-second grids at DIVA-GIS. Distance to the coast was calculated in ArcGIS.

Table 5: Summary Statistics: Historical (1893), Geographic, Missionary

Panel A: Historical	Obs	Mean	St. Dev.	Median	Min	Max
Population Density (1893), People /Km^2	265	45.49	59.59	25.30	0.08	415.30
Fraction Indigenous (1893)	255	0.67	0.31	0.77	0.00	1.00
Literacy (1893)	262	0.08	0.09	0.06	0.00	0.66
Panel B: Geographic	Obs	Mean	St. Dev.	Median	Min	Max
Distance to Coast (km)	314	51.78	28.20	51.50	2.20	117.38
Elevation (m)	314	1371.58	825.23	1343.17	7.52	3123.51
Panel C: Missionary	Obs	Mean	St. Dev.	Median	Min	Max
No. Prot Within 25 Km (1904-40)	314	8.31	8.11	6.00	0.00	30.00
Any Prot Within 25 Km (1904-40)	314	0.81	0.40	1.00	0.00	1.00
No. Cat Parishes Within 25 Km (1925)	314	5.37	5.41	3.00	0.00	25.00
Any Cat Parishes Within 25 Km (1925)	314	0.89	0.31	1.00	0.00	1.00

Source: Guatemalan 1893 Census, CGIAR , McCleary (2016a), McCleary (2016b)

4   Empirical Strategy

For the baseline regressions to investigate the relationship between religion and economic outcomes, I employ the following equation:

$$Y_{im} = \alpha + \beta \text{Prot}_{im} + \chi^T \mathbf{X}_{im} + \lambda_m + \varepsilon_{im} \tag{1}$$

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[8]`http://srtm.csi.cgiar.org`

Here Y_{im} is an economic outcome for individual i in municipality m, β is the coefficient of interest, $\mathbf{X}_{im}$ is a vector of controls, and λ_m is a municipality-fixed effect. I use OLS to estimate coefficients for both continuous outcome variables and binary outcome variables such as literacy. By employing fixed effects and using individual-level demographic controls, this strategy compares individuals who are similar along a variety of characteristics but differ only in religion.

However, this design suffers from reverse causality concerns. As discussed above, Protestants could have come from less wealthy families or have been less wealthy prior to conversion than non-Protestants. The ideal solution would be to have a panel dataset following individuals across time. As I lack these data, I employ a second-best strategy by looking at changes in *municipality* income over time. If Protestantism generally causes income growth in Guatemala, then a higher proportion of Protestants in a municipality in 1995 should represent greater potential for income growth in that municipality from 1995-2013, conditional on other pre-characteristics. I control for initial income (proxied by light density) and other initial characteristics and use the following empirical specification:

$$\%\Delta\text{Light}_{dm} = \alpha + \beta\,\%\text{Prot}_{dm} + \chi^T \mathbf{X}_{dm} + \lambda_d + \varepsilon_{dm} \tag{2}$$

Here $\%\Delta\text{Light}_{dm}$ is the percent change in light in municipality m within department d, β is the coefficient of interest, $\mathbf{X}_{im}$ is a vector of controls, and λ_d is a department-fixed effect. I use department-fixed effects to control for differences in geography and institutions across regions of the country.

As a second effort to combat reverse causality, I employ an instrumental variables regression in which the presence of a 1925 Catholic parish within 25 km of an individual's municipality instruments negatively for an individual being Protestant today. Instrumented Protestantism is then used to predict outcomes such as an individual's wealth, education, and occupation. I use 2SLS

with Stata's `ivreg2` command to estimate coefficients for the following system of equations:

$$\text{Prot}_{im} = \tau + \gamma \text{Mis}_m + \psi^T \mathbf{X}_{im} + \zeta Y_{av_m} + \nu_{im} \tag{3}$$

$$Y_{im} = \alpha + \beta \hat{\text{Prot}}_{im} + \chi^T \mathbf{X}_{im} + \theta Y_{av_m} + \varepsilon_{im} \tag{4}$$

Here Mis_m is an indicator for presence of 1925 Catholic parish within 25km of the individual's municipality and $\mathbf{X}_{im}$ is a vector of individual, municipality-level historical, and municipality-level geographic controls. Y_{av_m} is the average of the outcome variable among non-Protestants in the municipality. This term is included because Catholic parishes could have had effects of the economic outcomes of municipalities through mechanisms other than their effect on Protestantism. By controlling for the average of outcomes among non-Protestants in the municipality, I control for any effects of Catholic parishes that do not come uniquely through Protestantism. The other variables are as before.

If Protestantism has any effects on income, this strategy should identify those effects. The first stage predicts an individual's Protestantism based on proximity to Catholic parishes. The second stage predicts an economic outcome using the average outcomes of non-Protestants in the municipality, individual-level and municipality-level controls, and the predicted Protestantism. Conditional on the controls, the presence of a historical Catholic parish should not have any effect on economic outcome variable, meaning that any remaining differences in individual incomes should go through Protestantism. One might be concerned that historical Catholic parish presence would also impact the proportion of *Catholic* individuals in an area, in addition to the proportion of Protestants. While this is true, it is not concerning because nearly all non-Protestant Guatemalans are Catholic. The proportions of Protestants and Catholics in an area are thus inversely related, so testing the effects of Protestantism in this context is equivalent to testing the effects of non-Catholicism.

As I will show, while I do find negative first-stage effects of *Catholic* parishes on contemporary

Protestant status, I do not find any positive first-stage effects of *Protestant* missions on contemporary Protestant status. This means that any effects of Protestantism on contemporary economic status, conditional on pre-period controls, would not go through religion, but would come through the educational and social activities of the missionaries. Thus I estimate the effects of Protestant missionaries on economic outcomes using the following equation:

$$Y_{im} = \alpha + \beta \text{Mis}_{im} + \chi^T \mathbf{X}_{dm} + \varepsilon_{im} \tag{5}$$

Here all the variables are as before.

5 Results

5.1 Baseline: Protestantism

Table 6 compares Protestants and Catholics in the DHS dataset to investigate if there are any clear differences between the groups. While there are some statistically significant differences between the groups, the only clearly economically significant difference is in religious attendance. Demographically, Protestants are slightly more likely to be indigenous (43% vs. 40%), but are similar to Catholics along other demographic dimensions. The Protestant mean religious attendance is 5.61, representing attendance between weekly and multi-weekly, while the non-Protestant mean is near multi-monthly. When I leave only Catholics as the comparison group, removing those with no religion or other religions, the gap shrinks to a difference of 5.61 vs. 4.65 ($t = 48.98$, result not shown), still a substantial difference. Thus the average self-identifying Protestant in Guatemala is a more frequent church attender than is the average Catholic, which agrees with the descriptive literature (Martin 1990; Garrard-Burnet 1998).

Overall, Protestants are not outperforming non-Protestants economically. Protestant women

Table 6: Protestants and Non-Protestants in Guatemala, 1995-1998

Panel A: Demographic	Protestant	Non-Protestant	Difference
Religious Attendance	5.61	3.96	1.65***
Indigenous	0.43	0.40	0.03**
Age	28.61	28.57	0.04
Urban	0.32	0.31	0.01
Literacy	0.65	0.61	0.04***
Education	3.33	3.41	-0.09
Husband Education	3.62	3.69	-0.07
Panel B: Economic	Protestant	Non-Protestant	Difference
Wealth Index	0.04	0.02	0.02
Log Daily Earnings	4.44	4.53	-0.09*
Log Yearly Earnings	9.39	9.51	-0.12*
Worked in 12 Months	0.32	0.33	-0.01
Husband is Prof/Tech/Man	0.09	0.08	0.01**
Husband Works in Ag.	0.54	0.58	-0.04***
Husband Works in Sk. Man.	0.23	0.20	0.03***

Source: DHS

have slightly lower log daily earnings and log yearly earnings, but the differences (0.09 and 0.12) are less than a tenth of a standard deviation. Moreover, Protestants have a slightly higher wealth index, so the results together suggest that the two groups are economically similar. There are slight differences in occupation groups among the husbands of surveyed women. Protestants are more likely to be employed in professional, technical, and management work (9% vs. 8% [$t = 2.61$]) and in skilled manual labor (23% vs. 20% [$t = 3.88$]), while they are less likely to be employed in agricultural occupations (54% vs. 58% [t=4.21]). Though the differences are small, the directions agree with Annis' (1987) findings that Protestants tended to earn more of their wealth through non-agricultural means. However, these differences do not appear to lead to greater wealth overall.

Protestant women do have a slightly higher literacy rate than do non-Protestant women, at 65% vs. 61% ($t = 4.34$). However, this difference does not exist for years of education for either women or men. This difference is in the same direction as would be expected if a Protestant emphasis on Bible-reading led to higher literacy, as has been suggested not only in this context but

as a characteristic of Protestantism in nineteenth-century Africa and seventeeth-century Prussia (Nunn 2014: Becker and Woessmann 2009). Yet the difference is smaller than the 8.0 percentage points found in Becker and Woessmann (2009), and while it might suggest a real effect, it is not clearly economically important.

Interestingly, this picture does not match the localized surveys of Annis (1987) or Goldin and Metz (1991), in that both of those studies, which focused only on the towns of Almolonga and San Antonio, respectively, in the 1980s, noted larger differences between Protestants and non-Protestants. It is possible that while differences existed at those particular times and places, the differences did not exist across Guatemala in the 1990s.

Simple differences in means might mask positive economic effects of Protestantism if the Protestants or their parents or grandparents converted while being less economically well-off. If that were the case, then the similar economic situations of the groups today would be because of a Protestant work ethic, not in spite of one. As a first step to engage with this possibility, I now control for demographic characteristics and municipality-fixed effects. While this does not allow for a fully causal interpretation, it compares people in similar areas with similar demographic profiles. Results, using estimating equation 1, are displayed in Table 7.

The positive relationship between Protestantism and literacy remains but is still small when adding controls (Column 1). Conditional on age, ethnicity, urban status, and municipality, Protestant women have a literacy rate 3% higher than do non-Protestants. This would suggest a potentially economically significant effect of Protestantism on literacy, if there were no concern with reverse causality (i.e., literate people becoming Protestants).

Table 7: Protestantism and Economic Outcomes, With Controls

	(1) Literacy	(2) Education	(3) Wealth Index	(4) Log Yearly Earnings	(5) Husband Works in Ag.
Protestant	0.03***	-0.02	0.03	-0.02	-0.03***
	(0.01)	(0.07)	(0.02)	(0.04)	(0.01)
Indigenous	-0.29***	-2.55***	-0.43***	-0.54***	0.15***
	(0.02)	(0.17)	(0.04)	(0.07)	(0.02)
Age	-0.01***	-0.08***	0.00	0.01***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Urban	0.17***	2.35***	0.93***	0.53***	-0.38***
	(0.01)	(0.22)	(0.08)	(0.08)	(0.03)
Municipality-Fixed Effects	Y	Y	Y	Y	Y
N	18296	18357	18357	5290	12414

Source: DHS. OLS used for all columns. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

However, with these controls, there are no effects on education, wealth index, and log yearly earnings (columns 2-4). This confirms the picture suggested by the raw differences that Protestants and non-Protestants are no different in income. Small differences in husband occupation persist, though, as a Protestant husband is 3% less likely to work in agriculture than is a non-Protestant husband, while Protestants are 8% more likely to work in a professional, technical, or management position and 4% more likely to work in skilled manual labor. If there were no reverse causality concerns, we could conclude that Protestantism has no effects on income but does slightly improve women's literacy and shifts men's occupations. I next turn an analysis of growth in light density to examine effects of Protestantism on income where reverse causality is less of a concern.

5.2 Luminosity

I now consider the potential for municipality-level effects of Protestantism on income growth, and I use the percentage increase in the log of municipality light density from 1995 to 2013 to proxy for income growth. The results, which use Estimating Equation 2, are reported in Table 8. Both with and without 1995 controls the effect of Protestantism is negative and insignificant. In the preferred specification (Column 2), I am able to rule out with 95% confidence any effects larger than 19 percentage points, which corresponds to 0.38 of a standard deviation. Thus I bound the potential effect of Protestantism at 0.38 standard deviation for a municipality that is entirely Protestant, as compared with one that is entirely non-Protestant. There is no large, general effect of Protestantism on income growth when individual effects are aggregated to the municipality level.

The estimate on the coefficient of interest is relatively imprecisely estimated, however, indicating an inconsistent relationship between Protestantism and growth in log light density. The standard error on Protestantism in Column 2 is 0.12, while the standard error on 1995 log light density is 0.04. This indicates that, while there is a consistent effect of convergence, with low-log-light-density municipalities having higher percentage growth than high-log-light-density

municipalities, the effect of Protestantism is not as consistent.

Table 8: Growth in Log Light Density on Fraction Protestant

| | (1) | (2) |
	Pct Gr. Log Light Density (1995-2013)	
Fraction Protestant (1995)	-0.24	-0.05
	(0.26)	(0.12)
Fraction Indigenous (1995)		0.20***
		(0.05)
Mean Age (1995)		0.03*
		(0.01)
Fraction Urban (1995)		0.06
		(0.05)
Mean Education (1995)		0.04*
		(0.02)
Log(Light Density + 1) (1995)		-0.28***
		(0.04)
Department-Fixed Effects	N	Y
N	174	174

Standard errors in parentheses

Source: DHS and NOAA Operational Linescan Program

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.3   First Stage Estimates: Missionaries, Parishes, and Religion

I now consider the relationship between an individual's religion, as reported in the DHS data, and the individual's proximity to the locations of Protestant missionaries and Catholic parishes in the early part of the twentieth century. This shows the first stage results that will motivate the following instrumental variables analysis.

For an instrument to be valid, the instrument must be both a strong instrument, that is, have a substantial effect on the endogenous variable, and satisfy the exclusion restriction, or not affect the

outcome variable through any channel other than the endogenous variable. Thus, in this context, I must provide, first, evidence that the location of Catholic parishes in 1925 predicts individual religion today. The exclusion restriction cannot be tested directly, but I will argue for its validity in the following section.

The more natural choice of an instrument for Protestantism is an individual's proximity to Protestant missionary locations, rather than Catholic parish locations, so I first show that Protestantism does not work as an instrument. As a representation of Protestant missionary exposure, I use a dummy variable that takes the value 1 when a Protestant missionary was present within 25 km of the individual's municipality and takes 0 otherwise.

We might expect the locations of Protestant missionaries to have a positive impact on an individual's likelihood of being Protestant today. Proximity to missionaries might lead to a higher likelihood of learning about Protestantism and of engaging with people who seek to persuade others to accept the faith. Table 9 shows the results of regression of Protestantism on missionary exposure. Standard errors are clustered on municipalities because the variation in the predictor variable of interest (proximity to missionaries) comes only at the municipality level (Angrist and Pishke 2009). Surprisingly, there are no significant effects of proximity to Protestant missionaries on Protestantism today, even controlling for a broad array of individual, historical, geographical, and contemporary municipality-level factors.

This result seems less surprising, however, when considering the historical spread of Protestantism in Guatemala. Growth in Protestantism began to take place in the 1960s, after this 1904-40 pioneer missionary period, as was discussed in Section 2. Protestant growth was driven by later activities, primarily directed by Guatemalans, not by foreigners. Thus the lack of a relationship between historical missionary location and Protestantism today is not as farfetched as one might think.

I now consider the relationship between location of historical Catholic missions and individual Protestantism today. In Guatemala as well as in other parts of Latin America, scholars have linked

Table 9: No First Stage: Protestant Today on Historical Protestant Proximity

	(1)	(2)	(3)	(4)
		Protestant		
Any Prot Within 25 Km (1904-40)	-0.02	-0.02	-0.03	-0.03
	(0.03)	(0.03)	(0.03)	(0.04)
Indigenous		0.02	0.01	0.01
		(0.02)	(0.03)	(0.03)
Age		0.00	-0.00	-0.00
		(0.00)	(0.00)	(0.00)
Urban		0.01	0.01	-0.01
		(0.02)	(0.02)	(0.02)
Fraction Indigenous (1893)			0.06	0.07
			(0.07)	(0.07)
Literacy (1893)			0.14	0.16
			(0.28)	(0.27)
Population Density (1893), People /Km^2			-0.00	-0.00
			(0.00)	(0.00)
Elevation (m)			0.00	0.00
			(0.00)	(0.00)
Distance to Coast (km)			-0.00	-0.00
			(0.00)	(0.00)
Muni (Non-Prot) Mean Education				-0.02
				(0.02)
Muni (Non-Prot) Mean Wealth Index				0.06
				(0.05)
N	16721	16667	14483	14483

Source: DHS, McCleary (2016b), Guatemalan Census (1893), and CGIAR. Coefficients estimated using logistic regression. Standard errors in parentheses.

Table 10: First Stage: Protestant on Historical Catholic Proximity

	(1)	(2)	(3)	(4)
		Protestant		
Any Cat Parishes Within 25 Km (1925)	-0.05*	-0.06*	-0.11**	-0.12**
	(0.02)	(0.02)	(0.04)	(0.04)
Indigenous		0.02	0.01	0.00
		(0.02)	(0.03)	(0.03)
Age		0.00	-0.00	-0.00
		(0.00)	(0.00)	(0.00)
Urban		0.01	0.01	-0.01
		(0.02)	(0.02)	(0.02)
Fraction Indigenous (1893)			0.02	0.04
			(0.07)	(0.07)
Literacy (1893)			0.02	0.02
			(0.28)	(0.28)
Population Density (1893), People /Km^2			0.00	-0.00
			(0.00)	(0.00)
Elevation (m)			0.00	0.00
			(0.00)	(0.00)
Distance to Coast (km)			-0.00	-0.00
			(0.00)	(0.00)
Muni (Non-Prot) Mean Education				-0.02
				(0.02)
Muni (Non-Prot) Mean Wealth Index				0.07
				(0.05)
N	16721	16667	14483	14483
Kleibergen-Paap rk Wald F Statistic	6.02	6.50	8.37	8.70

Source: DHS, McCleary (2016b), Guatemalan Census (1893), and CGIAR.

Coefficients estimated using OLS. F statistic from IV regression. Standard errors clustered on municipality in parentheses.

* $p < 0.05$, ** $p < 0.01$

the growth of Protestantism with the absence of a strong institutional Catholic presence. Martin (1990), for instance, argues that Protestantism's success can partly be attributed to the presence in many parts of Latin America of a religious culture without a religious authority. Garrard-Burnett (1998) has noted that some Guatemalans turned to Protestant ministers for counseling when Catholic priests were absent to provide such services. Thus, we might expect that where the Catholic church was intuitionally stronger, we would see less growth in Protestantism.

Table 10 shows the results of regressing Protestantism today on the presence of a Catholic parish in 1925 in the individual's current municipality. Unlike the results for Protestantism, these results suggest a strong negative relationship that is robust to individual, historical, geographic, and contemporary municipality-level controls. In fact, the magnitude of the estimated coefficient increases with added controls.

One may be concerned that the presence of a Catholic parish in 1925 might be too weak an instrument for Protestantism today, and thus lead to poor estimates in an IV specification. Stock, Wright, and Yogo (2002) discuss this problem and suggest as a soft cutoff that instruments should have a Kleibergen-Paap rk Wald F statistic of at least 10. In Table 10 I report these statistics, computed from a separate IV regression using Stat's `ivreg2` command. In my preferred specification (Column 5), the instrument does not reach the Stock cutoff, but rather lingers at 8.70. Thus my instrument is slightly weaker than preferred. Because the cutoff is soft, however, I continue to use this instrument, noting that the weak relationship provides some reason for concern with the following IV estimates.

5.4 IV Estimates of Protestantism and Economic Outcomes

Before discussing IV estimates, I argue for the validity of the exclusion restriction. The exclusion restriction requires that proximity to historical Catholic parishes only affects wealth through its negative effect on an individual's religion today. This would be invalid if (a) Catholic parishes

located in areas that had, on average, higher potential wealth in the 1990s than did areas in which Catholic parishes did not locate; (b) Catholic parishes affected wealth through the direct means of physical assistance or education. To counter the first concern, I control for historical and geographic factors. As shown in Table 11, municipalities with a Catholic parish nearby in 1925 were more populated, more indigenous, less literate, further from the coast, and at higher altitudes than were other parishes. Because I include these variables in my IV specifications, any effects on contemporary individual wealth that come through these channels will be controlled for.

Table 11: Catholic Parish Location Choice

	Parish	No Parish	Difference
Population Density (1893), People /Km^2	48.72	6.33	42.38**
Fraction Indigenous (1893)	0.70	0.66	0.04
Literacy (1893)	0.07	0.15	-0.08***
Distance to Coast (km)	56.38	25.42	30.96***
Elevation (m)	1434.49	438.03	996.47***
Observations		210	

Source: McCleary (2016a), CGIAR, Guatemalan Census (1893)

The IV estimates of Protestantism on wealth index, literacy, education, log yearly earnings, and husband working in agriculture are shown in Table 12. Coefficients are estimated using estimating equations 3 and 4. In each column I include the full set of individual, geographic, historical, and contemporary municipality-level controls. For all five outcome variables, there are no statistically significant effects of Protestantism. As suggested by the previous analyses, there is no evidence that Protestantism has a positive effect on income. The coefficients are imprecisely estimated however, likely due to the weakness of the Catholic proximity instrument. Column (1) has an effect near 0 but bounds the potential positive effects at 0.75, about three quarters of a standard deviation of the wealth index, considering a 95% confidence interval. Thus, this analysis cannot rule out economically significant positive effects of Protestantism on wealth. Column (2) shows a positive but statistically insignificant relationship between Protestantism and literacy. This effect

Table 12: Instrumental Variables: Economic Outcomes and Protestantism

	(1) Literacy	(2) Education	(3) Wealth Index	(4) Log Yearly Earnings	(5) Husband Works in Ag.
Protestant	0.29	0.27	0.07	0.18	-0.54
	(0.22)	(1.18)	(0.34)	(2.69)	(0.29)
Indigenous	-0.24***	-1.95***	-0.37***	-0.49***	0.14***
	(0.02)	(0.23)	(0.05)	(0.10)	(0.03)
Age	-0.01***	-0.08***	0.00	0.01**	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Urban	0.12***	1.64***	0.60***	0.22	-0.22***
	(0.02)	(0.27)	(0.09)	(0.12)	(0.04)
Fraction Indigenous (1893)	-0.09*	1.00***	0.16*	0.24	-0.10
	(0.05)	(0.29)	(0.08)	(0.30)	(0.07)
Literacy (1893)	-0.26	0.34	-0.18	1.09	0.30
	(0.14)	(1.43)	(0.34)	(0.72)	(0.29)
Population Density (1893), People /Km^2	0.00	-0.00	0.00	0.00	-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Elevation (m)	0.00*	0.00**	0.00*	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Distance to Coast (km)	0.00**	0.01*	0.00	0.00	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Muni (Non-Prot) Mean Education	0.08***	0.68***	-0.03	-0.08	0.01
	(0.01)	(0.08)	(0.02)	(0.09)	(0.03)
Muni (Non-Prot) Mean Wealth Index	-0.09**	-0.15	0.78***	0.69*	-0.27***
	(0.03)	(0.23)	(0.07)	(0.27)	(0.07)
N	14438	14483	14483	4168	9828

Source: DHS, McCleary (2016a), CGIAR, Guatemalan Census (1893). Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

is thus in the same direction as the relationship found in Section 5.1, but due to imprecision a nonzero effect cannot be ruled out. Column (3) shows a very imprecise, near-zero effect on education, as as was found in the previous analysis. The estimates on log yearly earnings in Column (4) are very imprecise because of the small sample of women reporting any earnings, though these are also estimated near zero. Finally, Column (5) shows a large negative but statistically significant effect of Protestantism on the husband working in agriculture. This effect is in the same direction as was found in the OLS estimates, though again, imprecision means we cannot draw strong conclusions.

By themselves, the results from the IV neither confirm nor reject the presence of an effect of Protestantism on economic outcomes. The positive coefficient on literacy provides some support to the OLS result that Protestantism does have some effect on literacy, but it is not strong enough to appear in these imprecise estimates. Similarly, the large negative coefficient on the husband working in agriculture provides some support to the OLS picture of Protestantism affecting occupation choice, though it cannot completely confirm this. While the IV estimates do not reject any positive effects of Protestantism on income, they do support support the theory that there is a new Protestant ethic in Guatemala. I now turn to a final analysis of the relationship between Protestantism and economic outcomes by considering the effect of Protestant mission work.

5.5   Protestant Missionaries and Economic Outcomes: Direct Effects

While proximity to Protestant missionaries is not related to being Protestant today, as shown in Section 5.3, I now consider effects of Protestant missionaries on economic outcomes generally, estimating coefficients using Equation 5. Here I consider the reduced form rather than an IV because missionaries did not have an effect on the potential first stage (religion). I also look

at specific Protestant missionary groupings, rather than consider all of them together. This is motivated by the historical literature, which suggests that Presbyterian missionaries put particular stress on both education and broader social improvement, while Evangelical missionaries tended to have some of the same goals but did not stress these as strongly. Pentecostal missionaries did little educational or social work and focused primarily on evangelism (Garrard-Burnet 1998). We might expect missionaries with a stronger emphasis on social change to have positive effects on the economic situation of individuals nearby, and these effects could be persistent (as in, e.g., Caicedo 2014).

Broadly, the data reflect these historical trends. Table 13 shows the effects of 25 km proximity Presbyterian, Evangelical, and Pentecostal mission locations in 1904-40 on literacy, education, wealth index, log yearly earnings, and the husband working in agriculture. Evangelical mission proximity has a statistically significant effect on all variables, while Presbyterian proximity has statistically significant effects on wealth index and the husband's occupation and Pentecostal proximity has no effects. The relative strength of the Evangelical effects relative to the Presbyterian is somewhat surprising since Presbyterians were described as leading the way in education and social improvement efforts. However, the general picture is that Evangelicals and Presbyterian missions had positive, lasting effects on the economic situation of the areas in which they located, while Pentecostal missions did not.

The effects of Evangelical missionaries are also economically significant. Being near an Evangelical mission is associated with a 10 percentage point higher probability of being literate and an average of 0.8 more years of education (0.21 SD). It predicts an increase of 0.26 in the wealth index (0.26 SD) and 0.32 in log yearly earnings (0.19 SD). Finally, husbands are less likely to work in agriculture by 11 percentage points. For Presbyterians, there is a similar effect on the wealth index of 0.23 (0.23 SD) and on the husband working in agriculture of 12 fewer percentage points. These results demonstrate that Protestant missionary activity can have differential effects depending on the type of activities pursued by missionaries.

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Table 13: Effect of Protestant Missions on Economic Outcomes

	(1) Literacy	(2) Education	(3) Wealth Index	(4) Log Yearly Earnings	(5) Husband Works in Ag.
Any Presby Within 25 Km (1904-40)	0.02	0.47	0.23*	0.15	-0.12**
	(0.03)	(0.28)	(0.10)	(0.13)	(0.04)
Any Evangel Within 25 Km (1904-40)	0.10***	0.80**	0.26**	0.32*	-0.11**
	(0.03)	(0.26)	(0.09)	(0.13)	(0.04)
Any Pent Within 25 Km (1904-40)	-0.02	0.15	-0.04	0.23	0.06
	(0.03)	(0.35)	(0.13)	(0.14)	(0.05)
Fraction Indigenous (1893)	-0.35***	-1.46*	-0.54*	-0.39	0.10
	(0.07)	(0.65)	(0.22)	(0.27)	(0.09)
Literacy (1893)	0.73*	11.53***	3.11**	2.48**	-0.98*
	(0.28)	(2.62)	(1.00)	(0.91)	(0.39)
Population Density (1893), People /Km^2	0.00**	0.01**	0.00***	0.00*	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Elevation (m)	-0.00	-0.00	-0.00*	-0.00**	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Distance to Coast (km)	0.00	-0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
N	14490	14538	14538	4182	9867

Standard errors in parentheses

Source: DHS, McCleary 2016b, CGIAR, Guatemalan Census (1893)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6 Conclusion

In this paper, I have analyzed DHS data from 1990s Guatemala to provide empirical evidence that casts doubt on the generalizability of the theory that Protestantism causes income growth in Latin America. I found that Protestants and non-Protestants are similar along nearly all economic variables, including household wealth. This analysis faced the issue that individuals who affiliated with Protestantism may have been *ex ante* different from those who did not. Thus, I pursued two more strategies with greater potential for causal inference. First, I used data on the density of lights at night at the municipality level and found that the share of Protestants in a municipality in 1995 does not predict growth in light density in 2013, though light density proxies well for household wealth. Second, I performed an instrumental variables analysis using the presence of a Catholic parish within 25 km of the individual's municipality's centroid in 1925 as a (negative) instrument for Protestantism. I found no significant positive effects of Protestantism on wealth. However, the standard errors are large and thus this analysis cannot rule out significant positive effects.

Despite the absence of significant effects of Protestant religious affiliation, I did find significant effects of proximity to Evangelical missionaries, and to a lesser extent, to Presbyterian missionaries, on wealth and education today. I found no effects for Pentecostals. This agrees with the historical literature that says Evangelical and Presbyterian missionaries emphasized social change and education among the Protestant missionaries while Pentecostals focused on conversion.

This paper makes a new contribution to the scholarship on the economic effects of Protestantism in Latin America. While I cannot confirm the theory that a new Protestant Ethic exists, my results are limited to the context of Guatemala in to 1990s, a time and place in which Protestantism was already a major force. Much of the discussion of Protestantism fostering social mobility, however, has centered on converts at an earlier stage of the growth of Protestantism. Perhaps the phenomenon happened in the 1970s and 1980s, but not after, at least not in Guatemala.

This paper also contributes to the growing literature on the persistent effects of missionaries.

In particular, it suggests that Protestant missionaries are not a monolithic category and that certain types of missionaries are more likely to perform activities that lead to improved economic situations today. More broadly, this paper speaks to the historical persistence of economic factors. Missions that were located in areas in the early part of the twentieth century continue to have an effect today. Thus, when looking for explanations in differential development patterns, looking to historical factors is key. Moreover, religion should not be entirely left out of the equation. While it may not be the key to economic transformation in Guatemala, it seems to have motivated missionaries to do a precursor to contemporary development work – work that had lasting impacts.

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