The Price of Faith: Economic Costs and Religious Adaptation in Sub-Saharan Africa*

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Abstract

How do economic costs affect religious choices, and how do religious institutions adapt to economic realities? We study the Seventh-day Adventist (SDA) church in Sub-Saharan Africa, which prohibits production of tobacco, coffee, and tea, creating opportunity costs for potential members in areas suitable for these crops. We construct a measure of SDA membership opportunity cost that varies over time and space based on local crop suitability and export prices. Using church administrative data and member surveys, we find that increased opportunity costs lead to lower membership growth and lower satisfaction with the church among existing members. Higher opportunity costs also cause establishment of new SDA educational and health institutions; church members to perceive less messaging about "healthy living" religious tenets; and higher church member consumption of prohibited goods. These findings provide new insights into the microeconomics of cultural change, as mediated by religious institutions. Religious organizations can show striking flexibility in balancing tradition and adaptation when faced with economic pressures.

JEL codes: D71, L31, O12, Z12
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1. Introduction

Across religious traditions, rules and prohibitions structure daily behavior and shape economic life in profound ways. Sabbath restrictions, bans on specific occupations, and prohibitions on certain foods, substances, or financial practices all generate economic costs of religious participation. As Seabright (2024) emphasizes, these requirements are not incidental: they are central to how religions create boundaries, cultivate commitment, and sustain communities. While such prohibitions help define religious identity, they also expose individuals and religious organizations to economic pressures that vary across time and place. For individuals, adherence entails opportunity costs that may fluctuate with local economic conditions; for religious groups, maintaining strict rules may become more difficult when compliance becomes more demanding. Despite the ubiquity of these restrictions, we know little about how changes in their economic burden shape religious participation or how religious institutions adjust their teachings, emphasis, or service provision when adherence becomes more costly.

Studying these dynamics empirically is challenging because the prohibitions that religions enforce are themselves shaped by the environments in which they operate. Rules governing work, diet, or permissible economic activity often arise endogenously from local histories, cultural preferences, or institutional needs, making it difficult to disentangle the effects of religious prohibitions from the forces that produced them. A further difficulty is measurement, since the economic burden imposed by a religious rule can be hard to quantify. As a result, isolating the causal impact of changes in the economic cost of religious rules – on both individual participation and institutional adaptation – is difficult in most settings. Yet such evidence is central for understanding how the "prices" of religious rules shape behavior, and how cultural and institutional systems adapt when such prices increase.

In this paper, we address these challenges in a setting that provides sharp and exogenous variation in the economic cost of religious rules: the Seventh-day Adventist (SDA) Church in sub-Saharan Africa. The SDA church places heavy emphasis on healthy living, and thus prohibits or strongly discourages the production of tobacco, coffee, and tea. The opportunity cost of joining the SDA church due to these production prohibitions varies over space (owing to variability in the suitability of land for these crops) and over time (as export prices of these "prohibited" crops change). We exploit temporal price variation and spatial crop-suitability variation to construct a time-varying and local measure of the opportunity cost of SDA membership in Sub-Saharan Africa. Leveraging this variation and newly compiled administrative data covering nearly 200 SDA sub-national units in sub-Saharan Africa over three decades, we document how individuals adjust their participation when the cost of compliance increases, and how religious institutions respond by

shifting doctrinal emphasis and expanding compensatory services. This context allows us to study, in real time, how both sides of the religious marketplace react when the economic price of belonging rises.

Sub-Saharan Africa provides an especially suitable context for this investigation. The region has experienced substantial religious change in recent decades, with vibrant competition among Christian denominations, Islam, and traditional belief systems. At the same time, agricultural livelihoods remain central for much of the population, making households and religious communities particularly sensitive to crop price fluctuations. These features generate substantial variation in the economic consequences of SDA prohibitions and provide the statistical power needed to detect how changes in opportunity costs shape both individual participation and institutional responses. Together, this setting offers a promising context for studying the interaction between religious prohibitions, economic incentives, and organizational adaptation.

The key right-hand-side (causal) variable in our analyses is a quantitative measure, in money terms, of the opportunity cost of membership in the SDA church in a particular location. The opportunity cost variable is the annual revenue given up per hectare from following SDA prohibitions on the production of tobacco, coffee, and tea. We construct this measure at a fine-grained level (9 km by 9 km grid cells) using (time-invariant) data from FAO GAEZ on potential crop yields as well as FAO data on (time-varying, annual) export crop prices. The measure accounts for potential yields and prices for dozens of crops, and is the difference between "unconstrained" maximized revenue on a grid cell and "constrained" maximized revenue if one follows SDA prohibitions and avoids producing tobacco, coffee, or tea. For every grid cell in Sub-Saharan Africa, in each of 32 years from 1991 to 2022, we calculate the opportunity cost of SDA membership. We then take the mean across grid cells for localities for which we have SDA membership data, year by year; this results in a measure of the opportunity cost of membership that varies over space and time (i.e., at the locality-year level).

We conduct empirical analyses with annual outcome data (from 1991-2022) at the level of sub-national localities for which the SDA provides public data on their membership counts, and other local-level statistics such as the establishment of education and health institutions. The SDA church also made available to us the microdata of a survey of SDA members, which we use to examine members' self-reported religious attitudes and behaviors in a country-level panel from 2017 to 2022.

Our primary empirical analyses involve running panel regressions on annual data at the level of localities in Sub-Saharan Africa. Our opportunity cost measure – agricultural revenue given up per hectare from following SDA crop production prohibitions – is constructed from time-invariant geographic and climate characteristics combined with time-varying regional export prices, and so is immune from reverse causality concerns

(i.e., SDA membership changes cannot plausibly affect the opportunity cost variable). The key identification assumption is that the opportunity cost measure is uncorrelated with omitted variables that may also affect local membership changes. The main concern on this front is that the opportunity cost measure is correlated with local income, particularly in areas suitable for tobacco, coffee, or tea production. If shocks to income in general affect religious group membership, this would confound our interpretation of the opportunity cost variable. We gauge the importance of this concern by including in the regression a measure of *unconstrained* maximized income at the local level, whose variation is driven by crop suitability and crop prices across *all* crops. SDA membership growth is unaffected by this variable, and the coefficient on our opportunity cost variable is also unaffected by the inclusion of the unconstrained income variable. We conclude that our opportunity cost measure is not capturing effects of general income shocks, but instead should be narrowly interpreted as the impact of prohibitions from producing SDA-prohibited crops (tobacco, coffee, and tea).

To organize and interpret our empirical analyses, we develop a simple model of denominational choice in which households weigh the spiritual and social benefits of SDA membership against the economic costs imposed by crop prohibitions. The model generates five testable predictions: higher opportunity costs reduce membership; local churches respond by softening doctrinal emphasis on costly prohibitions while expanding services; membership responses are attenuated where SDA is already deeply embedded in the community; responses are also attenuated in highly Protestant environments, where SDA draws a more committed and positively selected pool; and even committed members who remain experience reduced satisfaction when costs rise exogenously.

We find that increases in opportunity costs lead to declines in new SDA church memberships. The effect is substantial in magnitude. In periods of non-zero opportunity costs, net membership growth falls by 10.4 percentage points on average, with the decline reaching 19.3 percentage points in periods when opportunity costs are in the top quartile (of the non-zero opportunity cost distribution). In addition, remaining SDA members increasingly question their membership in the church: when opportunity costs rise, members report less satisfaction with and less long-run commitment to the church. These patterns are not driven by broader agricultural income shocks or specification choices: the results are robust to controlling for overall agricultural revenues, alternative lag windows, and alternative specifications.

We then consider local SDA church responses to increases in local opportunity costs. First, we find that increases in opportunity costs lead to the establishment of new educational and health institutions. Establishing such institutions may facilitate efforts

to acquire new members.[1] Adventist-run education and health institutions may also be differentially attractive to members (compared to the general public), so such institutions may generate new and local benefits of membership, offsetting at least part of the increased opportunity costs of membership.

In addition, the church also responds to the increased opportunity costs by reducing the emphasis placed on the church's healthy-living prescriptions, which undergirds the prohibition on coffee, tobacco, and tea. We find that when opportunity costs rise, SDA members report hearing fewer messages about the church's "holistic living" (healthy living) prescriptions from church pastors. What's more, and strikingly, increases in opportunity costs lead to more violations of the church's prescriptions on healthy living – namely, more consumption of alcohol and tobacco. These findings provide evidence that the church responds to higher opportunity costs by reducing the emphasis on religious precepts that create those opportunity costs to begin with.

Beyond documenting average responses, we also show that the magnitude of these effects depends importantly on local religious market structure. Membership responses to opportunity-cost shocks are attenuated in places where the SDA church is more embedded – proxied by a higher local SDA population share – consistent with denser networks and stronger community ties raising the value of belonging and leaving fewer households near the margin of switching. Responses are also smaller in places with higher Protestant population shares, consistent with a selection channel: where Protestant alternatives are more prevalent, SDA members are more positively selected on commitment, reducing the mass of marginal switchers. By contrast, Catholic and Muslim shares do not generate comparable moderation patterns, suggesting that competition within Protestant Christianity is the relevant margin for SDA membership decisions. Together, these results imply that similar economic shocks can generate very different religious outcomes depending on the local denominational landscape.

Our findings shed new light on the economics of religion. Individuals take opportunity costs of membership into account when deciding whether to join a new religion. Existing members experience increased dissatisfaction with their religion in response to the same increase in opportunity cost. At the same time, local churches do not remain complacent, and respond dynamically to increases in opportunity costs by providing offsetting benefits and reducing emphasis on the religious prescriptions that are the source of the opportunity costs in the first place. Additionally, we show that the magnitude of these responses depends on local religious market structure. All of these findings are new in the context of the prior literature on the economics of religion.

[1]The SDA church – like many religions – considers education and health institutions to be fruitful contexts for evangelization (Chism et al., 2021).

Our findings contribute to understanding how religious organizations balance tradition and adaptation in response to economic conditions. Religious institutions are important entities shaping social norms, both for their members and in broader society. When individuals join religious groups, they typically shift their values and norms to those of the group. However, religious institutions can also change their moral prescriptions, which then influences the norms followed by their members. By studying the microeconomics of social norm change within a religious institution, we reveal an important mechanism through which social norms change more broadly.

While the literature on cultural evolution emphasizes that culture evolves in response to environmental conditions (Boyd and Richerson, 1985; Henrich, 2015), much recent work stresses that cultural norms are highly persistent and evolve slowly (Giuliano and Nunn, 2020). Our findings complement broader work on religious adaptation to economic and political conditions (Platteau, 2008; Carvalho and Koyama, 2016; Platteau, 2017). While this literature has typically focused on longer-term doctrinal evolution, we document more rapid and high-frequency adjustments by local religious institutions in response to short-run changes in economic incentives. Recent theoretical work by Acemoglu and Robinson (2025) provides a framework for understanding how cultural configurations can exhibit rapid, discontinuous change in response to shifting political and economic conditions. The flexibility and adaptability we document may be key to understanding the success of today's rapidly-growing religions.

The SDA church is certainly not representative of all religious groups. We study it precisely because it has been so successful in terms of membership growth, and its flexibility and adaptability could be key factors in this success. Understanding the strategies of fast-growing groups like the Adventists is crucial for comprehending religious and cultural change, analogous to studying rapidly-growing firms to understand the microeconomics behind their success. Just as studies of successful firms have revealed key insights about market competition, productivity growth, and organizational adaptation (Foster et al., 2001; Hsieh and Klenow, 2014; Bloom et al., 2013), examining fast-growing religious groups can illuminate underlying mechanisms of institutional and cultural change. Moreover, studying organizations during periods of rapid growth provides unique insights into adaptation and innovation that may not be visible when studying more stable incumbents (Christensen, 1997). As groups like the Adventists see differential growth in coming decades, the adaptability we document could become more widespread among religious groups.

More generally, the SDA church is not unusual in having precepts that impose opportunity costs on its members. Such opportunity costs are widespread across religions. For example, religions can prescribe the types of occupations in which adherents can and cannot work. Examples include the prohibition on usury in the early Christian church

(Ihssen, 2012; Visser and McIntosh, 1998), as well as Hindu caste-based occupational prescriptions (Goghari and Kusi, 2023). In addition, religious precepts may restrict labor activities on specific days (Stifel et al., 2011), and obligations such as festivals may compete with economic activities for time and financial resources (Montero and Yang, 2022). Religions may also prohibit consumption as well as production of certain foods, for example, in Islamic *halal* (El-Zibdeh, 2009) and Jewish *kashrut* (Forst, 1993) dietary rules. These and other prohibitions impose opportunity costs (e.g., lost income from prohibited occupations, as well as non-monetary costs) on members of religious groups.

Our findings contribute to a growing body of research on the economics of religion (see Iyer, 2016; Becker et al., 2024; Seabright, 2024; Lowes et al., 2026, for reviews). First, our work relates to studies of determinants of religious group membership and adherence. Prior work has explored how economic conditions and shocks influence religious adherence (e.g., Barro and McCleary, 2003; Chen, 2003; Henrich et al., 2010; Durlauf et al., 2012; Ager and Ciccone, 2018; Bentzen, 2019a,b; Auriol et al., 2020; Algan et al., 2022; Dube et al., 2024; Pope, 2024; Alfonsi et al., 2024; Corbi and Sanches, 2024; Hersey, 2024). In this paper, we examine how specific economic conditions – the opportunity costs of religious prohibitions – influence adherence and conversion in Sub-Saharan Africa.[2]

Our work also builds on economic analyses of religious prohibitions and organizational adaptation (Iannaccone, 1992; Berman, 2000; Berman and Iannaccone, 2006; Chen, 2010; Carvalho and Sacks, 2021), which emphasize how religious restrictions serve as screening devices and commitment mechanisms. We extend this work in three key directions. First, we study a setting where the economic costs of religious prohibitions are determined by forces outside the church's control. In canonical club goods models, churches choose the level of sacrifice to optimally screen members. In our setting, the SDA church prohibits tobacco, coffee, and tea production, but the economic burden of these prohibitions varies exogenously with global crop prices and local agricultural suitability. This allows us to identify how members and local churches respond when costs change for reasons unrelated to their strategic decisions. Second, we document targeted institutional adaptation: churches strategically reduce emphasis on the specific prohibitions creating costs while expanding compensatory services (schools, clinics). Third, we show that local religious market structure fundamentally shapes these dynamics, with membership responses attenuated in areas of high SDA embeddedness (stronger networks) and high Protestant share environments (more positive selection).

Furthermore, our finding that higher opportunity costs reduce member satisfaction and commitment deviates from club goods models of religion (e.g., Iannaccone, 1992; Berman, 2000; Carvalho, 2019; Campante and Yanagizawa-Drott, 2015). These models

[2]More broadly, our study also contributes to work on the religious landscape in sub-Saharan Africa (e.g., Nunn, 2010; Alesina et al., 2020; Le Rossignol et al., 2025).

predict that costly religious prohibitions enhance member satisfaction by screening out less-committed members, and that churches may strategically increase restrictions to strengthen commitment (Iannaccone, 1992; Berman and Iannaccone, 2006). In contrast, we find that when economic costs rise exogenously, even committed members who remain experience reduced satisfaction and commitment. This highlights a limit to the club goods screening logic: when cost increases are exogenous rather than strategically designed, prohibitions create genuine burdens that erode rather than strengthen member commitment – even among those who remain.

Our paper also contributes to research on how religious prescriptions and taboos influence identity and religiosity (Bénabou and Tirole, 2011; Levy and Razin, 2012, 2014; Atkin et al., 2021). We provide new evidence revealing the causal impact of the opportunity cost of religious taboos – in our case, taboos on particular crops – on decisions to join a new religion, as well as on current members' attitudes and adherence to religious tenets.

Finally, we also contribute to the literature on the supply side of religion. Related work studies how economic conditions and religious market structure affect religious conversions and adherence (Iannaccone, 1991; Finke and Stark, 2005; Gruber and Hungerman, 2008; Barro et al., 2010; Hanson and Xiang, 2013; Hungerman, 2014; Caicedo et al., 2023; Barro and McCleary, 2024; Le Rossignol et al., 2025). Our paper is distinct in using detailed data on church actions, such as the establishment of health and education institutions, to study how economic costs influence the actions of the church. Our work is also novel in examining how a church's emphases on adherence to specific religious prescriptions – messages conveyed from the pulpit, as well as adherence by church members – change when the opportunity cost of those prescriptions changes. Finally, we demonstrate how local religious market structure—both the density of the focal denomination and the prevalence of other religions—shapes both demand- and supply-side responses to economic shocks.

This paper is organized as follows. In the next section, we provide an overview of recent trends in religion in Sub-Saharan Africa, as well as for the Seventh-day Adventist Church in particular. Section 3 describes the data, and Section 4 presents the empirical strategy and conceptual framework. Section 5 presents our main results on the impact of the economic cost of membership on membership growth and church institutional responses, and also explores how impacts vary depending on the local religious market structure. Section 6 presents the results using surveys of SDA members to examine the impacts of changes in opportunity costs on SDA member satisfaction and commitment, and on adherence to religious tenets. Section 7 concludes.

2. Background

2.1. Religion in Sub-Saharan Africa

The religious landscape of Africa has undergone significant transformations in recent decades, characterized by rapid growth and shifting denominational allegiances. Christianity and Islam, in particular, have seen substantial expansion across the continent, often outpacing population growth (Zurlo, 2024). This religious boom has been especially pronounced in Sub-Saharan Africa, where Christianity has experienced remarkable growth since the mid-20th century (Jenkins, 2011). By 2020, nearly two-thirds of sub-Saharan Africans identified as Christian, making it one of the most Christian-populous regions in the world (Zurlo, 2024).[3]

Religious expansion has gone hand in hand with increasing denominational diversity. Across the region, Pentecostal and Charismatic churches have grown rapidly, often blending traditional African spiritual practices with Christian theology (Anderson, 2013). Mainline Protestant denominations and the Catholic Church have also expanded, albeit more slowly (Jenkins, 2016), and Islam has likewise grown in certain areas, particularly in West and East Africa (Hill, 2009). Recent survey evidence highlights that switching between Christian denominations is relatively common over the life course, and that competition is primarily *within* Christianity rather than between Christianity and non-affiliation (Alfonsi et al., 2024).[4] The dynamic religious environment has had profound implications for social, economic, and political spheres across the continent, influencing everything from voting patterns to economic behaviors and social norms (Ellis and Haar, 2007).

Within this dynamic religious landscape, the Seventh-day Adventist (SDA) Church has emerged as one of the fastest-growing Christian denominations in Africa (Adogame et al., 2008; Llywelyn, 2022). From its initial footholds established in the early 20th century, the SDA Church has expanded rapidly across the continent, with particularly strong growth in Eastern and Southern Africa (Höschele, 2007). This growth has occurred despite, or

[3] In most countries, this expansion has not taken the form of Christianity replacing traditional beliefs, but rather of a crowded and fluid religious marketplace in which households choose among multiple Christian denominations, Islam, and a variety of independent and syncretic churches while often maintaining traditional beliefs (Le Rossignol et al., 2025)

[4] Alfonsi et al. (2024) use panel data from Kenya and illustrate this pattern clearly: 38% of respondents report switching between traditional Christian churches (Catholic/mainline Protestantism) and Pentecostal churches over a 20-year period, with additional switching within these broad categories (about 7% between Catholic and mainline Protestantism and 25% among different Pentecostal churches). At the same time, only around 6% of respondents ever report a non-Christian affiliation, the share with no religion remains close to 1%, and 95% say religion is very important in their lives, implying that mobility largely reallocates believers across Christian denominations rather than into or out of religion.

perhaps partly because of, the church's distinctive doctrines and lifestyle practices, which set it apart from many other Christian denominations in the region.

2.2. The Seventh-day Adventist Church

The Seventh-day Adventist Church, founded in 1863 in the United States, is a Protestant Christian denomination known for its emphasis on the Second Coming ("Advent") of Christ and observance of the Sabbath on Saturday (Land, 2005). Since its inception, the SDA Church has experienced significant global growth, becoming one of the fastest-growing Christian denominations worldwide. As of 2021, the church reports a global membership exceeding 21 million, with a substantial presence in Sub-Saharan Africa (Office of Archives, Statistics, and Research, 2022).

Central to SDA doctrine is the concept of holistic health and wellness, rooted in the belief that the human body is the temple of the Holy Spirit (General Conference of Seventh-day Adventists, 2024). This theology underpins a distinctive set of lifestyle practices and prohibitions. Among the most notable of these are strong discouragement of or prohibitions on the consumption and production of tobacco, coffee, and tea (General Conference of Seventh-day Adventists, 2022).[5] These restrictions differentiate SDAs from many other Christian denominations in the region.[6]

The SDA Church strongly discourages the use of tobacco in any form, viewing it as harmful to health and incompatible with Christian stewardship of the body (General Conference of Seventh-day Adventists, 2022). This prohibition extends beyond personal use to include the cultivation and production of tobacco. Similarly, the church advises against the consumption of caffeinated beverages, particularly coffee and tea, citing concerns about their addictive properties and potential negative health effects (Wilson, 2017). While not as strictly enforced as the tobacco prohibition, many devout SDAs abstain from these beverages and their production (Brody, 1986).

These prohibitions have significant economic implications, especially in regions where tobacco, coffee, or tea are important cash crops (Prowse, 2013). In parts of Sub-Saharan Africa, where these crops are often crucial to local economies, the decision to join the SDA Church may represent a substantial economic sacrifice for individuals and communities. Despite these economic challenges, the SDA Church has seen rapid

[5]In addition to abstaining from tobacco, alcohol, tea, and coffee, SDA teaching encourages simple diets, often vegetarian or heavily plant-based, and in some cases adherence to Old Testament distinctions between "clean" and "unclean" meats (General Conference of Seventh-day Adventists, 2022).

[6]Some other Christian groups in Sub-Saharan Africa, particularly Pentecostal churches and the Church of Jesus Christ of Latter-day Saints (LDS), also discourage or prohibit alcohol and sometimes tobacco; discouragement of both coffee and tea is rare outside SDA and LDS groups. By contrast, Catholic and mainline Protestant churches generally place no doctrinal restrictions on cultivating or consuming tobacco, coffee, and tea beyond norms against excess or addiction.

growth in Sub-Saharan Africa (Office of Archives, Statistics, and Research, 2019), and has developed a sizeable institutional footprint across the region. Local congregations are linked to networks of schools, hospitals, and clinics that are formally affiliated with the church. Adventist primary and secondary schools, teacher-training colleges, and, in some settings, universities provide formal education that is attractive to households seeking upward mobility and access to white-collar employment. SDA hospitals and clinics similarly serve both Adventists and non-Adventists, and public-facing health programs are often explicitly connected to the church's evangelistic mission. Membership in the church thus often comes bundled with access to organizational resources and social networks that extend beyond purely spiritual activities.

3. Data

We study the impact of opportunity costs of membership in the SDA Church on new memberships and on church actions in response. We are also interested in the impacts on existing members' attitudes and adherence to religious tenets. Studying these questions requires assembling a range of datasets, many of which have not previously been used for research in economics.

3.1. Membership and Church Actions

We obtained data on membership in the SDA church from the SDA Office of Archives, Statistics, and Research (ASTR). The ASTR's public website offers a wealth of information, including official church publications and detailed datasets on the church's global presence, with data starting as early as 1863 for each available geographical area. Using the website's structure – which follows the church's organizational structure – we extracted yearly membership information at the lowest level of the SDA church's administrative divisions for each country.[7] For the remainder of this paper, we will refer to these sub-national divisions of varying sizes as SDA *localities*. For each locality, the data contains counts of the stock and flow of membership, including the number of baptisms, new membership gains, transfers, and member deaths, among others, for each year. Appendix Section A.1 provides definitions for each variable in the ASTR dataset.

The primary church membership outcome variables in our analyses below are 1) gains, 2) losses, and 3) net gains. Gains are defined as the total number of members added by all methods, including baptisms, former member baptisms, or professions of faith. Losses are defined as the total number of members removed from membership rolls, either by

[7]Appendix A.1.2 presents a detailed description of the SDA administrative structure.

dropping membership or by being recorded as missing. Net gains are defined as gains minus losses.

The primary church response outcome variables in our analyses are the number of 1) churches and 2) health or education institutions. We obtained the first variable directly from the ASTR yearly statistics. Churches represent the total number of registered churches or "companies" (newer churches) for the locality in a given year.[8]

To obtain the counts of health and education institutions, we systematically digitized the SDA Yearbooks – a yearly publication of the central branch of the SDA that serves as a directory of the SDA's organizational units and institutions (General Conference of Seventh-day Adventists, Archives, Statistics, and Research, 2023) – to extract the list of SDA institutions available year by year, using the listed addresses to geo-reference each institution and assign them to localities.

We focus on localities from 1991 onwards (through 2022 inclusive) due to completeness of data and widespread availability of data at the level of sub-national localities in Sub-Saharan Africa. To map each of these localities to countries' administrative divisions, we use information from the SDA Yearbooks on the geographic areas encompassed by each SDA organizational unit. Localities have slowly reorganized as their membership grows, usually splitting into smaller localities. This process naturally leads to an unbalanced panel. We follow each locality for as many years as it exists, with the same geographical boundaries as indicated in the SDA Yearbooks. We use this information to construct unique shapefiles identifying these localities across time by combining the data with the GADM shapefiles from the Global Administrative Areas database (Global Administrative Areas, 2022).[9] Figure 1 provides a map of the 195 SDA localities for 2020.[10] Figure 2 presents maps on the population size of Adventist membership across SDA sub-national localities for 1995 (a), 2011 (b), and 2020 (c).

3.2. Opportunity Cost of Religious Membership

We aim to create a measure of the opportunity cost of adhering to SDA prohibitions on the production of tobacco, coffee, and tea that varies both over time and at the locality level. To do so, we use data on (time-invariant) locality-specific potential crop yields and (time-varying) global crop prices.

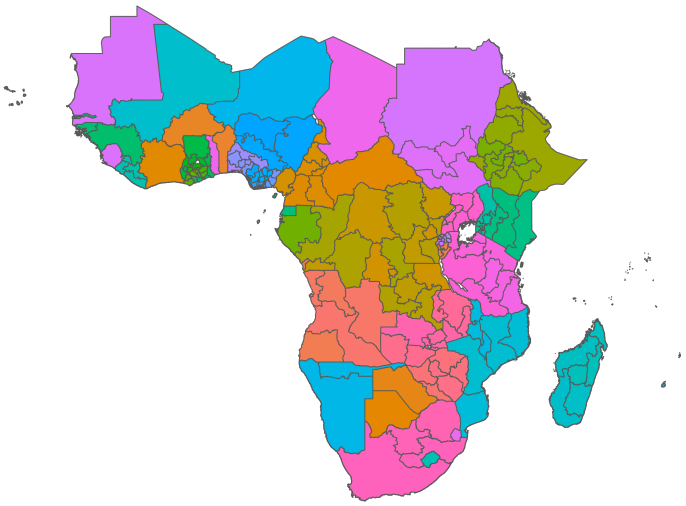
First, we use information that details at a very granular level – 9 km by 9 km grid cells – the time-invariant spatial variation in the suitability of the land for 38 different crops. These data come from the Global Agro-Ecological Zones (GAEZ v4) dataset of the

[8] See Appendix A.1 for variable details.

[9] Appendix A.2 contains a detailed description of the definition and construction of geographic definitions of SDA localities.

[10] Appendix Table C1 provides summary statistics for the religious membership data.

Figure 1: SDA Localities: 2020



Notes: Borders of the 2020 SDA sub-national localities used in our analyses. Borders determined using information from SDA Yearbooks (General Conference of Seventh-day Adventists, Archives, Statistics, and Research, 2023) in combination with GADM shapefiles from the Global Administrative Areas database (Global Administrative Areas, 2022). See Section 3.1 for details.

Food and Agriculture Organization (FAO) of the United Nations in cooperation with the International Institute for Applied Systems Analysis.[11] Crop yield data are in kilograms of production per hectare.

The second component needed to construct the opportunity cost measure is time-varying crop export prices from 1990 onward.[12] The prices are provided by the FAO's Food and Agricultural Trade Dataset (Food and Agriculture Organization of the United Nations, 2024), which includes export values and quantities at the country-year level. To mitigate the influence of country-specific economic shocks and capture broader regional trends, we use a weighted average of prices for Sub-Saharan Africa derived from export values and quantities.[13] Appendix Figure C1 presents a time series of average regional prices for prohibited crops (coffee, tea, and tobacco), and Appendix Figure C2 presents a time series of average regional prices for a subset of non-prohibited crops. These crop price data (and all data in money terms in this paper) are expressed in real 2010 US dollars.

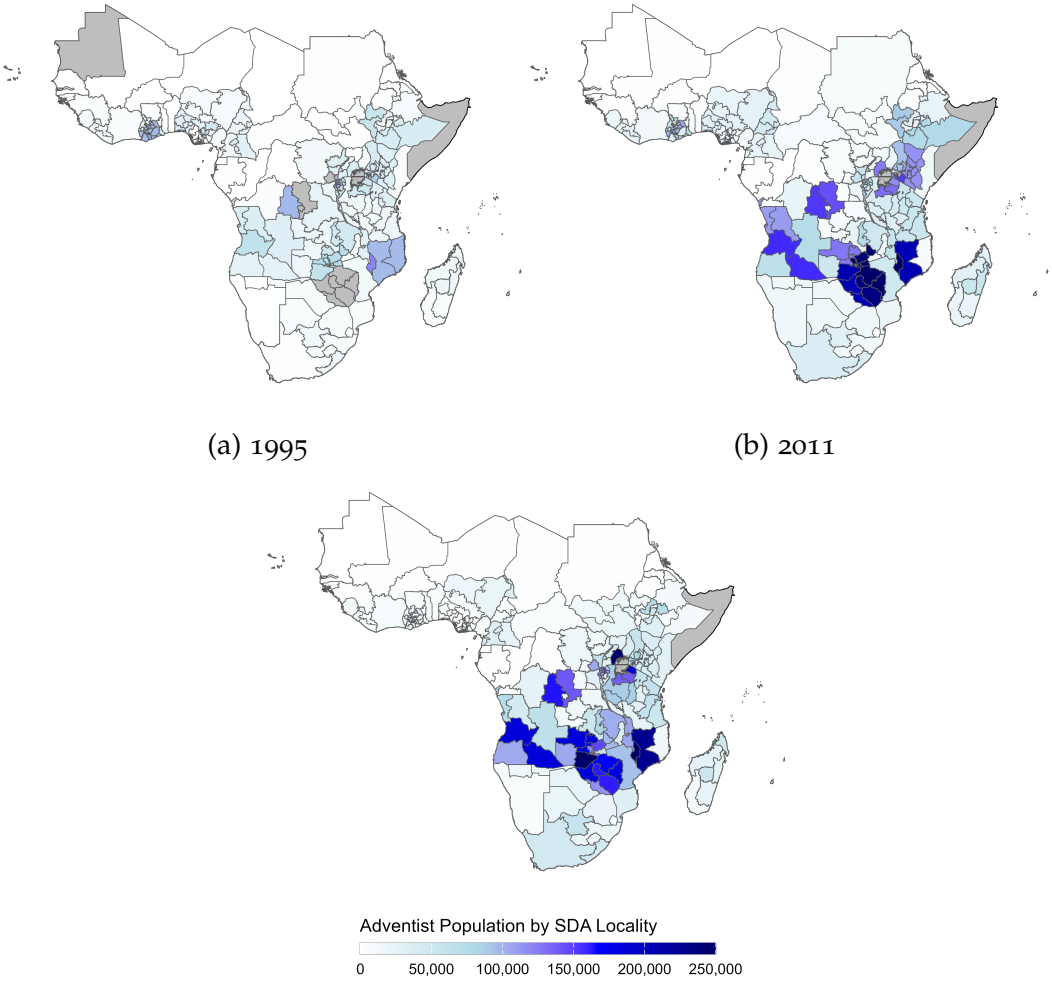
With these two components – the (time-invariant) potential crop yields measures and (time-varying) annual crop prices – we calculate the opportunity cost of adhering to SDA crop prohibitions. This opportunity cost measure is the revenue given up per hectare from avoiding the production of tobacco, coffee, and tea. Specifically, let p index

[11] GAEZ is a multi-stage model that combines geographic, soil, and climate data to produce estimates of potential yields for specific crops. See Appendix A.3 for details.

[12] Appendix Table A.4 describes the concordance between GAEZ crops and FAO products.

[13] Appendix Table A.5 provides a detailed description of the construction of export prices.

Figure 2: Number of SDA Members by Locality



(a) 1995 (b) 2011

(c) 2020

Notes: Number of SDA members by SDA locality for select years. Borders determined as described in Figure 1 and Section 3.1. Data on SDA membership are from the SDA Office of Archives, Statistics, and Research (ASTR).

pixels (grid cells), t index years, and k index crops from the set of 38 crops (K) for which we have both export prices ($p_{k,t}$) and crop suitability ($s_{k,p}$). We first define the "unconstrained" maximum revenue as:

$$R_{p,t}^{max} = \max_{k \in K} (p_{k,t} \cdot s_{k,p})$$

that is, the maximized revenue per hectare on a pixel (from selecting the revenue-maximizing crop from all possible crops for cultivation, given time-invariant crop yields and time-varying crop prices). Figure 3 presents maps of the highest unconstrained revenue-yielding crop across pixels for various years.

We then define the "constrained" maximum revenue as:

$$R_{p,t}^{constrained} = \max_{k \in K \setminus \{\text{tobacco, coffee, tea}\}} (p_{k,t} \cdot s_{k,p})$$

that is, the maximized revenue per hectare if one follows SDA prohibitions and does not produce tobacco, coffee, or tea.

We then calculate the opportunity cost of adhering to SDA production prohibitions for each pixel by taking the difference between the unconstrained and constrained maximized revenue variables. We define the opportunity cost of SDA membership (in 2010 US dollars per hectare per year) as:

$$\textit{SDA Cost}_{p,t} = R_{p,t}^{max} - R_{p,t}^{constrained}$$

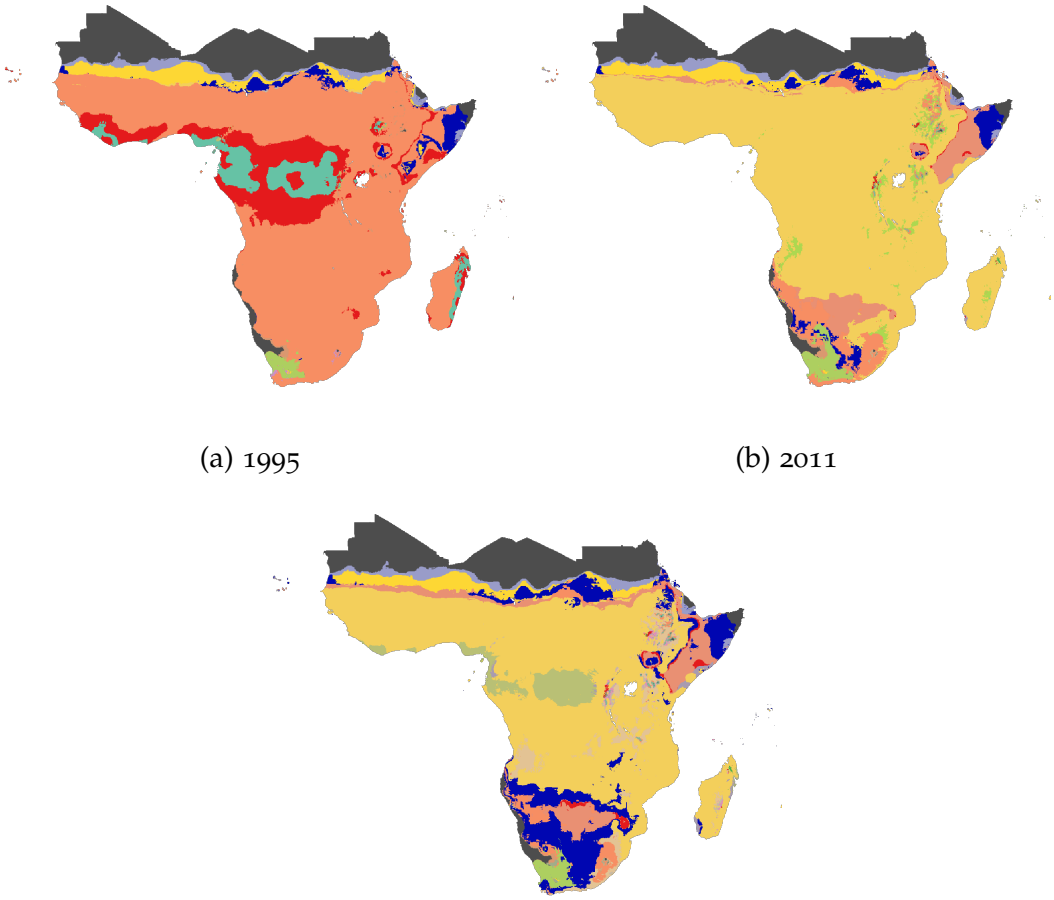
where positive values of $\textit{SDA Cost}_{p,t}$ indicate higher opportunity costs of religious membership. For pixel-years where the maximum revenue-generating crop is not a prohibited crop, our measure is zero, implying that adhering to SDA prohibitions does not incur any opportunity cost in those cases. Figure 4 presents maps of this opportunity cost measure ($\textit{SDA Cost}_{p,t}$) across pixels for various years.

We aggregate this measure to the SDA locality level for each year. We take the average of the opportunity cost measure across pixels in a locality (indexed by l), where the average is weighted by pixel-level population to avoid placing weight on areas with little to no population.[14] This is interpreted as the opportunity cost (in 2010 US dollars per hectare per year) of following SDA crop-production prohibitions in a given locality and year ($\textit{SDA Cost}_{l,t}$). Figure 5 presents the opportunity cost measure across SDA localities for multiple years.

As a first descriptive pattern, Figure C3 plots cross-country variation in average opportunity costs of SDA prohibitions against long-run SDA membership growth and shows a negative relationship across Sub-Saharan Africa: countries where the foregone revenue from prohibited crops is higher tend to exhibit slower SDA membership growth. While

[14]We use 1980 pixel-level population data from HYDE version 3.2.1 (Klein Goldewijk et al., 2017) to calculate the population-weighted average cost for each locality.

Figure 3: Revenue-Maximizing Crop by Pixel



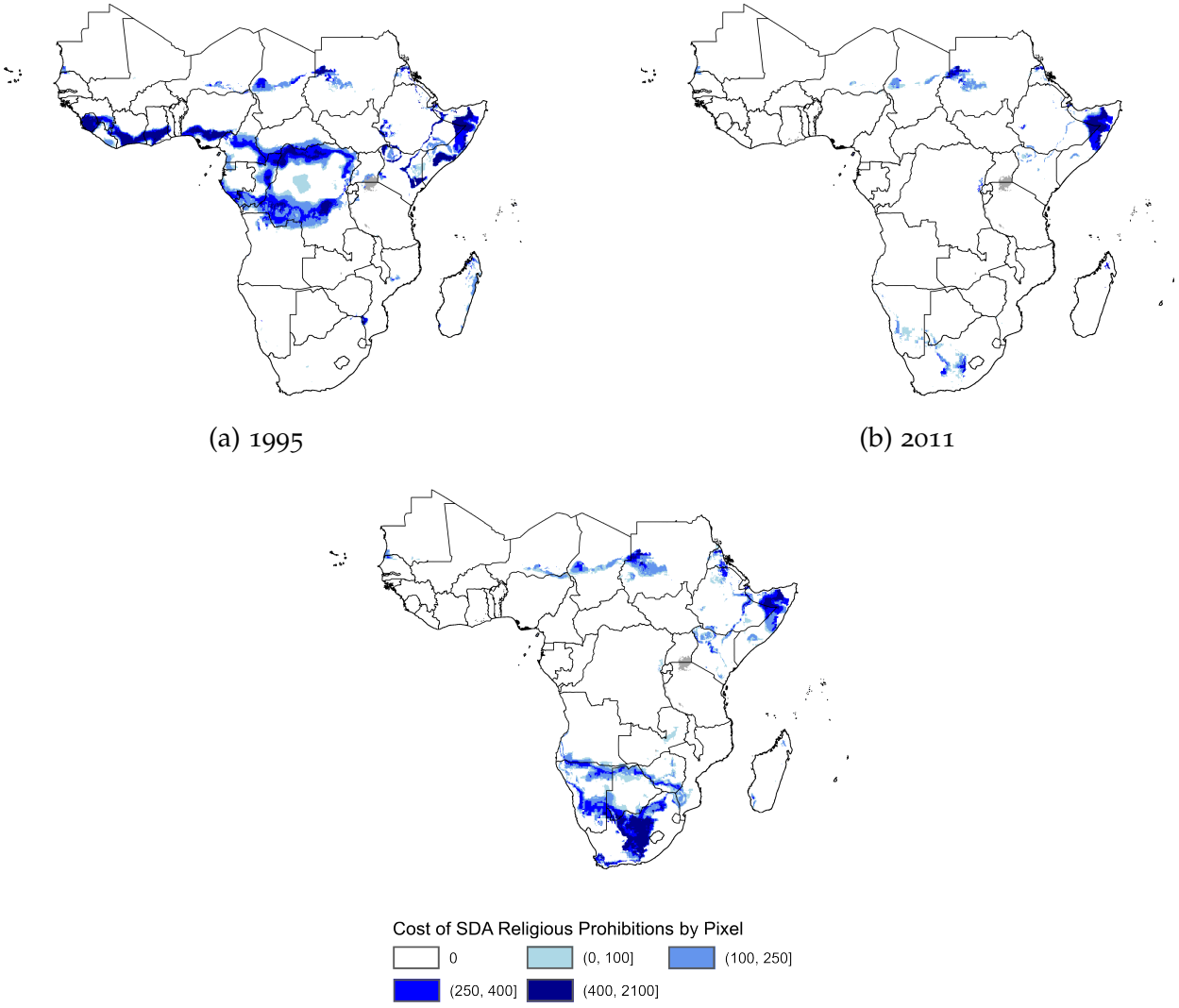
(a) 1995

(b) 2011

(c) 2020

Notes: Colors identify the revenue-maximizing crop for each of the 795,236 (9 km by 9 km) pixels in Sub-Saharan Africa in select years. Revenue-maximizing crop is determined using data on pixel crop suitability (from the Global Agro-Ecological Zones (GAEZ v4) dataset) and crop export prices (Food and Agriculture Organization of the United Nations, 2024). See Section 3.2 for details.

Figure 4: Opportunity Cost of SDA Crop Prohibitions by Pixel



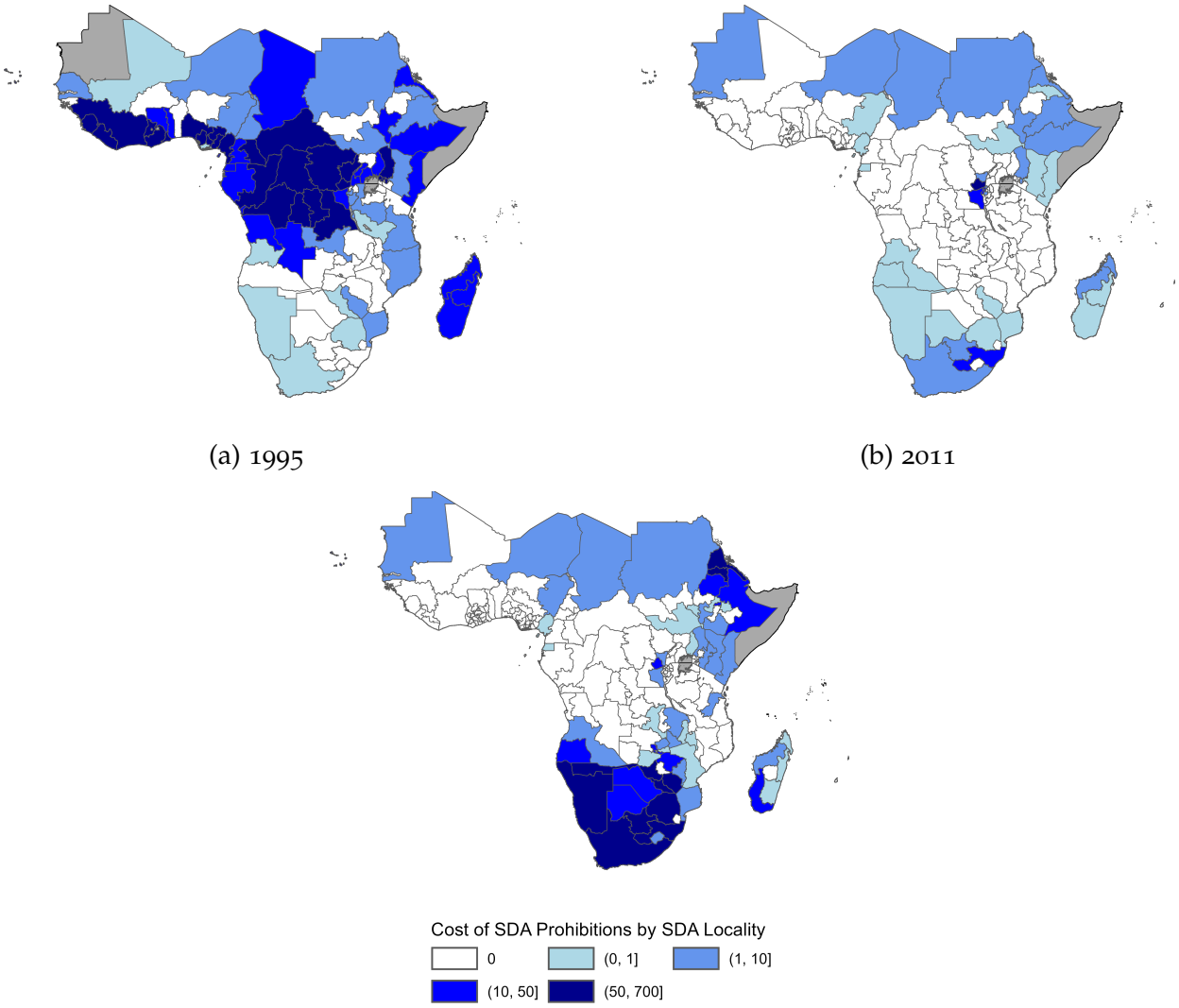
(a) 1995

(b) 2011

(c) 2020

Notes: Shades of blue quantify opportunity cost (in 2010 US dollars per hectare per year) of adhering to SDA prohibitions on production of tobacco, coffee, and tea in select years. Data is displayed for roughly 250,000 (9-km square) pixels in Sub-Saharan Africa. Opportunity cost is zero (white pixels) if the revenue-maximizing crop (displayed in Figure 3) is not an SDA-prohibited crop (tobacco, coffee, or tea). When the revenue-maximizing crop is an SDA-prohibited crop, opportunity cost is positive (shades of blue; darker is higher) and is calculated as revenue from growing an SDA-prohibited crop minus revenue from growing the highest-revenue crop that is not SDA-prohibited. See Section 3.2 for details.

Figure 5: Opportunity Cost of SDA Crop Prohibitions by SDA Locality



(a) 1995

(b) 2011

(c) 2020

Notes: Shades of blue quantify population-weighted mean opportunity cost (in 2010 US dollars per hectare per year) of adhering to SDA prohibitions on production of tobacco, coffee, and tea. Data is displayed for SDA localities in Sub-Saharan Africa in select years. Opportunity cost at pixel level (displayed in Figure 4) is averaged across all pixels in a locality; pixels weighted by 1980 population (from Klein Goldewijk et al. (2017)) when taking within-locality mean. See Section 3.2 for details.

suggestive, this cross-sectional correlation is not causal and could reflect confounding country-level characteristics. This motivates our empirical strategy presented in Section 4, which leverages within-locality changes in opportunity costs over time to identify the membership response to shifts in the opportunity costs of adherence.

3.3. SDA Member Surveys

The SDA church conducts worldwide surveys of its members, collecting information on their individual and household demographic characteristics; religious behaviors, roles, attitudes, and experiences; beliefs; and health. We focus on variables reflecting church messages in sermons, member beliefs and attitudes, such as members' satisfaction with and commitment to the church, as well as their usage of alcohol and tobacco. We use two rounds of the Global Church Member Survey (GCMS) conducted in 2017 and 2022. The lowest administrative division available in the GCMS that is comparable across multiple rounds is the respondent's country of residence, so our analyses of the GCMS data are conducted at that geographic level.

The primary outcome variables in our analyses from the GCMS survey are on whether holistic (healthy) living messages are emphasized in church services, the usage of alcohol and tobacco by members, and satisfaction with and commitment to the SDA church. We define "Holistic Message" as an indicator variable equal to one if the survey respondent answers that the Sabbath speaker in their church preaches frequently or very frequently about holistic healthful living (the importance of health for the body, mind, spirit, and social relationships), and 0 otherwise.[15] Alcohol and tobacco usage are indicator variables equal to one if the SDA member has consumed tobacco or alcohol during the reference period of the survey. "Satisfaction" is an indicator variable equal to one if the respondent reports being satisfied or very satisfied with their local church, and 0 otherwise. "Commitment with SDA Church" is an indicator variable equal to one if the respondent reports being likely or very likely to attend a SDA Church for the rest of their lives and 0 otherwise. Appendix A.6 provides further details on the GCMS and the variables we use. Appendix Table C2 presents summary statistics.

4. Empirical Strategy

We seek to estimate the effect of changes in the local, time-varying opportunity cost of adhering to SDA crop-production prohibitions on outcomes such as new SDA mem-

[15] As this measure of doctrinal emphasis is based on reports by church members, it does not necessarily reflect official decisions to change church doctrine, or to officially condone doctrinal violations. In other words, this measure reflects church members' *perceptions* of doctrinal emphasis, not necessarily official changes in doctrine.

berships as well as church actions at the locality level. In this section, we discuss our main estimating equation. We also provide evidence to validate the opportunity cost measure by showing that it predicts changes in crop production within Sub-Saharan Africa. Finally, we provide an overview of a simple theoretical model, with predictions on how opportunity costs affect membership decisions and church responses.

4.1. Estimating Equation

We estimate the effects of changes in the opportunity cost of SDA crop-production prohibitions using the following regression equation:

$$y_{lt} = \beta f(\textit{SDA Cost}_{l|t,t-k}) + \nu_l + \phi_t + X_l \times \phi_t + \epsilon_{lt} \tag{1}$$

where l indexes SDA sub-national localities, and t indexes years. y_{lt} is our outcome variable of interest (e.g., new SDA members in locality l in year t). $\textit{SDA Cost}_{l|t,t-k}$ measures the average opportunity cost of abiding by SDA crop prohibitions – the difference in potential revenue per hectare from following SDA restrictions on the production of tobacco, coffee, and tea, relative to the revenue per hectare from not being constrained by the prohibitions (as defined in Section 3.2) – in locality l between year $t-k$ and year t.[16] ν_l are locality fixed effects to account for all time-invariant differences across localities, such as geography or ecological factors that do not vary over time. ϕ_t represent year fixed effects to account for time-varying shocks that are common to all localities, such as global price shocks. X_l is a key baseline characteristic, population in 1980, which is interacted with ϕ_t to flexibly control for time-varying impacts of baseline population size. ϵ_{lt} represents the idiosyncratic error term, which we cluster at the country level to account for spatial correlation in shocks that could affect nearby localities similarly.

Conceptually, $\textit{SDA Cost}_{l|t,t-k}$ should be interpreted as a short- to medium-run average of the economic incentives created by SDA crop prohibitions. In practice, the opportunity cost of membership can be borne along several margins: landowners' crop choices, but also the wages and employment probabilities of agricultural workers, and the profits of local traders and processors involved in prohibited crops. For workers and intermediaries, these margins can react within short time frames; for landowners growing annual

[16] Because agricultural decisions and their economic consequences often have lagged effects, we allow the effect of $\textit{SDA Cost}_{l|t,t-k}$ to incorporate lags and measure average costs over time (e.g., between year $t-k$ and year t, where $k \in \{0,1,2\}$). We discuss the interpretation of this time-averaged measure in more detail in the following paragraph. Baseline results use $k = 2$, and we show that results are similar using alternative lag windows in Appendix C.5.

crops such as tobacco, adjustment may also be relatively fast, whereas for perennial crops like coffee and tea, the relevant margin is entry or exit over a longer horizon.[17]

The coefficient of interest in Equation (1) is β, the effect of changes in SDA opportunity costs on our outcomes of interest (e.g., new SDA members). When examining impacts on net membership gains, we hypothesize that $\beta < 0$, that is increasing the opportunity cost of SDA membership decreases net membership gains. To interpret β as the percentage change in y_{lt} associated with changes in the opportunity cost measures, we estimate the regression using Poisson regressions. This approach is particularly suited for count or non-negative outcome variables, such as new church membership or the number of SDA institutions, instead of log transformations (Chen and Roth, 2024).

The function $f(x)$ in Equation (1) allows us to flexibly capture the relationship between the opportunity cost measure, $\textit{SDA Cost}_{l|t,t-k}$, and the outcome y_{lt}. In our main specifications, $f(x)$ is either (i) an indicator function for positive opportunity costs, $\mathbb{1}(x > 0)$, or (ii) a set of indicator variables for quartiles of non-zero costs, $\mathbb{Q}_4^+(x)$. These functional forms enable us to estimate the impacts of SDA opportunity costs somewhat non-parametrically, without imposing linearity or other strong assumptions about the relationship between costs and outcomes. By allowing for differential effects across quartiles, we also examine whether the impacts of SDA costs are concentrated at higher or lower levels of opportunity costs, thereby providing additional insights into the response function.

The main identifying assumption is that $E[\epsilon_{lct} \mid \textit{SDA Cost}_{lc|t,t-k}] = E[\epsilon_{lct}] = 0$. That is, the opportunity cost of SDA prohibitions is uncorrelated with omitted variables that may also affect SDA membership at the locality level conditional on locality and time fixed effects.

To increase the plausibility of the identifying assumption, we make several analytical choices to increase confidence that the independent variable of interest (the measure of the opportunity cost of following SDA crop prohibitions) is plausibly exogenous. We also provide empirical tests supporting the validity of this identifying assumption.

First, we construct the measure using time-varying global prices instead of using local crop prices, which could influence both religious adherence and agricultural production. Second, we use cross-sectional ecological measures of potential crop yields from the FAO GAEZ that are based on geographic and climate characteristics instead of using observed crop production measures at the locality level. We then construct our opportunity cost measure as the difference between the *unconstrained* maximum potential revenue and

[17]Moreover, we also construct crop-specific opportunity cost indices to probe which crops drive the responses in Appendix C.5. Effects are most evident for tobacco opportunity costs, suggesting that those involved in tobacco farming are more on the margin of SDA membership (perhaps because they are better able to switch from tobacco to other income sources) than those reliant on income from perennial crops like coffee or tea.

the *constrained* maximum potential revenue if a locality follows SDA prohibitions and avoids producing tobacco, coffee, or tea. Taken together, these two choices imply that the opportunity cost measure we use is constructed using exogenous cross-sectional and time-varying measures.

Furthermore, an important concern when using shocks to potential agricultural revenues is that our opportunity cost measure will be highly correlated with local income in areas suitable for tobacco, coffee, or tea production. To address this concern, we also show results where we include the measure of *unconstrained* maximized revenue at the local level, whose variation is driven by crop suitability and crop prices across *all* crops. This allows us to study how SDA membership responds to general income shocks; it allows us to assess whether our opportunity cost measure is simply capturing the effects of general income shocks or whether it is capturing the impacts of the cost of crop prohibitions.

Note that our measure of the opportunity costs of SDA prohibitions primarily captures production-side effects, focusing on the revenue foregone from adhering to SDA crop restrictions. However, there are also potential consumption-side mechanisms that could influence SDA membership and bias our production-side estimates downwards. For instance, higher tobacco prices may reduce the attractiveness of smoking, making it easier for individuals to quit and align with SDA prohibitions, thereby facilitating church membership. These mechanisms would bias our estimates of the relationship between opportunity growth and membership growth in a positive direction and likely lead to attenuation of our coefficient estimates: shifts in a positive direction (toward zero) would be in the opposite direction of our hypothesized negative relationship between opportunity costs and membership growth.[18]

4.2. Validating the Opportunity Cost Measure

A natural first question is: does the opportunity cost measure reflect production realities on the ground? This is a novel measure, not previously used in the economics literature, so it is important to confirm that it is associated in a reasonable way with actual production of crops (across space and over time).

In conducting this validation exercise, first note another interpretation of the opportunity cost variable defined in Section 3.2. While we emphasize its interpretation as the opportunity cost of giving up the opportunity to produce tobacco, coffee, and tea, it can also be interpreted as simply the potential *revenue gain* from producing tobacco, coffee, and tea relative to all other crops. In other words, it quantifies the increase in potential

[18]In Section 6, we use data from SDA member surveys to directly examine how smoking behavior actually changes when opportunity costs rise.

revenue one could earn from devoting land to producing tobacco, coffee, and tea in a particular year, compared to devoting land to the production of any other crop. This measure naturally takes on only positive values (it is bounded at zero) because one can always forgo the production of tobacco, coffee, or tea if it does not produce any revenue gain. Looking at the opportunity cost measure in this way, we should expect it to be *positively* correlated with the production of tobacco, coffee, and tea.

We validate our opportunity cost measure by examining how changes in it are associated with country-level production of crops that are "prohibited" (tobacco, coffee, and tea) and "non-prohibited" (all other crops). We conduct regression analyses using annual, country-level agricultural production data from the FAO.[19] The results presented in Appendix Table C3 show that the opportunity cost variable does predict changes in agricultural production in the expected direction: increases in opportunity cost are associated with increases in the production of prohibited crops – tobacco, coffee, and tea – and decreases in the production of other crops. Thus, our measure predicts changes in the composition of production of prohibited vs. non-prohibited crops.

4.3. Conceptual Framework

To guide our empirical analysis, we develop a simple model of denominational choice in Appendix B. The model formalizes how economic costs of religious prohibitions affect individual participation and local church adaptation, and how these responses depend on local religious market structure. We summarize the key intuitions here.

Individual Participation (Prediction i): Households choosing between SDA and other Christian denominations weigh spiritual and social benefits against the economic costs imposed by crop prohibitions. When opportunity costs rise—for example, when tobacco or coffee prices increase in suitable areas—SDA membership becomes less attractive. Our first prediction is straightforward: *higher opportunity costs reduce SDA membership*. Households near the margin of joining are deterred by the increased economic sacrifice. We test this in Section 5.1.

Church Adaptation (Prediction ii): Local SDA leaders respond strategically to rising costs through two complementary adjustments. Leaders value maintaining doctrinal strictness (emphasis on prohibitions, frequent "holistic living" messaging) while attempting to grow membership. When opportunity costs rise, emphasizing the very prohibitions creating those costs becomes especially damaging to recruitment and retention. Churches therefore respond along two margins: they *reduce doctrinal strictness*—softening enforcement of costly prohibitions and decreasing messaging about abstinence from tobacco,

[19]We use annual country-level crop production measures because locality-level data on agricultural production are not available.

coffee, and tea—while simultaneously *expanding service provision*—investing more in schools, clinics, and other institutions that provide material benefits. When members face higher economic costs from foregone crop income, reducing doctrinal strictness lowers the economic burden, while expanding services provides tangible benefits (education, healthcare) that don't compound the economic sacrifice. Thus, services become particularly valuable precisely when prohibitions are already costly: they help acquire or retain members without asking for additional behavioral sacrifice. We examine these responses in Section 5.2 (institution-building) and Section 6 (reduced holistic living messaging).

How Market Structure Shapes Responses (Predictions iii–iv): The magnitude of membership responses depends critically on local religious market structure through two distinct mechanisms. First, there is an *Embeddedness Channel:* where SDA membership is already widespread, the benefits of belonging are higher through denser social networks and stronger community support. This raises the value of membership, meaning fewer households are near the margin of indifference. When costs rise, there are fewer people to switch away; therefore, *membership responses are attenuated in high-SDA areas.* Second, there is a *Selection Channel:* where Protestant Christianity is historically strong and Protestant alternatives are abundant, SDA draws from a more selected pool—those with stronger intrinsic preferences for SDA's distinctive theology. In competitive Protestant religious markets, choosing SDA over numerous Protestant alternatives reveals a stronger commitment. Fewer households are near the SDA–other-church margin. Thus, when costs rise, *membership responses are attenuated in highly Protestant environments.* Both mechanisms predict smaller responses to cost shocks, but through different channels: embeddedness raises membership benefits directly, while selection changes who chooses the SDA relative to alternatives. We explore both in Section 5.3.

Dissatisfaction Among Stayers (Prediction v): Church adaptation creates a tension for high-commitment members who deeply value strict SDA identity. While reducing doctrinal strictness and expanding services helps retain cost-sensitive members, high-commitment members experience reduced satisfaction from both rising economic costs *and* the church's doctrinal softening. For these members, the spiritual benefits lost from reduced strictness can outweigh the material benefits gained from expanded services. Even among those who remain, *higher opportunity costs reduce satisfaction and commitment* among the most devoted. We test this using member surveys in Section 6.

Relation to club-goods models: Our framework relates to club-goods models (Iannaccone, 1992; Berman, 2000; Carvalho and Koyama, 2016; Carvalho, 2019), in which individuals choose whether to join a religious "club" that endogenously imposes costly requirements or remain in a cheaper outside option, and where those costs help screen out low-commitment members and can raise average commitment and satisfaction among

stayers. Our setting differs in two key ways. First, the opportunity costs we study are exogenous—driven by agricultural conditions and crop prices rather than optimally chosen by the church—and are not directly controlled by local leaders. As a result, higher costs generate genuine income losses even for highly committed members, so we predict that rising costs will reduce satisfaction among stayers (rather than increase satisfaction) and prompt local churches to soften strictness and expand broadly accessible services. Second, canonical club-goods models typically analyze a single religious club holding the competitive environment fixed, whereas we study variation in the structure of denominational competition: both SDA density and the broader Protestant environment shape who selects into SDA and how sensitive membership and doctrine are to cost shocks. In this sense, we use a club-goods-style lens to study how exogenous cost shocks interact with denominational competition, rather than to characterize the optimal design of costly requirements within a single group.

The full model, including formal derivations and graphical illustrations, is presented in Appendix B.

5. Results: Membership Decisions & Church Responses

We now present our empirical estimates of the impact of opportunity costs of SDA crop-production prohibitions on demand-side outcomes (new SDA memberships) and supply-side outcomes (church actions), and explore how these responses vary with the local religious environment.

5.1. Membership Decisions

We first examine the impacts of the SDA opportunity cost measure on membership in the SDA church. Table 1 presents the estimates for equation (1), with membership net gains (columns 1 and 2), gains (columns 3 and 4), and losses (columns 5 and 6) as the dependent variables. Columns 1, 3, and 5 include results using the binary indicator equal to one if the SDA opportunity cost is non-zero, while columns 2, 4, and 6 estimate the impacts across quartiles of the SDA opportunity cost measure.

Results reveal that increases in SDA opportunity costs lead to significant decreases in new SDA memberships. Focusing first on net gains in membership, column 1 indicates that positive opportunity costs are associated with a 10.4% reduction in net membership gains. Examining the quartile estimates in column 2, we observe that the decline in net gains is largest in the highest quartile of opportunity costs (Q_4), with an estimated 19.3% reduction. These results suggest that net membership growth is most affected in areas where SDA opportunity costs are highest. Turning to gains in membership,

columns 3 and 4 provide further evidence of significant impacts. Column 3 shows that a locality with positive opportunity costs experiences an 8.3% reduction in gains compared to a locality with zero costs. In column 4, the quartile-specific analysis reveals that, similar to net gains, the reduction in gains is most pronounced in the highest quartile of opportunity costs, with an estimated 17.4% decrease. Columns 5 and 6 examine the relationship between opportunity costs and losses of *existing* members. Coefficients in columns 5 and 6 are not statistically significantly different from zero, indicating no clear evidence of a relationship between opportunity costs and membership losses.

Taken together, our findings suggest that the economic costs associated with religious prohibitions have a tangible impact on individuals' decisions to join religious groups. The decision to become a new member of the SDA church appears to be significantly influenced by the economic sacrifices required, highlighting the role of opportunity costs in decisions to affiliate with new religious groups.

Table 1: Impact of the Opportunity Cost of Religious Membership on Membership Decisions

	Dependent Variable:					
	Net Gains		Gains		Losses	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.104**		−0.083**		0.224	
	(0.049)		(0.035)		(0.174)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}\}$		−0.059		−0.038		0.435
		(0.041)		(0.028)		(0.296)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}\}$		−0.097		−0.083		−0.006
		(0.096)		(0.072)		(0.189)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}\}$		−0.157***		−0.122***		0.242
		(0.046)		(0.038)		(0.164)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}\}$		−0.193***		−0.174***		−0.185
		(0.054)		(0.051)		(0.176)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	4,238	4,238	4,238	4,238	4,175	4,175
Num SDA Localities	424	424	424	424	412	412
Num Countries	44	44	44	44	44	44
Pseudo R^2	0.856	0.856	0.905	0.905	0.663	0.668
Outcome Mean	2533.254	2533.254	3022.607	3022.607	637.481	637.481
Outcome SD	3804.671	3804.671	4253.701	4253.701	2823.458	2823.458

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms in the SDA locality in a given year. *Losses* is the number of reported dropped and missing members in the SDA locality in a given year. *Net Gains* is reported gains minus losses. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To better understand what margins drive these patterns, we next (i) separate prohibition-specific costs from broader agricultural income shocks, (ii) examine results using alternative time windows, (iii) examine placebo tests, (iv) decompose the opportunity cost by crop, and (v) present results using alternative specifications and functional forms.

Are results driven by broader agricultural income shocks? As discussed in Section 4, a potential concern with the estimates in Table 1 is that the opportunity cost measure might be picking up general changes in incomes via agricultural revenues. To explore this concern, Appendix Table C4 shows the results when we control for general changes in agricultural revenue that, unlike our opportunity cost measure, are not restricted to include non-prohibited crops – the $R_{p,t}^{max}$ variable defined in Section 3.2. The estimates of the SDA opportunity cost measure are robust to the inclusion of $R_{p,t}^{max}$ as a control, suggesting that the SDA opportunity cost measure is not just picking up changes in local incomes. Instead, it specifically captures the economic trade-offs imposed by religious prohibitions.

Timing and adjustment horizons: Opportunity costs may affect membership with different lags depending on which economic margin responds: some channels (e.g., local labor demand, trading and processing activity) can adjust quickly, while production-side adjustments (especially for perennial crops) may unfold more slowly. For this reason, our baseline specification measures *SDA Cost*$_{t,t-k}$ as the average opportunity cost over the previous two years ($k = 2$). Appendix Tables C5 and C6 show that the main pattern is not sensitive to this choice: estimated effects on new memberships are similar when we instead measure costs over $k \in \{0,1\}$ years. The stability of the estimates across these windows suggests that the membership response reflects relatively near-term changes in the economic burden of adherence rather than being driven by a particular lag choice.

Placebo test using leads of the opportunity cost measure: To further validate our main findings on new memberships, we conduct a placebo test using leads of the opportunity cost measure, examining whether changes in future opportunity costs have any predictive impact on current membership outcomes. Specifically, if leads of opportunity costs were found to affect current outcomes, it would suggest the presence of omitted variables or anticipatory behavior unrelated to the direct economic costs imposed by SDA prohibitions. Appendix Table C7 presents the results for net gains (columns 1 and 2), gains (columns 3 and 4), and losses (columns 5 and 6). Across all specifications, the coefficients on both the binary indicator for positive future opportunity costs and the quartile-specific measures are small in magnitude and statistically insignificant. This lack of association confirms that changes in opportunity costs occurring in future periods do not influence current membership decisions.

Which prohibited crops matter most? Our baseline *SDA Cost* aggregates foregone revenue across multiple prohibited crops. To shed light on mechanisms, we also construct crop-specific versions of *SDA Cost* that isolate foregone revenue from tobacco, coffee, and tea separately. For each prohibited crop $c \in \{\text{tobacco,coffee,tea}\}$, we recompute the revenue loss associated with excluding c from the feasible crop set, holding the set of alternative

crops fixed. Appendix Table C8 shows that the membership response is concentrated in tobacco-driven opportunity costs, with much weaker patterns for coffee and tea. This decomposition helps clarify where the aggregate effect comes from and is consistent with a channel operating through relatively short-horizon economic incentives and closely related local labor/trading activity.

Alternative specifications and estimators: We also show that the results are robust to alternative estimators that address treatment effect heterogeneity. Specifically, we re-estimate the relationship using the dynamic difference-in-differences approach of de Chaisemartin et al. (2024), which avoids negative-weight concerns in two-way fixed effects settings when treatment intensity varies over time. Results using both level and log-transformed specifications echo the baseline pattern: higher SDA opportunity costs reduce net gains in membership (Tables C9 and C10).

5.2. Church Responses

We now turn to exploring church responses to changes in opportunity costs: how the SDA church responds to the economic incentives facing their members. Table 2 presents estimates of equation (1), with the number of churches (columns 1 and 2) and the number of health and education institutions (columns 3 and 4) as the dependent variables.

Columns 1 and 2 suggest limited evidence of supply-side responses in terms of churches. The coefficients on the indicator for positive opportunity costs (column 1) and the quartiles of the opportunity cost measure (column 2) are small in magnitude and not statistically significant. Changes in the economic opportunity costs of SDA membership do not significantly influence the number of churches in an SDA locality.

In contrast, columns 3 and 4 reveal a significant response in the provision of education and health institutions. Positive opportunity costs are associated with an 8.1% increase in the number of such institutions (column 3). These results suggest that the church strategically enhances its provision of services, particularly in education and health, to offset the consequences of increased opportunity costs for members and potential members.

Interestingly, the quartile-specific analysis in column 4 shows a different pattern than the membership responses in Table 1: we find little evidence that the church's responses are larger in localities with higher quartiles of opportunity costs. For instance, a locality in the second quartile of opportunity costs experiences a 7.7% increase in the number of education and health institutions, while the response diminishes at higher quartiles, with the coefficient for the highest quartile being smaller and not statistically significant. This pattern suggests that the SDA church's institutional response – establishing health and education institutions – is more limited when opportunity cost increases are relatively

large. Because these health and education institutions are often accessible to non-members as well, they serve a dual role: offering additional benefits to existing members while also helping to attract potential new members. This dual function potentially contributes to the church's strategy for relatively small opportunity cost increases, where such investments can more effectively retain members and draw in new ones. When opportunity costs become too large, however, even these efforts may be insufficient to offset the economic barriers to membership.

Overall, the results in Table 2 highlight that the SDA church strategically adjusts its institutional presence in response to changes in the opportunity costs of membership. While the number of churches remains unaffected, the church increases its investment in health and education institutions, potentially as a strategy to provide new benefits that mitigate the economic challenges associated with membership. Increases in establishment of institutions may also reflect efforts to proselytize and attract members in regions where economic costs would otherwise deter participation.

Table 2: Impact of the Opportunity Cost of Religious Membership on Church Responses

	Dependent Variable:			
	Churches		Institutions	
	(1)	(2)	(3)	(4)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.012		0.081***	
	(0.022)		(0.028)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}\}$		−0.008		0.090***
		(0.028)		(0.030)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}\}$		−0.037		0.077**
		(0.023)		(0.035)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}\}$		0.022		0.067*
		(0.018)		(0.035)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}\}$		0.015		0.058
		(0.016)		(0.041)
Locality Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Observations	4,238	4,238	2,700	2,700
Num SDA Localities	424	424	266	266
Num Countries	44	44	32	32
Pseudo R^2	0.945	0.946	0.465	0.466
Outcome Mean	319.130	319.130	3.725	3.725
Outcome SD	366.580	366.580	3.440	3.440

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Churches* is the number of reported churches and companies in the SDA locality in a given year. *Institutions* is the number of reported health or education institutions in the SDA locality in a given year in the SDA annual yearbooks. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Separating opportunity costs from broader agricultural conditions: As with membership outcomes, we assess whether the supply-side patterns reflect SDA-specific trade-offs rather than broader changes in local agricultural profitability. Appendix Table C11 shows that the estimated increase in health and education institutions is stable when controlling for unconstrained maximized agricultural revenue, $R_{p,t}^{max}$. This suggests that the church's

response is not simply a response to local income shocks, but is linked to the incremental opportunity costs created by the prohibitions.

Timing and adjustment horizons: Institutional investments plausibly respond with different timing than membership flows, since opening or expanding facilities may require planning, resources, and administrative approvals. Our baseline specification measures *SDA Cost*$_{t,t-k}$ using a two-year average ($k = 2$) to capture the relevant economic environment faced by members and church leaders. Appendix Tables C12 and C13 show that the core supply-side pattern – limited adjustment in the number of churches but increased investment in health and education institutions – is similar when we instead measure opportunity costs over $k \in \{0,1\}$. This indicates that the results do not hinge on a particular lag choice.

Which prohibited crops matter most? Next, we apply the same crop decomposition used for membership outcomes to examine whether church responses are concentrated in particular prohibited-crop incentives. Appendix Table C14 shows that the increase in health and education institutions is driven primarily by tobacco-related opportunity costs, with smaller and statistically weaker responses for coffee- and tea-specific costs.

Alternative specifications and estimators: We also show that the church response results are robust to alternative estimators that address treatment effect heterogeneity. Specifically, we re-estimate the relationship using the dynamic difference-in-differences approach of de Chaisemartin et al. (2024), which addresses negative-weight concerns in two-way fixed effects settings when treatment intensity varies over time. Results using both levels and log-transformed specifications confirm the baseline pattern: churches adjust along service-provision margins – expanding health and education institutions – rather than changing the number of churches when opportunity costs rise (Tables C15 and C16).

5.3. The Role of Religious Market Structure

We now test two predictions from our conceptual framework about how local religious market structure shapes responses to opportunity cost shocks. Our framework identifies two distinct mechanisms through which market structure attenuates membership responses to rising costs. The *embeddedness channel* operates through network benefits: where SDA membership is widespread, denser social networks and better access to church services raise the value of membership, leaving fewer households near the margin of indifference. The *selection channel* operates through compositional sorting: in areas with abundant Protestant alternatives, SDA attracts a more committed subset of believers – those with stronger intrinsic preferences for SDA's distinctive theology – leaving fewer marginal types sensitive to economic costs.

We test these mechanisms by examining how SDA membership share (embeddedness) and local Protestant prevalence (selection) moderate the impact of opportunity costs on membership decisions. These mechanisms explain why similar cost increases produce different membership responses across localities depending on SDA density and the broader Protestant environment.

5.3.1. Embeddedness Channel: SDA Density

Where SDA membership is widespread, the spiritual and social benefits of belonging are amplified through denser community networks, better access to church-affiliated services, and stronger mutual support systems. This raises the net value of membership, meaning fewer households are near the margin of joining SDA. When opportunity costs rise, there are fewer people positioned to switch away.

Appendix Table D1 examines how the SDA membership share in a locality moderates the impact of opportunity costs. Each specification includes an interaction between the indicator for positive opportunity costs and the SDA share of the local population (ranging from 0 to 100%), measured in the first year we observe the locality.[20] The results support the embeddedness mechanism. The negative impact of opportunity costs on net gains is significantly attenuated in localities with higher SDA density (column 1). The interaction term indicates that the deterrent effect is fully offset when approximately 14% of the population is SDA – a level only reached in roughly the top 5-10% of localities in our sample. There is a similar pattern for gains: denser SDA networks substantially reduce the impact of rising costs on new memberships (column 2). Finally, in localities with denser SDA membership, higher opportunity costs are associated with fewer losses of existing members (column 3). The benefits of larger SDA networks appear to help retain members even when economic costs rise, either by reducing the burden of adherence or by increasing the relative value of remaining within the group.

These findings provide evidence that religious embeddedness alters the economics of participation. The same cost increase that substantially deters membership in areas with sparse SDA presence has minimal or no effect where SDA forms a significant portion of the community.

5.3.2. The Selection Channel: Protestant Environment

Our framework also predicts that membership responses should be attenuated in richer Protestant environments. In localities where Protestant Christianity is historically strong

[20]SDA share is right-skewed in our sample: the mean locality has an SDA share of roughly 3.1%, but the median is only about 0.9%, reflecting that a small number of heavily Adventist localities pull the average up. The 75th percentile is about 3.3%, and only the top decile exceeds 9%.

and denominational alternatives are abundant, SDA draws from a more selected pool of potential members – those with stronger intrinsic preferences for SDA's distinctive theology and practices. In competitive religious markets, choosing SDA over numerous Protestant alternatives reveals deeper commitment. Consequently, fewer households are near the margin between SDA and other churches, and cost shocks move fewer people across this threshold.

Appendix Table D2 presents results that examine how the Protestant share of the local population moderates responses to opportunity costs.[21] The interaction terms capture whether the impact of rising costs differs in areas with low versus high Protestant share environments. The results support the selection mechanism. Column 1 shows that the negative impact of opportunity costs on net gains is significantly attenuated in areas with higher Protestant prevalence. The interaction term indicates that the effect of positive SDA opportunity costs is offset when approximately 40% of the population is Protestant. Column 2 reveals a similar pattern for gains: where Protestant alternatives are abundant, SDA membership is less sensitive to cost fluctuations. We find no significant moderation effects for Catholic or Muslim shares, suggesting that competition within Protestant Christianity is the relevant margin for SDA membership decisions.

These findings show that denominational competition shapes who joins SDA and how they respond to economic incentives. In religiously diverse markets, those who choose SDA are systematically different – more committed to SDA's specific doctrines – making their participation less sensitive to economic considerations.

6. Results: SDA Health Messaging and Member Satisfaction

We next examine the impacts of the SDA opportunity cost measure on messages emphasized in church services, usage of alcohol and tobacco, and satisfaction with the church. We use data from the SDA Global Church Member Survey (GCMS) on SDA members and examine two main sets of outcomes. First, we examine how changes in the cost of prohibitions impact the healthy living messages emphasized by the church and actual health behaviors by SDA members, specifically the usage of tobacco and alcohol. Second, we examine the impacts on members' satisfaction with and commitment to the SDA church.

[21] We measure religious composition using country-level data on major denominations (Protestant, Catholic, Muslim shares) from the year 2000 using the World Religion Database (Zurlo, 2026), the earliest comparable census-based dataset available for our sample. These broad denominational categories do not capture finer distinctions among specific groups (e.g., Jehovah's Witnesses, Pentecostals) but provide the best available measure of the religious environment facing potential SDA members for our study period.

6.1. Estimating Equation

The SDA Global Church Member Survey (GCMS) does not include information on respondents' sub-national localities, only their countries. We therefore conduct these analyses at the country level, and similarly aggregate our opportunity cost measure to the country level.

To examine the impacts of opportunity costs on outcomes in the SDA GCMS, we estimate the following modification of equation (1):

$$y_{ict} = \beta f(\textit{SDA Cost}_{c|t,t-k}) + \nu_c + \phi_t + \mathbf{X}_{ict}\Gamma + \epsilon_{ict} \tag{2}$$

where i indexes individuals, c indexes countries, and t indexes years. y_{ict} is our outcome variable of interest (e.g., SDA member i's attitudes in country c in year t). $\textit{SDA Cost}_{c|t,t-k}$ is the country-level measure of the average opportunity cost of abiding by SDA crop prohibitions in country c between year $t-k$ and year t. As in Section 4, $f(x)$ is either (i) an indicator function for positive opportunity costs, $\mathbb{1}(x > 0)$, or (ii) a set of indicator variables for quartiles of positive costs, $\mathbb{Q}_4(x > 0)$. ν_c represent country fixed effects to account for time-invariant differences across countries, such as geography or cultural factors that do not vary over time. ϕ_t represent survey-year fixed effects to account for time-varying shocks that are common to all countries, such as global price shocks. $\mathbf{X}_{ict}$ is a vector of individual-level covariates (age, age squared, gender, and educational attainment fixed effects). ϵ_{ict} is the error term. We present standard errors clustered at the country level.

Appendix Table C2 presents summary statistics for outcomes in the SDA GCMS survey data.

6.2. SDA Emphasis on Healthy Living

We first examine the impacts of the opportunity cost of membership on the emphasis by the church on healthy living prescriptions and member adherence. These prescriptions include prohibitions on alcohol and tobacco consumption, as well as strong discouragement of consumption of caffeinated beverages such as coffee and tea. Table 3 presents estimates of equation (2) where the dependent variables include whether church sermons emphasize a holistic approach to health (columns 1-2), and members' self-reported usage of tobacco (columns 3-4) and alcohol (columns 5-6). (The SDA GCMS surveys do not ask about coffee or tea consumption, or production of any good.) The estimates suggest that higher opportunity costs are significantly associated with a reduced emphasis on holistic health messages in church services (columns 1 and 2). Additionally, columns 3-6 reveal that higher opportunity costs are significantly associated with more violations of the church's prescriptions on healthy living – namely, a higher likelihood of reporting

alcohol and tobacco consumption. These findings suggest that as the economic costs of adhering to SDA prohibitions increase, the church reduces emphasis on holistic health messaging, and members are more likely to engage in health behaviors discouraged by the church.

Table 3: Impact of the Opportunity Cost of Religious Membership on Health Messaging

	Dependent Variable:					
	Holistic Message		Tobacco		Alcohol	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.081**		0.021***		0.040***	
	(0.031)		(0.007)		(0.005)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}\}$		−0.037		0.015*		0.031***
		(0.063)		(0.009)		(0.008)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}\}$		−0.119***		0.022***		0.039***
		(0.030)		(0.006)		(0.007)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}\}$		−0.045		0.016**		0.037***
		(0.030)		(0.007)		(0.005)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}\}$		0.042		0.017*		0.036***
		(0.030)		(0.009)		(0.011)
Country FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	30,645	30,645	32,286	32,286	32,513	32,513
Num Countries	34	34	34	34	34	34
Adjusted R^2	0.020	0.023	0.006	0.006	0.050	0.050
Outcome Mean	0.745	0.745	0.028	0.028	0.075	0.075
Outcome SD	0.436	0.436	0.165	0.165	0.263	0.263

Notes: Observations are individual respondents in the SDA Global Church Member Survey (GCMS) in Sub-Saharan Africa. Standard errors clustered at the country level are presented in parentheses. All regressions control for respondent age, age squared, gender, educational attainment fixed effects, and an indicator variable equal to 1 if the respondent is missing age, education, or gender information. *Holistic Message* is a binary variable that takes a value of one if the respondent answers that the Sabbath speaker in their church preaches frequently or very frequently about *holistic healthful living* (the importance of health for the body, mind, spirit, and social relationships), and 0 if seldom or never. *Tobacco* and *Alcohol* are binary variables that indicate whether the respondent has consumed alcohol or tobacco in the past 12 months. $SDA\ Cost_{t,t-k}$ measures the average country-level opportunity cost of abiding by the SDA crop prohibitions–the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathrm{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using OLS regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.3. Member Satisfaction and Commitment

We next examine the impacts of opportunity costs on members' satisfaction with and commitment to the church. Table 4 presents estimates of equation (2) for these outcomes. The results show that higher opportunity costs significantly decrease both satisfaction with the SDA church (columns 1-2) and members' self-reported commitment to the church (columns 3-4). Specifically, the coefficient in column 1 indicates a 4.8% decline in satisfaction, while column 3 shows a 2.2% decline in commitment. These results suggest that rising opportunity costs associated with SDA prohibitions erode members' attachment to the church.[22]

One important consideration when interpreting the results from the SDA Global Church Member Survey is that the sample is self-selected – it includes only individuals who remained members of the SDA church at the time of the survey. Since our prior findings demonstrate that higher opportunity costs reduce new church membership, it

[22]Interestingly, this is in contrast to the predictions of club goods models of religions (e.g., Iannaccone, 1992), which suggest that increases in the costs of religious participation might actually increase satisfaction and commitment of remaining members.

is likely that, in countries with higher opportunity costs, the surveyed population is smaller and more positively selected in terms of religious commitment. That is, those who remain in the church despite higher costs may be the most devout or committed members, potentially creating a bias against finding higher levels of dissatisfaction (in Table 4) or more violations of church prohibitions (in Table 3). If anything, this selection mechanism would lead us to underestimate the negative impacts of higher opportunity costs on satisfaction and adherence. Given this, it is striking that we observe significant increases in tobacco and alcohol use, as well as lower satisfaction and commitment, despite this likely positive selection. It is likely that if we had been able to conduct this analysis in a population of current *and* prior members, the estimated impacts of opportunity costs on satisfaction and commitment would have been even more negative.

Taken together, the results from SDA member surveys highlight the challenges the SDA church faces in retaining members when opportunity costs of adherence increase and how the church attempts to offset these costs by reducing its emphasis on its healthy living prescriptions. This strategy may reflect an effort to adapt its messaging and priorities in response to the rising economic burdens faced by its members, even as these efforts appear insufficient to fully counteract the decline in satisfaction and commitment.

Table 4: Impact of the Opportunity Cost of Religious Membership on Satisfaction and Commitment

	Dependent Variable:			
	Satisfaction		Commitment with SDA Church	
	(1)	(2)	(3)	(4)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.048***		−0.022***	
	(0.010)		(0.006)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}\}$		−0.025		−0.004
		(0.019)		(0.008)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}\}$		−0.040**		−0.019***
		(0.015)		(0.006)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}\}$		−0.047***		−0.019***
		(0.010)		(0.005)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}\}$		−0.054**		−0.021***
		(0.020)		(0.007)
Country FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	32,690	32,690	32,739	32,739
Num Countries	34	34	34	34
Adjusted R^2	0.043	0.043	0.033	0.033
Outcome Mean	0.810	0.810	0.952	0.952
Outcome SD	0.392	0.392	0.214	0.214

Notes: Observations are individual respondents in the SDA Global Church Member Survey (GCMS) in Sub-Saharan Africa. Standard errors clustered at the country level are presented in parentheses. All regressions control for respondent age, age squared, educational attainment fixed effects, and gender, and an indicator variable equal to 1 if the respondent is missing age, education, or gender information. *Satisfaction* is a binary variable that takes a value of 1 if the respondent reports being satisfied or very satisfied with their local church, and 0 otherwise. *Commitment with SDA Church* is a binary variable that takes a value of 1 if the respondent reports being likely or very likely to attend a SDA Church for the rest of their lives and 0 otherwise. *SDA Cost*$_{t,t-k}$ measures the average country-level opportunity cost of abiding by the SDA crop prohibitions–the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using OLS regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

7. Conclusion

The evidence presented in this study reveals how economic incentives shape religious participation and institutional adaptation in Sub-Saharan Africa. Through our analysis of the Seventh-day Adventist church, we demonstrate that economic costs significantly influence both individual religious choices and institutional responses. When the opportunity costs of religious adherence rise – specifically, the foregone agricultural revenue from adhering to prohibitions on tobacco, coffee, and tea production – we find substantial declines in new membership and increased dissatisfaction among existing members.

However, religious institutions do not remain passive in the face of these economic pressures. Our findings reveal sophisticated adaptive responses by the SDA church: establishing new educational and health institutions (to enhance proselytization efforts and to provide offsetting benefits to members), and notably, reducing emphasis on the very religious prescriptions that generate these economic costs. This institutional flexibility – maintaining core religious identity while adapting to local economic conditions – may help explain the remarkable growth of religions like the Seventh-day Adventists in Sub-Saharan Africa.

Our findings have implications well beyond the specific context we study. First, they demonstrate how economic incentives can drive religious change through multiple channels: directly affecting individual choices about religious participation, and indirectly by inducing institutional adaptation. Second, they reveal religious institutions as dynamic actors that strategically adjust their practices and messaging in response to local conditions, while maintaining their fundamental identity. This adaptability may be particularly important in developing regions where religious prescriptions can significantly impact economic livelihoods.

More broadly, our research illuminates mechanisms of institutional and cultural change. While much work emphasizes the persistence of cultural practices, we document how religious institutions can facilitate relatively rapid adaptation to economic conditions. This suggests that successful religious movements may act as mediators of cultural change, selectively relaxing certain prescriptions while maintaining their core identity and values. In an era of rapid economic transformation across the developing world, understanding these dynamics of religious and cultural adaptation becomes increasingly important.

Future research could extend our approach to other religious groups and contexts, examining how different types of economic costs affect religious participation and institutional responses. The interaction between economic development, religious practice, and institutional adaptation that we document may be especially relevant for understanding religious change in other developing regions experiencing rapid economic transforma-

tion. More broadly, our findings suggest the importance of studying how cultural and religious institutions adapt to changing economic conditions while maintaining their essential character and appeal to adherents.

These results ultimately contribute to our understanding of how religious organizations navigate the fundamental tension between maintaining traditional practices and adapting to economic realities. The sophisticated responses we document – offsetting costs through new benefits while selectively adapting religious emphasis – may represent a broader pattern of successful religious adaptation in the face of economic change. Understanding these dynamics is crucial as religious institutions continue to play vital roles in economic development and social transformation across the developing world.

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Online Appendix for

The Price of Faith: Economic Costs and Religious Adaptation in Sub-Saharan Africa

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Appendix A. Data Appendix

A.1. Office of Archives, Statistics, and Research (ASTR) Data

A.1.1. Variable Definitions

- Year: Year in which the statistical values were reported.
- Churches: Total number of registered churches for the specified year and field.[23]
- Companies: Total number of registered companies for the specified year and field.[24]
- Beginning Membership: Membership at the beginning of the year.
- Baptisms: Number of additions by baptism reported for the given year.
- Former Member Baptisms: Number of additions by baptisms of former members (previously removed by dropped or missing).
- Professions of Faith: Number of additions by profession of faith[25] reported for the given year.
- Transfers In: Number of additions by transfer of membership into this conference during the year.
- Transfers Out: Number of losses by transfer of membership out of this conference during the year.
- Deaths: Number of losses by death.
- Dropped: Number of memberships dropped by individual request.
- Missing: Number of members reported missing.
- Total Gains: Total number of members added by all methods. Total Gains = Baptisms + Former Member Baptism + Profession of Faith + Transfers In.
- Total Losses: Total number of members removed by all methods. Total Losses = Dropped + Missing + Death + Transfers Out.

[23] A local church is a mature congregation that has representation in conference sessions.

[24] A company is a congregation that has not yet achieved maturity and has not formally been organized as a local church.

[25] A profession of faith is an alternative to baptism for individuals to become members. It is reserved for people who previously belonged to another church and had already been baptized by immersion.

- Adjust: Used historically to note adjustments needed to ensure consistency because of reporting errors or subsequent corrections. 'Adjustments' can also be used by fields to report membership corrections that do not necessarily fit in other columns.
- Net Growth: Shows the net growth during the year. Formula: Net Growth = Ending Membership - Beginning Membership.
- Ending Membership: Membership reported at the end of the given year.

For our analyses, we define *Gains* as the sum of Baptisms, Former Member Baptisms, and Professions of Faith and exclude transfers in. We define *Losses* as the sum of Dropped and Missing, and again exclude transfers out (as transfers are likely more due to reorganizations in SDA structures). *Net gains* is defined as gains minus losses. In only a very small share of observations (3.5%) is net gains negative. To facilitate our primary estimation approach, Poisson pseudo-maximum likelihood (which does not accommodate negative values), we censor the small number of negative net gains values at zero (replacing negative values with zero).

A.1.2. SDA Organizational Structure

We conduct our analyses at the lowest geographical level of organization of the SDA Church. This corresponds to the public data available from the SDA's Office of Archives, Statistics, and Research (ASTR).

The organizational structure of the Seventh-day Adventist Church (North American Division of the Seventh-day Adventist Church, 2024) consists of four main elements that operate within a global framework.

- Local Church: The foundational unit of the Church, composed of individual members. A Local Church is officially recognized by the constituency session of a local Conference or Mission, which grants it status as a Seventh-day Adventist Church. (The SDA's ASTR does not provide data at the level of "local churches", but only at the next level above the local church level.)

- Local Conference/Mission: A group of Local Churches within a defined geographic area. A Local Conference is granted official status by the constituency session of a Union Conference or Mission. The term "Conference" indicates a high level of self-governance, whereas "Mission" denotes an organization that receives direct support from a supervisory body.

- Union Conference/Mission: This is a grouping of local Conferences and/or Missions within a specific geographic territory. A Union Conference/Mission is granted official status by the General Conference's constituency session. The Union's membership consists of local Conferences and Missions.

- General Conference: The highest organizational level, encompassing all Union Missions, Union Conferences, and other directly attached fields globally. The General Conference provides supervision and assistance to the Church's operations worldwide.

The General Conference (the SDA's highest organizational level) is divided into "divisions" or regional offices. The SDA divisions are the following: East-Central Africa Division (ECD), Euro-Asia Division (ESD), Inter-American Division (IAD), Inter-European Division (EUD), North American Division (NAD), Northern Asia-Pacific Division (NSD), South American Division (SAD), South Pacific Division (SPD), Southern Africa-Indian Ocean Division (SID), Southern Asia Division (SUD), Southern Asia-Pacific Division (SSD), Trans-European Division (TED), and West-Central Africa Division (WAD).

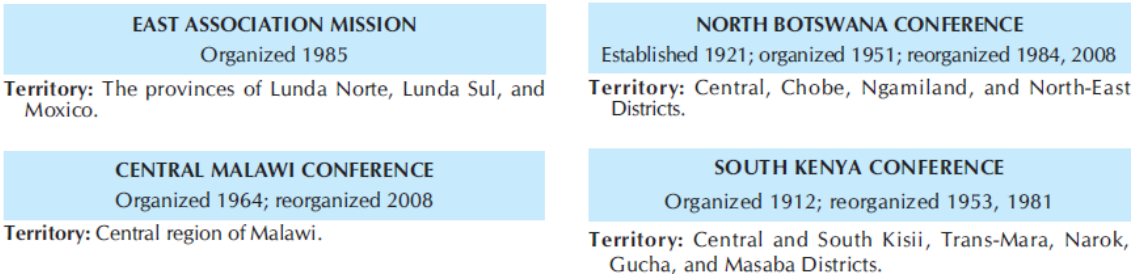
The countries in our sample come from WAD, ECD, SID, as well as the Middle East and North Africa Union Mission.

Administratively speaking, many Missions and Conferences are further subdivided into Fields (Seventh-Day Adventist Church, Monrovia Central, 2024; Adventist Statistics, 2024). As such, the lowest administrative level in each geographical can be a Mission, a Conference, or a Field. Our analyses always take the lowest administrative level available as our unit of analysis, because this is the lowest level at which the data are made available to the public.

A.2. Localities

To construct our unit of analysis, which we refer to as the *locality*, we gathered information from several sources. First, using the ASTR's website structure, we identified all the units at the lowest level of the organizational structure of the Seventh-day Adventist Church and scraped their membership tables for each one of them. Then, we compared the units available with the ones listed in the SDA Yearbooks, identifying the *geographical territory* of each locality. Figure A1 provides examples of territorial definitions in the 2015 SDA Yearbook.

Figure A1: 2015 SDA Yearbook



Notes: The figure presents the territories of four *localities*, as described in the 2015 SDA Yearbook: the East Association Mission of Angola, the North Botswana Conference, the Central Malawi Conference, and the South Kenya Conference.

Given the expansion of the SDA church, *localities* go through slight changes over the years, adapting to their growing membership by splitting Missions, Conferences, or Fields into smaller units over time. Instead of trying to modify these units to match across the entire sample period, we decided to respect their structure by identifying as a locality either a Mission, Conference, or Field that has the exact same boundaries over time, for as many years as the locality's geographical territory remains constant. This yields an unbalanced panel, with a varying number of localities across years (ranging from 93 in 1991 to 195 in 2020).

For most of these *localities*, the sub-national units described in the *territory* description in the corresponding SDA Yearbook are straightforward, as seen in Figure A1, describing the exact districts, states, or regions encompassed by the Mission, Conference, or Field. In a minority of cases, Yearbook territorial definitions were ambiguous, requiring us to make informed judgments about exact locality boundaries.

A.3. GAEZ

GAEZ is a seven-stage model that combines soil and climate data to produce estimates of potential yields under different assumptions. The calculated yield of each crop/land utilization type (LUT) is affected by water sources (e.g., rain-fed vs. irrigated) and by the assumed intensity of inputs and management (e.g., low vs. high).

For this study, we selected the rain-fed, low-level option of inputs for each crop to reduce potential concerns that the choice of (high) agricultural inputs or irrigation reflects endogenous decisions that could be potentially correlated with religious adherence.[26]

A.4. Concordance of GAEZ crops with Crops in FAO Production Data

Appendix Table A1 shows the concordance we use to match crops found in the GAEZ data with crops found in the FAO production database.

[26] According to the GAEZ documentation, under a low level of inputs, the farming system is largely subsistence-based. The production relies on traditional cultivars, labor-intensive techniques, no application of plant nutrients, no use of chemicals for pest and disease control, and minimum conservation measures (FAO and IIASA, 2021).

Table A1: Mapping between GAEZ crops and FAO Production names

Crop Name	**GAEZ Abbreviation**	**FAO Specification List**
banana	bana	Bananas
barley (best type)	barl	Barley
buckwheat	bckw	Buckwheat
phaseolous bean	bean	Beans, dry
cabbage	cabb	Cabbages
carrot	carr	Carrots and turnips
cassava	casv	Cassava, dry
chickpea	chck	Chick peas, dry
coconut	cocn	Coconuts, in shell
cacao (best type)	coco	Cocoa beans
coffee (best type)	coff	Coffee, green
cotton	cott	Cotton linters
cowpea	cowp	Cow peas, dry
dry peas	dpea	Peas, dry
flax fibre	flax	Flax, raw or retted
gram	gram	Chick peas, dry
groundnut	grnd	Groundnuts, excluding shelled
maize (best type)	maiz	Maize (corn)
millet (best type)	mllt	Millet
oat	oats	Oats
oil palm	oilp	Palm oil
olive	oliv	Olive oil
onion	onio	Onions and shallots, dry (excluding dehydrated)
pigeonpea	pigp	Pigeon peas, dry
rapeseed	rape	Rape or colza seed
dryland rice	ricd	Rice
rye (best type)	ryes	Rye
sorghum (best type)	sorg	Sorghum
soybean	soyb	Soya beans
sweet potato	spot	Sweet potatoes
sugar beet	sugb	Sugar beet
sugar cane	sugc	Sugar cane
sunflower	sunf	Sunflower seed
tea	teas	Tea leaves
tobacco	toba	Unmanufactured tobacco
tomato	toma	Tomatoes
wheat (best type)	whea	Wheat
yam (best type)	yams	Yams

A.5. FAO Export Prices

The Food and Agricultural Trade Dataset is collected, processed, and disseminated by FAO according to the standard International Merchandise Trade Statistics (IMTS) Methodology. The data is mainly provided by the United Nations Statistics Division, Eurostat, and other national authorities as needed. This source data is checked for outliers, trade partner data is used for non-reporting countries or missing cells, and data on food aid is added to take into account total cross-border trade flows (Food and Agriculture Organization of the United Nations, 2024). The data contains information on import and export quantities and values at a country-year level starting in 1961. Quantities are reported in thousands of animals or tonnes (only the latter being relevant for our analyses). Values are adjusted using US prices and reported in thousands of real 2010 US dollars. With this information, we construct a panel of time-varying trade prices at the country level, focusing on Sub-Saharan Africa (SSA). The dataset is first filtered to retain only observations corresponding to crops matching the FAO GAEZ crops as listed in Annex A.4, for which land suitability is measured. Export prices are calculated by dividing export value by export quantity when both values are different from zero, and assigning a missing value otherwise. Thus, prices correspond to thousands of US dollars per ton. To adjust for inflation – since the export values are reported in US dollars – prices are further deflated using the U.S. Consumer Price Index (CPI) from the The World Bank (2024). The data is filtered to include only SSA countries. Finally, missing country-crop-year combinations are filled in with the average of available prices for countries in the region for each crop-year combination, weighted by the export volume of each country.

A.6. Seventh-day Adventist Global Church Member Survey (GCMS)

The General Conference of the SDA church commissioned the Global Church Member Survey (GCMS) over three rounds: 2013, 2017, and 2022. The GCMS was fielded in each of these years in the church's global membership, at the individual level. The Meta-Analysis Research Team at Andrews University worked with the ASTR and the research teams from each Division during the development of the surveys. Each research team chooses the data collection format that fits their needs. The vast majority of them are collected in-person, with mail, electronic surveys in asynchronous mode, and synchronous group settings being the second, third, and fourth most common (66%, 12%, 11%, and 11% respectively for the third GCMS round).[27] Participation is voluntary. The survey is administered at the individual level. There is no intentional individual-level

[27]For a small portion of the data, they do not have registries of the collection method.

panel dimension; while some individuals may be present in the panel for multiple years, no individually-identifying data is collected to connect these individuals over time. We use the country-level geographic identifiers in the dataset to create a panel of cross-sections over time. To maintain comparable questions for our analysis, and due to lower sample sizes and more aggregation of units, we exclude the first round for our estimations.

The survey first asks for demographic characteristics such as gender, age, marital status, and education. Of greatest interest to us are questions on religious behavior and experiences. With these data, we construct five variables: *Holistic Message*, *Tobacco*, *Alcohol*, *Satisfaction*, and *Commitment with the SDA Church*.

Holistic Message In both the 2017 and 2022 rounds, members were asked "How often does the Sabbath speaker in your church preach on the following topics?", and included '*Holistic Healthful Living* — the importance of health for the body, mind, spirit, and social relationships' as one of the topics. The response options correspond to a Likert scale that includes the following options: I don't know, never, seldom, frequently, and very frequently. We construct a binary variable that takes a value of 1 if the person responds frequently or very frequently, 0 if seldom or never, and is missing if they report they don't know.

Alcohol and Tobacco The GCMS includes questions regarding the consumption of alcohol and tobacco. (There are no questions on the consumption of coffee or tea, and no questions on the production of any of these goods.) The 2017 round asks a yes or no question on whether the members have consumed tobacco or alcohol in the past 12 months. The 2022 round asks how often members have consumed alcohol or tobacco in the past 12 months, with the options being: never, once or twice, 3-10 times, or more than 10 times. To make the questions comparable, for the 2022 round we group all answers for which the members have consumed any amount of alcohol or tobacco as a yes. We then construct indicator variables for the 2017 and 2022 rounds indicating whether the individual has consumed these prohibited goods in the last 12 months (separately for alcohol and tobacco).

Satisfaction and Commitment The survey also includes questions to gauge members' satisfaction with and commitment to the church. The first question asks "How satisfied are you with your local church", with possible responses on a Likert scale that ranges from very dissatisfied to very satisfied. With this information, we construct the "Satisfaction" variable, an indicator variable equal to one if the respondent reports being satisfied or very satisfied with their local church and 0 otherwise. The question about commitment

asks members "How likely is it that you will be attending a Seventh-day Adventist Church for the rest of your life?", with the responses on a Likert scale that ranges from very unlikely to very likely. "Commitment with SDA Church" is an indicator variable equal to one if the respondent reports being likely or very likely to attend an SDA Church for the rest of their lives and 0 otherwise.

See Table C2 for the GCMS data summary statistics. Once we restrict to the countries included in our sample, the final sample is around 35,000 across the two GCMS rounds. The average proportion of alcohol usage across the two survey rounds is 7%, and the proportion of tobacco usage is 3%. Around 75% of people across the two rounds report that the Sabbath speaker in their church preaches on "Holistic Living" frequently or very frequently, 80% of them report being satisfied or very satisfied with their local church, and 95% of them say that they are likely or very likely to attend an SDA church for the rest of their life. The average age of the respondents is around 40 years old, 40% of them are women, and the median of their education level is complete secondary education.

Appendix B. Conceptual Framework

This appendix presents a simple model of denominational choice with club-like benefits to religious groups, and derives five key implications: (i) higher opportunity costs of SDA prohibitions reduce SDA membership; (ii) local SDA churches respond by reducing doctrinal strictness and expanding service provision; (iii) these membership responses are attenuated in places with higher SDA prevalence (an "embeddedness" channel); (iv) these membership responses are attenuated in places with a richer Protestant environment where SDA members are more positively selected (a "selection" channel); and (v) doctrinal softening following cost shocks can reduce the welfare of some remaining members.

B.1. Setup and Household Choice

Localities are characterized by:

- An opportunity-cost index $x \in \mathbb{R}_+$ (higher x means relatively more profitable tobacco, coffee, and tea)
- A local SDA doctrinal strictness choice $\theta \in \mathbb{R}_+$, chosen by local SDA leaders
- A local SDA service provision choice $\sigma \in \mathbb{R}_+$ (e.g., schools, clinics, outreach), chosen by local SDA leaders
- An SDA embeddedness index $m \in \mathbb{R}_+$ (e.g., SDA prevalence)
- A Protestant environment index $P \in \mathbb{R}_+$ (e.g., Protestant prevalence)

We focus on the choice between SDA and a composite outside option (other Christian denominations and potentially non-affiliation) for the subset of households for whom SDA is a realistic alternative. For such a household i, let α_i denote its idiosyncratic taste for SDA relative to the outside option, drawn from a distribution $F(\cdot; P)$ with density $f(\cdot; P)$ on $\mathbb{R}$. The Protestant environment P shifts this distribution in the way described further below.

The utility difference between SDA and the outside option is

$$\Delta U_i(m,P,x,\theta,\sigma) \;=\; \alpha_i \;+\; B(m,\theta,\sigma) \;-\; C(x,\theta), \tag{A1}$$

where:

- $B(m,\theta,\sigma)$ captures the spiritual, social, and material benefits of SDA:
  - $B_m(m,\theta,\sigma) > 0$ (higher SDA prevalence raises benefits)

- $B_\theta(m,\theta,\sigma) > 0$ (stricter doctrine provides spiritual benefits to members)
- $B_\sigma(m,\theta,\sigma) > 0$ (more services provide material and social benefits)

- $C(x,\theta)$ captures the costs of SDA prohibitions:
  - $C_x(x,\theta) > 0$ (higher opportunity costs increase burden of prohibitions)
  - $C_\theta(x,\theta) > 0$ (stricter doctrinal enforcement makes prohibitions more costly)
  - $C_{x\theta}(x,\theta) > 0$ (interaction: doctrinal strictness is especially costly when opportunity costs are high)

Household i chooses SDA if and only if $\Delta U_i(m,P,x,\theta,\sigma) \geq 0$, i.e.,

$$\alpha_i \;\geq\; z(m,x,\theta,\sigma) \equiv C(x,\theta) - B(m,\theta,\sigma).$$

Given (m,P,x,θ,σ), the SDA membership share in a locality is

$$s(m,P,x,\theta,\sigma) \;=\; \Pr\big(\alpha_i \geq z(m,x,\theta,\sigma)\big) \;=\; 1 - F\big(z(m,x,\theta,\sigma); P\big). \tag{A2}$$

B.2. Prediction (i): Cost Shocks Reduce SDA Membership

Holding (m,P,θ,σ) fixed, differentiate (A2) with respect to x:

$$\frac{\partial s(m,P,x,\theta,\sigma)}{\partial x} = -f\big(z(m,x,\theta,\sigma); P\big)\,\frac{\partial z(m,x,\theta,\sigma)}{\partial x} \tag{A3}$$

$$= -f\big(z(m,x,\theta,\sigma); P\big)\,C_x(x,\theta) \;<\; 0, \tag{A4}$$

since $f > 0$ and $C_x > 0$. Thus, higher opportunity costs of SDA prohibitions reduce SDA membership, all else equal.

B.3. Prediction (ii): Local Church Adaptation

Consistent with the decentralized structure of SDA governance in Sub-Saharan Africa, we model the decisions of local church leaders who choose policy stances independently across localities, taking the broader denominational environment as given.

Local SDA pastors and church leaders choose two policy instruments:

- Doctrinal strictness $\theta \in \mathbb{R}_+$: the intensity of enforcement and messaging around SDA prohibitions on tobacco, coffee, and tea, and other aspects of "holistic living." A higher θ reflects greater emphasis (e.g., more frequent messaging from the pulpit) on strict adherence to these prohibitions.

- Service provision $\sigma \in \mathbb{R}_+$: the level of investment in and operation of schools, clinics, and outreach that provide material and social benefits to members and potential members, and may facilitate evangelization and retention. A higher σ reflects more resources devoted to these services.

These policy choices affect membership in distinct ways. Stricter doctrine (higher θ) may raise spiritual benefits for highly committed members ($B_\theta > 0$), but it increases the salience and enforcement of costly prohibitions ($C_\theta > 0$). Expanded services (higher σ) increase the material and social benefits of membership ($B_\sigma > 0$) without imposing additional marginal economic costs.

Local church leaders choose θ and σ to balance membership growth against the value they place on doctrinal adherence and the costs of service provision. We use a simple reduced-form objective:

$$\Omega(m,P,x,\theta,\sigma) \;=\; s(m,P,x,\theta,\sigma) + \eta\theta - \kappa\sigma, \quad \eta > 0,\ \kappa > 0, \tag{A5}$$

where η reflects the weight placed on maintaining strict SDA identity for a given membership level, and κ reflects the per-unit cost (financial and organizational) of service provision. The parameter η could reflect leaders' personal commitment to doctrine or the value of maintaining a distinctive religious brand.

The first-order conditions (FOCs) for interior optima $\theta^*(m,P,x)$ and $\sigma^*(m,P,x)$ are:

$$\frac{\partial \Omega}{\partial \theta}(m,P,x,\theta^*,\sigma^*) \;=\; s_\theta(m,P,x,\theta^*,\sigma^*) + \eta \;=\; 0, \tag{A6}$$

$$\frac{\partial \Omega}{\partial \sigma}(m,P,x,\theta^*,\sigma^*) \;=\; s_\sigma(m,P,x,\theta^*,\sigma^*) - \kappa \;=\; 0. \tag{A7}$$

From (A2),

$$s_\theta(m,P,x,\theta,\sigma) = -f\big(z(m,x,\theta,\sigma);P\big)\, z_\theta(m,x,\theta,\sigma) = -f\big(z(m,x,\theta,\sigma);P\big)\,[C_\theta(x,\theta) - B_\theta(m,\theta,\sigma)],$$

$$s_\sigma(m,P,x,\theta,\sigma) = -f\big(z(m,x,\theta,\sigma);P\big)\, z_\sigma(m,x,\theta,\sigma) = f\big(z(m,x,\theta,\sigma);P\big)\, B_\sigma(m,\theta,\sigma).$$

We assume $s_\theta(m,P,x,\theta^*,\sigma^*) < 0$ (tightening θ reduces membership at the margin), $s_\sigma(m,P,x,\theta^*,\sigma^*) > 0$ (expanding services increases membership at the margin), and that s is concave in both policy instruments, so $s_{\theta\theta}(m,P,x,\theta^*,\sigma^*) < 0$ and $s_{\sigma\sigma}(m,P,x,\theta^*,\sigma^*) < 0$. These conditions ensure that the church's optimization problem has a well-defined interior solution.

The key comparative statics are how θ^* and σ^* respond to opportunity costs:

Doctrinal Strictness: Totally differentiating (A6) with respect to x yields

$$s_{\theta x}(m,P,x,\theta^*,\sigma^*) + s_{\theta\theta}(m,P,x,\theta^*,\sigma^*)\,\frac{d\theta^*}{dx} + s_{\theta\sigma}(m,P,x,\theta^*,\sigma^*)\,\frac{d\sigma^*}{dx} = 0.$$

The cross-partial $s_{\theta x}$ captures how the marginal membership effect of strictness changes with opportunity costs:

$$\begin{aligned} s_{\theta x}(m,P,x,\theta,\sigma) &= -\frac{\partial}{\partial x}\left[f(z;P)\left[C_\theta(x,\theta) - B_\theta(m,\theta,\sigma)\right]\right] \\ &= -f'(z;P)\, z_x \left[C_\theta(x,\theta) - B_\theta(m,\theta,\sigma)\right] - f(z;P)\, C_{x\theta}(x,\theta). \end{aligned}$$

Under our assumptions, we have $s_{\theta x}(m,P,x,\theta^*,\sigma^*) < 0$.[28] This condition states that the marginal membership cost of doctrinal strictness rises with opportunity costs: when foregone crop income is high, emphasizing the very prohibitions that create those costs becomes particularly damaging to recruitment and retention. Thus, local churches face a steeper trade-off: each additional unit of doctrinal strictness drives away more marginal members when those prohibitions are already economically burdensome.

To derive the comparative static, we solve the system of equations from totally differentiating both FOCs. For intuition, consider first the case where the cross-effect $s_{\theta\sigma}$ is small or where services adjust slowly relative to strictness.[29] Then, approximately,

$$\frac{d\theta^*}{dx} \;\approx\; -\frac{s_{\theta x}(m,P,x,\theta^*,\sigma^*)}{s_{\theta\theta}(m,P,x,\theta^*,\sigma^*)}.$$

Given $s_{\theta x} < 0$ and $s_{\theta\theta} < 0$, we obtain

$$\frac{d\theta^*}{dx} < 0. \tag{A8}$$

Thus, as opportunity costs x rise, local SDA churches optimally *reduce* doctrinal strictness: they soften enforcement of costly prohibitions and reduce messaging from the pulpit about the importance of abstaining from tobacco, coffee, and tea.

Service Provision: Similarly, totally differentiating (A7) with respect to x,

$$s_{\sigma x}(m,P,x,\theta^*,\sigma^*) + s_{\sigma\theta}(m,P,x,\theta^*,\sigma^*)\,\frac{d\theta^*}{dx} + s_{\sigma\sigma}(m,P,x,\theta^*,\sigma^*)\,\frac{d\sigma^*}{dx} = 0.$$

[28] The key assumptions are: (i) $C_{x\theta} > 0$ (the interaction term: enforcement of prohibitions is especially costly when opportunity costs are high), which makes the second term negative; and (ii) $f'(z;P) < 0$ at the relevant threshold (the density is declining as we move into the tail of the taste distribution), which ensures the first term is also negative given that $z_x = C_x > 0$ and $C_\theta > B_\theta$ at the margin. The declining density assumption is standard for common distributions (normal, logistic) and means there are fewer households with very high intrinsic preference for SDA as we move further from the center of the distribution. Both terms reinforce each other, ensuring $s_{\theta x} < 0$.

[29] The approximation $\frac{d\theta^*}{dx} \approx -\frac{s_{\theta x}}{s_{\theta\theta}}$ holds exactly if $s_{\theta\sigma} = 0$ (doctrine and services affect membership independently) or if σ is fixed in the short run while θ adjusts. More generally, solving the full system using Cramer's rule shows that $\frac{d\theta^*}{dx} < 0$ (and, subsequently, $\frac{d\sigma^*}{dx} > 0$) holds under the stability condition $s_{\theta\theta} \cdot s_{\sigma\sigma} - s_{\theta\sigma}^2 > 0$ (ensuring the church's optimization problem is concave), together with our maintained assumptions $s_{\theta x} < 0$, $s_{\sigma\sigma} < 0$, and $s_{\sigma x} > 0$. These results hold regardless of whether $s_{\theta\sigma}$ is positive (complements) or negative (substitutes). In either case, the fundamental mechanism—that strictness becomes especially costly when opportunity costs are high—drives the reduction in θ.

The cross-partial $s_{\sigma x}$ captures how the marginal membership effect of services changes with opportunity costs. Under our assumptions, we have $s_{\sigma x} > 0$: services become more valuable at the margin when opportunity costs are high.[30] The intuition is straightforward: when opportunity costs rise, more households become marginal (closer to leaving SDA), and services provide a way to retain them without asking for additional behavioral sacrifices. Since services deliver tangible benefits (education, healthcare) that don't compound the economic burden of crop prohibitions, they become particularly effective when members are already stressed by foregone income.

Under standard concavity conditions ($s_{\sigma\sigma} < 0$) and this assumption, we obtain

$$\frac{d\sigma^*}{dx} > 0. \tag{A9}$$

Thus, as opportunity costs x rise, local SDA churches optimally *expand* service provision: they reallocate effort toward schools, clinics, and other institutions that help retain members or attract new ones without requiring costly behavioral sacrifices.

Intuitively, when x rises, the SDA threshold shifts upward (making SDA less attractive). Expanding services provides broadly accessible benefits that offset this shift without imposing additional behavioral costs. If the density $f(z;P)$ is relatively high at the new threshold (many households near indifference), adding services becomes particularly effective at preventing exits.

Together, (A8) and (A9) show that local SDA churches respond to higher opportunity costs through a dual adjustment: reducing doctrinal strictness and expanding service provision. The key economic mechanism is that the marginal membership cost of doctrinal strictness rises with opportunity costs ($s_{\theta x} < 0$), making it optimal for churches to reduce θ when x increases. The expansion of services follows from both the direct value of offsetting higher costs and the need to compensate for reduced spiritual benefits from doctrinal softening (lower θ). These adjustments are mutually reinforcing: both policies move in directions that mitigate membership losses from the opportunity cost shock.

B.4. Prediction (iii): Attenuated Responses in High-SDA Areas (Embeddedness)

Consider two localities with the same (P,x,θ,σ) but different SDA embeddedness, $m^H > m^L$. Since $B_m(m,\theta,\sigma) > 0$,

[30] Formally, $s_{\sigma x} = -f'(z;P) \cdot z_x \cdot B_\sigma$. This is positive if the density f is declining at the threshold (a standard assumption for common distributions such as a normal or logistic distribution) since $z_x = C_x > 0$. The declining density means that as costs push the threshold higher, we move to a part of the distribution where small changes in benefits affect more households. Thus services become more effective at retention precisely when opportunity costs make strictness more damaging.

$$B(m^H,\theta,\sigma) > B(m^L,\theta,\sigma) \quad \Rightarrow \quad z(m^H,x,\theta,\sigma) = C(x,\theta) - B(m^H,\theta,\sigma) < C(x,\theta) - B(m^L,\theta,\sigma) = z(m^L,x,\theta,\sigma).$$

From (A4), the magnitude of the membership response to x at (m,P) is

$$\left|\frac{\partial s(m,P,x,\theta,\sigma)}{\partial x}\right| = f\big(z(m,x,\theta,\sigma);P\big)\, C_x(x,\theta).$$

Assume that, for given P, the density at the cutoff $f(z;P)$ is decreasing in z over the relevant range (so pushing z further into the tail reduces f). Since $z(m^H,x,\theta,\sigma) < z(m^L,x,\theta,\sigma)$, we have

$$f\big(z(m^H,x,\theta,\sigma);P\big) < f\big(z(m^L,x,\theta,\sigma);P\big),$$

and therefore

$$\left|\frac{\partial s(m^H,P,x,\theta,\sigma)}{\partial x}\right| < \left|\frac{\partial s(m^L,P,x,\theta,\sigma)}{\partial x}\right|.$$

Intuitively, when SDA is more embedded (higher m), SDA membership is more attractive ex ante, so the threshold $z(m,x,\theta,\sigma)$ is lower and there are fewer households close to indifference between SDA and the outside option. As a result, a given increase in opportunity costs induces less switching away from SDA.

Figure B1 illustrates this mechanism: for a given Protestant environment P and local church policy stance (θ,σ), higher SDA embeddedness m shifts the SDA cutoff $z(m,x,\theta,\sigma)$ leftward along the same taste distribution, so that the density at the margin is lower and a given increase in opportunity costs moves fewer households out of SDA.

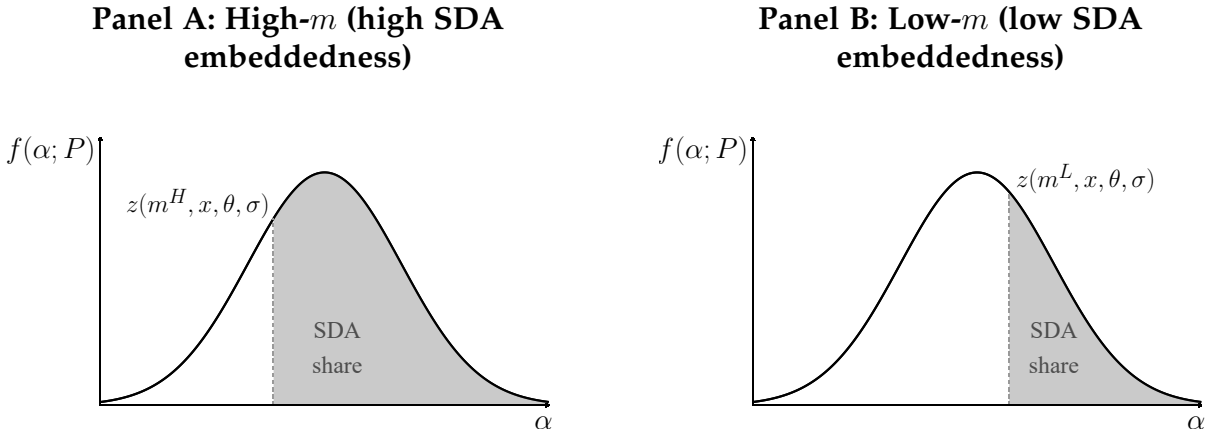


Figure B1: Embeddedness and the SDA threshold. For a given Protestant environment P and policy stance (θ,σ), higher SDA embeddedness m raises the benefit of SDA membership $B(m,\theta,\sigma)$ and lowers the cutoff $z(m,x,\theta,\sigma) = C(x,\theta) - B(m,\theta,\sigma)$ that separates SDA members from others. In high-SDA localities (m^H), the threshold $z(m^H,x,\theta,\sigma)$ lies further to the left than in low-SDA localities (m^L), and—under the assumption that the density $f(\alpha;P)$ is lower at this more favorable cutoff—fewer households lie close to indifference, so a given increase in opportunity costs induces less switching away from SDA.

B.5. Prediction (iv): Attenuated Responses in Highly Protestant Environments (Selection)

Now consider two localities with the same (m,x,θ,σ) but different Protestant environments, $P^H > P^L$. We assume that an environment with higher Protestant prevalence P changes the taste distribution for SDA in two related ways:

(S1) **Positive selection into SDA:** In highly Protestant environments, the pool of potential SDA members is on average more pro-SDA (for example because of historical revival activity or stronger Protestant norms). Thus, as P increases, the distribution of tastes α_i shifts to the right in the sense of first-order stochastic dominance: for any cutoff z, the share of households with $\alpha_i \geq z$, $1 - F(z;P)$, is weakly increasing in P.

(S2) **Fewer marginal types at the cutoff:** In more Protestant environments, the conditional distribution of α_i among SDA members is more right-truncated, so there are fewer households close to indifference between SDA and other churches. Thus, for the relevant range of thresholds $z(m,x,\theta,\sigma)$, the density at the margin, $f(z;P)$, is decreasing in P.[31]

From assumption (S1), highly Protestant environments draw a more pro-SDA subset of households into SDA; from (S2), the density of households at the cutoff is lower in high-P environments:

$$f\big(z(m,x,\theta,\sigma);P^H\big) < f\big(z(m,x,\theta,\sigma);P^L\big).$$

Using (A4), the magnitude of the response to x is

$$\left|\frac{\partial s(m,P,x,\theta,\sigma)}{\partial x}\right| = f\big(z(m,x,\theta,\sigma);P\big)\, C_x(x,\theta),$$

so

$$\left|\frac{\partial s(m,P^H,x,\theta,\sigma)}{\partial x}\right| < \left|\frac{\partial s(m,P^L,x,\theta,\sigma)}{\partial x}\right|.$$

Figure B2 visualizes this selection mechanism. In both panels, the horizontal axis is the taste for SDA relative to other churches and the vertical axis is its density. A higher opportunity cost x shifts the SDA cutoff from z_0 to z_1, so the change in SDA membership is the mass of households between these two thresholds. In low-P environments, the

[31] Assumption (S1) does not imply (S2). First-order stochastic dominance restricts cumulative distributions but allows densities to cross; (S2) is an additional restriction on the density at the threshold that is natural in our context where highly Protestant environments both attract more SDA members on average (S1) and make SDA membership more positively selected, concentrating members further from the margin (S2).

density at the margin $f(z; P^L)$ is high, so the same shift eliminates a large shaded mass of SDA members; in high-P environments, the density at the margin $f(z; P^H)$ is much lower, so the shaded mass is smaller and the membership response to the same cost shock is attenuated.

In words, where the Protestant field is denser, SDA membership is more positively selected: SDA draws households with higher α_i (stronger preference for SDA relative to other Protestants), so the density of households near the SDA–other-church margin is smaller and cost shocks move fewer people across it. This yields attenuated membership responses in high-P environments via the selection channel.

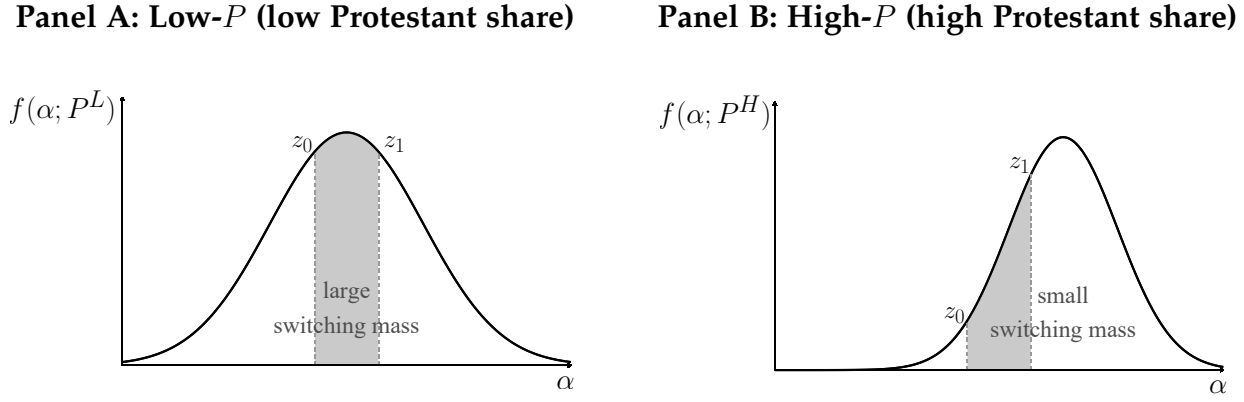


Figure B2: Selection and cost shocks in low- and high-Protestant environments. In each panel, the SDA share is the area under the density to the right of the threshold z. A cost shock (an increase in x) shifts the threshold from z_0 to z_1. Because the density at the margin is larger in low-P environments, the same shock causes more switching out of SDA than in high-P environments.

B.6. Prediction (v): Doctrinal Softening and Dissatisfaction of Stayers

Finally, we show how doctrinal softening in response to higher x can reduce the welfare of some remaining SDA members. While we initially model households as differing only in their idiosyncratic taste α_i for SDA, in this extension we enrich this to allow for heterogeneity in how households value doctrinal strictness, distinguishing high-commitment from low-commitment types.[32]

Suppose there are two types of households, $k \in \{H,L\}$:

- Type H ("high-commitment") members derive high spiritual benefits from strict SDA identity and discipline.

[32]This type heterogeneity can be interpreted as variation in α_i that correlates with preferences over θ: high-commitment households have both higher baseline α_i (making them more likely to be SDA) and stronger preferences for doctrinal strictness, while low-commitment households have lower α_i and weaker attachment to strict doctrine.

- Type L ("low-commitment") members derive weaker spiritual benefits from strictness and may be more sensitive to its costs.

For given (m,x,θ,σ), type k's utility from SDA relative to the outside option is

$$U_k(m,x,\theta,\sigma) = B_k(m,\theta,\sigma) - C(x,\theta),$$

with $B_{H,\theta}(m,\theta,\sigma) > B_{L,\theta}(m,\theta,\sigma) \geq 0$, $B_{k,\sigma} > 0$, and $C_x > 0$, $C_\theta > 0$. For each type k, there is a participation condition $U_k(m,x,\theta,\sigma) \geq \bar{U}$ relative to non-SDA options.

Let $\theta^*(m,P,x)$ and $\sigma^*(m,P,x)$ be the locally chosen policies (Section B.3), with $\frac{d\theta^*}{dx} < 0$ from (A8) and $\frac{d\sigma^*}{dx} > 0$ from (A9). Consider type k's utility along this policy path:

$$\tilde{U}_k(x) = U_k\big(m,x,\theta^*(m,P,x),\sigma^*(m,P,x)\big).$$

Totally differentiating with respect to x gives

$$\frac{d\tilde{U}_k}{dx} = B_{k,\theta}\big(m,\theta^*,\sigma^*\big)\,\frac{d\theta^*}{dx} + B_{k,\sigma}\big(m,\theta^*,\sigma^*\big)\,\frac{d\sigma^*}{dx} - \Big[C_x\big(x,\theta^*\big) + C_\theta\big(x,\theta^*\big)\,\frac{d\theta^*}{dx}\Big],$$

so

$$\frac{d\tilde{U}_k}{dx} = -\,C_x\big(x,\theta^*\big) + \big[B_{k,\theta}\big(m,\theta^*,\sigma^*\big) - C_\theta\big(x,\theta^*\big)\big]\frac{d\theta^*}{dx} + B_{k,\sigma}\big(m,\theta^*,\sigma^*\big)\,\frac{d\sigma^*}{dx}. \tag{A10}$$

Since $\frac{d\theta^*}{dx} < 0$ and $\frac{d\sigma^*}{dx} > 0$:

- For low-commitment members ($k = L$), it is natural to assume $B_{L,\theta}(m,\theta^*,\sigma^*) - C_\theta(x,\theta^*) < 0$, so doctrinal softening (a fall in θ) reduces the net cost of SDA and partially offsets the direct increase in opportunity costs. The expansion in services ($\frac{d\sigma^*}{dx} > 0$) provides additional offsetting benefits.

- For high-commitment members ($k = H$), who place a high value on strictness, we may have $B_{H,\theta}(m,\theta^*,\sigma^*) - C_\theta(x,\theta^*) \geq 0$. In this case, if the loss from reduced strictness is sufficiently large and services provide only partial compensation (i.e., $B_{H,\theta}\big|\frac{d\theta^*}{dx}\big| > B_{H,\sigma}\frac{d\sigma^*}{dx}$), then

$$\frac{d\tilde{U}_H}{dx} < 0.$$

Thus, even among households that remain in SDA after a rise in x, high-commitment members may experience lower utility due to both higher economic costs and doctrinal softening that outweighs the benefits of expanded services. This provides a simple rationale for our survey evidence that some remaining SDAs report weaker attachment and dissatisfaction in high-cost environments where local SDA churches have softened doctrine and shifted toward more broadly accessible services.

Appendix C. Additional Tables & Figures

C.1. Summary Statistics

Table C1: Summary Statistics: SDA Membership Data

	Mean	SD	p10	p25	p50	p75	p90	Min	Max	N
Costs:										
SDA Cost$_t$	14.36	56.14	0.00	0.00	0.00	0.46	24.30	0.00	652.93	4,238
SDA Cost$_{t-1}$	14.03	55.97	0.00	0.00	0.00	0.21	21.89	0.00	677.20	4,238
SDA Cost$_{t-2}$	14.80	58.57	0.00	0.00	0.00	0.21	23.30	0.00	677.20	4,238
SDA Cost$_{t-3}$	14.91	59.09	0.00	0.00	0.00	0.15	23.09	0.00	677.20	4,238
Average Costs:										
SDA Cost$_{t,t-1}$	14.20	45.13	0.00	0.00	0.00	4.37	36.91	0.00	645.51	4,238
SDA Cost$_{t,t-2}$	14.40	41.69	0.00	0.00	0.00	7.33	41.27	0.00	593.24	4,238
SDA Cost$_{t,t-3}$	14.53	39.71	0.00	0.00	0.01	9.73	44.07	0.00	457.48	4,238
Costs > 0:										
SDA Cost^+_t	46.26	93.17	0.06	0.91	7.85	45.29	142.38	0.00	652.93	1,316
SDA Cost$^+_{t-1}$	47.72	95.15	0.05	0.91	7.89	45.22	148.88	0.00	677.20	1,246
SDA Cost$^+_{t-2}$	50.88	99.80	0.07	1.00	8.66	47.76	166.33	0.00	677.20	1,233
SDA Cost$^+_{t-3}$	52.27	101.45	0.07	0.99	8.91	48.94	173.73	0.00	677.20	1,209
Average Costs > 0:										
SDA Cost$^+_{t,t-1}$	34.09	64.92	0.09	1.31	8.11	35.27	101.39	0.00	645.51	1,765
SDA Cost$^+_{t,t-2}$	30.35	56.39	0.11	1.46	8.84	32.36	83.06	0.00	593.24	2,011
SDA Cost$^+_{t,t-3}$	27.77	51.45	0.10	1.27	8.61	30.04	76.01	0.00	457.48	2,217
Dependent Variables: Membership Decisions										
Gains	3022.61	4253.70	100	379	1,255	4,162	8,133	0	47,397	4,238
Net Gains	2533.25	3804.67	50	287	1,016	3,323	6,997	0	44,651	4,238
Losses	628.00	2803.45	0	5	94	513	1,501	0	130,331	4,238
Dependent Variables: Church Responses										
Churches	319.13	366.58	23	69	190	442	776	0	2,735	4,238
Institutions	2.38	3.28	0	0	1	3	7	0	19	4,238

Notes: Data are at the locality-year level, for sub-national localities of the Seventh-day Adventist church. $SDACost_t$ and other opportunity cost variables calculated as described in Section 3.2. Data are an unbalanced panel from 1991 to 2022, for up to 202 localities per year. Data on membership and churches are from the SDA Office of Archives, Statistics, and Research (ASTR). Data on institutions are counts of health and education facilities which we digitized from SDA Yearbooks (General Conference of Seventh-day Adventists, Archives, Statistics, and Research, 2023), extracting SDA institutions using listed addresses to geo-reference institutions and assign them to localities. Gains are defined as the total number of members added by all methods, including baptisms, former member baptisms, or professions of faith. Losses are defined as the total number of members removed from membership rolls, either by dropping membership or by being recorded as missing. Net gains are gains minus losses.

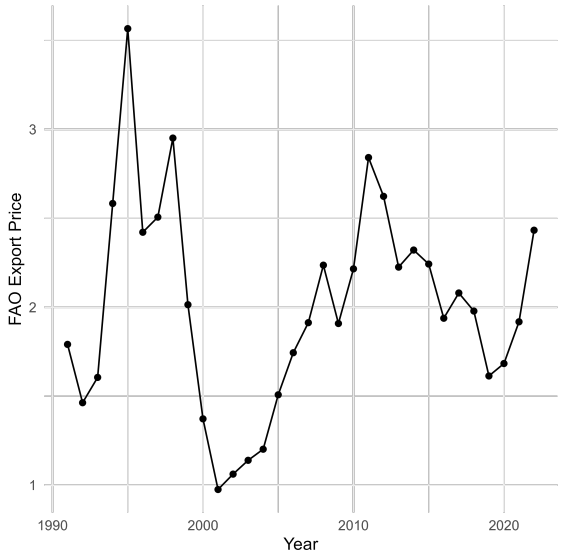
Table C2: Summary Statistics: SDA Member Surveys

	Mean	SD	p10	p25	p75	p90	Min	Max	N
Prices:									
SDA Cost$_t$	3.14	5.84	0.00	0.00	1.46	10.28	0.00	80.85	35,127
SDA Cost$_{t-1}$	19.10	51.13	0.00	0.00	4.59	51.27	0.00	320.70	35,127
SDA Cost$_{t-2}$	4.15	13.68	0.00	0.00	2.74	3.43	0.00	168.50	35,127
SDA Cost$_{t-3}$	21.50	53.79	0.00	0.00	14.33	39.94	0.00	323.24	35,127
Prices > 0:									
SDA Cost$_t$	5.30	6.80	0.00	0.96	8.63	17.55	0.00	80.85	20,763
SDA Cost$_{t-1}$	7.36	14.76	0.01	0.52	4.59	23.81	0.00	128.11	14,976
SDA Cost$_{t-2}$	7.91	18.83	0.18	1.02	3.34	19.26	0.01	168.50	17,143
SDA Cost$_{t-3}$	11.92	25.23	0.00	0.73	6.21	36.15	0.00	230.22	16,807
Dependent Variables:									
Holistic Message	0.74	0.44	0.00	0.00	1.00	1.00	0.00	1.00	30,645
Commitment with SDA Church	0.95	0.21	1.00	1.00	1.00	1.00	0.00	1.00	32,739
Commitmend to Jesus Christ	0.91	0.29	1.00	1.00	1.00	1.00	0.00	1.00	32,405
Satisfaction	0.81	0.39	0.00	1.00	1.00	1.00	0.00	1.00	32,690
CO: Help others with religious struggles	0.79	0.41	0.00	1.00	1.00	1.00	0.00	1.00	32,601
CO: Responsibility to reduce pain	0.81	0.39	0.00	1.00	1.00	1.00	0.00	1.00	32,150
CO: Give time to help others	0.74	0.44	0.00	0.00	1.00	1.00	0.00	1.00	32,247
CO: Give money to help others	0.59	0.49	0.00	0.00	1.00	1.00	0.00	1.00	32,058
CO: Care about reducing poverty	0.64	0.48	0.00	0.00	1.00	1.00	0.00	1.00	31,928
CO: Apply faith to social issues	0.52	0.50	0.00	0.00	1.00	1.00	0.00	1.00	31,705
Commitment to Others (Mean)	3.88	0.88	2.67	3.33	4.50	5.00	1.00	5.00	33,232
Life filled with meaning	0.90	0.30	0.00	1.00	1.00	1.00	0.00	1.00	31,354
Spiritual Growth (Mean)	4.10	0.69	3.33	3.75	4.67	5.00	1.00	5.00	33,164
Spiritual Struggle (Mean)	2.88	1.07	1.00	2.33	3.67	4.00	1.00	5.00	32,914
God Wants me to Abstain	0.96	0.19	1.00	1.00	1.00	1.00	0.00	1.00	32,900
Should Abstain	0.94	0.24	1.00	1.00	1.00	1.00	0.00	1.00	32,070
Healthy Diet	0.96	0.20	1.00	1.00	1.00	1.00	0.00	1.00	32,235
Health Adherence	0.95	0.16	1.00	1.00	1.00	1.00	0.00	1.00	33,530
Alcohol	0.07	0.26	0.00	0.00	0.00	0.00	0.00	1.00	32,513
Tobacco	0.03	0.16	0.00	0.00	0.00	0.00	0.00	1.00	32,286
Alcohol isn't Safe to Use	0.77	0.42	0.00	1.00	1.00	1.00	0.00	1.00	30,749
Follows SDA Health Message	0.70	0.46	0.00	0.00	1.00	1.00	0.00	1.00	32,120
Following SDA Health Message ensures Salvation	0.64	0.48	0.00	0.00	1.00	1.00	0.00	1.00	31,678
Controls:									
Age	38.62	13.80	22.00	28.00	48.00	58.00	12.00	96.00	33,627
Women	0.39	0.49	0.00	0.00	1.00	1.00	0.00	1.00	34,345
Education Level	4.05	1.37	2.00	3.00	5.00	5.00	0.00	6.00	33,625

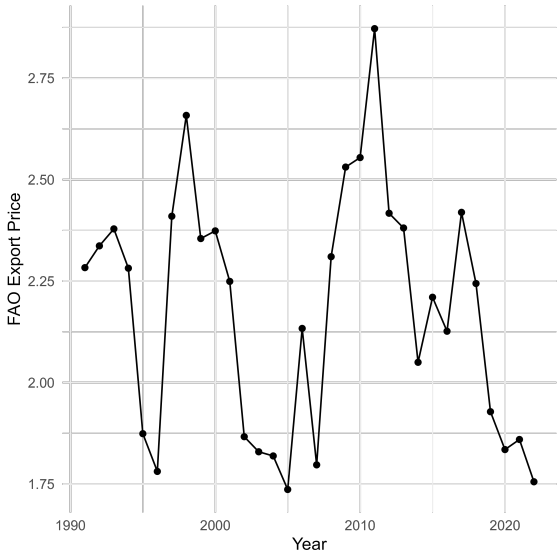
Notes: Data are at the country-year level, for Sub-Saharan Africa. Data are a two-period panel of countries in 2017 and 2022. Opportunity cost variables calculated as described in Section 3.2. Dependent variables are from the Global Church Member Survey (GCMS) (2017 and 2022) and are defined as follows: *Holistic Message* is a binary variable that takes a value of 1 if the individual reports that the Sabbath speaker in their church preaches on Holistic Healthful Living (the importance of health for the body, mind, spirit, and social relationships) frequently or very frequently, and 0 if seldom or never; *Tobacco* is a binary variable that takes a value of 1 if the individual reports having used tobacco in the past 12 months, and 0 otherwise; *Alcohol* is a binary variable that takes a value of 1 if the individual reports having used alcohol in the past 12 months, and 0 otherwise; *Satisfaction* is a binary variable that takes a value of 1 if the individual reports being satisfied or very satisfied with their local church, and 0 if they report being neutral, dissatisfied, or very dissatisfied; *Commitment with SDA Church* is a binary variable that takes a value of 1 if the individual reports being likely or very likely to attend a SDA Church for the rest of their life, and 0 if they report being neutral, unlikely, or very unlikely. Control variables are defined as follows: *Age* is the age of the individuals in years; *Women* is a binary variable that takes a value of 1 if the individual reports being a woman and 0 otherwise; *Education Level* is a categorical variable that reports the highest schooling level of the respondent (the categories are No Education, Incomplete Primary, Complete Primary, Incomplete Secondary, Complete Secondary, Post-Secondary, and Graduate).

C.2. Price Time Series

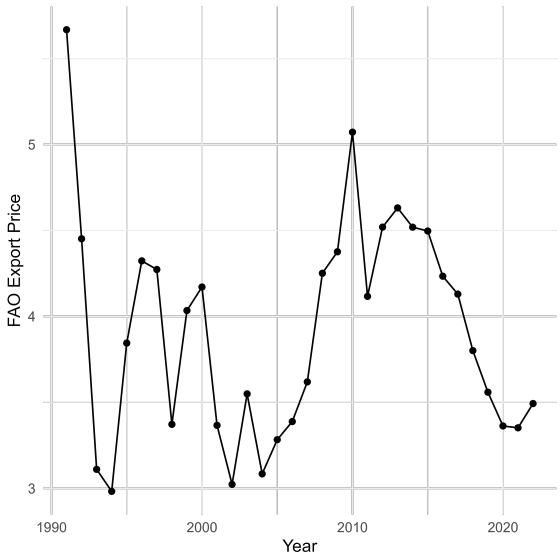
Figure C1: Average FAO Export Prices: Prohibited Crops



(a) Coffee



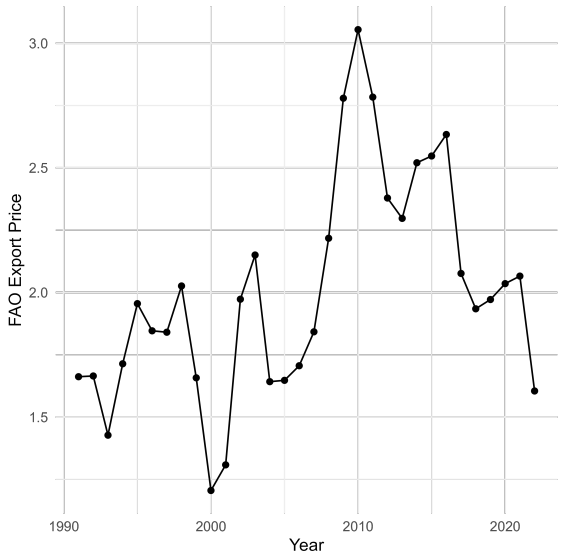
(b) Tea



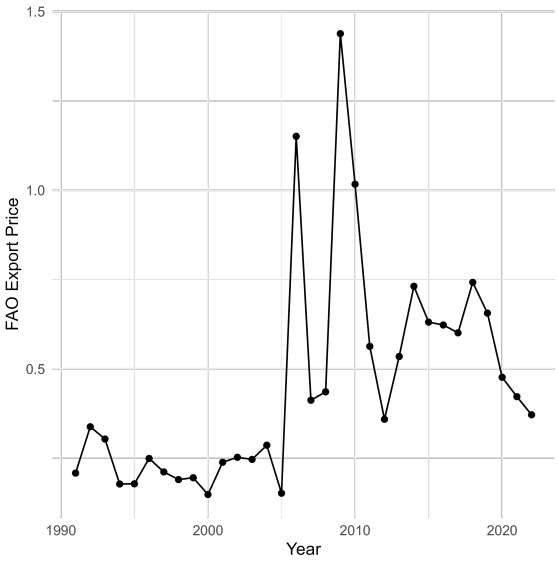
(c) Tobacco

Notes: The figures present the regional (Sub-Saharan Africa) average FAO Export prices over time for crops prohibited or discouraged by the SDA (Food and Agriculture Organization of the United Nations, 2024).

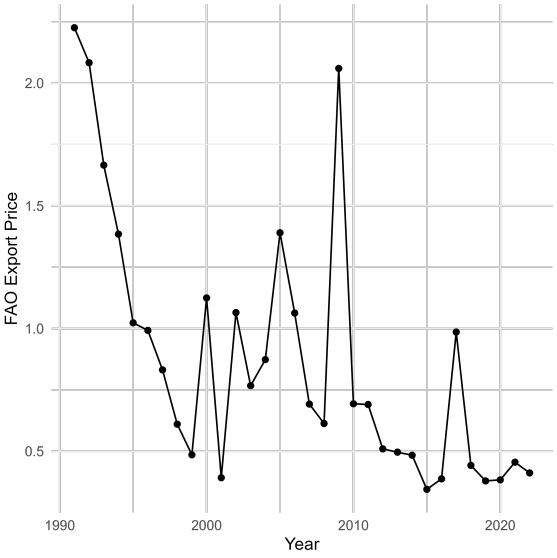
Figure C2: Average FAO Export Prices: Non-Prohibited Crops (Examples)



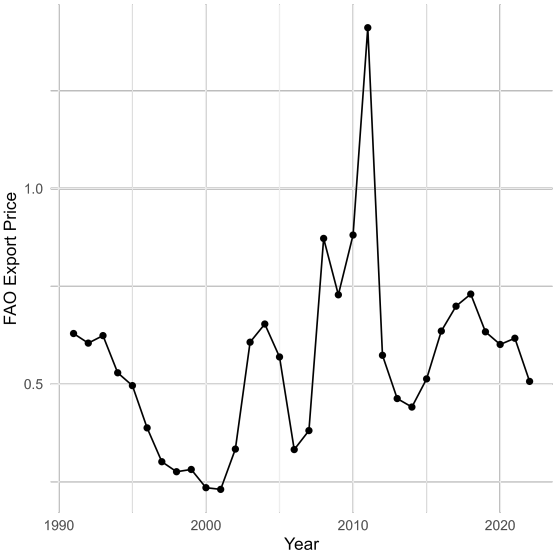
(a) Cacao



(b) Maize



(c) Carrot

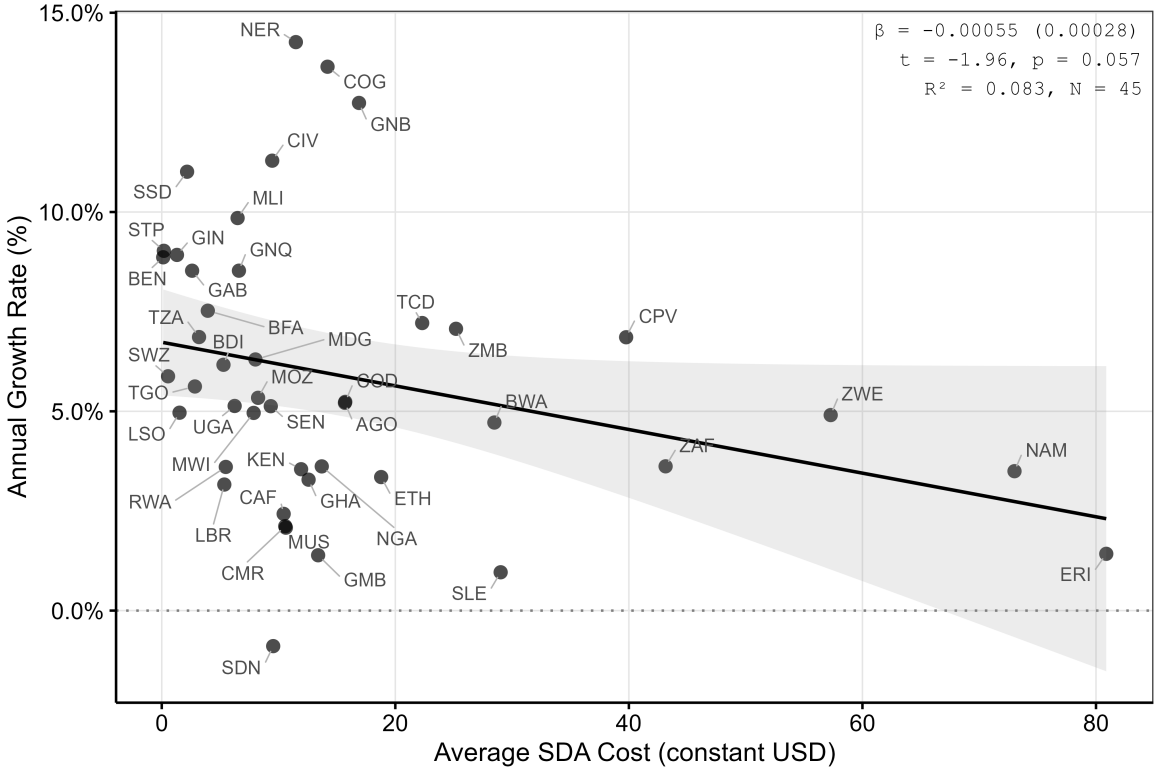


(d) Sweet Potato

Notes: The figures present the regional (Sub-Saharan Africa) average FAO Export prices over time for a subset of crops that are neither prohibited nor discouraged by the SDA (Food and Agriculture Organization of the United Nations, 2024).

C.3. Cross-Sectional Relationship

Figure C3: Relationship between SDA Cost and Growth Rate of SDA Membership



Notes: This figure plots the relationship between average SDA cost and SDA membership growth rates across countries in Sub-Saharan Africa. Each point represents one country (identified by ISO country code). The annual growth rate is calculated as the compound annual growth rate of SDA membership between the first and last year observed for each country. Average SDA Cost is the mean opportunity cost of abiding by SDA crop prohibitions (coffee, tea, and tobacco restrictions) over the observed period, measured in constant USD per hectare. The solid line represents the linear regression fit with 95% confidence interval (shaded area). The regression coefficient β represents the estimated effect of a one-unit increase in average SDA cost on the annual growth rate, with standard error in parentheses. The horizontal dotted line indicates zero growth. Sample includes all countries with available data between 1991 and 2022.

C.4. Production

Table C3: Impact of the Opportunity Cost of Religious Membership on Agricultural Production

	Dependent Variable: *Area Harvested*							
	Prohibited Crops				*Non-Prohibited Crops*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SDA Cost$_t$	0.002***				−0.000			
	(0.001)				(0.000)			
SDA Cost$_{t,t-1}$		0.003***				−0.001		
		(0.001)				(0.000)		
SDA Cost$_{t,t-2}$			0.003***				−0.001**	
			(0.001)				(0.001)	
SDA Cost$_{t,t-3}$				0.004***				−0.001**
				(0.001)				(0.001)
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Country Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,073	1,073	1,073	1,073	1,337	1,337	1,337	1,337
Num Countries	35	35	35	35	44	44	44	44
Adjusted R2	0.906	0.907	0.908	0.908	0.987	0.987	0.988	0.988
Outcome Mean	100,752	100,752	100,752	100,752	3,632,479	3,632,479	3,632,479	3,632,479
Outcome SD	178,327	178,327	178,327	178,327	6,123,439	6,123,439	6,123,439	6,123,439

Notes: Observations are countries in Sub-Saharan Africa between 1994 and 2022. Standard errors clustered at the country level are presented in parentheses. *Area Harvested* is the total area harvested in each country-year for the given crops, measured in hectares. *Amount Produced* is the total production in each country-year for the given crops, measured in kilograms of dry weight. *Prohibited Crops* are coffee, tobacco, and tea. *Non-Prohibited Crops* are banana, barley, buckwheat, phaseolous bean, cabbage, cacao, carrot, cassava, chickpea, coconut, cotton, cow pea, dry peas, flax fiber, groundnuts, maize, millet, oat, palm oil, olive oil, onion, pigeon pea, rape seed, rice, rye, sorghum, soybean, sweet potato, sugar beet, sugar cane, sunflower, tomato, wheat, yam. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions–the revenue per hectare agricultural revenue given up per hectare due to abiding by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for country population in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C.5. Alternative Specifications

Table C4: Impact of the Opportunity Cost of Religious Membership on Member Decisions: Controlling for Maximum Potential Revenue

	Dependent Variable:					
	Net Gains		Gains		Losses	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.104**		−0.080**		0.282*	
	(0.048)		(0.034)		(0.164)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}\}$		−0.060		−0.037		0.484*
		(0.040)		(0.028)		(0.283)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}\}$		−0.099		−0.081		0.040
		(0.094)		(0.069)		(0.188)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}\}$		−0.158***		−0.121***		0.294*
		(0.044)		(0.036)		(0.161)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}\}$		−0.194***		−0.171***		−0.097
		(0.052)		(0.050)		(0.191)
$\ln(R^{max,l}_{t,t-2})$	−0.004	−0.020	0.055	0.035	1.025**	0.942*
	(0.115)	(0.116)	(0.110)	(0.110)	(0.502)	(0.499)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	4,238	4,238	4,238	4,238	4,175	4,175
Num SDA Localities	424	424	424	424	412	412
Num Countries	44	44	44	44	44	44
Pseudo R^2	0.856	0.856	0.905	0.905	0.666	0.670
Outcome Mean	2533.254	2533.254	3022.607	3022.607	637.481	637.481
Outcome SD	3804.671	3804.671	4253.701	4253.701	2823.458	2823.458

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms in the SDA locality in a given year. *Losses* is the number of reported dropped and missing members in the SDA locality in a given year. *Net Gains* is reported gains minus losses. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $R^{max}{}_{t,t-k}$ measures the average maximum potential *unconstrained* agricultural revenue–the agricultural revenue per hectare for producing the maximum potential revenue crop regardless of prohibitions–between years t and $t-k$ in a SDA locality. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C5: Impact of the Opportunity Cost of Religious Membership on Membership Decisions
Alternative with No Lag: $SDA\ Cost_t$

	Dependent Variable:					
	Net Gains		Gains		Losses	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}\{SDA\ Cost_t > 0\}$	−0.083**		−0.058*		0.310	
	(0.038)		(0.032)		(0.210)	
$\mathbb{Q}_1^+\{SDA\ Cost_t\}$		−0.080		−0.036		0.860*
		(0.053)		(0.037)		(0.445)
$\mathbb{Q}_2^+\{SDA\ Cost_t\}$		−0.080**		−0.049		0.065
		(0.037)		(0.031)		(0.140)
$\mathbb{Q}_3^+\{SDA\ Cost_t\}$		−0.101		−0.067		0.182
		(0.065)		(0.045)		(0.322)
$\mathbb{Q}_4^+\{SDA\ Cost_t\}$		−0.073		−0.084**		−0.342*
		(0.046)		(0.037)		(0.206)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	4,238	4,238	4,238	4,238	4,175	4,175
Num SDA Localities	424	424	424	424	412	412
Num Countries	44	44	44	44	44	44
Pseudo R^2	0.856	0.856	0.905	0.905	0.664	0.677
Outcome Mean	2533.254	2533.254	3022.607	3022.607	637.481	637.481
Outcome SD	3804.671	3804.671	4253.701	4253.701	2823.458	2823.458

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms in the SDA locality in a given year. *Losses* is the number of reported dropped and missing members in the SDA locality in a given year. *Net Gains* is reported gains minus losses. *SDA* $Cost_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x>0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathrm{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table C6: Impact of the Opportunity Cost of Religious Membership on Membership Decisions
Alternative Lag: $SDA\ Cost_{t,t-1}$

	Dependent Variable:					
	Net Gains		Gains		Losses	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}\{\text{SDA Cost}_{t,t-1} > 0\}$	−0.054*		−0.027		0.205	
	(0.031)		(0.023)		(0.231)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-1}\}$		−0.015		0.023		0.523
		(0.040)		(0.027)		(0.362)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-1}\}$		−0.074**		−0.035		0.088
		(0.035)		(0.029)		(0.148)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-1}\}$		−0.065		−0.053		−0.042
		(0.056)		(0.038)		(0.326)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-1}\}$		−0.088*		−0.090**		−0.398*
		(0.046)		(0.039)		(0.205)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	4,238	4,238	4,238	4,238	4,175	4,175
Num SDA Localities	424	424	424	424	412	412
Num Countries	44	44	44	44	44	44
Pseudo R^2	0.856	0.856	0.905	0.905	0.663	0.672
Outcome Mean	2533.254	2533.254	3022.607	3022.607	637.481	637.481
Outcome SD	3804.671	3804.671	4253.701	4253.701	2823.458	2823.458

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms in the SDA locality in a given year. *Losses* is the number of reported dropped and missing members in the SDA locality in a given year. *Net Gains* is reported gains minus losses. *SDA* $Cost_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x>0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathrm{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table C7: Impact of the Opportunity Cost of Religious Membership on Member Decisions: Placebo Test using Leads of the Opportunity Cost Measure

	Dependent Variable:					
	Net Gains		Gains		Losses	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}\{SDA\ Cost_{t+1,t+2} > 0\}$	−0.019		0.001		−0.077	
	(0.063)		(0.043)		(0.194)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t+1,t+2}\}$		−0.045		0.003		0.139
		(0.086)		(0.058)		(0.269)
$\mathbb{Q}_2^+\{SDA\ Cost_{t+1,t+2}\}$		−0.029		−0.006		−0.069
		(0.041)		(0.032)		(0.182)
$\mathbb{Q}_3^+\{SDA\ Cost_{t+1,t+2}\}$		0.003		−0.012		−0.283
		(0.084)		(0.061)		(0.227)
$\mathbb{Q}_4^+\{SDA\ Cost_{t+1,t+2}\}$		0.033		0.027		−0.376
		(0.087)		(0.053)		(0.359)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	3,825	3,825	3,825	3,825	3,775	3,775
Num SDA Localities	396	396	396	396	384	384
Num Countries	44	44	44	44	44	44
Pseudo R^2	0.859	0.859	0.907	0.907	0.663	0.666
Outcome Mean	2564.195	2564.195	3062.045	3062.045	624.833	624.833
Outcome SD	3844.218	3844.218	4313.558	4313.558	2745.449	2745.449

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms in the SDA locality in a given year. *Losses* is the number of reported dropped and missing members in the SDA locality in a given year. *Net Gains* is reported gains minus losses. $SDA\ Cost_{t,t+k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years $t+1$ and $t+k$. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C8: Impact of the Opportunity Cost of Religious Membership on Member Decisions: Impacts by Prohibited Crop

	Dependent Variable:					
	Net Gains		Gains		Losses	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}\{\text{SDA Tobacco Cost}_{t,t-2} > 0\}$	−0.152***		−0.103***		0.240	
	(0.034)		(0.028)		(0.167)	
$\mathbb{1}\{\text{SDA Coffee Cost}_{t,t-2} > 0\}$	0.012		0.014		0.094	
	(0.063)		(0.050)		(0.234)	
$\mathbb{1}\{\text{SDA Tea Cost}_{t,t-2} > 0\}$	0.006		0.007		0.022	
	(0.082)		(0.072)		(0.176)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}^{toba,l}\}$		−0.076**		−0.031		0.558*
		(0.034)		(0.022)		(0.310)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}^{toba,l}\}$		−0.176***		−0.141***		−0.192
		(0.047)		(0.033)		(0.212)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}^{toba,l}\}$		−0.281***		−0.198***		0.390*
		(0.051)		(0.039)		(0.231)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}^{toba,l}\}$		−0.239***		−0.191***		−0.247
		(0.055)		(0.050)		(0.158)
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}^{coff,l}\}$		0.022		0.013		−0.167
		(0.058)		(0.043)		(0.209)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}^{coff,l}\}$		−0.004		0.021		0.420*
		(0.123)		(0.098)		(0.229)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}^{coff,l}\}$		0.032		0.018		0.142
		(0.067)		(0.048)		(0.300)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}^{coff,l}\}$		−0.101		−0.102		0.099
		(0.114)		(0.103)		(0.267)
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}^{teas,l}\}$		0.059		0.054		−0.086
		(0.088)		(0.078)		(0.185)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}^{teas,l}\}$		−0.152		−0.097		0.281
		(0.096)		(0.084)		(0.185)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}^{teas,l}\}$		−0.146		−0.068		0.189
		(0.121)		(0.092)		(0.134)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}^{teas,l}\}$		−0.233**		−0.322***		−0.542***
		(0.109)		(0.097)		(0.178)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	4,238	4,238	4,238	4,238	4,175	4,175
Num SDA Localities	424	424	424	424	412	412
Num Countries	44	44	44	44	44	44
Pseudo R^2	0.856	0.857	0.905	0.906	0.663	0.675
Outcome Mean	2533.254	2533.254	3022.607	3022.607	637.481	637.481
Outcome SD	3804.671	3804.671	4253.701	4253.701	2823.458	2823.458

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms in the SDA locality in a given year. *Losses* is the number of reported dropped and missing members in the SDA locality in a given year. *Net Gains* is reported gains minus losses. $SDA\ Cost_{t,t-k}^{c}$ measures the average opportunity cost of abiding by the SDA crop prohibitions for crop c: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on tobacco, coffee, and tea, respectively –between years $t+1$ and $t-k$. $\mathbb{1}(x>0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of $SDA\ Cost_{t,t-k}$ and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table C9: Impact of the Opportunity Cost of Religious Membership on Member Decisions: Alternative specification using de Chaisemartin et al. (2024)

	Dependent Variable:														
	Net Gains					Gains					Losses				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−566.2**					−379.8					628.7**				
	(261.8)					(266.0)					(311.9)				
$\mathbb{Q}_1^+\{\text{SDA Cost}_{t,t-2}\}$		−818.2*					−494.3					1881.6			
		(475.7)					(362.1)					(1439.0)			
$\mathbb{Q}_2^+\{\text{SDA Cost}_{t,t-2}\}$			−623.4*					−343.8					965.7*		
			(378.1)					(342.7)					(518.3)		
$\mathbb{Q}_3^+\{\text{SDA Cost}_{t,t-2}\}$				−416.5					−355.7					1177.3	
				(457.4)					(386.7)					(775.2)	
$\mathbb{Q}_4^+\{\text{SDA Cost}_{t,t-2}\}$					−160.2					−375.2**					−290.9**
					(155.7)					(151.3)					(132.5)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outcome Mean	2533.3	2375.7	2491.8	2437.4	2499.7	3022.6	2838.5	2984.1	2918.7	2982.5	628.0	592.4	607.9	598.2	573.7
Observations	4238	2720	2731	2674	2573	4238	2720	2731	2674	2573	4238	2720	2731	2674	2573
# of rSDAs	424	382	384	379	383	424	382	384	379	383	424	382	384	379	383
# Switchers-Out	785	146	110	70	62	785	146	110	70	62	785	146	110	70	62
# Never-Switchers	1100	1726	1776	2071	2212	1100	1726	1776	2071	2212	1100	1726	1776	2071	2212
# Switchers-In	2353	848	845	533	299	2353	848	845	533	299	2353	848	845	533	299

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Net Gains* is reported baptisms, professions of faith, and former member baptisms minus dropped and missing members in the SDA locality in a given year. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms. *Losses* is the number of reported dropped and missing members. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions between years t and $t-k$: the agricultural revenue per hectare given up if *constrained* by SDA crop restrictions on coffee, tea, and tobacco. $\mathbb{1}\{x > 0\}$ is an indicator function equal to 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}_j^+\{x\}$ are indicator variables equal to 1 if x is in the jth quartile of non-zero values of x and 0 otherwise. Estimated using the staggered difference-in-differences estimator of de Chaisemartin et al. (2024). Each quartile regression compares localities where cost equals zero to localities in that specific quartile, estimated separately. Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C10: Impact of the Opportunity Cost of Religious Membership on Member Decisions: Alternative specification using de Chaisemartin et al. (2024)

	Dependent Variable:														
	ln(Net Gains+1)					ln(Gains+1)					ln(Losses+1)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.42*					−0.12					−0.01				
	(0.25)					(0.09)					(0.20)				
$\mathbb{Q}_1^+\{\text{SDA Cost}_{t,t-2}\}$		−0.33					−0.03					0.48***			
		(0.26)					(0.09)					(0.18)			
$\mathbb{Q}_2^+\{\text{SDA Cost}_{t,t-2}\}$			−0.54*					−0.01					0.22		
			(0.28)					(0.13)					(0.20)		
$\mathbb{Q}_3^+\{\text{SDA Cost}_{t,t-2}\}$				−0.52*					−0.35					−0.69*	
				(0.28)					(0.22)					(0.40)	
$\mathbb{Q}_4^+\{\text{SDA Cost}_{t,t-2}\}$					0.19					−0.05					−0.13
					(0.19)					(0.14)					(0.40)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outcome Mean	6.56	6.54	6.56	6.56	6.57	6.93	6.93	6.95	6.92	6.93	4.09	4.00	4.08	4.01	4.06
Observations	4238	2720	2731	2674	2573	4238	2720	2731	2674	2573	4238	2720	2731	2674	2573
# of rSDAs	424	382	384	379	383	424	382	384	379	383	424	382	384	379	383
# Switchers-Out	785	146	110	70	62	785	146	110	70	62	785	146	110	70	62
# Never-Switchers	1100	1726	1776	2071	2212	1100	1726	1776	2071	2212	1100	1726	1776	2071	2212
# Switchers-In	2353	848	845	533	299	2353	848	845	533	299	2353	848	845	533	299

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Net Gains* is reported baptisms, professions of faith, and former member baptisms minus dropped and missing members in the SDA locality in a given year. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms. *Losses* is the number of reported dropped and missing members. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions between years t and $t-k$: the agricultural revenue per hectare given up if *constrained* by SDA crop restrictions on coffee, tea, and tobacco. $\mathbb{1}\{x > 0\}$ is an indicator function equal to 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}_j^+\{x\}$ are indicator variables equal to 1 if x is in the jth quartile of non-zero values of x and 0 otherwise. Estimated using the staggered difference-in-differences estimator of de Chaisemartin et al. (2024). Each quartile regression compares localities where cost equals zero to localities in that specific quartile, estimated separately. Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C11: Impact of the Opportunity Cost on Church Responses: Controlling for Maximum Potential Revenue

	Dependent Variable:			
	Churches		Institutions	
	(1)	(2)	(3)	(4)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.011		0.081***	
	(0.021)		(0.028)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}\}$		−0.007		0.090***
		(0.027)		(0.031)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}\}$		−0.035		0.076**
		(0.022)		(0.035)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}\}$		0.023		0.066*
		(0.018)		(0.034)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}\}$		0.017		0.057
		(0.016)		(0.041)
$\ln(R^{max,l}_{t,t-2})$	0.015	0.020	−0.008	−0.015
	(0.038)	(0.041)	(0.098)	(0.096)
Locality Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Observations	4,238	4,238	2,700	2,700
Num SDA Localities	424	424	266	266
Num Countries	44	44	32	32
Pseudo R^2	0.945	0.946	0.465	0.466
Outcome Mean	319.130	319.130	3.725	3.725
Outcome SD	366.580	366.580	3.440	3.440

Notes: Observations are SDA localities in Sub-Saharan Africa between 1994 and 2022. Standard errors clustered at the country level are presented in parentheses. *Churches* is the number of reported churches and companies in the SDA locality in a given year. *Institutions* the total number of education and health institutions in the SDA locality in a given year. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions–the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$ (see Appendix A). $R^{max}{}_{t,t-k}$ measures the average maximum potential *unconstrained* agricultural revenue–the agricultural revenue per hectare for producing the maximum potential revenue crop regardless of prohibitions–between years t and $t-k$ in a SDA locality. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C12: Impact of the Opportunity Cost of Religious Membership on Church Responses
Alternative with no Lag: $SDA\ \ Cost_t$

	Dependent Variable:			
	Churches		Institutions	
	(1)	(2)	(3)	(4)
$\mathbb{1}\{SDA\ Cost_t > 0\}$	−0.003		0.053***	
	(0.029)		(0.017)	
$\mathbb{Q}_1^+\{SDA\ Cost_t\}$		−0.002		0.086***
		(0.037)		(0.025)
$\mathbb{Q}_2^+\{SDA\ Cost_t\}$		−0.004		0.022
		(0.032)		(0.023)
$\mathbb{Q}_3^+\{SDA\ Cost_t\}$		−0.008		0.051*
		(0.026)		(0.026)
$\mathbb{Q}_4^+\{SDA\ Cost_t\}$		−0.001		0.023
		(0.021)		(0.026)
Locality Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Observations	4,238	4,238	2,700	2,700
Num SDA Localities	424	424	266	266
Num Countries	44	44	32	32
Pseudo R^2	0.945	0.945	0.465	0.465
Outcome Mean	319.130	319.130	3.725	3.725
Outcome SD	366.580	366.580	3.440	3.440

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Churches* is the number of reported churches and companies in the SDA locality in a given year. *Institutions* is the number of reported health or education institutions in the SDA locality in a given year in the SDA annual yearbooks. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x>0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table C13: Impact of the Opportunity Cost of Religious Membership on Church Responses
Alternative Lag: $SDA\ \ Cost_{t,t-1}$

	Dependent Variable:			
	Churches		Institutions	
	(1)	(2)	(3)	(4)
$\mathbb{1}\{\text{SDA Cost}_{t,t-1} > 0\}$	−0.005		0.072***	
	(0.021)		(0.027)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-1}\}$		0.007		0.089***
		(0.026)		(0.032)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-1}\}$		−0.031		0.058*
		(0.028)		(0.031)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-1}\}$		0.004		0.053*
		(0.017)		(0.031)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-1}\}$		0.004		0.061
		(0.017)		(0.041)
Locality Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Observations	4,238	4,238	2,700	2,700
Num SDA Localities	424	424	266	266
Num Countries	44	44	32	32
Pseudo R^2	0.945	0.945	0.465	0.465
Outcome Mean	319.130	319.130	3.725	3.725
Outcome SD	366.580	366.580	3.440	3.440

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Churches* is the number of reported churches and companies in the SDA locality in a given year. *Institutions* is the number of reported health or education institutions in the SDA locality in a given year in the SDA annual yearbooks. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x>0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table C14: Impact of the Opportunity Cost of Religious Membership on Church Responses: Impacts by Prohibited Crop

	Dependent Variable:			
	Churches		Institutions	
	(1)	(2)	(3)	(4)
$\mathbb{1}\{\text{SDA Tobacco Cost}_{t,t-2} > 0\}$	0.002		0.087***	
	(0.021)		(0.033)	
$\mathbb{1}\{\text{SDA Coffee Cost}_{t,t-2} > 0\}$	−0.007		−0.015	
	(0.039)		(0.032)	
$\mathbb{1}\{\text{SDA Tea Cost}_{t,t-2} > 0\}$	0.016		0.071*	
	(0.044)		(0.041)	
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}^{toba,l}\}$		−0.003		0.095**
		(0.033)		(0.038)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}^{toba,l}\}$		−0.026		0.071**
		(0.018)		(0.035)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}^{toba,l}\}$		0.049		0.127***
		(0.032)		(0.047)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}^{toba,l}\}$		−0.009		0.130
		(0.025)		(0.080)
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}^{coff,l}\}$		−0.021		0.009
		(0.041)		(0.026)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}^{coff,l}\}$		0.012		−0.024
		(0.047)		(0.032)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}^{coff,l}\}$		−0.019		−0.089
		(0.037)		(0.075)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}^{coff,l}\}$		0.138***		−0.134**
		(0.051)		(0.062)
$\mathbb{Q}_1^+\{SDA\ Cost_{t,t-2}^{teas,l}\}$		0.057		0.056
		(0.047)		(0.042)
$\mathbb{Q}_2^+\{SDA\ Cost_{t,t-2}^{teas,l}\}$		−0.060		0.155
		(0.038)		(0.105)
$\mathbb{Q}_3^+\{SDA\ Cost_{t,t-2}^{teas,l}\}$		−0.123**		0.234***
		(0.061)		(0.057)
$\mathbb{Q}_4^+\{SDA\ Cost_{t,t-2}^{teas,l}\}$		−0.120		0.240***
		(0.083)		(0.057)
Locality Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Observations	4,238	4,238	2,700	2,700
Num SDA Localities	424	424	266	266
Num Countries	44	44	32	32
Pseudo R^2	0.945	0.946	0.466	0.466
Outcome Mean	319.130	319.130	3.725	3.725
Outcome SD	366.580	366.580	3.440	3.440

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Churches* is the number of reported churches and companies in the SDA locality in a given year. *Institutions* is the number of reported health or education institutions in the SDA locality in a given year in the SDA annual yearbooks. $SDA\ Cost_{t,t-k}^{c}$ measures the average opportunity cost of abiding by the SDA crop prohibitions for crop c: the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on tobacco, coffee, and tea, respectively –between years $t+1$ and $t-k$. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of $SDA\ Cost_{t,t-k}$ and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C15: Impact of the Opportunity Cost of Religious Membership on Church Responses: Alternative specification using de Chaisemartin et al. (2024)

	Dependent Variable:									
	Churches					Institutions				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	1.5					0.1**				
	(5.7)					(0.0)				
$\mathbb{Q}_1^+\{\text{SDA Cost}_{t,t-2}\}$		−6.1					−0.0			
		(6.4)					(0.1)			
$\mathbb{Q}_2^+\{\text{SDA Cost}_{t,t-2}\}$			2.6					0.2**		
			(8.3)					(0.1)		
$\mathbb{Q}_3^+\{\text{SDA Cost}_{t,t-2}\}$				−1.6					−0.0	
				(4.3)					(0.1)	
$\mathbb{Q}_4^+\{\text{SDA Cost}_{t,t-2}\}$					31.5					0.3
					(25.1)					(0.2)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outcome Mean	319.1	291.5	301.2	296.1	291.0	2.4	2.2	2.2	2.1	2.1
Observations	4238	2720	2731	2674	2573	4238	2720	2731	2674	2573
# of rSDAs	424	382	384	379	383	424	382	384	379	383
# Switchers-Out	785	146	110	70	62	785	146	110	70	62
# Never-Switchers	1100	1726	1776	2071	2212	1100	1726	1776	2071	2212
# Switchers-In	2353	848	845	533	299	2353	848	845	533	299

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Net Gains* is reported baptisms, professions of faith, and former member baptisms minus dropped and missing members in the SDA locality in a given year. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms. *Losses* is the number of reported dropped and missing members. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions between years t and $t-k$: the agricultural revenue per hectare given up if *constrained* by SDA crop restrictions on coffee, tea, and tobacco. $\mathbb{1}\{x > 0\}$ is an indicator function equal to 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}_j^+\{x\}$ are indicator variables equal to 1 if x is in the jth quartile of non-zero values of x and 0 otherwise. Estimated using the staggered difference-in-differences estimator of de Chaisemartin et al. (2024). Each quartile regression compares localities where cost equals zero to localities in that specific quartile, estimated separately. Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C16: Impact of the Opportunity Cost of Religious Membership on Church Responses: Alternative specification using de Chaisemartin et al. (2024)

	Dependent Variable:									
	ln(Churches+1)					ln(Institutions+1)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.00					0.02*				
	(0.02)					(0.01)				
$\mathbb{Q}_1^+\{\text{SDA Cost}_{t,t-2}\}$		−0.04					−0.01			
		(0.03)					(0.01)			
$\mathbb{Q}_2^+\{\text{SDA Cost}_{t,t-2}\}$			−0.02					0.04**		
			(0.03)					(0.02)		
$\mathbb{Q}_3^+\{\text{SDA Cost}_{t,t-2}\}$				−0.04					0.00	
				(0.03)					(0.02)	
$\mathbb{Q}_4^+\{\text{SDA Cost}_{t,t-2}\}$					0.04					0.14
					(0.04)					(0.11)
Locality Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outcome Mean	5.06	5.01	5.03	5.00	5.01	0.84	0.78	0.79	0.77	0.76
Observations	4238	2720	2731	2674	2573	4238	2720	2731	2674	2573
# of rSDAs	424	382	384	379	383	424	382	384	379	383
# Switchers-Out	785	146	110	70	62	785	146	110	70	62
# Never-Switchers	1100	1726	1776	2071	2212	1100	1726	1776	2071	2212
# Switchers-In	2353	848	845	533	299	2353	848	845	533	299

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Net Gains* is reported baptisms, professions of faith, and former member baptisms minus dropped and missing members in the SDA locality in a given year. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms. *Losses* is the number of reported dropped and missing members. *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions between years t and $t-k$: the agricultural revenue per hectare given up if *constrained* by SDA crop restrictions on coffee, tea, and tobacco. $\mathbb{1}\{x > 0\}$ is an indicator function equal to 1 when x is greater than zero and 0 otherwise. $\mathbb{Q}_j^+\{x\}$ are indicator variables equal to 1 if x is in the jth quartile of non-zero values of x and 0 otherwise. Estimated using the staggered difference-in-differences estimator of de Chaisemartin et al. (2024). Each quartile regression compares localities where cost equals zero to localities in that specific quartile, estimated separately. Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix D. Impacts by Local Religious Market Structure

Table D1: Impact of the Opportunity Cost of Religious Membership on Membership Decisions: Impacts by Share of Population that is an SDA Member in a Locality

	Dependent Variable:		
	Net Gains	Gains	Losses
	(1)	(2)	(3)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.185***	−0.128***	0.452**
	(0.034)	(0.029)	(0.204)
$\mathbb{1}\{SDA\ Cost_{t,t-2} > 0\} * SDA_{Share}$	0.013***	0.007***	−0.037***
	(0.005)	(0.002)	(0.012)
Locality Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Observations	4,238	4,238	4,175
Num SDA Localities	424	424	412
Num Countries	44	44	44
Pseudo R^2	0.857	0.905	0.665
Outcome Mean	2533.254	3022.607	637.481
Outcome SD	3804.671	4253.701	2823.458

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms in the SDA locality in a given year. *Losses* is the number of reported dropped and missing members in the SDA locality in a given year. *Net Gains* is reported gains minus losses. SDA_{share} is the share of the population that are SDA members in a locality in the first year a locality appears in the SDA records. The denominator is estimated population in 1980 per locality based on Klein Goldewijk et al. (2017). *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions–the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\text{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D2: Impact of the Opportunity Cost of Religious Membership on Membership Decisions: Impacts by Share of Population of Various Religious Denominations

	Dependent Variable:		
	Net Gains	Gains	Losses
	(1)	(2)	(3)
$\mathbb{1}\{\text{SDA Cost}_{t,t-2} > 0\}$	−0.601***	−0.474***	0.675
	(0.149)	(0.130)	(0.537)
$\mathbb{1}\{SDA\ Cost_{t,t-2} > 0\} * M$	0.001	0.001	−0.006
	(0.002)	(0.002)	(0.011)
$\mathbb{1}\{SDA\ Cost_{t,t-2} > 0\} * Ca$	−0.000	0.001	0.005
	(0.002)	(0.002)	(0.007)
$\mathbb{1}\{SDA\ Cost_{t,t-2} > 0\} * P$	0.016***	0.012***	−0.012
	(0.005)	(0.004)	(0.010)
$\mathbb{1}\{SDA\ Cost_{t,t-2} > 0\} * SDA_{Share}$	0.008**	0.004	−0.034**
	(0.004)	(0.004)	(0.016)
Locality Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Observations	4,181	4,181	4,118
Num SDA Localities	419	419	407
Num Countries	42	42	42
Pseudo R^2	0.859	0.907	0.664
Outcome Mean	2555.638	3051.339	645.958
Outcome SD	3823.851	4273.761	2841.991

Notes: Observations are SDA localities in Sub-Saharan Africa between 1991 and 2022. Standard errors clustered at the country level are presented in parentheses. *Gains* is the number of reported baptisms, professions of faith, and former member baptisms in the SDA locality in a given year. *Losses* is the number of reported dropped and missing members in the SDA locality in a given year. *Net Gains* is reported gains minus losses. M, Ca, and P are the share of the population that are Muslim, Catholic, and Protestant (net of SDA), respectively, in a country in 2000 according to Zurlo (2024). SDA_{share} is the share of the population that are SDA members in a locality in the first year a locality appears in the SDA records; the denominator is estimated population in 1980 per locality based on Klein Goldewijk et al. (2017). *SDA Cost*$_{t,t-k}$ measures the average opportunity cost of abiding by the SDA crop prohibitions–the agricultural revenue per hectare given up per hectare if *constrained* by SDA crop restrictions on coffee, tea, and tobacco–between years t and $t-k$. $\mathbb{1}(x > 0)$ represents the indicator function that equals 1 when x is greater than zero and 0 otherwise. $\text{Q}^+(x)$ represent indicator variables equal to 1 if x is in kth quartile of non-zero values of x and 0 otherwise. Estimated using Poisson regressions via pseudo-maximum likelihood; regressions exclude observations that are either singletons or separated by a fixed effect (Correia et al., 2020). Regressions control for population in each locality in 1980 interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.