Church Membership and Social Insurance: Evidence from the Great Mississippi Flood of 1927*

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Abstract

Religious organizations are key providers of social insurance. This paper focuses on the devastating impact of the Great Mississippi Flood of 1927 to investigate how an increase in the demand for social insurance affects church membership. We find a significant increase in church membership in flooded counties. This effect is stronger in counties with severe economic losses and where access to credit was limited. Consistent with economic theories stressing the insurance aspect of religious organizations, we show that denominations with a relatively large church network, or classified as strict and charity-oriented, gained more members in flooded counties.

Keywords: Religion; Informal Insurance; Club Goods; Natural Disasters.

JEL codes: Z12; H40; D70

***Acknowledgements:** We would like to thank Thomas Barnebeck Andersen, Stephen Broadberry, Carl-Johan Dalgaard, Walter Garcia-Fontes, Peter Sandholt Jensen, Nicolai Kaarsen, Erzo F.P. Luttmer, Paul Sharp, Holger Strulik, Nico Voigtländer, and seminar participants at the Danish Public Choice workshop 2014 (University of Copenhagen), the 5th workshop on Growth, History and Development (University of Southern Denmark), the FRESH meeting at Canterbury (University of Kent), the SAEe 2014 at Palma de Mallorca (Universitat de les Illes Balears), and the Historical Economics of Religion Workshop 2015 (Queen's University Belfast) for their helpful comments and suggestions. The paper was previously entitled "Church Membership and Social Insurance: Evidence from the American South".

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1 Introduction

One salient feature of religious organizations is their involvement in social services and insurance.[1] This fact is explained in economic theories that consider religious organizations as clubs where the provision of social insurance among members constitutes an important determinant of religious membership (Iannaccone, 1992; Berman, 2000; Abramitzky, 2008). While not ruling out that faith plays a role in religious organizations, these theories stress the centrality of the insurance aspect of religious communities and predict that religious organizations have more members in societies where individuals have a higher demand for social services and insurance that these organizations can provide.

This paper provides evidence in line with a central prediction from these theories: increased demand for social insurance should increase membership in religious organizations. To identify this empirically, we investigate how church membership evolved in the aftermath of the Great Mississippi Flood of 1927. This flood was considered to be the greatest natural disaster in the history of the United States (American National Red Cross, 1929) and was therefore an unprecedented shock to the economy of the affected areas. The economic losses were massive.[2] More than 160,000 family homes were flooded in an area where around 930,000 people resided. Property losses of local business and public utilities and the implied suspension of normal business "constituted an economic aftermath beyond computation" (American National Red Cross, 1929, p.7).[3]

The first contribution of this paper is to document that the 1927 Mississippi flood caused an increase in church membership. Exploiting time variation due to the flood together with cross-sectional variation in the fraction of county land flooded within the same state, we show that religious organizations significantly increased their membership numbers in flooded counties relative to non-flooded counties between 1926 and 1936. Flooded counties experienced, on

[1] For studies on the role religious organizations play as providers of social services, see Moberg (1984), Cnaan and Boddie (2002), McCleary and Barro (2006a), and Gruber and Hungerman (2007), for example.

[2] Out of the massive total losses, the flood destroyed crops and killed livestock with an estimated value of around \$124 million (1927 prices). For a rough comparison, the GDP for the United States in 1927 was around \$100 billion and GDP per capita was around \$810 (Williamson, 2015). This means that the losses in only crops and livestock comprised the yearly income of around 150,000 individuals, which is circa 16 percent of the number of people (930,000) living in flooded areas.

[3] The 170 affected counties are located in seven states: Louisiana, Mississippi, Arkansas, Tennessee, Missouri, Illinois, and Kentucky.

average, a 16 percentage point increase in church members per capita. We document that these results are not caused by any differences in pre-existing trends in church membership between flooded and non-flooded counties.

The paper's second contribution is to present supporting evidence for the hypothesis that an increase in the demand for social insurance was a central mechanism through which the flood influenced church membership.[4] If the effect of the flood on church membership works through increased demand for social insurance, it is a necessary condition that the effect on church membership is larger in counties that experienced more severe economic losses due to the flood. Consistent with this argument, we show that the positive effect of the flood on church membership was stronger in flooded counties with lower growth in agricultural production and more crop failure during the sample period. Additionally, we find that credit availability mitigated the positive effect of the flood on church membership. These findings suggest that access to informal insurance in religious organization and credit availability during economic distress played a central role for the decision to become a member or not.

The Census of Religious Bodies in the United States collected data on church membership by county and denomination. Hence, we can examine whether a specific type of religious denominations accounted for the surge in membership in flooded counties. Historical evidence suggests that religious organizations were able to offer members informal insurance arrangements through an extensive church network (Overacker, 1998; Bovee, 2010; Roll, 2010). While spatial diversified risk-sharing arrangements involve a trade-off between risk-pooling benefits and enforcement costs, households can mitigate the enforcement costs by taking part in risk-pooling arrangements with relatives or persons with close ties that are not subject to the same income risk. This can both be along ethnic or religious lines (Rosenzweig and Stark, 1989; Grimard, 1997; Richardson, 2005). Using exclusively the within-county by denomination variation in church membership, we show that the increase in church membership in flooded counties was more pronounced in denominations with a relatively large church network. This finding is consistent with the hypothesis that after experiencing an adverse economic shock, individuals

[4] We regard our setting as being well suited to examine this mechanism, since possible confounding effects from other insurance providers were limited during this period. Flood insurance was not common at this time (White, 1945), and the few companies that offered such coverage abandoned that business as a result of the 1927 Mississippi flood (Parker, 2000, p.413).

choose to join denominations with larger church networks since these denominations are able to provide insurance by pooling risk through spatial diversification.

Another strand of theoretical research argues that stricter denominations are more efficient providers of charity and insurance as they efficiently counteract free-riding by imposing behavioral restrictions on their members (Iannaccone, 1992; Berman, 2000; Abramitzky, 2008).[5] While such behavioral restrictions impose additional costs on potential members, membership of stricter denominations should be more attractive after the flood as they can provide a generous mutual insurance network without suffering from free-riding problems. Consequently, these denominations will be better at keeping the new members, since free riding is limited. In line with the theoretical predictions we find that, after the flood, denominations classified as strict (evangelical/fundamentalist denominations) gained more members in flooded counties. In addition, denominations that spend a higher share of their budget on local relief and charity gained more members after the flood. This is consistent with the prediction that the decision to become a member is influenced by the help and support among members of the local congregations and that the stricter denominations were more likely to provide this help.

We are also able to rule out alternative explanations that could potentially confound the interpretation of our findings. Most importantly, we address the concern that the observed pattern in church membership is driven by flood-induced migration. As flooded counties experienced black out-migration (Hornbeck and Naidu, 2014), a potential confounding factor could be that black emigrants were less likely to be church members than the average individual. In that case, total church members per capita in flooded counties could have increased simply due to a composition effect, even if churches in the flooded counties did not gain any new members. Since we also observe a significant increase in total church members in flooded counties we are able to rule this out as the only explanation. Reassuringly, the data and anecdotal evidence also

[5] For example, Berman (2000) argues that the stringent practices and prohibitions imposed on Ultra-Orthodox Jews allow them to sustain a high degree of mutual charity among community members. According to Iannaccone (1992), these behavioral restrictions typically involve requirements on diet, clothing, praying, and social customs. Since many of these practices are observable, they are efficient tools to limit hidden actions (moral hazard). While the associated costs of these restrictive religious practices are considered as unproductive for each individual, they are productive for the religious community, since they increase participation and avoid free-riding. This positive effect on participation is due to screening (avoiding that less committed individuals will become members) and lowering outside options of members; for example, due to stigmatization. Another feature of these practices is that they are cost-efficient signaling tools; i.e., affordable ways for an individual to show future commitment to the community.

suggest that compositional effects from flood-induced migration are more likely to downward bias our estimated effect. We further show that the effect of the flood on church membership is robust to sample modifications and is not driven by public relief programs such as the New Deal or local redistribution.

An alternative explanation of the increase in church membership in flooded counties is that individuals became more religious after such a traumatic life event (e.g., Pargament, 1997). For example, Bentzen (2015) shows that religiosity increases significantly in the aftermath of earthquakes across subnational world districts. Although religiosity may increase without affecting church membership at the extensive margin, it is plausible that increased religiosity is part of the reason why more people joined a religious organization in flooded counties. To test this explanation more systematically, we constructed denomination-specific indices of religious intensity, religious coping, and religious beliefs. We find that denominations which are associated with higher religious intensity and more emphasis on religious coping gained more members after the flood. However, and reassuringly for the hypothesis of this paper, we find that the insurance motive remains quantitatively the most important one. We therefore conclude that our findings support the hypothesis that demand for social insurance is a central determinant of church membership.

2 Related Literature

Our paper is most closely related to the literature that emphasizes the role of charity and insurance in religious organizations.[6] On the theoretical side, economists often regard the insurance function of religious organizations as an important determinant of church membership (Iannaccone, 1992; Berman, 2000; Abramitzky, 2008). In line with these theories, recent empirical research has shown that religious organizations, at least partially, insure their members against economic risk. For example, Dehejia, DeLeire, and Luttmer (2007) find that involvement with religious organizations helps individuals to better insure their happiness and consumption

[6] There is a large literature that investigates the determinants of religious attendance, (e.g., Azzi and Ehrenberg, 1975; Iannaccone 1998; Gruber, 2004, 2005; McCleary and Barro, 2006a; and Glaeser and Sacerdote, 2008). One important question in this context is how religious attendance depends on income (e.g., McCleary and Barro, 2006b; Becker and Woessmann, 2013; and Franck and Iannaccone, 2014).

against income shocks.[7]

Chen (2010) provides further evidence that religious institutions can facilitate consumption smoothing. He finds support for the hypothesis that religious communities can act as ex post insurance providers by documenting a positive effect of economic distress induced by the Indonesian financial crisis between 1997 and 1998 on religious intensity (measured by communal Koran study and Islamic school attendance).[8] In line with the ex post insurance hypothesis, Chen shows that credit availability reduces the effect of economic distress on religious intensity.

While this paper shares with Chen (2010) the focus on the effect that economic distress has on participation in religious organizations, our study differs from Chen in three important dimensions: (i) we are able to test the predictions of economic theories regarding how denomination-specific characteristics (e.g., strictness and network size) influence the impact of economic distress on church membership; (ii) we study a longer time period (the years 1926-1936), while Chen's study is based on observations that span one year. Our results therefore validate that the effect of economic distress is not only capturing a short run surge in church membership due to people in need of urgent help and relief. On the contrary, we show an effect on church membership nine years after the shock, especially in charity-oriented and stricter denominations. This finding further supports the theories predicting that group formation and stigmatization prevent individuals from leaving religious communities that provide more social insurance; and (iii) we focus on church membership instead of examining participation in religious activities. Thus, economic distress not only induces higher religious intensity of existing members, but also affects participation at the extensive margin as more people decided to join religious organizations in flooded counties.

Our work also relates to Ager and Ciccone (2015), who study the link between exposure to economic risk and religious membership based on an ex ante insurance framework.[9] While

[7] A separate literature has pointed out that there exists, in general, a positive correlation between religious participation and subjective well-being (e.g., Ellison, 1991; Diener et al., 1999; Luttmer, 2005; Campante and Yanagizawa-Drott, 2015). For example, religion may function as a buffer against adverse life events (e.g., Pargament, 1997; Clark and Lelkes, 2005; Scheve and Stasavage, 2006; Bentzen, 2015).

[8] This theory shows that, within a religious community, people can get help after experiencing a negative economic shock if participation involves high religious intensity associated with a strong group formation and social sanctions on those who leave the community. Thus, ex post insurance is a financially sustainable strategy of communities with strong group formation.

[9] Since the empirical evidence suggests a positive link between religiosity and risk aversion at the individual level (e.g., Miller and Hoffman, 1995; Diaz, 2000; Hilary and Hui, 2009), the link between individual risk aversion

Ager and Ciccone show that church membership is higher in societies where people expect more common economic risk, we find that the realization of a large economic shock affects church membership by its effect on the demand for social insurance.[10]

A large strand of literature has documented other forms of informal insurance arrangements that are designed to buffer against economic risk when formal insurance markets are absent or incomplete. Besley (1995) provides an introduction to this literature that seeks to explain the causes of informal institutions that provide credit and risk-sharing arrangements and their consequences for economic development. The studies of Alderman and Paxson (1994), Townsend (1995), and Dercon (2004) document that households in developing countries partially share income risk. Such informal risk sharing mechanisms range from implicit insurance provided through family and friend networks (e.g., Rosenzweig and Stark, 1989; Fafchamps and Lund, 2003), fragmentation of land holdings (e.g., McCloskey, 1976), self-enforcing mutual-help arrangements (e.g., Kimball, 1988; Ligon et al., 2000), informal credits (e.g., Rosenzweig, 1988; Udry, 1994) to spatially diversified mutual-insurance arrangements (e.g., Grimard, 1997; Richardson, 2005). Our analysis complements this literature by providing evidence that religious organizations can be seen as a particular example of a risk-pooling institution that facilitates mutual insurance and credit among their members.

A central building block of our hypothesis is formed by the literature showing that religious organizations were the main providers of social services in the United States until the middle of the 20th century (e.g., Gruber and Hungerman, 2007).[11] For example, during the 1920s, the Presbyterian Church in the United States spent a yearly average of about \$6.50 per member on benevolences (Weber, 1927, p.141). In 1936, religious organizations spent over \$71 million on benevolences; alone \$16 million (about 270 million in 2013 US dollars) on local relief and charity (Bureau of the Census, 1941). More generally, and important for our argument, social insurance in religious organizations involves a broad range of transactions among members besides money transfers that help individuals to smooth consumption and wellbeing in case of

and religiosity could influence the decision of religious organizations to provide social insurance.

[10] Specifically, Ager and Ciccone (2015) use variability in rainfall as a measure of common economic risk in agricultural counties in nineteenth-century United States and find that religious communities are larger in counties subject to greater rainfall risk

[11] As churches in the United States required financial support from their members to finance social services, membership was far from costless. Considering only monetary costs, church member giving as a proportion of disposable income ranged between 3 and 3.5 percent in the 1920s (Ronsvalle and Ronsvalle, 1999, Figure 2.1).

an adverse economic shock (Steinitz, 1982; Taylor and Chatters, 1986, 1988).[12]

Another way of examining whether social services and insurance are an important aspect of religious organizations is to test if social services provided by the government crowd out charitable spending of religious organizations. Results from cross-national studies indicate that an increase in government welfare spending is associated with a decline in religious participation, pointing to a substitution effect between church charitable spending and government expenditure for welfare services (e.g., Gill and Lundsgaarde, 2004; Scheve and Stasavage, 2006).[13] For the United States, Hungerman (2005) finds that a cutback of welfare services to non-US citizens in 1996 increased charitable church spending and member donations of Presbyterian congregations. Gruber and Hungerman (2007) show that local New Deal spending crowded out church charitable activities during the 1930s. As a robustness check, we show that the increase in church membership per capita in flooded relative to non-flooded counties is unaffected by public relief programs such as the New Deal or local public redistribution.

Finally, in terms of the empirical strategy, our paper relates to Hornbeck and Naidu (2014), who exploit variation in the impact of the 1927 Mississippi flood across counties to investigate how the flood affected black out-migration and agricultural development in the American South. We differ from their study by focusing on church membership and by using a larger sample that includes all flooded counties in the seven affected states.

3 Data and Empirical Strategy

3.1 Data

The baseline sample spans a total of 638 counties observed between 1926 and 1936. These counties constitute the seven affected states: Louisiana, Mississippi, Arkansas, Tennessee, Missouri, Illinois, and Kentucky.[14] We use data from the Bureau of the Census to construct measures of

[12] Landau (1993) provides an illustrative example, where mutual help among members of Ultra-Orthodox communities comprises not only money and in-kind transfers, but also various time-intensive tasks, such as visiting sick members.

[13] Related to this literature is also Chen and Lind's (2014) finding that members of religious organizations with greater within-group giving are more opposed to the welfare state.

[14] Our sample is an extension of Hornbeck and Naidu (2014), who consider a restricted sample of 163 counties located in four out of the seven affected states (Louisiana, Mississippi, Arkansas, and Tennessee). As a robustness check, we also use the more restrictive sample (in terms of number of counties) used by Hornbeck and Naidu;

church membership at the county level. The church membership data were collected in cooperation with local church officials and published in the Census of Religious Bodies. These volumes contain detailed county-level information about church membership of Christian denominations for the years 1890, 1906, 1916, 1926, and 1936. County-level church membership, which refers to all religious denominations listed in the Census of Religious Bodies, and population data are retrieved from the ICPSR 2896 file (Haines, 2010).

While the religious censuses of 1890 to 1926 are considered to be detailed and reliable, we are aware of some concerns about the 1936 data (Stark, 1992; Finke and Scheitle, 2005; Gruber and Hungerman, 2007). The Bureau of the Census acknowledged that the 1936 records suffered from undercounting, especially in the South and West, due to lower levels of cooperation compared to previous decades (Gruber and Hungerman, 2007). Several congregations of Southern Baptists and the Methodist Episcopal Church (South), which are both large denominations in the American South, refused to participate and consequently had fewer church members in 1936 compared to 1926 due to underreporting (Finke and Scheitle, 2005). However, to confound our results, the underreporting of church members in 1936 needs to be systematically related to the Mississippi flood of 1927.[15] Reassuringly, our main findings are not affected if we exclude members of the Southern Baptist Church and the Methodist Episcopal Church (South) – the main denominations associated with underreporting – from our analysis.[16]

The flood intensity captures the share of each county flooded (see Figure 1a). The blue shaded areas indicate the sample region of flooded counties in the seven affected states. Flood intensity is based on a map, which was compiled and printed by the US Coast and Geodetic Survey (1927).[17] Figure 1a shows that counties closer to the Mississippi River were generally more affected by the flood and were more likely to experience an increase in church members per capita between 1926 and 1936 (see Figure 1b). In the data appendix we provide a detailed description of all variables used in the empirical analysis. Descriptive statistics of the main variables of interest are shown in Table 1.[18]

see Section 4.3 for details.

[15] It is impossible that the flood had a direct effect on church census records by causing a loss of records since the 1936 census, which we use as the post-flood observation, was conducted nine years after the flood.

[16] We present these results in Section 4.3.

[17] We retrieved the flood data from the replication files of Hornbeck and Naidu (2014).

[18] The measure of total church members relative to population is above unity in Jefferson Parish (LA) (1.04) and in Vermilion Parish (LA) (1.11). Our results are unaffected if these counties (parishes) are excluded from

3.2 Empirical Strategy

This section describes the empirical strategy employed to identify the average effect of the Great Mississippi Flood of 1927 on church membership. Since we compare outcomes before and after the flood across counties with different flood intensities (measured as the fraction of county area flooded in 1927), our empirical framework follows a differences-in-differences (DD) strategy.

The baseline estimation equation is:

$$M_{ct} = \delta_c + \varphi_{st} + \beta Flood_c \times I_t^{post} + \mathbf{X}_c \mathbf{I}_t^{post} \Gamma + \varepsilon_{ct}, \tag{1}$$

where M_{ct} denotes the measure for church membership (church members per capita or the logarithm of total church members) in county c at time t; $Flood_c$ is the fraction of county area flooded; and I_t^{post} is an indicator variable that equals one in the post-treatment period (i.e., $t = 1936$) and zero in the pre-treatment period (i.e., $t = 1926$). We also control non-parametrically for county fixed effects (δ_c) to capture time-invariant factors that affect both church membership and the fraction of county area flooded, such as geography, and state-by-time fixed effects (φ_{st}) to capture any time-varying factors at the state level, such as state-wide policy changes. $\mathbf{X}_c \mathbf{I}_t^{post}$ denotes a set of county-specific geographical characteristics (i.e., latitude, longitude, cotton and corn suitability, ruggedness, and distance to the Mississippi River) interacted with the time indicator. We compute standard errors that are Huber robust and clustered at the county level.[19] Following Hornbeck and Naidu (2014), the regressions are weighted by county size.

4 Results

4.1 Flexible Results

Before reporting the results from estimation equation (1), we test the key identifying assumption in the DD strategy of conditional identical pre-trends between treatment and control counties

the analysis or if we truncate this variable at unity; see Section 4.3 for more details.

[19]This type of clustering allows the residuals to be arbitrarily serially correlated within counties.

using the following flexible model:

$$M_{ct} = \delta_c + \varphi_{st} + \sum_{j=1906}^{1936} \beta_j Flood_c \times I_t^j + \sum_{j=1906}^{1936} \mathbf{X}_c I_t^j \Gamma_j + \varepsilon_{ct}, \tag{2}$$

where the main difference to estimating equation (1) is that $Flood_c$ and $\mathbf{X}_c$ are interacted with a full set of year fixed effects, $\sum_{j=1906}^{1936} I_t^j$. The sample length is now extended to 1890–1936. Since 1890 is the (omitted) year of comparison, the estimated $\beta_j' s$ denote the effect of being flooded in 1927 on the outcomes (M_{ct}) for every year we consider relative to 1890. A test of the DD-identifying assumption is that the coefficients in the pre-treatment periods are zero, implying that there should only be an effect of the flood in the post-treatment period in 1936 (i.e., $\hat{\beta}_{1906} \approx \hat{\beta}_{1916} \approx \hat{\beta}_{1926} \approx 0$ and $\hat{\beta}_{1936} \neq 0$).[20]

Table 2 presents the results from the estimating equation (2). We show estimates for church members per capita in columns (1)–(3) and estimates for the logarithm of total church members in columns (4)–(6). While there are positive differences in the pre-treatment periods in columns (1) and (4), where we only control for county and year fixed effects, these effects disappear once we add state-by-time fixed effects in column (2). However, the positive and statistically significant effect for the post-treatment period remains. Thus, consistent with the hypothesis that the flood in 1927 caused an increase in church membership, more flooded counties experienced an increase in church members per capita relative to non-flooded counties only after 1927 when the flood took place.

Column (3) reports estimates from a specification that controls for the set of geographic variables (latitude, longitude, cotton and corn suitability, ruggedness, and distance to the Mississippi River) interacted by the set of year fixed effects. As seen from Figure 2, which visualizes the estimates from this specification, there are no significant differences in pre-trends between treatment and control counties related to the future flood share. We reach the same conclusion when we use the logarithm of total church members as outcome variable in columns (4)–(6). Thus, the key assumption in the DD framework, i.e., that treatment and control counties follow common conditional pre-trends, is not violated. Since we also find a positive and statistically significant effect on total church members, the effect on church members per capita cannot

[20] See, for example, Angrist and Pischke (2008).

only be driven by non-members moving out of the flooded counties.[21] We also note that the results in Table 2 are robust to the functional form and controlling for county-specific linear time trends.[22]

Overall, the results from the flexible specification show that there are no significant pre-trends between treatment and control counties once we account for state-by-time fixed effects. When we add these controls, a clear positive effect of flooding on church membership (in total and relative to population) emerges after the 1927 flood. Changing the comparison year to, for example, 1926 provides a similar picture; that is, $\hat{\beta}_{1890} \approx \hat{\beta}_{1906} \approx \hat{\beta}_{1916} \approx 0$ and $\hat{\beta}_{1936} > 0$. Overall, there is a clear and distinct discontinuity in the pattern of the church data after the 1927 flood and no evidence in the data that the key identifying assumption of our empirical strategy is violated.

4.2 Main DD Results

In this section, we discuss the estimates from the DD specification of equation (1) using 1926 as pre-treatment period and 1936 as post-treatment period. Table 3 reports the DD estimates. Column (1) shows a positive and statistically significant association between flooded counties and church members per capita after controlling for county and year fixed effects. The point estimate implies that on average flooded counties experienced a 15.3 percentage point increase in church members per capita.

One concern is that the flood correlates with some more fundamental state-specific changes in church membership per capita during the observed period. It is also plausible that the impact of geographical characteristics on church membership may have changed over time; for instance, if information of some denominations started to diffuse from the North to the South along the Mississippi river during the considered period for other reasons than the flooding in 1927. As seen from columns (2) and (3), our main result is robust to controlling for state-by-time fixed effects and the set of geographical variables interacted with time. The point estimate, $\hat{\beta} = 0.16$ (standard error = 0.031), is strikingly similar to the estimate reported in column (1).

Figure 3 plots the partial relationship between $Flood_c \times I_t^{post}$ and church members per capita

[21] We refer to Section 4.3.1 for a detailed discussion of the potential effects from flood-induced migration.
[22] These results are available from the authors upon request.

from column (3). This scatter plot allows for visual inspection of our baseline specification. One could argue that the four observations located in the Northeast and Southwest corners of the plot are outliers. If these are excluded we find that $\hat{\beta} = 0.11$ (standard error = 0.032), which shows that the effect is not a result of these outliers. Moreover, Appendix Table 1 demonstrates that the baseline results are also robust to excluding counties with outcomes in the 1st, 5th, 95th, and 99th percentiles.

Columns (4)–(6) document the effects of the flood on total church members. In column (6) we find a positive and statistically significant association between the flood and total church membership at the 1 percent level. The point estimate implies that flooded counties experienced a 32 percent increase in total church members. Note that we obtain similar results for both outcome variables in Table 3, as flooded and non-flooded counties follow the same pattern in population growth after the shock (see Figure 4).[23]

4.3 Robustness

We have carried out a number of robustness checks on the baseline estimating equation. Appendix Table 2 shows that the results are qualitatively similar if we restrict the control counties to be no further than 50 km/75 km/100 km away from the Mississippi river (columns 1–3), bordering the flooded region (column 4), or using the restricted Hornbeck and Naidu (2014) sample of 163 counties (column 5). Appendix Table 3 demonstrates that the findings in Table 3 are also robust to excluding the main Southern denominations with underreporting (Southern Baptist Church and the Methodist Episcopal Church, South). We also use a falsification exercise, where we assume that the flood took place either between 1890 and 1900, 1900 and 1910, or 1910 and 1920 to check the validity of our results. Appendix Table 4 reports that flooded counties changed similarly to non-flooded counties in those years supporting the identifying assumption that in the absence of the 1927 Mississippi flood, treatment and control counties would have changed similarly over time. Appendix Table 5 reveals that we obtain similar results when the standard errors of the point estimates are corrected for spatial correlation (Conley, 1999). In the following subsections we show that our findings are not driven by flood-induced

[23] The estimated coefficient on the fraction of county land flooded is also statistically significant at the 1-percent level when using unweighted least squares regressions.

migration and public relief programs such as the New Deal and local public redistribution.

4.3.1 Flood-induced Migration

A potential threat to identification is the possibility that the 1927 flood triggered migration of individuals who differed from stayers in terms of church membership. As Hornbeck and Naidu (2014) documented a black exodus from flooded counties, a threat to identification would be if black emigrants were not representative in terms of church membership. Our baseline estimate would be upward biased if, compared to the average individual in flooded counties, black emigrants were less likely church members. Anecdotal evidence reveals that this is unlikely to be the case. For example, Sernett (1997) and Overacker (1998) report that black migration to the North was, to a large extent, facilitated by church networks, which is consistent with the above-mentioned theories highlighting the insurance aspect in form of mutual help and support among church members. If anything, our estimate would be downward-biased as black migrants leaving the American South were more likely church members than the average person staying in the flooded areas.[24]

In addition, we can reject the hypothesis that out-migration of non-members was the only reason why church members per capita increased in flooded counties since we also documented a corresponding increase in total church members in Section 4.2. The similar evolution of populations in flooded and non-flooded counties during the period of interest (see Figure 4) reveals why we find similar effects when we use total church members instead of church members per capita as dependent variable. Based on these arguments and the available anecdotal evidence, we arrived at the conclusion that flood-induced out-migration is unlikely to explain our findings.

The evolution of population size shown in Figure 4 is consistent with Hornbeck and Naidu (2014, Table 2, columns 5-6), who find no statistically significant differences in total population size between flooded and non-flooded counties. Table 4, column (1) confirms this finding, where in equation (1) we replaced church membership by total population size as dependent variable. Our results indicate that the decline in black population was offset by an increase in white (and

[24] For example, Sernett (1997, pp.76-77) writes: "In some instances ministers arrived in the North with enough members of their old congregations to immediately organize a church. The Rev. R.H. Harmon brought twenty-eight members of his congregation from Mississippi to Chicago. He told a Defender reporter: I am working at my trade. I have saved enough to bring my wife and four children and some of my congregation. We are here for keeps".

other non-black) population in flooded counties. Thus, the increase in total church membership in flooded counties might be a result of white in-migration if these migrants were more likely to be church members compared to the average population in the flooded counties.

In this case, it is important to distinguish between two scenarios. The first scenario is that people who moved from non-flooded counties into flooded counties were mainly church members. For this explanation to hold, we would expect to see a negative effect on the evolution of church members in non-flooded counties compared to the rest of the American South. As Figure 5 shows, this was not the case. On the contrary, the evolution in church membership in non-flooded countries is remarkably similar to that of the rest of the South. We conclude that people who moved between flooded and non-flooded counties did not seem to have been special in terms of church membership. The second scenario is that churches facilitated that members from the entire United States moved into the flooded counties due to the need for people to help with the provision of relief and reconstruction. In that case we would also expect to see a corresponding increase in the number of clergymen per capita. As Table 4, column (2) shows, this was not the case.[25] We should note that even if our results are driven by white in-migration this can still be consistent with the "insurance hypothesis" of church membership. For example, Roll (2010, p.6) writes: "Religious fellowship enabled migrant settler families in the [Missouri] Bootheel to form new communities and organize politically. Churches, which often were the only meeting places available to rural people, became important civic spaces where a shared moral system that ordered ideas about families, labor, leadership, and belonging could be enunciated and enforced."

Columns (3)–(8) of Table 4 present further robustness checks. In columns (3)–(5) the outcome variable is church members per capita. In column (3), we add county population size as additional control variable to the benchmark specification (i.e., column (3) of Table 3). As expected, the estimated coefficient on the fraction of county land flooded remains quantitatively and qualitatively unaffected. Our main result also remains unchanged when we control for black population in column (4). Column (5) includes the initial (1920) share of

[25] If the decision to migrate is affected by transportation costs, and these are increasing with the distance to the flooded areas, we would expect to see more church members coming from counties close to the flooded region (i.e., the non-flooded counties in our sample). Again, since these counties have a similar trend in the evolution of church members as the rest of the American South (see Figure 5), the data do not support this explanation.

the county population who were black interacted with the time indicator as additional control. This should capture any differential effect, including induced migration, between blacks and whites from the flood. The estimated coefficient on the fraction of county land flooded remains positive and statistically significant at the 1 percent level, although the coefficient in column (5) becomes somewhat smaller. Column (6) documents that our finding for total church members is robust to controlling for initial (1920) black population interacted with the time indicator. In the two final columns, we only exploit variation in church members relative to population within purely white and black denominations.[26] Importantly, the flood had a positive and statistically significant effect in both specifications suggesting that our main result is not driven by race-specific denominations. Overall, the presented evidence does not support the hypothesis that flood-induced migration or other changes in the composition of the population were the main causes of the increase in church membership in flooded counties.

4.3.2 Redistribution and Public Relief

In Table 5, column (1) we add per capita tax revenues at the county level as a further control variable to our benchmark specification. Per capita tax revenues at the county level are intended to serve as a proxy of local redistribution (Ramcharan, 2010). Reassuringly, our coefficient of interest remains unaffected and statistically significant at the 1 percent level.

Since we compare church membership between 1926 and 1936, our period includes the New Deal and the associated expansion of government spending during the 1930s. This is a potential threat to identification, as Fishback et al. (2005) argue that counties with major rivers received more relief through the New Deal. Moreover, Gruber and Hungerman (2007) find that the New Deal crowded out church charitable spending of six large Christian denominations in the 1930s. To address this concern, we include in columns (2)–(5) of Table 5 controls for the New Deal program interacted with the time indicator.[27] We find that the effect of the flood on church members per capita remains positive and statistically significant at the 1 percent level. Thus, within the considered time span, the effect of the flood on church membership was not mitigated

[26] We use information from the Census of Religious Bodies to classify denominations along racial lines. While most of the so-called "black churches" were listed separately, some denominations grouped black and white members in the Census together. These "mixed denominations" are not included in columns (7)–(8).

[27] This is equivalent to controlling for the change in New Deal spending as there were all zero in the pre-treatment period.

by the New Deal spending program.[28] Overall, the evidence presented in Table 5 shows that our results are robust to public relief spending (i.e., the New Deal) and local redistribution of income through county taxes.

5 Mechanisms

Before presenting detailed evidence on the insurance hypothesis, we provide a brief discussion of the different competing mechanisms that could have triggered individuals' demand for social insurance after the 1927 flood.

On the theoretical side, the effect of the flood on individuals' risk perception is distinct from the direct impact that an adverse economic shock has on income and wealth of the affected people. Since the Great Mississippi Flood of 1927 was an unprecedented disaster, it is hard to argue that individuals in the affected areas did not update their risk perception in the period after 1927. This notion is further supported in Daniel (1997, p.3) reporting that the Chief of Engineers concluded that the levees in 1926 were in a condition to prevent the destructive effect of floods. Even if individuals' risk perception would remain unchanged, the flood might have affected church membership by its devastating impact on the local economy. People who lost their homes and property might have sought help from religious organizations. Indeed, clergymen of any denomination asked their congregations for flood fund contributions to help affected people in the Red Cross refugee camps (American National Red Cross, 1929, pp.16-17). Even though urgent relief was not contingent on joining a church, the situation in the affected areas made a connection between relief and church membership likely, in particular since denominations did not forgo the opportunity to attract new members in the refugee camps. As reported in Daniel (1977, p.168), "Evangelical preachers, like home demonstration agents, treated the massive relief camps as missionary fields ripe unto the harvest".

Based on the anecdotal evidence, we think that the demand for local relief and charity and the change in individuals' risk perception in the affected areas increased the demand for social insurance after the 1927 flood. Therefore, we think of our main hypothesis as encompassing both

[28] Our finding does not rule out that the New Deal spending crowded out charity spendings of churches and thus ultimately lowered church membership in the long run.

explanations.[29] Another competing explanation is that individuals joined religious organizations in flooded counties because they became more religious. While we will further elaborate on the religiosity mechanism in Section 5.2, we note that both explanations are not mutually exclusive (i.e., individuals might join religious organizations in flooded counties for both insurance and religious motives). What is important for the validity of the insurance hypothesis is to verify whether flood intensity affected church membership through economic distress.

5.1 Economic Distress and Credit Availability

Table 6 strongly suggests that the impact of the flood on church membership had an economic explanation. Column (1) reveals that the coefficient on the interaction, $Flood \times I^{post} \times \Delta Crop$ *failure*, is positive and statistically significant at the 5 percent level. Flooded counties with a larger increase in crop failure during the 1925–1930 period experienced a significant increase in church members per capita. The point estimate implies that a one-standard-deviation increase in the change of crop failure translates into a 0.042 percentage points increase in church members per capita. Along the same lines, columns (2) and (3) demonstrate that the estimated coefficients on the interaction term with changes in cotton production and the average value of farmland per acre during the 1925–1930 period are negative and statistically significant at the 10 percent level.[30] For example, the interaction term in column (3) implies that in flooded counties a one-standard deviation decrease in the change of the average value of farmland leads to a 0.044 percentage point increase in church members per capita. Column (4) confirms these findings by showing a significant negative effect of the interaction term with the growth rate of agriculture value added per capita during the 1920–1930 period, while column (5) shows that there is no such effect using the growth rate of manufacturing value added per capita, which is consistent with the fact that our sample covers mainly local rural economies.

In line with the insurance argument, column (1) of Table 7 shows that credit availability (measured by the number of banks per 1000 inhabitants in 1926) mitigates the effect of the shock on church membership. In particular, the estimated coefficient on the interaction term

[29] While it would be interesting to empirically disentangle the shock and risk effects, the lack of systematic individual data makes this impossible to implement.

[30] We thank Michael Haines for sharing his county-level database from the United States Censuses of Agriculture in 1925 and 1930.

indicates that a one-standard deviation increase in banks per 1000 inhabitants in 1926 reduces the magnitude of the shock by about 15 percentage points. Column (2) of Table 7 also reports a negative effect when using the value of bank deposits per 1000 inhabitants in 1926, although the estimated coefficient on the interaction term is not statistically significant at conventional levels. Consistent with the insurance hypothesis, our results indicate that the effect of the flood on church membership works largely through economic distress, while credit availability reduced the potential benefits from joining a church in flooded counties.

5.2 Denomination-specific Evidence

As the Census of Religious Bodies provides data on church members for each denomination at the county level, we can exploit the cross-sectional and time variation in flood intensity together with denomination-specific variation in network size, expenditure for charity and local relief, and religious values (fundamentalism, religious intensity) to study the characteristics of the denominations that gained more members in flooded counties.

We consider the following estimating equation:

$$M_{dct} = \varphi_{dt} + \gamma_{ct} + \gamma Flood_c \times I_t^{post} \times Index_d^j + \epsilon_{dct}, \tag{3}$$

where M_{dct} denotes members of denomination d per capita in county c at time t. The flood-shock variable, $Flood_c \times I_t^{post}$, is now interacted with denomination-specific indices, $Index_d^j$, which are explained as the analysis progresses. Our specification also controls non-parametrically for county-by-time fixed effects (γ_{ct}) and denomination-by-time fixed effects (φ_{dt}).[31] Regressions are weighted by county size and standard errors are Huber robust.

We construct indices based on denominations' charity-orientation, religious strictness, and network size to capture the predictions from the above-mentioned theories regarding the ability of religious organizations to facilitate social insurance among members. One aspect of determining whether the insurance motive plays a major role in religious organizations is to evaluate how much weight denominations put on charity and local relief. We construct two charity

[31] Note that the county-by-time fixed effects absorb the direct effect of the flood-shock variable, $Flood_c \times I_t^{post}$. The direct effects of the denomination specific indices, $Index_d^j$, are absorbed by the denomination-by-time fixed effects.

indices using information on local relief and charity expenditures from the Census of Religious Bodies in 1936.[32] The Charity Index ranks denominations according to how much they spent on charity and local relief relative to other expenditures (extensive margin). A higher score indicates that a given denomination is considered to be more charity-oriented.

The capability of a denomination to offer spatially diversified risk-sharing arrangements is of importance when members require an insurance scheme against common local agricultural risk, such as floods or crop failure. The scope of the disaster in 1927 may have limited the insurance capacity within congregations in flooded counties making membership in denominations that could draw on a large church network outside the affected areas more attractive.[33] We construct a Network Index, which captures the overall size of church networks using information from the Census of Religious Bodies in 1926, ranking denominations according to the total number of churches. A higher score indicates that a given denomination has the possibility to draw on a larger church network.

To evaluate whether stricter denominations gained more members in flooded counties we construct an index of religious strictness named the "Fundamentalist Index".[34] We categorize denominations into a liberal vs. fundamentalist classification scheme according to Steensland et al. (2000). Denominations classified as liberal are assigned a zero, whereas denominations classified as fundamentalist obtain a one, such that more strict (fundamentalist) denominations have a higher index score.

Table 8 reports the results from using these three indices each interacted with the flood variable. The estimating equation is (3) and the estimation method is weighted least squares. The effect between the interaction terms and church membership is in fact positive and statistically significant at least at the 5 percent level. Consistent with theories linking church

[32] Note that only the 1936 Census lists expenditures for local relief and charity separately by denomination (the 1926 Census only lists expenditures for benevolences which subsumed expenditures for home and foreign mission, denominational support, and other benevolent spending). What is important for the validity of our analysis is that denominations do not change their rankings in terms of charity and local relief expenditure relative to other expenditure between 1926 and 1936.

[33] However, it is important to mention that it was still possible to sustain support networks within flooded counties as not all residents were flood victims (only 24 out of 638 counties experienced more than 50 percent of their land being flooded).

[34] In our sample, congregations had on average about 80 members per church in 1890. Since the average congregation size in our sample is relatively small, social sanctions should still work effectively and mitigate the moral hazard problem. See, for example, Abramitzky (2008) for a related discussion on group size and moral hazard for the Israeli kibbutzim.

membership and social insurance, we find that denominations in flooded counties gained more members if they (i) spent a larger share of expenditure on charity-related activities, (ii) had stricter religious values, and (iii) had access to a larger church network.

Next, we examine whether religiosity can explain the church membership increase in flooded counties. Due to lack of contemporaneous data, we construct denomination-specific indices of religious intensity, religious coping, and religious beliefs using information about church members from the US General Social Survey (GSS). The following analysis is based on the assumption that the ranking of denominations for each index did not change from 1926 to the years in which the surveys were conducted. Our measure of religious intensity (Intensity Index) ranks denominations according to how their members answered the following questions in the GSS: "How often do you pray?". For religious coping we use information on whether GSS respondents "think about their life as part of a larger force" (Coping Index). The following information from GSS respondents is used to capture religious beliefs: "Do you believe in the devil (Devil Index), heaven (Heaven Index), hell (Hell Index), and miracles?" (Miracle Index). We code all indices such that a higher score means that the average member of a given denomination is considered to be more religious.

Table 9 presents the results from using the religiosity indices each interacted with the flood-shock variable. The point estimates indicate that church members per capita in flooded counties increased significantly more in denominations where the average member participates more in religious activities and put more emphasis on religious coping. On the other hand, belief in the devil, hell, heaven, or miracles seems not to be crucial determinants for the impact of the flood on church members per capita. The findings of Tables 8 and 9 suggest that both insurance and religiosity played an important role for why individuals decided to join religious organizations in flooded counties.

Finally, Table 10 reports horse races between the indices from Table 8 and the intensity and coping indices, as these were the most important determinants of the increase in church members per capita. As a measure of the magnitude of the coefficients, we report the standardized beta coefficients on the indices in the bottom of the table. Including all the indices in column (3) shows that one standard deviation in the Network Index accounts for 32.40 percent of a standard deviation in church members per capita, while the corresponding numbers for the coping and intensity indices are 23.98 percent and 22.37 percent, respectively. While the estimated coefficients on the Charity Index and the Fundamentalist Index are both positive and statistically significant at the 1 percent level, the standardized beta coefficients suggest that they account for less than 10 percent of a standard deviation each. In sum, the results in Table 10 demonstrate that social insurance plays a central role in explaining the flood-induced increase in church members per capita.

6 Concluding remarks

This paper exploited time variation due to the Great Mississippi Flood of 1927 together with cross-sectional variation in the fraction of county land flooded to estimate the effect of increased demand for social insurance on church membership. The presented empirical evidence documented a positive effect of the Great Mississippi Flood of 1927 on church membership. Specifically, we find that flooded counties experienced on average a 16 percentage point increase in church members per capita between 1926 and 1936. Further analysis shows a stronger effect of the flood on membership for denominations that had a larger church network and were more strict (fundamentalist). Since economic theories predict that these types of denominations are more able to provide insurance to their members, our findings support the hypothesis that access to social service and insurance is an important reason why more people decide to become a church member in times of economic distress. Future research may try to bridge the literatures on religion and non-market credit institutions (Besley, 1995) further. This could increase the understanding of the role that religion plays in the process of economic development through the special abilities of religious organizations in providing insurance to their members.

Data Appendix

Religion Data

Church Membership: The Census of Religious Bodies collected and published information on church members for the years 1890, 1906, 1916, 1926, and 1936. We use two measures of church membership at the county level: (i) church members per capita (the denominator is the county population of either 1890, 1900, 1910, 1920, or 1930) and (ii) total church members. The Census of the Religious Bodies in 1926 and 1936 also collected information on church members by denomination and race allowing us to construct separate measures of church membership by race (see Table 4). We consider denominations as black (white) if their members were listed as exclusively black (white); see the Census of Religious Bodies (Bureau of the Census, Table 33, 1930; 1941) for further details. County-level church membership refers to all religious denominations listed in the Census of Religious Bodies. These data and the county-level population are retrieved from the ICPSR 2896 file (Haines, 2010).

Clergymen: We use the microdata from IPUMS (Ruggles et al., 2010) to obtain a measure of clergymen per capita for the years 1920 and 1930. This variable is constructed as the number of clergymen (IPUMS variable OCC1950 == 9) divided by county population. We refer to the description of the IPUMS variable "OCC1950" for further details.

Denomination Specific Indices: Data for the charity indices (Charity Index) are from the Census of Religious Bodies in 1936 and for the network indices (Network Index) from the Census of Religious Bodies in 1926. The classification scheme for the fundamentalist indices (Fundamentalist Index) are Steensland et al. (2000). Data for the indices on religious intensity (Intensity Index), religious coping (Coping Index), and religious beliefs (Devil–Miracle indices) are from the US General Social Survey (Smith et al., 2013). We refer to Section 5.2 for further details.

Geography Data

Flood: Flood intensity is based on a map compiled and printed by the US Coast and Geodetic Survey (1927). The flood data are from the replication files of Hornbeck and Naidu (2014).

Suitability of Cotton and Corn: Data on cotton (corn) suitability come from the FAO (2012), which calculates cotton (corn) suitability as the maximum potential yield of cotton (corn) based on climate, soil type, and ideal growing conditions for cotton (corn); for more information see, e.g., Hornbeck and Naidu (2014, footnote 22). The county-level data are retrieved from the replication files of Hornbeck and Naidu (2014).

Distance to the Mississippi River: Distance in meters from the Mississippi River to a county's centroid. The measure is based on the GIS Map of the National Weather Service (Rivers of the US), http://www.nws.noaa.gov/geodata/catalog/hydro/html/rivers.htm.

Longitude and Latitude: Data on the longitude and latitude of each county seat are retrieved from Fishback et al. (2011).

Ruggedness: Measures of counties' ruggedness are based on the USGS National Elevation Dataset (Farr et al., 2007). Like Hornbeck and Naidu (2014), we use the standard deviation in altitude across county points and the maximum range in altitude across county points as proxies for ruggedness. The county-level data are retrieved from the replication files of Hornbeck and Naidu (2014).

County Level Controls

New Deal: County-level data on the New Deal spending program (AAA, public works, relief) per capita are from Fishback et al. (2005).

Taxes per Capita: County-level data on per capita tax revenues for the years 1920 and 1930 are from Ramcharan (2010).

Crop Failure: We used county level data on crop failure from the Censuses of Agriculture for the years 1925 and 1930. The exact variables are "crop land failure, acres (var 77)" for 1925 and "Total crop land with crop failure, acres (var 14)" for 1930. Note that the value of crop failure reported in the US Census corresponds to the year preceding the census years; i.e., the years 1924 and 1929. The county-level data from the United States Censuses of Agriculture are from Michael Haines.

Cotton Production: We used cotton production in acres from the Censuses of Agriculture for the years 1925 and 1930. The exact variables are "Cotton, acres (var 299)" for 1925 and "Cotton, lint, acres (var 305)" for 1930. Note that the cotton production reported in the US Census corresponds to the year preceding the census years; i.e., the years 1924 and 1929.

Value of Farmland: We used the average value of farmland and buildings per acre for the years 1925 and 1930. County-level data on the value of farmland are retrieved from the ICPSR file 2896 (Haines, 2010).

Agriculture Value Added: Value added in agriculture is calculated as agricultural output minus the expenditure for fertilizer and feed for 1920 and 1930. The variables used to construct agricultural output in 1920 are "var114, var121, var125, var128, and var138" (ICPSR 2896 dataset 86). For 1930 we used from the Census of Agriculture the variable "total farm products sold, traded, or used by value" as measure of agricultural output ("var1112").

Manufacturing Value Added: Value added in manufacturing is calculated as manufacturing output minus the cost of materials for 1920 and 1930. County-level data are retrieved from the ICPSR file 2896 (Haines, 2010).

Banks: The number of banks at the county level in 1926 are from the Federal Deposit Insurance Corporation Data on Banks in the United States. The data are retrieved from the ICPSR file 7 (Federal Deposit Insurance Corporation, 2001).

Deposits: Total value of deposits (in thousands of dollars) in 1926 are from the Federal Deposit Insurance Corporation Data on Banks in the United States. The data are retrieved from the ICPSR file 7 (Federal Deposit Insurance Corporation, 2001).

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Figure 1a: *The sample of flooded and non-flooded counties*

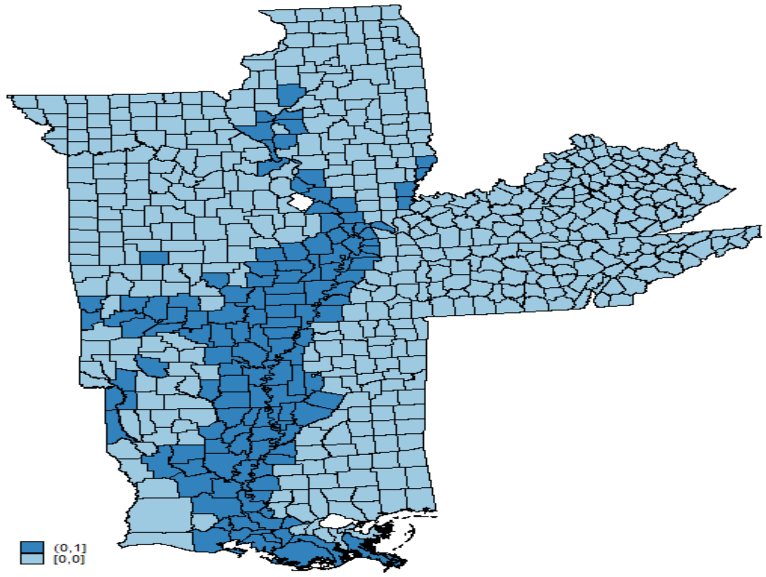


Figure 1b: *The change in church membership per capita between 1926 and 1936*

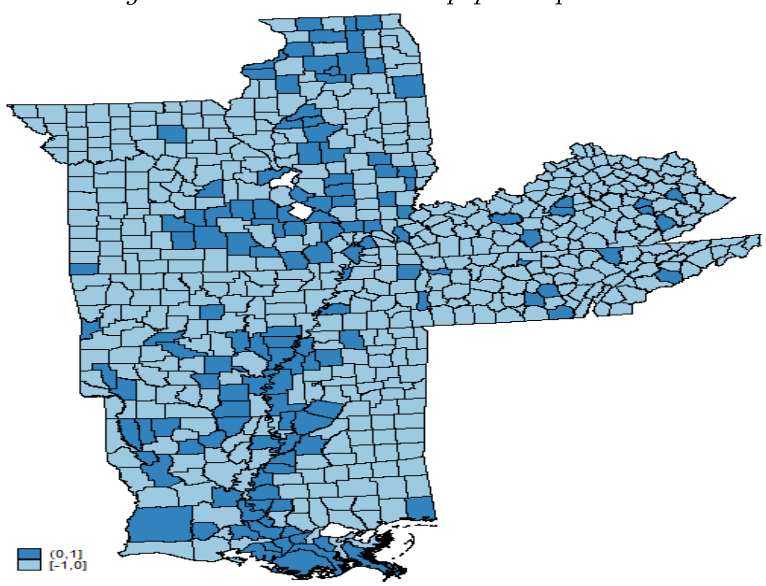
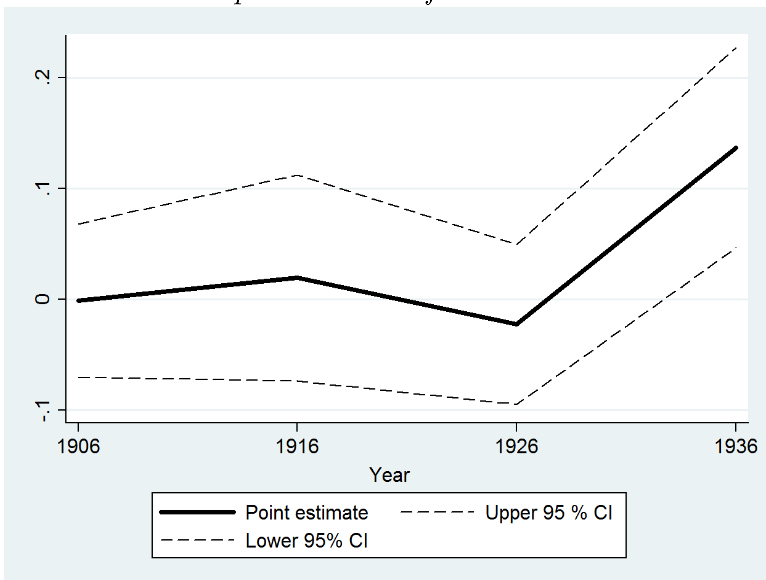
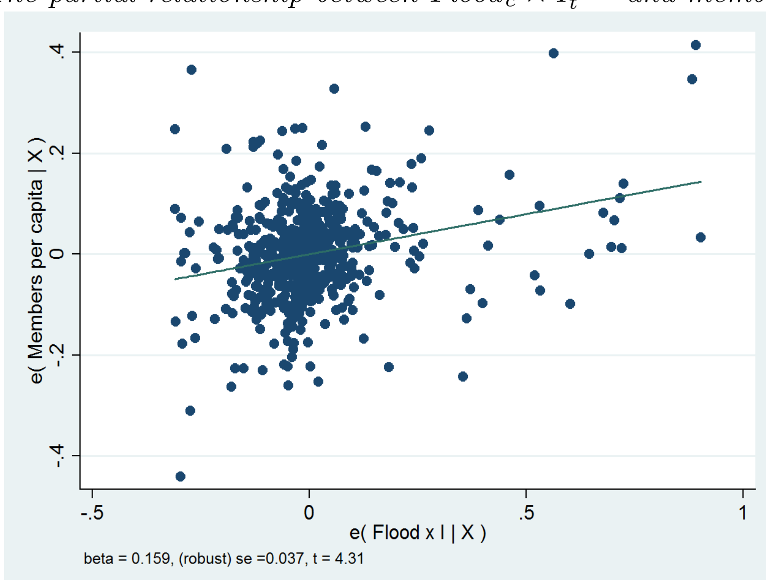


Figure 2: *The relationship between the flood share and members per capita*



Note: The point estimates and 95% CIs are from column (3) of Table 2.

Figure 3: *The partial relationship between* $Flood_c \times I_t^{post}$ *and members per capita*



Note: The partial correlation plot is from column (3) of Table 3

Figure 4: *The evolution of population in flooded and non-flooded counties over time*

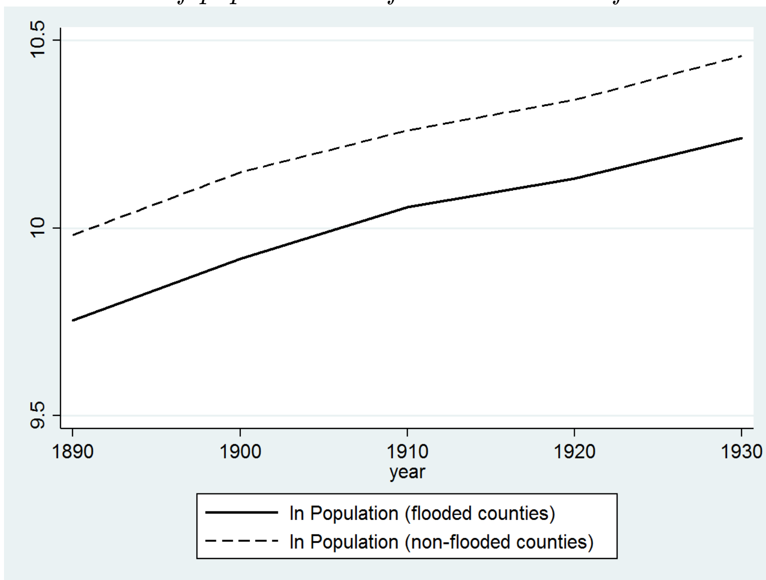


Figure 5: *The evolution of church membership in flooded and non-flooded counties over time*

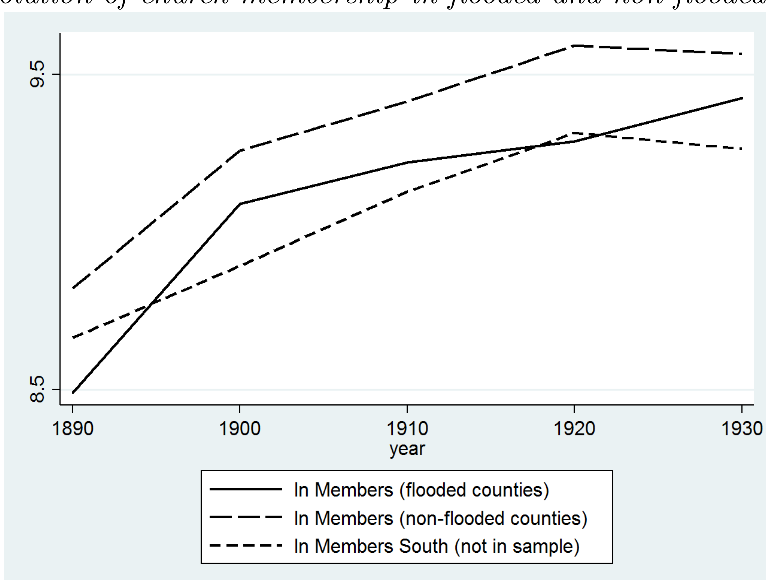


Table 1—Summary Statistics

Variables:	(1) N	(2) mean	(3) sd	(4) min	(5) max
Church members p.c.	1,276	0.380	0.145	0.0425	1.108
Log church members	1,276	8.960	0.905	5.753	14.53
Flood × I^{post}	1,276	0.0345	0.136	0	1
Controls ($\times I^{post}$)**:**					
Distance MS	1,276	92,028	137,500	0	693,228
Corn suitability	1,276	4.732	5.435	0	15.12
Cotton suitability	1,276	0.237	0.349	0	1.327
Latitude	1,276	17.97	18.10	0	42.26
Longitude	1,276	44.87	44.93	0	95.30
Altitude range	1,276	102.6	177.8	0	1,804
Altitude std	1,276	16.38	30.00	0	335.0
Number of counties	638	638	638	638	638

Notes: The table reports summary statistics for the variables used in the baseline DD specification: Years 1926 and 1936 (Table 3). Notice that the geographical (cross-sectional) variables are interacted with the time indicator.

Table 2—Flexible Estimates: The Flood-Membership Relation by Year, 1890-1936

	Dependent variable:					
	church members p.c.			log church members		
	(1)	(2)	(3)	(4)	(5)	(6)
Flood × 1906	0.107***	0.0458	-0.00101	0.369***	0.159	0.0968
	(0.0308)	(0.0352)	(0.0352)	(0.0970)	(0.127)	(0.119)
Flood × 1916	0.0701**	0.0483	0.0194	0.395***	0.145	0.0575
	(0.0342)	(0.0513)	(0.0473)	(0.145)	(0.192)	(0.181)
Flood × 1926	0.0428	0.00555	-0.0224	0.428***	0.106	0.0239
	(0.0290)	(0.0357)	(0.0367)	(0.125)	(0.161)	(0.150)
Flood × 1936	0.196***	0.169***	0.137***	0.895***	0.507**	0.344*
	(0.0407)	(0.0437)	(0.0459)	(0.155)	(0.199)	(0.194)
Controls ($\times I^{post}$)**:**						
Latitude	No	No	Yes	No	No	Yes
Longitude	No	No	Yes	No	No	Yes
Cotton suitability	No	No	Yes	No	No	Yes
Corn suitability	No	No	Yes	No	No	Yes
Ruggedness	No	No	Yes	No	No	Yes
Distance MS	No	No	Yes	No	No	Yes
Year FE	Yes	No	No	Yes	No	No
State-by-year FE	No	Yes	Yes	No	Yes	Yes
Observations	3,185	3,185	3,185	3,185	3,185	3,185
Counties	638	638	638	638	638	638

Notes: Observations are reported at the county level over the period 1890-1936 (every decade). The estimates are relative to 1890. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. In columns (1)-(3), the outcome variable is church members per capita. In columns (4)-(6), the outcome variable is log total church members. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1890-1926 and one in 1936. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3—Baseline DD Estimates: The Effect of the Flood on Membership

	Dependent variable:					
	church members p.c.			log church members		
	(1)	(2)	(3)	(4)	(5)	(6)
Flood × I^{post}	0.153***	0.163***	0.159***	0.467***	0.401***	0.320***
	(0.0309)	(0.0343)	(0.0368)	(0.0760)	(0.0868)	(0.0931)
Controls (×I^{post})**:**						
Latitude	No	No	Yes	No	No	Yes
Longitude	No	No	Yes	No	No	Yes
Cotton suitability	No	No	Yes	No	No	Yes
Corn suitability	No	No	Yes	No	No	Yes
Ruggedness	No	No	Yes	No	No	Yes
Distance MS	No	No	Yes	No	No	Yes
Year FE	Yes	No	No	Yes	No	No
State-by-year FE	No	Yes	Yes	No	Yes	Yes
Observations	1,276	1,276	1,276	1,276	1,276	1,276
Counties	638	638	638	638	638	638

Notes: Observations are reported at the county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. In columns (1)-(3), the outcome variable is church members per capita. In columns (4)-(6), the outcome variable is log total church members. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 4—Robustness to Migration

	Dependent variable:							
	pop-ulation	clergy-men		church members p.c.		log church members	white members p.c.	black members p.c.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Flood × I^{post}	0.00341	0.000200	0.160***	0.159***	0.111***	0.294***	0.0638**	0.0391***
	(0.0409)	(0.000634)	(0.0352)	(0.0367)	(0.0405)	(0.0924)	(0.0291)	(0.0109)
Population	No	No	Yes	No	No	No	No	No
Black population	No	No	No	Yes	No	No	No	No
Controls ($\times I^{post}$)**:**								
Black share$_{20}$	No	No	No	No	Yes	No	No	No
Black population$_{20}$	No	No	No	No	No	Yes	No	No
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276
Counties	638	638	638	638	638	638	638	638

Notes: Observations are reported at the county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. In column (1), the outcome variable is log population size for the period 1920-1930. In column (2), the outcome variable is the number of clergymen per capita for the period 1920-1930. In columns (3)-(5), the outcome variable is church members per capita. In column (6), the outcome variable is log total members. In columns (7) and (8), the outcome variable is white and black church members per capita, respectively. Flood is the share of the county flooded, I^{post} is the time indicator which equals zero in 1926 and one in 1936. Population is the log total population over the period 1920-1930, black population is the log total black population over the period 1920-1930, black share is the black population share (out of the total population) in 1920. black population$_{20}$ is the log black population in 1920. The baseline controls are: latitude, longitude, cotton and corn suitability, ruggedness, distance to MS, and state-by-year fixed effect. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.
*** p<0.01, ** p<0.05, * p<0.1.

Table 5—Robustness to the New Deal and Redistribution

	Dependent variable is church members p.c.				
	(1)	(2)	(3)	(4)	(5)
Flood × I^{post}	0.155***	0.157***	0.159***	0.151***	0.148***
	(0.0372)	(0.0372)	(0.0374)	(0.0369)	(0.0375)
Taxes/capita	Yes	No	No	No	No
Controls (×I^{post})**:**					
Relief/capita	No	Yes	No	No	Yes
Public works/capita	No	No	Yes	No	Yes
AAA spendings/capita	No	No	No	Yes	Yes
Baseline controls	Yes	Yes	Yes	Yes	Yes
Observations	1,240	1,275	1,273	1,272	1,270
Counties	636	638	638	638	638

Notes: Observations are reported at the county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. The outcome variable is church members per capita. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936. Taxes/capita is the county level of log total taxes per capita over the period 1920-1930. The New Deal variables are: log relief per capita, log public works per capita, and log AAA spendings per capita. The baseline controls are: latitude, longitude, cotton and corn suitability, ruggedness, distance to MS, and state-by-year fixed effect. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level. *** p<0.01, ** p<0.05, * p<0.1.

Table 6—Mechanism: Economic Distress

	Dependent variable is church members p.c.				
	(1)	(2)	(3)	(4)	(5)
Flood × I^{post}	0.154***	0.148***	0.175***	0.0930**	0.159***
	(0.0373)	(0.0418)	(0.0364)	(0.0416)	(0.0384)
Flood × I^{post}×:					
ΔCrop failure	0.0427**				
	(0.0192)				
ΔLog cotton production		-0.183*			
		(0.0979)			
ΔLog value of farmland			-0.202*		
			(0.119)		
ΔLog agriculture VA/capita				-0.196**	
				(0.0886)	
ΔLog manufacture VA/capita					0.00214
					(0.0178)
Baseline controls	Yes	Yes	Yes	Yes	Yes
Observations	1,274	586	1,274	1,276	1,276
Counties	637	293	637	638	638

Notes: Observations are reported at the county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. The outcome variable is church members per capita. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936. The following variables are interacted with Flood×I^{post}: ΔCrop failure is the change in the acrage with crop failure between 1925 and 1930; ΔLog cotton production is the change in log cotton acreage between 1925 and 1930; ΔLog value of farmland is the change in average value of farmland and buildings per acre between 1925 and 1930; ΔLog agriculture VA/capita is the change in log agricultural value added per capita between 1920 and 1930; ΔLog manufacture VA/capita is the change in log manufacture value added per capita between 1920 and 1930. The baseline controls are: latitude, longitude, cotton and corn suitability, ruggedness, distance to MS, and state-by-year fixed effect. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.
*** p<0.01, ** p<0.05, * p<0.1.

Table 7—Mechanism: Credit Constraints

	Dependent variable is church members p.c.		
	(1)	(2)	(3)
Flood × I^{post}	0.265***	0.205***	0.287***
	(0.0740)	(0.0563)	(0.0864)
Flood × I^{post} × Banks	-0.587**		-0.539*
	(0.286)		(0.289)
Flood × I^{post} × Deposits		-0.520	-0.345
		(0.437)	(0.480)
Baseline controls	Yes	Yes	Yes
Observations	1,276	1,276	1,276
Counties	638	638	638

Notes: Observations are reported at the county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. The outcome variable is church members per capita. Flood is the share of the county flooded, $\mathbf{I}^{post}$ is the time indicator, which equals zero in 1926 and one in 1936. Banks are the number of banks per 1000 inhabitants in the county in 1926. Deposits are the total value of deposits (in thousands of dollars) per 1000 inhabitants in 1926. The baseline controls are: latitude, longitude, cotton and corn suitability, ruggedness, distance to MS, and state-by-year fixed effect. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.
*** p<0.01, ** p<0.05, * p<0.1.

Table 8—Mechanism: Charity and Insurance

	Dependent variable: church members p.c		
	(1)	(2)	(3)
Flood × I^{post}×:			
Charity Index	0.0223**		
	(0.00932)		
Network Index		0.00315**	
		(0.00134)	
Fundamentalist Index			0.00770***
			(0.00183)
County-by-year FE	Yes	Yes	Yes
Denomination-by-year FE	Yes	Yes	Yes
Observations	81,664	85,492	67,628
Counties	638	638	638
Denominations	64	67	53

Notes: Observations are reported at the denomination-by-county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county-by-year fixed effects and denominations-by-year fixed effects. The outcome variable is church members relative to population by denomination. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936 (absorbed by the county-by-year fixed effects). The following variables are interacted with Flood× I^{post}: denomination-specific indices (Charity Index; Network Index; Fundamentalist Index) $Index_d^j$. For a detailed explanation of the indices, see Section 5.2. We also refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity.
*** p<0.01, ** p<0.05, * p<0.1.

Table 9—Mechanism: Religious Intensity, Coping, and Belief

	Dependent variable is church members p.c.					
	(1)	(2)	(3)	(4)	(5)	(6)
Flood × I^{post}×:						
Intensity Index	0.00465***					
	(0.00118)					
Coping Index		0.00481**				
		(0.00226)				
Devil Index			-0.00263*			
			(0.00154)			
Heaven Index				0.00186		
				(0.00165)		
Hell Index					0.00137	
					(0.00146)	
Miracle Index						0.00116
						(0.00114)
County-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Denomination-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59,972	47,212	47,212	53,592	53,592	53,592
Counties	638	638	638	638	638	638
Denominations	47	37	37	42	42	42

Notes: Observations are reported at the denomination-by-county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county-by-year fixed effects and denominations-by-year fixed effects. The outcome variable is church members relative to population by denomination. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936 (absorbed by the county-by-year fixed effects). The following variables are interacted with Flood$\times I^{post}$: denomination-specific indices (Intensity Index; Coping Index; Devil Index, Heaven Index, Hell Index, Miracle Index) $Index_d^j$. For a detailed explanation of the indices, see Section 5.2. We also refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity. *** p<0.01, ** p<0.05, * p<0.1.

Table 10—Horse Race using Different Indices

	Dependent variable is church members p.c.		
	(1)	(2)	(3)
Flood × I^{post} ×:			
Charity Index	0.127***		0.604***
	(0.0373)		(0.113)
Network Index	0.00359**		0.00546***
	(0.00147)		(0.00173)
Fundamentalist Index	0.0180***		0.0131***
	(0.00499)		(0.00427)
Intensity Index		0.00341***	0.0161***
		(0.000835)	(0.00313)
Coping Index		0.0158***	0.0101***
		(0.00208)	(0.00252)
Standardized β on:			
Charity Index	0.0172	-	0.0819
Network Index	0.2130	-	0.3240
Fundamentalist Index	0.0585	-	0.0424
Intensity Index	-	0.3475	0.2237
Coping Index	-	0.0508	0.2398
County-by-year FE	Yes	Yes	Yes
Denomination-by-year FE	Yes	Yes	Yes
Observations	38,280	38,280	38,280
County	638	638	638
Denominations	30	30	30

Notes: Observations are reported at the denomination-by-county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county-by-year fixed effects and denominations-by-year fixed effects county. The outcome variable is church members relative to population by denomination. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936 (absorbed by the county-by-year fixed effects). The following variables are interacted with Flood× I^{post}: denomination-specific indices (Charity Index; Network Index; Fundamentalist Index; Intensity Index; Coping Index) $Index_d^j$. For a detailed explanation of the indices, see Section 5.2. We also refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity.
*** p<0.01, ** p<0.05, * p<0.1.

Table A1: Test for Outliers

	Dependent variable:			
	church members p.c.		log church members	
	Percentiles excluded:			
	1 & 99	5 & 95	1 & 99	5 & 95
	(1)	(2)	(3)	(4)
Flood × I^{post}	0.138***	0.0984***	0.320***	0.347***
	(0.0375)	(0.0376)	(0.0933)	(0.0995)
Baseline controls	Yes	Yes	Yes	Yes
Observations	1,236	1,090	1,244	1,122
Counties	618	545	622	561

Notes: Observations are reported at the county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. In columns (1) and (2), the outcome variable is church members per capita. In columns (3) and (4), the outcome variable is log total church members. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936. Columns (1) and (3) exclude counties with the outcomes in the 1st and 99th percentiles. Columns (2) and (4) exclude counties with the outcomes in the 5th and 95th percentiles. The baseline controls are: latitude, longitude, cotton and corn suitability, ruggedness, distance to MS, and state-by-year fixed effect. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.
*** p<0.01, ** p<0.05, * p<0.1.

Table A2: Sample Modifications

	Dependent variable is church members p.c.				
	Control Counties'				
	Distance to MS 50 km	Distance to MS 75 km	Distance to MS 100 km	Adjacent Control Counties	Restricted Sample of 163 Counties
	(1)	(2)	(3)	(4)	(5)
Flood × I^{post}	0.104***	0.129***	0.127***	0.120***	0.0920**
	(0.0390)	(0.0381)	(0.0383)	(0.0355)	(0.0428)
Baseline controls	Yes	Yes	Yes	Yes	Yes
Observations	352	424	474	518	326
Counties	176	212	237	259	163

Notes: Observations are reported at the county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. In columns (1)-(3) we restrict the control counties to be not further than 50 km/75 km/100 km from the Mississippi river. Column (4) only uses control counties that are adjacent to the flooded region. Column (5) considers the 163 counties used in the study of Hornbeck and Naidu (2014). The outcome variable is church members per capita. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936. The baseline controls are: latitude, longitude, cotton and corn suitability, ruggedness, distance to MS, and state-by-year fixed effect. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A3: Underreporting of Specific Denominations

	Dependent variable:					
	church members p.c.			log church members		
	(1)	(2)	(3)	(4)	(5)	(6)
Flood × I^{post}	0.146***	0.150***	0.146***	0.499***	0.396***	0.296***
	(0.0306)	(0.0340)	(0.0366)	(0.0882)	(0.103)	(0.111)
Year FE	Yes	No	No	Yes	No	No
State-by-year FE	No	Yes	Yes	No	Yes	Yes
Geographic Controls	No	No	Yes	No	No	Yes
Observations	1,276	1,276	1,276	1,276	1,276	1,276
Counties	638	638	638	638	638	638

Notes: Observations are reported at the county level over the period 1926-1936. The table reports least squares estimates weighted by county size. All regressions include county fixed effects. The outcome variables are 1) church members per capita excluding members of the Southern Baptist Church and the Methodist Episcopal Church (South) 2) total church members excluding the same churches. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936. The geographic controls are: latitude, longitude, cotton and corn suitability, ruggedness, and distance to MS. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A4: Placebo Treatment Periods

	Dependent variable:					
	church members p.c.			log church members		
	1890-1906	1906-1916	1916-1926	1890-1906	1906-1916	1916-1926
	I^{post}=1906	I^{post}=1916	I^{post}=1926	I^{post}=1906	I^{post}=1916	I^{post}=1926
	(1)	(2)	(3)	(4)	(5)	(6)
Flood × I^{post}	0.000994	0.0205	-0.0419	0.0999	-0.0425	-0.0336
	(0.0353)	(0.0437)	(0.0437)	(0.119)	(0.106)	(0.0917)
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,271	1,271	1,276	1,276	1,276	1,276
Counties	638	638	638	638	638	638

Notes: Observations are reported at the county level over the period 1890-1906 (columns (1) and (4)), 1906-1916 (columns (2) and (5)), and 1916-1926 (columns (3) and (6)). The table reports least squares estimates weighted by county size. All regressions include county fixed effects. In columns (1)-(3), the outcome variable is church members per capita. In columns (4)-(6), the outcome variable is log total church members. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936. The baseline controls are: latitude, longitude, cotton and corn suitability, ruggedness, distance to MS, and state-by-year fixed effect. We refer to the data appendix for further details. Constants are not reported. Standard errors (in parentheses) account for arbitrary heteroskedasticity and are clustered at the county level.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A5—Baseline DD Estimates: Spatial correlation

	Dependent variable:					
	church members p.c.			log church members		
	(1)	(2)	(3)	(4)	(5)	(6)
Flood × I^{post}	0.154***	0.151***	0.147***	0.476***	0.374***	0.304***
	[0.0329]	[0.0268]	[0.0263]	[0.0722]	[0.1085]	[0.0837]
Controls ($\times I^{post}$)**:**						
Latitude	No	No	Yes	No	No	Yes
Longitude	No	No	Yes	No	No	Yes
Cotton suitability	No	No	Yes	No	No	Yes
Corn suitability	No	No	Yes	No	No	Yes
Ruggedness	No	No	Yes	No	No	Yes
Distance MS	No	No	Yes	No	No	Yes
Year FE	Yes	No	No	Yes	No	No
State-by-year FE	No	Yes	Yes	No	Yes	Yes
Observations	1,276	1,276	1,276	1,276	1,276	1,276
Counties	638	638	638	638	638	638

Notes: Observations are reported at the county level over the period 1926-1936. The table reports ordinary least squares estimates. All regressions include county fixed effects. In columns (1)-(3), the outcome variable is church members per capita. In columns (4)-(6), the outcome variable is log total church members. Flood is the share of the county flooded, I^{post} is the time indicator, which equals zero in 1926 and one in 1936. We refer to the data appendix for further details. Constants are not reported. Conley standard errors are reported in brackets. We assume that observations that are more than five degrees from each other (i.e., circa 550 km at the equator) are spatially independent and that the spatial dependence is linearly falling in distance.
*** p<0.01, ** p<0.05, * p<0.1.